Lake County All Lands Restoration Initiative

OWEB Focused Investment Partnership: Strategic Action Plan

KLAMATH LAKE FOREST HEALTH PARTNERSHIP October 2023 / Version 3.0

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1. Introduction

Wildfires today are larger and more severe, starting earlier, ending later, and resulting in loss of homes, forests, and other resources. In Lake County alone, 281,336 acres have burned in wildfires in just the last 2 years (2020-2021). Past and current management practices, including fire exclusion, have left forests in dry regions stressed from drought, overcrowding, and uncharacteristic insect and disease outbreaks. To further compound the issue, humans have caused 84 percent of the wildfires in the United States. These human-caused fires account for 44 percent of the total area burned and result in a fire season that lasts three times longer over a greater area (Balch et al. 2017). The increase in size and severity of wildland fires is causing ecological, social, and economic damage. The departure from historic fire patterns is also having an impact on water, wildlife habitat, stream function, large and old tree structure, and soil integrity. To address these issues, the National Cohesive Wildland Fire Management Strategy was developed as a strategic push to encourage collaborative work among all stakeholders across all landscapes to use best scientific principles and make meaningful progress towards three goals: 1) resilient landscapes; 2) fire-adapted communities; 3) safe and effective wildfire response (WFEC 2014).

The Klamath-Lake Forest Health Partnership (KLFHP) is a 501(c)(3) nonprofit organization in South Central Oregon actively working to address these challenges. With a mission to "facilitate restoration projects on public and private forestland in Klamath and Lake Counties through education, outreach, and diverse partnerships," the KLFHP has been extremely successful in planning and implementing cross-boundary landscape-scale forest restoration and wildfire risk reduction projects following a basic process. This process has been documented in an Oregon State University Extension Publication titled Planning and Implementing Cross-Boundary, Landscape-scale Restoration and Wildfire Risk Reduction Projects (Leavell et al. 2018).

In 2016, the KLFHP started developing landscape-scale, cross-boundary efforts with the North Warner Multi-Ownership Forest Health Project (North Warner Project). The North Warner Project spans 162,400 acres of public and private land with 30 private landowners in Lake County. The KLFHP has mapped and assessed 32,000 acres of private land, leveraged $7 million of funding (including a Joint Chiefs Landscape Restoration Partnership award 2017-2019), and restored dry forests on approximately 22,161 acres of private land and 16,333 acres of Forest Service (USFS) managed public land through various thinning (commercial and pre-commercial) and prescribed fire treatments (Map 7). There are stands remaining that need thinning and preparations are in place to reintroduce and maintain this landscape with prescribed fire. With an Oregon Watershed Enhancement Board (OWEB) Technical Assistance grant awarded in 2021, funding is available to do the necessary planning to implement prescribed fire including coordination with landowners, addressing liability issues, writing burn plans, etc. The first cross-boundary prescribed fire was completed in May 2021. https://www.klfhp.org/northwarner

The second Lake County project, titled the Thomas Creek All Lands Project (Thomas Creek Project), covers 240,000 acres. The KLFHP has mapped and assessed 48,565 acres of private land (175 landowners), leveraged $7.9 million of funding (including a Joint Chiefs Landscape Restoration Partnership award 2021-2023), and restored dry forests on approximately 3,194 acres of private land and 9,672 acres of USFS land through various thinning (commercial and pre-commercial) treatments (Map 7). There is extensive thinning that needs to be completed before reintroducing prescribed fire. https://www.klfhp.org/thomas-creek

Within the Lake County All Lands Restoration Initiative:

- Mapping and assessment completed on 80,565 acres of private land
- 100+ landowners engaged
- $14,900,000 leveraged in outside funding
- 25,355 acres of private land thinned
- 26,005 acres of USFS land thinned
- Preparing for cross-boundary prescribed fire

The success of these projects is based on a few key factors: 1) the KLFHP is a high-performing partnership that operates under a shared vision with a priority of restoration across Lake and Klamath counties; 2) projects are designed around National Environmental Policy Act (NEPA)-ready USFS projects creating long-lasting partnerships and opportunities for implementation (i.e. prescribed fire) across private and public land; 3) KLFHP partners dedicate time and resources to private landowner outreach, engagement, and assistance with land management planning; 4) there is an up-front investment in private land mapping and assessment to understand current dry forest conditions and develop recommendation; 5) KLFHP partners use all authorities, agreements, and tools to accomplish work, and most importantly; 6) the KLFHP focuses on action on-the-ground to accomplish ridgetop-to-ridgetop restoration (restoring uplands down to the water bodies).

The Lake County All Lands Restoration Initiative (LCALRI) will focus on the North Warner and Thomas Creek Projects located immediately adjacent to each other (Map 2). The focus on dry forest restoration will be to complete thinning treatments in forested communities and to utilize prescribed fire as a follow-up within the North Warner Project, while beginning thinning treatments within the Thomas Creek Project in preparation for future prescribed fire. The total area of these combined landscapes covers 402,400 acres and includes: 317,000 acres of wildland urban interface (WUI) as identified in the Lake County Community Wildfire Protection Plan (CWPP) near the communities of Lakeview, Valley Falls, and Paisley (Map 6); high concentrations of old legacy ponderosa pine forests; and habitat for priority species including sage grouse, gray wolf, Warner sucker, Great Basin redband trout, Modoc sucker, northern goshawk, Lewis' woodpecker, black-backed woodpecker, and white-headed woodpecker.

This Strategic Action Plan Version 3.0 was updated for submission of a Focused Investment Partnership (FIP) grant in 2023. The 2022 FIP submission for the LCALRI was recommended for funding, but did not rank high enough to be selected for funding. To keep this project moving forward and to maintain the engagement of private landowners, the Lake County Umbrella Watershed Council submitted and was awarded the Lake County All Lands Restoration Mini-FIP Phase 1 and Phase 2 OWEB restoration grants. With this award of $366,295 and $397,432 respectively, a total of 1,356 acres of OWEB funded thinning will be completed within the

project area. This initial work is important as successful implementation will result in landowners spreading the word and encour-aging other landowners to engage in the project; private landowner engagement is key to restor-ing landscapes across multiple ownerships.

Between September 2020 and September 2021, three large wildfires (Brattain, Patton Meadow, and Cougar Peak Fires) burned approximately 104,964 acres or 26% of the LCALRI landscape (Map 4). Although this has been a tremendous loss to the partnership and community, this emphasizes the true reality of how quickly and negatively wildfires can impact our forested landscapes. It is imperative that the remaining unburned portion of the landscape be restored in a timely manner for long-term resilience.

The LCALRI Strategic Action Plan was developed at the local level by the core partners listed below. This same group co-authored the Leavell et al. 2018 publication mentioned above. Through several coordinated meetings over two years, this high-performing partnership worked together to write this Strategic Action Plan which sets goals, objectives, and a course of action for the LCALRI landscape.

2. Partnership Roles

The KLFHP has completed a Klamath and Lake Counties Shared Stewardship Memorandum of Understanding (MOU) that identifies how the KLFHP is putting shared stewardship into practice in Klamath and Lake Counties. This county-level MOU tiers to the objectives identified in the state-level Shared Stewardship MOU between the Oregon Department of Forestry (ODF) and USDA Forest Service Pacific Northwest Region signed August 13, 2019.

Core partners for implementation:

Klamath-Lake Forest Health Partnership (KLFHP) – The mission of the KLFHP is to facilitate restoration projects on public and private forestland in Klamath and Lake Counties through education, outreach, and diverse partnerships. The KLFHP, which was formed in 1995, is a cooperative network of diverse local and regional partners who cooperate together in order to address forestland management/restoration in Klamath and Lake Counties. The KLFHP is committed to: 1) providing technological and ecological information on forest health; 2) serving as a resource for all forest landowners in diagnosing and addressing forest health problems (including management recommendations based on the latest science); 3) working cooperatively with landowners, the general public, and forest operators to educate and encourage best management practices on forest lands; and 4) using innovative partnerships and funding sources to increase the pace, scale, and scope of restoration across public and private lands. The core partners mentioned below are members of the KLFHP and attend monthly KLFHP meetings and project-level subcommittee meetings. Coordination for the LCALRI will occur through the KLFHP. More information on the KLFHP can be found at klfhp.org.

Lake County Umbrella Watershed Council (LCUWC) – The mission of the LCUWC is to promote cooperative, holistic restoration across jurisdictional boundaries, to better Lake County's watersheds and people. The LCUWC is instrumental in assisting private landowners with developing project plans, acquiring funding, and implementing restoration treatments on private lands within the project area. The LCUWC would oversee the administration and implementation of a Focused Investment Partnership grant for the LCALRI.

Fremont-Winema National Forest (USFS) – The mission of the USFS is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations. The USFS provides leadership in environmental policy, collaborative forestry, project planning, and implementation. The USFS is responsible for completing the environmental analysis and implementing thinning and prescribed fire treatments on public lands within the USFS Crooked Mud Honey (North Warner Project) and USFS Thomas Creek Landscape Restoration (Thomas Creek Project) Projects (Map 2). The USFS will also take the lead in developing a strategy to guide short- and long-term prescribed fire strategies within the LCALRI landscape. In 2021, the Fremont-Winema National Forest was awarded a 10-year extension to the Lakeview Stewardship Collaborative Forest Landscape Restoration Project (CFLRP) which provides certainty in funding for restoration treatments on USFS land within the project area.

Oregon Department of Forestry (ODF) – The mission of ODF is to serve the people of Oregon by protecting, managing, and promoting stewardship of Oregon's forests to enhance environmental, economic, and community sustainability. ODF assists private landowners through the fire protection program and administering the Oregon Forest Practices Act. ODF provides forestry expertise and implements projects on USFS land through Good Neighbor Authority agreements and on private land through Stewardship Forester positions and the statewide cooperative agreement between NRCS and ODF when expending Environmental Quality Incentives Program (EQIP) funding. ODF also gains funding, such as USFS State and Private funding, for implementing restoration on private lands. ODF is the lead agency in providing forestry expertise to private landowners within the LCALRI project area.

Oregon State University, College of Forestry Extension (OSU Extension) – The mission of OSU Extension is to create opportunities for people to explore how science-based knowledge can improve social, economic, and ecological conditions across the State of Oregon. OSU Extension is the lead agency in connecting science and research, in the area of fire and forestry, with land management. The OSU Extension Forestry and Fire Specialists for Lake and Klamath Counties coordinate science-based outreach and education for landowners and provides technical expertise and assistance with land management planning in the area of forestry and fire science/management. With the newly approved OSU Extension Fire Initiative, there is also a local OSU Extension Fire Specialist who will assist in educating landowners and promoting the use of prescribed fire on private lands.

Natural Resources Conservation Service (NRCS) – The mission of NRCS is to provide resources to farmers and landowners to aid them with conservation. NRCS works collectively with partners to help maintain healthy and productive working landscapes benefitting both environmental and agricultural needs. NRCS provides financial and technical assistance to voluntary farmers, ranchers, and forest landowners to implement conservation practices on private lands, mainly through the Environmental Quality Incentives Program (EQIP) (i.e. Joint Chief's initiatives) or Bipartisan Infrastructure Law (BIL) funding. In keeping with the Oregon NRCS Strate-

gic Approach to Conservation, the Lake County District Conservationist approved a Conservation Implementation Strategy in 2023 for the LCALRI landscape to prepare for private land treatments to improve forest health, reduce the risk of high severity fire, and improve wildlife habitats.

Lake County Resources Initiative (LCRI) – The mission of LCRI is to demonstrate an economic, ecological, and sustainable approach to natural resource management, climate disruption solutions, youth and community education, and increased economic development in the pursuit of continual improvement of the quality of life for present and future generations. LCRI provides assistance through hiring of seasonal employees to over-see the mapping and assessment of private lands, multi-party ecological monitoring, and coordi-nation with the KLFHP. LCRI has a long-standing monitoring program that began in 2002. Each year, a crew of high school and college students collect data that informs management on USFS lands. The LCRI monitoring crew will implement the monitor-ing for the LCALRI project following the protocols identified in the newly published Klamath-Lake Forest Health Partnership All-Lands Monitoring Plan. LCRI was awarded a Title II grant in 2021 to support monitoring on private lands, and they will continue to pursue grant funding for monitoring.

Lake County Cooperative Weed Management Area (Lake County CWMA) – The mission of the Lake County CWMA is to control noxious weeds in Lake County, Oregon. The Lake County CWMA assists private landowners with noxious weed treatments and coordinates with federal agencies to manage across public and private lands. The Lake County CWMA has developed a noxious weed management plan for the LCALRI project area to identify goals and objectives, priorities, preventative measures, Best Management Practices (BMPs), and treatments plans for the treatment of noxious weeds within the project area.

Oregon Department of Fish and Wildlife (ODFW) – The mission of ODFW is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations. ODFW provides financial assistance to the project for mapping, assessments, and restoration of private lands mainly through the Mule Deer Initiative. ODFW also provides input on the implementation of the conservation measures identified in the Oregon Conservation Strategy for the Warner Mountains and Thomas Creek-Goose Lake Conservation Opportunities Areas and opportunities to improve habitat for Oregon Conservation Strategy species.

The Nature Conservancy (TNC) – The mission of TNC is to conserve the lands and waters on which all life depends. TNC provides leadership in ecological and restoration science, monitoring, science delivery, and science interpretation for a variety of audiences. TNC is a member of the KLFHP and assists with landowner outreach and education, and also provides leadership, local science, and learning exchange opportunities based upon experience and implementation of dry forest restoration practices at their Sycan Marsh Preserve. TNC is also hiring a 7-10 person fire module that will be available to assist with prescribed burning on federal and private lands.

Ecosystem Workforce Program (EWP) – The Ecosystem Workforce Program (EWP) is an applied social science research and extension program built on the fundamental belief that ecology, economy, and governance are interconnected. EWP is a program associated with the University of Oregon. EWP will be the lead partner for overseeing data management, analysis, and reporting of the monitoring data. EWP has been providing this service to the USFS for 12+ years in support of their Collaborative Forest Landscape Restoration Program.

Additional core partners:

Lake County Soil and Water Conservation District (SWCD) – The mission of SWCD is to provide technical assistance to individuals, groups and other agencies for the purpose of managing and enhancing our natural resources, environment, and economy. Lake County SWCD provides leadership and technical expertise to guide the protection and conservation of the unique soil and water resources of the county. SWCD assists landowners with technical expertise and pursuing funding for restoration of private lands.

Bureau of Land Management (BLM) – The mission of the BLM is to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations. The Klamath and Lake District of the BLM are members of the KLFHP and provide leadership in the management of dry forest and shrub-steppe ecosystems and function. The BLM manages a small amount of land within the LCALRI landscape.

Oregon Prescribed Fire Council (OPFC) – The mission of the OPFC is to serve as a venue for practitioners, state and federal agencies, academic institutions, tribes, coalitions, and interest-ed individuals to collaboratively promote and conserve the fire adapted natural ecosystems in Oregon and expand the responsible use of prescribed fire. The KLFHP formed a Chapter of the OPFC in South Central Oregon to coordinate cross-boundary prescribed fire in Klamath and Lake Counties.

3. Scope

In 2014, the Fremont-Winema National Forest prioritized landscape-level projects on public land for restoration based upon several important components. The USFS Crooked-Mud-Honey Restoration Project is 50,000 acres and located within the North Warner Project, while the USFS Thomas Creek Restoration Project is 104,000 acres and located within the Thomas Creek Project (Map 2). Both USFS projects are identified as a high priority for restoration for the following reasons:

1. They encompass the Warner Mountain and Thomas Creek-Goose Lake Conservation Opportunity Areas identified in the Oregon Conservation Strategy.
2. Most watersheds are rated as “fair” in the USFS Watershed Condition Framework.
3. There are watersheds, wildlife habitat, aquatic resources, and WUI adjacent to the communities of Lakeview, Valley Falls, Paisley, and private lands, at risk of high severity wildfire.
4. There are high concentrations of old legacy ponderosa pine that provides critical wildlife habitat.

In February 2015, the Fremont-Winema National Forest and OSU Extension held a Forest Summit. The purpose was to bring together professionals, practitioners, and private/public land managers to come up with cooperative ways to increase the scope and scale of landscape restoration within Klamath and Lake Counties. Over 100 people attended representing federal, state, and private agencies, private landowners, tribal representatives, and academia. At the end of the Forest Summit, the KLFHP was voted to take the lead with a pilot project in either Klamath or Lake County and to create a process leading to success.

In 2016, following the vote by attendees at the Forest Summit of 2015, the KLFHP sought out a project within Klamath or Lake County to complete cross-boundary, landscape-level restoration. In the era of mega-fires, the partnership acknowledged the need to manage at a scale commensurate with the challenge of increasing health of vegetation communities while decreasing fire risk; in other words, to manage a landscape at the scale of a typical mega-fire (>100,000 acres). The KLFHP also acknowledged the need to manage across ownership boundaries recognizing that wildfire, wildlife habitats, streams, and forests span across public and private lands. Other goals for a landscape effort included desired benefits to human communities and local economies.

"The KLFHP acknowledged the need to manage across ownership boundaries recognizing that wildfire, wildlife habitats, streams, and forests span across public and private lands."

The North Warner Project was the first project selected in 2016 because it included the NEPA-ready USFS Crooked Mud Honey Project and there was extensive aquatic restoration already completed on public and private land. Currently, there is a total of 42 stream restoration, fish passage, and riparian enhancement projects completed on private land and two fish passage projects on public land. This presented the KLFHP with a great opportunity for ridgetop-to-ridgetop restoration.

With the North Warner Project, the KLFHP developed a process to accomplish forest restoration at a landscape-scale and across ownership boundaries. After successfully applying the process with the North Warner Project, the KLFHP published the work in Leavell et al. 2018. Since 2016, the KLFHP has: successfully implemented several thousand acres of thinning treatments; provided extensive outreach, engagement, and assistance for private landowners; developed multiple agreements using all available authorities; and leveraged several million dollars of funding for both restoration and additional capacity within key organizations (ODF, LCUWC, OSU Extension, and USFS).

One important key to success was the mapping and assessment completed on non-industrial private lands. The mapping includes delineation

Within the Lake County All Lands Restoration Initiative:

Mapping and assessment has been completed on 80,565 acres of private land.

Data collected includes:

- Stand delineation
- Stand density
- Cover type
- Fuel loading
- Understory composition
- Aspen condition
- Springs
- Noxious weeds

of forest stand boundaries and identifies current forest condition. In addition, data was collected on fuel loading, understory composition, aspen condition, springs, and noxious weed locations. The data was used to identify priorities for restoration based upon stand density and fuel loading (Map 8), and they provide a foundation for developing land management plans for private landowners.

In 2019, the KLFHP collectively decided to start the Thomas Creek Project, which is located immediately west and adjacent to the North Warner Project (Map 2). Similar to the North Warner Project, it was selected because it included the NEPA-ready USFS Thomas Creek Landscape Restoration Project, and there was extensive aquatic restoration already completed on both public and private lands. There has been a total of 46 stream restoration, fish passage, and riparian enhancement projects completed on private lands, and eight fish passage, six miles of stream restoration, eleven miles of road decommissioning, and a riparian fence completed on USFS lands. Once again, this presents the opportunity for ridgetop-to-ridgetop restoration and to take advantage of investments already in place.

The Thomas Creek Project is at the beginning phases of implementation for upland dry forest restoration, while the North Warner Project is moving into the maintenance stage with the use of prescribed fire. These two KLFHP-focused landscapes are now building upon each other, while increasing the geographic area of forest restoration, wildfire risk reduction, improvements in aquatic and wildlife habitat, and overall resiliency. Although the Thomas Creek Project has been recently impacted by wildfires, there is a great need to restore the remaining forests for long-term resiliency.

The geographic boundary of the LCALRI is the North Warner and Thomas Creek Projects combined, totaling 402,400 acres (Map 1). This strategic action plan will outline goals and objectives for increasing resiliency within the LCALRI landscape by completing high and moderate priority thinning treatments and the first entry of prescribed fire (including associated noxious weed treatments) and by outlining the long-term return interval of maintenance with prescribed fire based on the ecological site conditions. This is expected to take a minimum of 20 years.

"This strategic action plan will outline goals and objectives for increasing resiliency....by completing high and moderate priority thinning treatments and the first entry of prescribed fire (including associated noxious weed treatments)....."

While the LCALRI is being implemented, the partnership is in the planning phase for the next landscape located immediately adjacent to and south of North Warner and Thomas Creek All Lands Projects. This project is titled the South Warner All Lands Projects. An OWEB Technical Assistance grant was awarded in 2021 to complete the mapping and inventory of private lands and this project is associated with a USFS NEPA-ready project. The partnership will apply for separate grants to implement dry forest restoration treatments within the South Warner All Lands project area. In the future, this will broaden the LCALRI and it encompasses the remaining high priority Wildland Urban Interface surrounding the town of Lakeview.

4. Vision

The partnership envisions creating a healthy, resilient, and functional forest landscape maintained with fire as an ecological process, while mitigating the threat of high severity wildfire to dry forests, fish and wildlife habitat, water quality, and the surrounding human communities. This healthy and resilient landscape has abundant, productive, and diverse populations of native fish and wildlife species and contributes to the social, cultural, and economic well-being of the communities that live, work, and recreate within its boundaries.

5. Ecological Priorities and Goals

The **ecological priority** for the LCALRI is dry-type forest restoration maintained with frequent low to moderate intensity fire.

Goal 1: By 2024, engage with 75% of the private landowners to increase public knowledge and understanding of dry forest restoration principles and restoration techniques, while building public support for increased use of fire as an essential restoration tool through outreach, engagement, and applied fire.

Goal 2: By 2024, develop a short- and long-term strategy for the location and frequency of prescribed fire that would maintain the investment in thinning treatments and re-establish the historical range in the frequency of fire, while meeting private and USFS land management objectives.

Goal 3: By 2030, restore dry forest landscape resiliency, forest health, hydrologic function, and wildlife habitat within ponderosa pine and mixed conifer habitats by re-establishing open and variable forest structure and reducing fuel loading within approximately 40% of the moderate and high priority stands.

Goal 4: By 2030, restore healthy aspen, meadow, and shrub-steppe habitats by reducing encroaching conifers and juniper within approximately 40% of the high and moderate priority stands.

Goal 5: By 2030, re-introduce low to moderate intensity fire as a key ecological process with first entry prescribed fire across public and private lands on 40% of the area identified for prescribed fire in the North Warner Project area.

Goal 6: By 2040, re-introduce low to moderate intensity fire as a key ecological process with first entry prescribed fire across public and private lands on 60% of the area identified for prescribed fire in the LCALRI landscape (this includes the 40% completed in Goal 5).

6. Profile of the Focus Area

Biophysical Setting

The 402,400-acre LCALRI landscape is located in the East Cascades Ecoregion of Oregon (Map 1). The area is located within the Abert Lake, Goose Lake, and Warner Lakes closed basins and includes portions of the following watersheds: Lower Chewaucan River, Upper Chewaucan River, Drews Creek-Frontal Goose Lake, Thomas Creek, Deep Creek, Crooked Creek, and Honey Creek. The area includes the northern extent of the Warner Mountain Range on the edge of the Great Basin. The area is diverse with a mix of ponderosa pine and mixed conifer forests, aspen woodlands, flowing water, meadow, and shrub-steppe habitats.

Lake County climate is semi-arid with long, severe winters and short, dry summers. With a typical high desert climate, the County experiences over 300 days of sunshine per year and receives an average of 15 inches of annual precipitation. Warm and sunny days of summer record highs in the 80s with cool nights. Data taken from Remote Automatic Weather Stations (RAWS) show a significant increase in moisture as elevation increases. The low precipitation and high wildfire risk months are June, July, August, and September.

Dry ponderosa pine and mixed conifer forested lands account for about 74% (296,464 acres) of the LCALRI landscape, while non-forested lands (i.e. shrub-steppe, meadow, agriculture, and water) account for 26% (106,125 acres) of the area. The landscape ranges in elevation from 4,300 feet to 8,400 feet at Drake Peak Lookout. The landscape at lower elevations includes agricultural lands that transition to shrub-steppe and conifer forests. As elevations increase, the forest type begins to change to an ecosystem dominated by various mixed conifer species including white-bark pine at the highest elevations. Forest structure ranges from young plantation forests to old growth forests containing high concentrations of old legacy pine. Aspen woodlands are present throughout the project area associated with streams and springs, and portions of the landscape are composed of moist and dry meadows, rock outcrops, and mountain mahogany.

The LCALRI landscape contains portions of the Thomas Creek-Goose Lake and Warner Mountains Conservation Opportunity Areas (COA) identified in the Oregon Conservation Strategy. The recommended conservation actions for the Thomas Creek-Goose Lake COA are to: 1) maintain or enhance in-channel watershed function, connection to riparian habitat, flow and hydrology; 2) maintain or restore riparian habitat and ecological function, ensuring sufficient habitat complexity for wildlife; and 3) maintain riparian, wet meadow habitats and emergent wetlands. The recommended conservation actions for the Warner

High priority aquatic and wildlife species that will benefit from the Lake County All Lands

- Warner sucker
- Great Basin redband trout
- Modoc sucker
- Gray wolf
- Black-backed woodpecker
- Greater sage grouse
- Lewis's woodpecker
- Northern goshawk
- White-headed woodpecker
- Whitebark pine

Mountains COA are to: 1) maintain or restore aspen woodland and sagebrush habitats; 2) maintain or restore riparian habitat and ecological function; and 3) use fire and thinning as needed to restore and enhance ponderosa pine habitats.

The LCALRI project, in coordination with previous and ongoing aquatic restoration efforts, will benefit several priority species. The Conservation Strategy Species, which are Oregon's "species of greatest conservation need," are defined as having small or declining populations, are at-risk, and/or are of management concern. These priority aquatic and wildlife species include: Warner sucker, Great Basin redband trout (Chewaucan, Goose Lake, Warner Lakes), Modoc sucker, gray wolf, black-backed woodpecker, greater sage grouse, Lewis's woodpecker, northern goshawk, white-headed woodpecker. Although not a Conservation Strategy Species, whitebark pine was also recently listed as a federally listed endangered species.

Warner sucker is federally listed as an endangered species and found in the Honey Creek subwatershed where adfluvial runs are still present in the Honey Creek stream system. Redband trout are known to occur in Crooked Creek, Thomas Creek, and Honey Creek.

Modoc sucker are found within the Upper Thomas Creek subwatershed and were delisted from the Endangered Species List in 2015, largely due to the cooperative efforts of state and federal agencies working with landowners. The LCUWC was instrumental in working with the majority of the property owners from Goose Lake to the headwaters to fund and implement aquatic restoration work (i.e. bridges, stream enhancement, etc.). In addition, Thomas Creek and it's tributaries are a high priority for area resource managers because they provide habitat for all 9 native fish (Modoc sucker, Goose Lake redband trout, Goose Lake tui chub, Pit sculpin, Pit-Klamath brook lamprey, speckled dace, Pit roach, Pit sculpin, and Goose Lake sucker), and they provide refuge during late summer when flows are low and during years of drought/climate change. Thomas Creek itself is the largest stream in the basin at 40 stream miles in length and much of the stream has been enhanced for fish passage connectivity and genetic exchange.

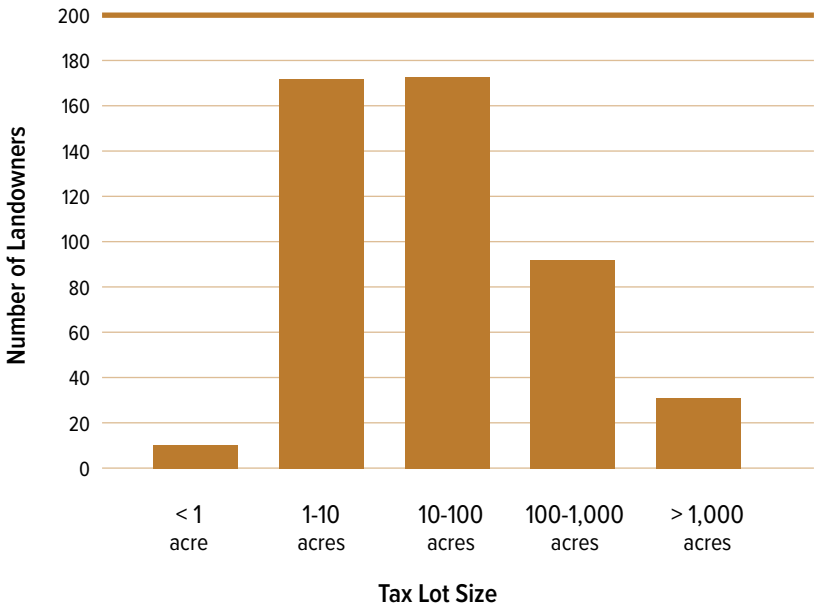
Gray wolves were removed as a federally listed endangered species in January 2021 and individuals range within the project area. Priority bird species are also present throughout the LCALRI landscape: black-backed woodpeckers are associated with post-fire habitats with high densities of snags; greater sage grouse are associated with sagebrush habitat on the eastern fringes of the landscape; Lewis's woodpecker are associated with open canopy ponderosa pine and post-fire habitats with large snags; northern goshawk are associated with forests with a mosaic of structural stages; and white-headed woodpeckers are associated with open ponderosa pine forests with mature trees.

Whitebark pine is federally listed as an endangered species and found in the higher elevation areas within the project area, often at or above the tree line. This unique tree species is almost exclusively dependent upon Clark's nutcracker for seed dispersal.

Social Setting

The project area is located approximately 6 miles north of the town of Lakeview, Oregon within Lake County. There is approximately 175,700 acres of USFS, 3,820 acres of BLM, 765 acres of State, 176,160 acres of non-industrial private, and 44,780 acres of industrial private land (Map 2). Non-industrial private land tax lots range in size from small (<1 acre) to larger (>1,000 acres) properties; Figure 1 represents ownership size for non-industrial private ownership within the LCALRI.

Figure 1. Number of landowners by tax lot size



Lakeview, Paisley, and Valley Falls are small, rural communities that are highly dependent upon the resources within the LCALRI landscape. This is a working landscape in which many of the participating private landowners have a vested interest in restoring and protecting dry forest resources across both public and private land. Collins Companies is the primary industrial private landowner within the LCALRI landscape and also the owner of the one remaining sawmill in Lake County. Many of the participating landowners are long time generational ranchers that own private timberland, but also hold grazing permits on USFS lands. The local community also enjoys this landscape for recreation such as fishing, hunting, biking, hiking, camping, and wildlife viewing.

The southern, eastern, and northern boundaries of the LCALRI landscape border the towns of Lakeview, Paisley, and Valley Falls, subdivisions in the Drews Reservoir area, and numerous individual homes and ranches. The Lake County CWPP identified the communities of Lakeview, Valley Falls, and Drews Reservoir as having a high-hazard risk and Paisley a moderate-hazard risk of being impacted by a wildfire.

These communities have experienced the hardships that come from large, high severity wildfires including a breakdown in community relations between private and federal agencies, impacts to livestock and fences, burned forests on public and private land, and negative impacts to water quality, wildlife, and fish habitats. This first-hand experience has, and will continue to be, a strong motivator for the community to come together and address wildfire risk across ownership boundaries and through partnerships.

"These communities have experienced the hardships that come from large, high severity wildfires.....This first-hand experience has, and will continue to be, a strong motivator for the community to come together to address wildfire risk across ownership boundaries and through partnerships."

Local Economy

Historically, the local economy was driven by timber production and agriculture. The timber industry has declined since the 1980's and Collins Companies Lakeview Sawmill is the only sawmill operating in the local area and remains critical to the local economy and restoration efforts. For comparison, seven sawmills operated in Lakeview in 1940, employing half the town at that time. Like many other small rural communities in Eastern Oregon, Lake County is heavily reliant on

natural resources and the relationships between the timber and ranching industry, government and state agencies, non-governmental partners, and private landowners for economic stability. Although to a lesser extent, recreation within the LCALRI landscape provides economic benefits to businesses in Lakeview, Paisley, and Valley Falls. Many people come to Lake County to enjoy the solitude and open space while camping, hunting, hiking, bird watching, biking, etc. This provides secondary benefits to these rural communities to local hotels, gas stations, grocery stores, restaurants, etc.

Lake County median age, household income, and poverty levels continue to differ from statewide levels. Lake County residents are older, household income is lower, and more of the population is living in poverty than the statewide aver-age. The median income of Lake County residents is approximately $21, 430 less than the state average. The top employment sectors in Lake County include: government, wood products manufacturing, agriculture, and retail trade. Local, state, and federal government agencies account for 42% of employment in the county, and this contrasts sharply with the statewide figure of 16%. Lake County employment in wood products manufacturing, animal production, and crop rotation is also much higher than the statewide average. Lake County demographics are represented in Table 1.

Table 1. Comparison of key social and economic characteristics for Lake County

Characteristics	Lake County (2021 data)	Oregon State (2021 data)
Median age	47.5	39.5
Median household income	$44,237	$65,667
Percent of population in poverty	19.4%	12.4%

The Collins Companies Lakeview Sawmill has been the only remaining sawmill in Lake County since 1996. This sawmill has an annual production capacity of 70 million board feet and provides approximately 80 jobs each year. The addition of a $6.8 million small-log mill in 2007 and further improvements in 2012-2013 are an important investment in the future of the Lakeview community, as well as a turning point for restoration forestry in the local area. About 15 to 20 percent of wood product is harvested from Collins Companies private industrial lands, with the remaining from public and private sources. The Collins Companies owns and sustainably manages 43,800 acres of private, industrial timberland within the LCALRI landscape. This tract of land was heavily impacted by the Cougar Peak Fire in 2021. Collins Companies is widely regarded as a timber industry leader in environmental stewardship and is certified by the Forest Stewardship Council (FSC).

"The Collins Companies Lakeview Sawmill has been the only remaining sawmill in Lake County since 1996... The addition of a $6.8 million small-log mill in 2007 and further improvements in 2012-2013 are... a turning point for restoration forestry in the local area."

Additionally within the Lakeview community, Next Renewable Fuels is currently building a processing plant to convert woody biomass into renewable natural gas and clean hydrogen. When operational, Next Renewable Fuels will convert waste woody biomass into renewable fuels which will bring employment opportunities to Lakeview, and provide a source for non-merchantable woody biomass from the LCALRI landscape.

Historical Perspective

Human activities over the past 150 years, including fire suppression and past logging practices, have radically altered the structure, composition, and disturbance regimes of dry forests within the LCALRI landscape. Post-World War II, selective harvest and overstory removals were implemented across much of the project area. Early management practices focused on harvesting large ponderosa pine, which opened the understory to extensive small tree regeneration and shrub growth. These management strategies coupled with effective fire suppression, allowed white fir, western juniper, small-diameter ponderosa pine and lodgepole pine to encroach into areas previously dominated by large, open-spaced ponderosa pine, as well as overtaking aspen, meadow, and shrub-steppe communities.

Ponderosa Pine (1958): Historic compared to current condition
(Photos taken on the Fremont-Winema National Forest)
Photo Credit: Herald and Weaver and Faith Brown

Today, dry forests have an increased tree density that exceeds the carrying capacity of soils and environment; a shift in basal area to dominance by smaller diameter trees; an increase in surface fuels; and a shift in species composition to dominance by shade-tolerant species (i.e. white fir) relative to historical conditions. The capacity of existing dry forests to withstand current and projected stressors without undergoing significant change has been compromised.

7. Conservation Needs and Opportunities

Addressing Recommendations in the 2019 Governor's Council on Wildfire Response Report

In response to the increased wildfire risks affecting all Oregonians, Governor Brown signed an executive order creating the Governor's Council on Wildfire Response in January 2019. The Council was tasked with reviewing Oregon's current model for wildfire prevention, preparedness, and response, and analyzing the sustainability of the current model to provide recommendations to strengthen, improve, or replace existing systems. Several recommendations within this report would be addressed with the implementation of the LCALRI, including:

- **Defensible Space (Highest Priority)** – Treatments should include defensible space treatments near buildings and infrastructure critical to public safety. Treatments in the LCALRI project would include defensible space treatments around homes and priority infrastructure such as the Grizzly Peak Communication Site.
- **Prioritization (Highest Priority)** –There is a need to prioritize policies and investments. The OWEB dry forest restoration priority references the Haugo et al. publication (2015) as a guide for prioritization (Map 5). The KLFHP used this information, as well as other resources and local knowledge, to identify the LCALRI as a priority landscape for focused investment.
- **Near-Term Restoration Treatments (Highest Priority)** – Implement priority projects near USFS NEPA-approved projects while working with willing landowners. This project is associated with the USFS Crooked Mud Honey and Thomas Creek NEPA-approved projects.
- **Building Project Pipeline (Very High Priority)** – To build a pipeline for future projects that include cultivating relationships with private landowners near areas where the USFS plans to complete NEPA. As described in the Introduction, the KLFHP has a long-term plan for current and future all lands projects that were identified and prioritized by the KLFHP. The LCALRI builds on the North Warner Project by adding the Thomas Creek Project as the future pipeline. This landscape will become even larger when the South Warner All Lands Project is implemented in the future.
- **Capacity Building (Very High Priority)** – In anticipation of continued increases in restoration investments, capacity-building must commence in the near-term. The KLFHP has already built capacity to plan and implement landscape restoration and will continue to build capacity as funding is acquired.
- **Program Expansion (Very High Priority)** – Expansion of prescribed burns via Community Resiliency and Smoke Mitigation Grant Program, invasive treatments, and use of timber sales to offset restoration costs. Lake County received a grant from the Oregon Department of Environmental Quality to develop a Community Response Plan (CRP) for the Lakeview Smoke Sensitive Receptor Area. This project includes invasive treatments, prescribed fire, and use of timber sales on both USFS and private lands.
- **Long-term Barriers (High Priority)** – To increase the pace and scale of restoration, a number of policy and operation barriers must be addressed. The KLFHP has overcome a multitude of barriers in effectively implementing landscape-scale cross-boundary restoration and could be a model for other areas in the state.

Landscape-Level Dry Forest Restoration

There is a need to manage at a scale large enough to effectively restore multi-level landscape patterns, processes, and dynamics (Hessburg 2015). The LCALRI project offers a unique opportunity to restore dry forests across a 402,400-acre landscape (Map 2). Currently, cross-boundary restoration is occurring across the West, but in general projects are implemented at much smaller scales. Effectively managing at this large of a scale using the process developed by the KLFHP, is very unique. The scale of this project is large enough to allow for variable stand structure and patterns to meet the habitat needs of multiple species; to reintroduce fire as a disturbance process benefiting both wildlife and forest health; and to effectively reduce the risk of high severity fire.

Relative to the rest of Oregon, the LCALRI landscape was identified by Haugo et al. as a priority for restoration due to estimates that >35% of the watersheds are in need of disturbance restoration such as thinning and prescribed fire (2015) (Map 5). This project would include the integrated use of vegetation treatments and prescribed fire to achieve the necessary changes in landscape patterns, at scales broad enough to be meaningful, and the reintroduction of low intensity fire would restore natural disturbance regimes to create a resilient landscape (Hessburg 2015).

Addressing Climate Change

The Climate Change and Adaptation Vulnerability Assessment in South-Central Oregon General Technical Report states that the effects of climate change include higher air temperature, through its influence on soil moisture, is expected to cause gradual changes in the abundance and distribution of tree and shrub species, with drought-tolerant species being more competitive (Halofsky et. al 2019). Ecological disturbance, including wildfire and insect outbreaks, will be the primary facilitator of vegetation change, and future forest landscapes may be dominated by younger age classes and smaller trees (Halofsky et al. 2019). This effect of climate change has already had a significant effect on the LCALRI with recent high severity wildfires and is a motivator for treating the remaining unburned areas.

In response to the effects of climate change, adaptation options include minimizing the incidence of high-severity, stand-replacing disturbance events which will help increase the resilience of dry forests (Halofsky et al. 2019). Reducing stand density with thinning in dry forests can decrease forest drought stress and increase tree growth and vigor by reducing competition (Halofsky et al. 2019). Adaptation strategies for rangelands include rapid removal or control of nonnative plants, and collaboration among landowners to effectively control nonnatives (Halofsky et al. 2019). Mechanical treatments, and in some cases prescribed fire, can be used to control expansion of western juniper in some locations (Halofsky 2019). The conservation opportunities described below for the LCALRI are climate change adaptation actions that will minimize further impacts of climate change.

The effects of climate change had a significant effect within the LCALRI in 2021. It was an extremely dry summer with a record number of days above 90°F that started earlier than normal in the month of June. The two most significant fires in Lake County were the Bootleg Fire which burned to 414,000 acres in 6 days and the Cougar Peak Fire which grew to over 85,000 acres in 2 days. Both fires started in untreated dense forests, in red flag warning weather conditions, resulting in extreme fire behavior and rapid fire growth. Remote sensed Rapid Assessment of Vegetation Condition (RAVG) is showing that much of the fire areas burned with high severity resulting in a complete loss of vegetation. The small proportion of low to moderate severity fire were within areas previously treated with thinning and prescribed fire demonstrating the effectiveness of these treatments, even under extreme weather and fire behavior.

Strategic Thinning to Reduce the Risk of High Severity Fire and Improve Habitat

Dry Ponderosa Pine and Mixed Conifer Habitats

There is a need to reduce the risk of high severity fire to fish and wildlife habitat, highly valued forest resources, and the communities of Lakeview, Valley Falls, Paisley, and residents of the Drews Valley subdivisions. A qualitative review of the literature conducted by Kalies and Kent found that fuels treatments reduce fire severity, crown and bole scorch, and tree mortality com-

pared to untreated forests post-fire; this finding is most consistent with the combination of thin and burn treatments (2016). Combined thinning and burning treatments are also found to result in greater survival of overstory tree structure (Kalies and Kent 2016) which is especially important to the protection of old legacy ponderosa pine. In addition, a meta-analysis by Martinson and Omi looking at the effect of fuel treatments on fire response in 19 studies found a reduction of canopy volume scorch from 100 percent in untreated stands to 40 percent in treated stands, and a reduction in scorch height from 100 feet to 52 feet (2013). This effect can be greater with increased thinning intensity, while treatments less than ten years old are more effective (Cram et al. 2006).

Effect of Treatments within the 2021 Bootleg Fire
Photo Credit: Steve Rondeau, Klamath Tribes Natural Resource Department

Combined thinning and prescribed burning within the LCALRI landscape offers the opportunity to reduce fire severity to ponderosa pine and mixed conifer habitats. This would reduce the potential for loss of fish and wildlife habitat or soil erosion and sedimentation to streams as a result of high severity wildfire. In addition to the improvements in conifer habitats, defensible space treatments immediately adjacent to homes and structures will improve the potential for protecting highly valued resources during a wildfire event. Lastly, the continuity of thinning and prescribed fire at a landscape-scale across ownerships will improve the effectiveness of fuels reduction treatments during wildfire response and increase firefighter safety. In some cases, strategic thinning and prescribed fire may be identified within past wildfires to enhance the effectiveness of treatments in the unburned areas.

To date, thinning and pile burning is completed or in progress on 41,042 acres (25,010 acres of USFS land and 16,032 acres of private land) within dry ponderosa pine and mixed conifer forests (Map 7) setting the stage for subsequent prescribed fire (Map 9). In addition, 2,421 acres of prescribed fire have been completed. The Thomas Creek Project has extensive ponderosa pine and mixed conifer forests identified for thinning (Map 8), and prescribed fire would occur after thin-ning and pile burning is completed. Thinning prescriptions would be guided by the appropriate stand density targets based on site type and soil productivity to meet forest health objectives. The KLFHP has professional foresters (ODF, OSU Extension, and USFS) that provide recommen-dations for each stand. The priority for thinning will be the moderate and high priority stands. In total, there is approximately 45,348 acres (16,386 USFS and 28,962 private) identified as moderate and high priority for thinning in dry ponderosa pine and mixed conifer habitats.

Aspen and Meadow Habitats

There is a need to improve aspen, mahogany, meadow, and shrub-steppe habitat to enhance wildlife habitat by reducing encroaching conifers and juniper. Within the project area, dry ponderosa pine and mixed conifer forests are intermixed with inclusions of aspen and mahogany stands, wet and dry meadows, and sagebrush habitats, providing a diversity of habitat for a variety of wildlife species.

Avian diversity in aspen stands within a conifer matrix is much higher than in dry pine forests alone (Griffis-Kyle and Beier 2003). In Oregon, aspen stands have both a higher diversity and higher density of avian species than those found in the surrounding dry and moist conifer forests (Sallabanks et al. 2005). Conifer encroachment can suppress aspen sprouts as well as overtop and kill the aspen overstory through vegetative competition for light, water, and soil resources (Shepperd et al., 2001a; Jones et al., 2005). Historically, fire would have removed the competing conifers while also stimulating and releasing a large number of aspen sprouts from the trees and soils that were affected by the fire (Seager et al. 2013). Fortunately, our management experience has shown that even severely suppressed aspen will respond to conifer removal with new suckering, provided that live stems are present (Seager et al. 2013).

Woody-plant encroachment threatens the biodiversity and ecosystem functioning of meadows worldwide (Celis et al. 2019). Conversion of meadows to shrublands, woodlands, or forests can have profound consequences for carbon, water, and nutrient cycling (O'Donnell and Caylor 2012); plant diversity (Ratajczak et al.2012); and for trophic interactions (e.g., plant–pollinator networks) (Hadley and Betts 2011). A recent study by Celis et al. suggests that in a landscape dominated by forests, conifer invasion of meadows can reduce the local and larger-scale diversity of plants and their insect pollinators (2019).

Within the LCALRI, conifers and juniper have been thinned within 1,247 acres (374 USFS and 873 private) of aspen and meadows habitats, setting the stage for subsequent prescribed fire. The Thomas Creek Project has numerous aspen and meadow stands on USFS and private land in need of thinning, and prescribed fire would occur after thinning and pile burning is completed, reinvigorating these sites (Map 9). The priority for thinning will be the moderate and high priority stands. In total, there is approximately 545 acres (74 USFS and 471 private) identified as moderate and high priority for thinning in aspen and meadow habitats.

Pre- and post-thinning of aspen in the North Warner Project Photo Credit: Cheran Cavanaugh

Pre-thinning **Post-thinning**

Shrub-steppe Habitats

The spatial extent and number of individual western juniper has increased dramatically since the late 1800's and can have a significant impact on soil resources, plant communities, and wildlife habitat if left to expand (Miller et al. 2005). Bates et al. showed that cutting of juniper trees was effective in increasing total understory biomass, cover, and diversity (2000). Miller et al. reports that as juniper densities increase and woodland areas continue to expand, sage grouse habitat will decline (2005). The LCALRI landscape provides nesting and brood rearing habitat for greater

sage grouse mainly on BLM and private lands within the project area, and brood rearing habitat on USFS lands. Sage grouse habitat is primarily on the eastern portions of the project area, where the East Cascades and Great Basin and Range Ecoregions abut.

There are often inclusions of mountain mahogany within shrub-steppe and ponderosa pine habitat types. Mountain mahogany is a very important forage species for wildlife such as mule deer and elk. It is also important for avian species, such as red-naped sapsuckers, that create sapwells for feeding on mountain mahogany. The expansion of juniper and conifer within mountain mahogany woodlands has reduced the health and vigor of many stands within the project area. Combined thinning and prescribed burning within the LCALRI landscape offers the opportunity to maintain and improve the health of mountain mahogany habitats.

Within the LCALRI, juniper has been reduced on 9,071 acres (621 USFS and 8,450 private) of shrub-steppe habitat. The Thomas Creek Project has numerous shrub-steppe habitats on USFS and private land in need of thinning (Map 8). Old growth juniper will be maintained for wildlife habitat, and prescribed fire would not occur where sagebrush needs to be maintained for sage grouse habitat. The priority for juniper cutting will be the moderate and high priority stands. In total, there is approximately 10,228 acres (80 USFS and 10,148 private) identified as moderate and high priority for juniper cutting in shrub-steppe habitats.

Summary

As stated in the 2019 Governor's Council on Wildfire Response Report, research suggests that strategic treatments across 40% of a given landscape can significantly alter fire behavior for positive benefit (2019). The objective for the LCALRI is to thin approximately 40% of the 56,121 acres of high and moderate priority stands remaining for treatment. Thinning treatments would be strategically coordinated, implemented, and completed between USFS and private lands within the larger landscape, which will facilitate cross-boundary prescribed fire across the landscape. The priority for strategic thinning will be: 1) the remaining areas within the North Warner Project; and 2) stands within Thomas Creek Project.

In addition, the LCALRI landscape has been divided into three implementation zones to facilitate entry with prescribed fire. The objective is to complete all the necessary thinning and pile burning within Zone 1 first to allow for expedited application of prescribed fire. Thinning and prescribed fire would then proceed in Zone 2 followed by Zone 3 (Map 8).

Table 2. High/moderate priority stands where thinning is completed or in progress (Map 7)*

Ownership	Conifer	Aspen/Meadow	Shrub-Steppe	Total
USFS	25,010 acres	374 acres	621 acres	26,005 acres
Private	16,032 acres	873 acres	8,450 acres	25,355 acres
Total	**41,042 acres**	**1,247 acres**	**9,071 acres**	**51,360 acres***

* In addition, 2,421 acres of prescribed fire have been completed

Table 3. High/moderate priority stands remaining for potential thinning (Map 8)

Ownership	Conifer	Aspen/Meadow	Shrub-Steppe	Total
USFS	16,386 acres	74 acres	80 acres	16,540 acres
Private	28,962 acres	471 acres	10,148 acres	39,581 acres
Total	**45,348 acres**	**545 acres**	**10,228 acres**	**56,121 acres**

Reintroduce and Maintain Thinning with Fire as an Ecological Process

There is a need to reintroduce fire as an ecological process and to maintain the high investments in thinning treatments. Recent studies suggest there is an enormous deficit of frequent, low-severity fire degrading ecosystems in South Central Oregon and large low severity fires may have been critical to maintaining forest patterns resistant and resilient to fire and drought (Hagmann 2013). Dry forest restoration treatments in fire-dependent ponderosa pine forests that reduce tree density increase ecosystem resilience in the short term, while the reintroduction of fire is important for long-term resilience. (Hood et al. 2016).

Through coordinated efforts across the LCALRI landscape, there is ample opportunity to reintroduce fire at larger scales and across ownership boundaries. This is supported by Hessburg et al. which suggests treatments across public and private land through the planning, implementation and monitoring process will expand options for management and create synergies that are otherwise unavailable (2015). For example, the opportunity for prescribed fire on private lands as an ecological process (Leavell et al. 2018) may become an option for landowners through coordinated efforts with adjacent federal agencies, based on coordinated cross-boundary thinning treatments. Coordinated efforts may also open the opportunity to manage a wildfire to meet resource objectives. Thinning on private land and building relationships with private landowners in advance of a wildfire, increases the possibility and likelihood for success.

In 2018, South Central Oregon formed a chapter to the Oregon Prescribed Fire Council to assist with advancing the use of fire as an ecological process within the area. The mission of the Oregon Prescribed Fire Council is to serve as a venue for practitioners, state and federal agencies, academic institutions, tribes, coalitions, and interested individuals to collaboratively promote and conserve the fire adapted natural ecosystems in Oregon and expand the responsible use of prescribed fire. Effectively advancing the use of fire across ownership boundaries involves great coordination, expertise, agreements, and stakeholder support. The formation of the South Central Oregon local chapter, organized through the KLFHP, will assist with expanding the use of prescribed fire within the LCALRI landscape.

Concurrent with this project, the USFS recently completed a strategic fire planning effort with multiple agencies and partners to delineate Potential wildfire Operations Delineations (PODs) using local knowledge and modeled data. PODs are landscape delineations whose boundary features allow for better control of a wildfire. Within each POD, partners discussed values at risk and used modeled data to determine potential opportunities for direct or indirect fire suppression strategies. This exercise was completed across jurisdictional boundaries for lands associat-

ed with the Fremont-Winema National Forest. For example, the process identifies areas on the landscape where current conditions may allow for use of fire with low risk of loss to resources and includes public and private lands. This effort increased the communication and agreement between partners on: 1) the potential locations and opportunities to use fire to meet resource objectives; and 2) applying a risk-based response to wildfire.

With the landscape-level coordinated efforts within the LCALRI landscape, there are incredible opportunities to work together between agencies, partners, and private landowners to increase the use of fire on the landscape. Extensive thinning across public and private lands will set the stage for reintroducing fire as an ecological process and maintaining thinning treatments in the short- and long-term. There is a short- and long-term prescribed fire strategy in place for the North Warner Project area (Map 9) that outlines potential prescribed fire boundaries and the recommended frequency of fire of every 10-20 years, and partners are working to develop landscape prescribed burn plans and the necessary agreements that allow for prescribed fire across public and private lands. Once thinning treatments are underway in the Thomas Creek Project, a similar strategy, burn plans, and agreements will be completed.

Prescribed burning in ponderosa pine forest Photo Credit: USFS

Increase Understory Abundance and Diversity

Encroachment of conifers and juniper in dry ponderosa pine, mixed conifer, aspen, meadow, and shrub-steppe habitats, combined with a lack of low intensity fire, has led to decreased understory abundance and diversity. This reduces the quality of habitat for wildlife, pollinators, and riparian resources. Additive to this, noxious weeds have spread and are found throughout the project area. A total of 1,537 noxious weed sites were mapped on the private lands during the mapping and assessment effort, and there are 1,616 known sites on USFS land (Map 10). The LCALRI Noxious Weed Management Plan (CWMA 2021) identifies preventative measures, goals and objectives, and best management practices (BMPs) for thinning and prescribed fire treatments and identifies a strategy for the timing of noxious weed treatments in relation to the forest restoration treatments. This plan was developed in partnership between the Lake County CMWA and the USFS.

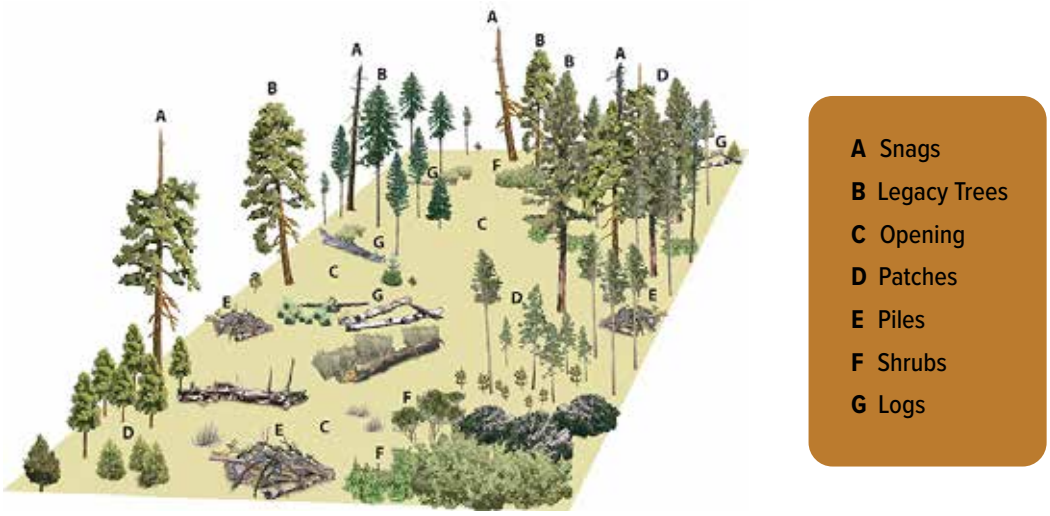
Enhance Habitat for Oregon Conservation Strategy Species

Dry-type forests are critical to healthy watershed function and process. The aquatic habitat within these forested areas is closely linked with the health of the dry-type forests, which support over 800 fish and wildlife species. Habitats span multiple ownerships, so the restoration of fish and wildlife habitats and connectivity requires a high degree of coordination (Hessburg 2015). This project offers the opportunity to restore dry forests to benefit fish and wildlife habitat in partnership between federal agencies and private landowners.

Thinning and prescribed fire treatments are designed to maintain and enhance habitat for a variety of wildlife species across the LCALRI landscape. A few basic concepts apply to thinning on USFS land, and strongly encouraged for private landowners as well. These concepts are well documented in the Wildlife-Friendly Fuels Reduction in Dry Forests of the Pacific Northwest

paper (Strong et al. 2016) which is provided to private landowners during the land management planning process. Maintaining habitat complexity elements in the overstory and understory are critical for many forest wildlife species in the form of snags and down wood, legacy trees, openings, and untreated patches. For example, small clumps of trees provide a place for deer and elk to hide from predators; shrub clumps provide nesting and hiding cover for ground nesting birds and small mammals; snags provide nesting and foraging habitat for many bird species; logs provide ground cover for small mammals, amphibians, and reptiles, release nutrients back into the soil, and provide insects for birds and bears (Strong 2016).

Figure 2. A forest treated to reduce fire risk, be more resilient to insects and disease, and enhance wildlife habitat.[1]



Spatial variability in dry forest stands is also an important component of forest structure that governs ecological processes and functions from the micro- to meso- scale (Churchill et al. 2018). Spatial variability involves retaining trees with variable spacing to allow for openings, individual trees, and clumps of trees. Modifying spatial pattern and tree density through restoration treatments can positively influence dry forest processes and functions including fire behavior, drought resistance, insects and pathogens, snow retention, tree regeneration and growth, wildlife habitat, and understory diversity (Churchill et al. 2018).

The LCALRI project, in coordination with previous and ongoing aquatic restoration, will benefit several priority species that are both strategy species identified in the Oregon Conservation Strategy and a species of concern for the USFS. These priority species include Warner sucker, Great Basin redband trout (Chewaucan, Goose Lake, Warner Lakes), Modoc sucker, gray wolf, black-backed woodpecker, greater sage grouse, Lewis's woodpecker, northern goshawk, and white-headed woodpecker. Table 4 provides a summary of the benefits of thinning and prescribed fire to these terrestrial and aquatic species.

[1] *Source of figure: Strong et al. 2016.*

Table 4. Benefits of thinning and prescribed fire to Oregon Conservation Strategy species

Species	Benefits
Warner sucker	Upland thinning and prescribed fire will reduce the risk of sedimentation and poor water quality from high severity wildfire. In addition, there are benefits from fish passage and screening at irrigation diversions on Honey Creek in the progress of implementation in the project area.
Great Basin redband trout	Upland thinning and prescribed fire will reduce the risk of sedimentation and poor water quality from high severity wildfire. In addition, there are benefits from instream restoration, fish passage, habitat enhancement, and riparian area improvements on Crooked Creek and Thomas Creek recently completed within the project area.
Modoc sucker	Upland thinning and prescribed fire will reduce the risk of sedimentation and poor water quality from high severity wildfire. In addition, there are benefits from fish passage, screening, riparian area enhancement, habitat enhancement and stabilization on Thomas Creek recently completed within the project area.
Gray wolf	Thinning and prescribed fire at landscape-scales would improve habitat for prey species such as elk and mule deer.
Black-backed woodpecker	Large blocks of untreated areas are identified for no treatment on USFS land; prescribed fire will increase snag densities.
Greater sage grouse	Thinning in shrub-steppe habitats and meadows would increase the production and quality of early successional plants and maintain sagebrush; reduced risk of habitat loss resulting from high severity wildfire.
Lewis' & white-headed woodpeckers	Thinning in ponderosa pine and mixed conifer habitats will transition dense multi-story stands to open stands; prescribed fire will increase snag densities; variable prescriptions for retaining and creating clumps and openings will enhance habitat; reduced risk of loss of habitat from high severity wildfire.
Northern goshawk	Within the known territories on USFS, treatments are designed to maintain habitat; openings and prescribed fire improve foraging habitat; thinning with complexity improves nesting and foraging habitat; reduced risk of habitat loss resulting from high severity fire.

Addressing Recommended Conservation Actions within Oregon Conservation Opportunity Areas

There is a need to address the recommended conservation actions within the Oregon Conservation Opportunity Areas to conserve habitat for strategy species. This LCALRI landscape offers the opportunity to address the recommended conservation actions identified within the Thomas Creek-Goose Lake and Warner Mountains Oregon Conservation Opportunity Areas. With recent aquatic restoration completed or in progress within the LCALRI project area, this offers a unique opportunity to accomplish ridgetop-to-ridgetop restoration restoring uplands down to waterbodies. Table 5 provides a summary of how this project would address the recommended conservation actions.

Table 5. How does the LCALRI address Conservation Actions?

Recommended Conservation Action	How the Project Addresses the Conservation Action
Thomas Creek-Goose Lake COA (Thomas Creek Project)	
Maintain or enhance in-channel watershed function, connection to riparian habitat, flow and hydrology	Twenty-six miles of instream restoration on Thomas Creek (20 miles private and 6 miles USFS), 8 fish passage projects, and 1 riparian fence were recently completed within the Thomas Creek Project.
Maintain or restore riparian habitat and ecological function, ensuring sufficient habitat complexity for wildlife	Twenty-six miles of instream restoration on Thomas Creek (20 miles private and 6 miles USFS), 8 fish passage projects, and 1 riparian fence were recently completed within the Thomas Creek Project.
Maintain riparian, wet meadow habitats and emergent wetlands	Twenty-six miles of instream restoration on Thomas Creek (20 miles private and 6 miles USFS), 8 fish passage projects, and 1 riparian fence were recently completed within the Thomas Creek Project.
Warner Mountains COA (North Warner Project)	
Maintain or restore aspen woodland and sagebrush habitats	Approximately 1,106 acres of aspen and 7,030 acres of shrub-steppe have been restored within the Warner Mountains COA.
Maintain or restore riparian habitat and ecological function	Instream restoration was recently completed on 15 miles of Crooked Creek on private lands.
Use fire and thinning as needed to restore and enhance ponderosa pine habitats	Approximately 30,358 acres of thinning has occurred within ponderosa pine habitats within the Warner Mountain COA, with prescribed fire to follow.

Engaging with Communities on Forest Restoration, Fire, and Smoke

There is a need to engage with local communities on forest restoration, fire, and smoke to increase understanding and to gain stakeholder support for increased thinning and use of fire as an ecological process. Through the coordinated efforts of this project, there are many opportunities for engaging with local communities. This process has been ongoing with landowners associated with the North Warner Project and serves as a model for engaging with landowners in the Thomas Creek Project.

In 2016, dry forest stands were mapped and assessed for approximately 30 private landowners totaling 32,000 acres in the North Warner Project. In addition, data was collected on fuel loading, understory composition, aspen condition, springs, and noxious weed locations. The maps and data were used to inform priorities and treatment recommendations, and they provided a foundation for developing land management plans. The private land mapping and assessment provided an excellent outreach and engagement tool between partners and private landowners. In 2019, a similar mapping and assessment effort was completed for approximately 175 landowners totaling 48,565 acres in the Thomas Creek Project, through an OWEB Technical Assistance grant and USFS funding.

The partners also informed and engaged landowners through mailings, meetings, workshops, phone calls, social media, and in-person discussions for the North Warner project. These efforts were instrumental in helping private landowners understand the need for thinning to improve forest health, wildlife habitat, and to reduce the risk of high severity fire. The partners are now engaging with the North Warner Project landowners on the use of prescribed fire. The first step in using fire is to burn the slash piles generated from thinning. A pile burning workshop was held in Oct. of 2018 to provide landowners with the knowledge and resources for safely and effectively burn slash piles.

With the success of the North Warner Project the following products and workshops have been completed to aid in further landowner outreach and engagement, particularly for the new landowners within the Thomas Creek Project. These efforts were funded through an OWEB Stakeholder Grant awarded in 2019.

1) A 2-page Forest Resiliency brochure. See Appendix A.
2) A 3-5 minute film to educate and encourage private landowners to partner to complete forest restoration. https://youtu.be/6H1n7CeRyvg
3) A 2-4 page newsletter to be mailed out to the 205 landowners within the LCALRI landscape. See example in Appendix B.
4) A prescribed fire workshop was held in May of 2021 for private landowners. As part of the workshop, a 40-acre prescribed fire was completed across public and private land.

To prepare for the increased scale and use of the prescribed fire within the project area, the KLFHP is also working with Lake County Public Health, Lake County Commissioners, Lakeview Air Quality Committee, and Department of Environmental Quality to develop a Community Response Plan (CRP) for the Lakeview Smoke Sensitive Receptor Area. In 2020, Lake County received a grant from the Oregon Department of Environmental Quality to develop the Lakeview CRP. This plan is part of a formal request under the 2019 Oregon prescribed fire smoke management plan for an exemption from the 1-hour smoke intrusion threshold. Such action is necessary because of the urgent need to increase the pace and scale of prescribed fire treatments. Through the enhanced community outreach, communications, and notifications outlined in this plan, the window of opportunity for using prescribed fire will increase while mitigating public exposure to smoke from wildland fire sources (prescribed and wildfire) and better protect public health and safety in the near- and long-term.

In 2021, the Lake County Umbrella Watershed Council completed a survey of landowners within the North Warner Project to understand both interest and concerns with applying prescribed fire on their private lands. This survey will help the partnership in addressing the concerns of landowners such as liability and in developing educational materials and workshops. Overall, the survey demonstrated that landowners are interested in utilizing prescribed fire as a restoration tool.

All the efforts described above will result in a better understanding within our local communities on the benefits of dry forest restoration, the beneficial use of fire, and the trade-offs between smoke generated from wildfire versus prescribed fire. By building stakeholder support in the local community, there is an opportunity to foster a sustainable, landowner-driven approach to forest management that will extend the life and benefits of implemented treatments.

Providing Economic Benefits

There is a need to increase the economic benefits to the rural communities associated with this project based upon the local economic conditions. In Lake County where residents are older, household income is lower, there is higher unemployment, and more of the population is living in poverty than the statewide average (Table 1), forest restoration offers an important opportunity for economic benefits. Forest restoration activities can create considerable economic activity and jobs. Data suggest that in Oregon, forest restoration projects could: 1) create or retain approximately 13 jobs and generate approximately $2.2 million in total economic activity performing mechanical forest restoration projects such as hazardous fuels reduction, per $1 million invested; and 2) create or retain nearly 29 jobs and generate over $2.1 million in total economic activity performing labor intensive work such as tree planting and manual thinning activities, per $1 million invested (Moseley and Max Nielson-Pincus 2009). This project could create or retain in the range of 156-348 jobs as a result of this project alone, which is significant for the small rural communities of Lakeview, Valley Falls, and Paisley.

8. Theory of Change

Strategy 1: Promote Native Vegetation

This strategy focuses on implementing preventative measures and noxious weed treatments associated with thinning and prescribed fire treatments to reduce spread and promote native vegetation.

Actions

- Share knowledge and engage landowners[1i] through mailings, meetings, workshops, phone calls, social media, and in-person discussions.
- Use the private land noxious weed inventory to assist landowners in developing land management plans[2i] that identify the priority and location for noxious weed treatments.
- Noxious weed sites are prioritized for treatment[3i].
- Identify priority areas[3i] for noxious weed treatments as guided by the LCALRI Noxious Weed Management Plan.
- Noxious weed BMPs are incorporated into thinning and prescribed fire treatments and priority noxious weed sites are treated[6i].
- Ecological, social, and economic monitoring is reported to the partnership for evaluation and adjustments as needed[8i].
- Landowners and key stakeholders are provided with a summary report via newsletter or workshop[9i].

Theory of Change

Completing a multi-year private landowner outreach and engagement effort to improve the awareness and understanding of noxious weed prevention and treatment will result in increased awareness and treatment on private lands.

- Outreach and engagement workshops will result in development of land management plans[2i] (Leavell et al. 2018) that include noxious weed prevention and treatments.
- Noxious weed treatments will result in a diversity and abundance of understory vegetation.[6e]
- A diversity and abundance of understory vegetation creates resilient vegetative conditions that are beneficial to wildlife.

Strategy 2: Strategic Thinning

This strategy focuses on thinning to restore and promote healthy ponderosa pine, mixed conifer, aspen, meadow, and shrub-steppe habitats and to set the stage for beneficial short-term and long-term maintenance with prescribed fire.

Actions

- Share knowledge and engage landowners[1i] through mailings, meetings, workshops, phone calls, social media, and in-person discussions.
- Use the private land mapping and inventory to assist landowners in developing land management plans[2i] that identify the priority and location for thinning.
- Noxious weed sites are prioritized for treatment[3i].
- Identify priority areas[5i] for thinning treatments based upon private land management plans and the USFS Crooked Mud Honey and Thomas Creek Environmental Analysis.
- Noxious weed BMPs are incorporated into thinning treatments and priority sites are treated[6i].
- Implement strategic thinning and slash treatment to reduce tree and fuel density[7i].
- Ecological, social, and economic monitoring is reported to the partnership for evaluation and adjustments as needed[8i].
- Landowners and key stakeholders are provided with a summary report via newsletter or workshop.

Theory of Change

Completing a multi-year private landowner outreach and engagement effort to improve the awareness and understanding of forest management will result in increased thinning on private lands.

- By building stakeholders in the community, the project will foster a sustainable, landowner-driven approach to forest management that will extend the life and benefits of implemented treatments[1i].
- Outreach and engagement workshops will result in development of land management plans[2i] (Leavell et al. 2018) that include thinning to restore healthy forests.
- The pace and scale of forest restoration will increase due to private landowner participation[7i] (Leavell et al. 2018).

Thinning in priority areas will protect and improve habitat supporting forest dependent wildlife[8e], increase landscape resilience to extreme fire, drought, and insect and disease[9e], and provide economic benefits to local communities[10e].

- Reducing the density of trees in dry ponderosa pine and mixed conifer habitats[1e] within priority areas will improve the growth and vigor of conifers[5e] (Hood et al. 2016) and increase understory diversity and abundance[6e] (Dodson et al. 2008).
- Thinning in dry ponderosa pine and mixed conifer forests will increase the landscape resilience to extreme fire, drought, insects and disease[9e] (Hood et. al. 2016).
- Reducing conifers and juniper in aspen to less than 20 percent will promote regeneration and multiple age classes[7e] (Swanson et al. 2010).
- Reducing conifer and juniper in meadow habitats will increase the diversity of riparian vegetation[6e] (Celis et al. 2019).
- Reducing juniper in shrub-steppe habitats will increase total understory biomass, cover, and diversity[6e] (Bates et al. 2000).
- Coordinated treatments across public and private land through the planning, implementation and monitoring process will expand options for management and create synergies that are otherwise unavailable (Hessburg et al. 2015). For example, commercial harvest on a small property[7i] may become economically viable when implemented with adjoining properties.
- Landscape-scale thinning treatments will reduce risk of wildfire[9e] to fish and wildlife habitat, water quality, and communities and improve habitat for dependent wildlife species[8e] at meaningful scales.
- Contracted work will provide economic benefits to the local communities[10e] (Moseley and Max Nielson-Pincus 2009).

Strategy 3: Prescribed Fire

This strategy focuses on re-introducing low to moderate intensity fire as a key ecological process, to maintain thinning treatments in the short- and long-term, and to re-establish the historical range in the frequency of fire.

Actions

- Share knowledge and engage landowners[1i] through mailings, meetings, workshops, phone calls, social media, and in-person discussions.
- Use the private land mapping and inventory to assist landowners in developing land management plans[2i] that identify potential opportunities for prescribed fire.
- Noxious weed sites are prioritized for treatment[3i].
- Develop a short- and long-term strategy for the location and frequency of fire across the entire landscape[4i] that would maintain the investment in thinning treatments and re-establish the historical range in the frequency of fire.
- Identify priority areas[5i] for prescribed fire treatments based upon private land management plans and the USFS Crooked Mud Honey and Thomas Creek Environmental Analysis.
- Noxious weed BMPs are incorporated into prescribed fire treatments and priority sites are treated[6i].
- Implement first entry prescribed fire to reduce small diameter tree and fuel density[7i].
- Ecological, social, and economic monitoring is reported to the partnership for evaluation and adjustments as needed[8i].
- Landowners and key stakeholders are provided with a summary report via newsletter or workshop.

Theory of Change

Completing a multi-year private landowner outreach and engagement effort to improve the awareness and understanding of fire ecology will result in use of prescribed fire on private lands.

- Outreach and engagement workshops will result in development of land management plans[2i] (Leavell et al. 2018) that include opportunities for prescribed fire.
- By building stakeholders in the community, the project will foster a sustainable, landowner-driven approach to forest management that will extend the life and benefits of implemented treatments[1i].
- The pace and scale of forest restoration will increase due to private landowner participation[7i] (Leavell et al. 2018).

Re-introducing low to moderate intensity fire as a key ecological process with first entry prescribed fire, will protect and improve habitat supporting forest dependent wildlife[8e] and increase landscape resilience to extreme fire, drought, and insect and disease[9e].

- Prescribed fire will increase understory diversity and abundance[6e] (Dodson et al. 2008).
- Prescribed fire in dry ponderosa pine and mixed conifer forests will increase the landscape resilience to extreme fire, drought, insects and disease[9e]. (Hood et. al. 2016).
- Prescribed fire will promote aspen regeneration and multiple age classes[7e] (Swanson et al. 2010).
- Coordinated treatments across public and private land through the planning, implementation and monitoring process will expand options for management and create synergies that are otherwise unavailable (Hessburg et al. 2015). For example, the opportunity for prescribed fire on private lands[7i] as an ecological process (Leavell et al. 2018) may become an option for landowners through coordinated efforts with adjacent federal or state agencies.
- Landscape-scale prescribed fire treatments, in combination with thinning, will reduce risk of wildfire[9e] to fish and wildlife habitat, water quality, and communities, and improve habitat for dependent wildlife species[8e] at meaningful scales.

9. Progress Monitoring Framework

The Lake County Resources Initiative (LCRI) has a long-standing monitoring program that began in 2002. Each year, a trained crew leader with a crew of 6-8 high school and college students collect data that informs management on USFS lands. The work is guided by a monitor-ing plan titled the Lakeview Collaborative Forest Landscape Restoration (CFLR) Project Monitor-ing Plan (Markus et al. 2014). Using the CFLR Monitoring Plan as a guide, in 2021 the KLFHP finalized the Klamath-Lake Forest Health Partnership All-Lands Monitoring Plan for both private and USFS lands for the LCALRI project which include ecological, social, and economic monitoring. The LCRI monitoring crew will implement the monitoring following established monitoring protocols, complete annual reports, report results to the partnership, and recommend adjustments to implementation as needed. The Ecosystem Workforce Program (EWP) will oversee data management, analysis, and reporting. This monitoring will be implemented with a combination of USFS CFLR funding for monitoring on USFS lands, complimented with a Title II grant that was awarded to LCRI in 2021 for monitoring on private lands.

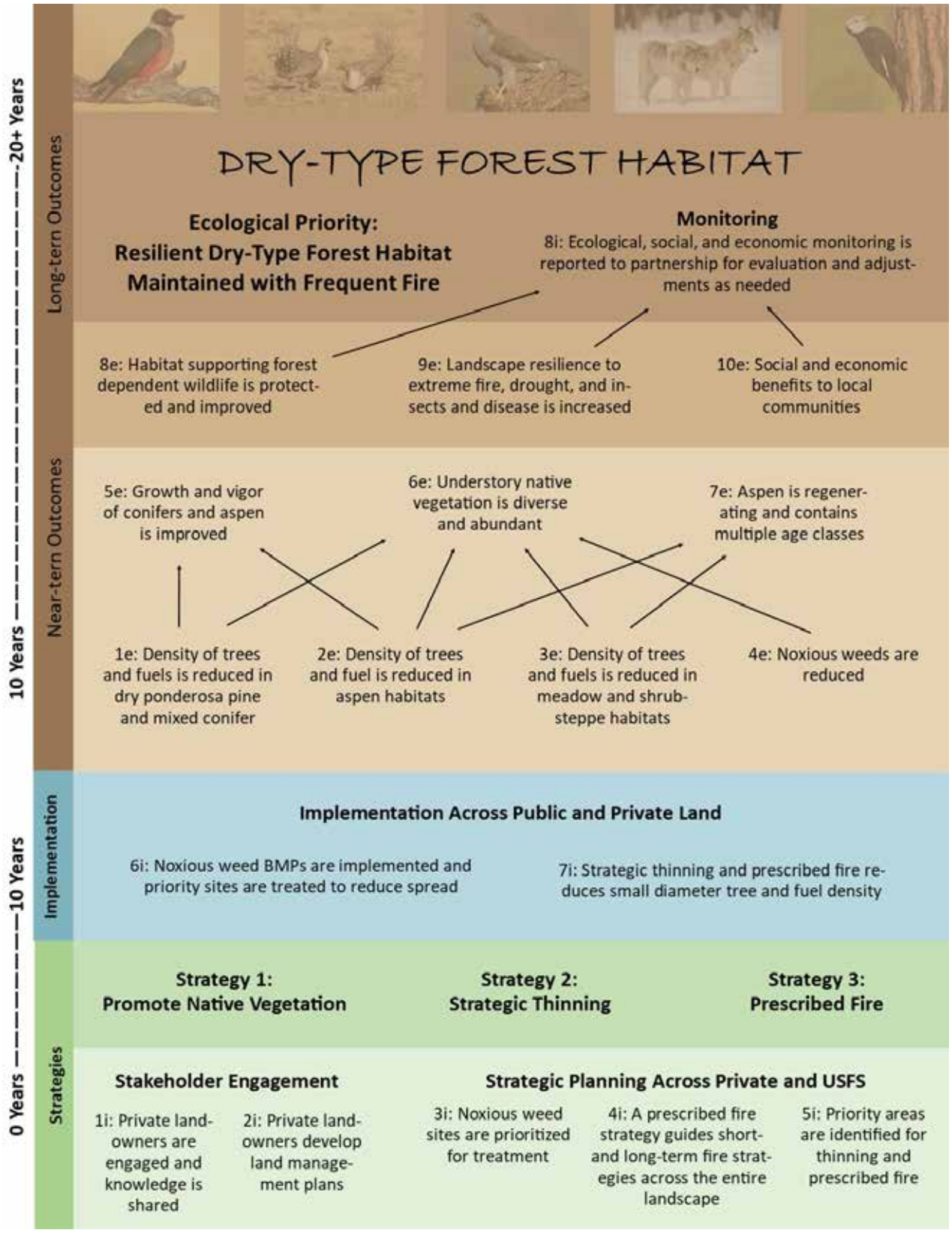
Table 6. Outputs

Implementation Results (Output)	Objective	Metric
1i Private landowners are engaged and informed	By 2024, 75% of landowners within the project area contacted and informed	Number of engaged landowners
2i Private landowners develop land management plans	By 2024, 50% of landowners will have a land management plan	Number of land management plans
3i A noxious weed management plan informs preventative and treatment plans	By 2024, the noxious weed sites are prioritized for treatment	Management plan completed
4i A prescribed fire strategy guides short- and long-term fire strategies	By 2024, a coordinated long-term prescribed fire strategy across public and private land is completed	Strategy completed
5i Priority areas are identified for thinning and prescribed fire	By 2024, priority areas are identified and mapped	Priority areas mapped
6i Noxious weeds BMPs are implemented and priority sites are treated to reduce spread	By 2024, BMPs for preventative measures are incorporated into thinning and prescribed fire treatments and priority acres are treated	Implementation of BMPs Acres of noxious weeds treated
7i Thinning and prescribed fire reduces small diameter tree and fuel density	By 2030, approximately 40% of priority conifer, aspen, meadow, and shrub-steppe habitats are thinned	Acres thinned
	By 2030, prescribed fire applied on 40% of area identified for prescribed fire in the North Warner Project	Acres prescribed burned
	By 2040, prescribed fire applied on 60% of the area identified for prescribed fire in the LCALRI area	Acres prescribed burned
8i Ecological, social, and economic monitoring is reported to the partnership for evaluation and adjustments as needed	The partnership will review the annual monitoring report and make adjustments to implementation as needed	Annual review of monitoring results
	By 2030, analysis and summary report provided to all participating landowners and key stake-holders	Production of report

Table 7. Ecological and economic outcomes

Ecological and Social Outcomes	Outcome	Metric
1e Density of trees and fuels is reduced in dry ponderosa pine and mixed conifer habitats	By 2030, tree stocking in treated areas is comparable to the natural range of variability and surface fuels are reduced	Stand structure (tree species, density, and basal area) Fuel measurements
2e Density of trees and fuels is reduced in aspen habitats	By 2030, shading and competition by conifers will be reduced to less than 20% in treated aspen habitats	Stand structure (tree species, age, and density) Conifer canopy closure
3e Density of trees and fuels is reduced in meadow and shrub-steppe habitats	By 2030, encroaching conifers and junipers will be reduced in treated meadow and shrub-steppe habitats	Stand structure (tree species and density)
4e Noxious weeds are reduced	By 2030, priority weed sites are treated as recommended in the noxious weed management plan	Acres of weeds treated
5e Growth and vigor of conifers and aspen is improved	By 2030, conifers and aspen within treat-ed stands show improvement in tree growth and vigor	Tree diameters and aspen percent crown Presence of insect or disease
6e Understory native vegetation is diverse and abundant	By 2030, understory vegetation will show increases in abundance and diversity	Understory vegetation diversity and abundance
7e Aspen is regenerating and contains multiple age classes	By 2030, aspen within treated stands show evidence of regeneration and improved vigor	Aspen age class and density
8e Habitat supporting forest dependent wildlife is protected and improved	By 2030, habitat structure and function nec-essary to support forest dependent species maintained or improved for Oregon Conser-vation Species	Acres if conifer, aspen, meadow, and shrub-steppe habitats treated
9e Landscape resilience to extreme fire, drought, and insect and disease is increased	By 2030, modeled fire risk across the project area is reduced by 50%. By 2040, modeled fire risk across the project area is reduced by 75%.	Modeled wildfire hazard
10e Social and economic benefits to local communities	By 2030, there will be realized social and economic benefits to Lakeview, Valley Falls, and Paisley	Social and economic impact monitoring

Figure 3. Results Chain



10. Adaptive Management

As noted in the document Adaptively Managing Restoration Initiatives a Guide for Oregon Watershed Enhancement Board's Focused Investment Partnership Program (Warren et al.), the fundamental principles of adaptive management are to engage key partners, plan, implement, evaluate, adjust, and institutionalize adaptive management. This Strategic Action Plan clearly identifies engagement with key partners, provides a strategic plan for implementation, and includes a strategy for monitoring to allow for evaluation and adjustments in implementation as needed. Monitoring will be implemented across public and private lands following the protocols identified in the newly published Klamath-Lake Forest Health Partnership All-Lands Monitoring Plan. This monitoring plan has adaptive management principles built in by identifying a monitoring process that includes gathering data, analyzing results, sharing and learning from the results, and making adjustments to the process or implementation as needed.

The KLFHP is already operating through an adaptive management framework. The KLFHP has learned a great deal from the planning and implementation of the North Warner Project as documented in Leavell et al. (2018). This, along with the expected lessons learned from implementing prescribed fire, is already being applied through an adaptive management framework in the Thomas Creek Project. For example, the private land mapping and assessment effort used in the North Warner Project was modified for the Thomas Creek Project. Adjustments were made to the data collection protocols to allow for a better transition into implementation, and data collection was also improved by using the ESRI Collector application for GIS allowing for easier sharing of data between agencies. In turn, the Lake County CWMA can easily assess noxious weed sites documented within the project area. There are also many other lessons learned about treatment prescriptions, working with contractors, formation of agreements between partners, etc. that will allow for more effective and efficient planning and implementation in the Thomas Creek Project.

"The KLFHP has learned a great deal from the planning and implementation of the North Warner Project...This, along with the expected lessons learned from implementing prescribed fire, is already being applied through an adaptive management framework in the Thomas Creek Project."

As planning and implementation in the LCALRI continues, annual review of treatments, location of treatments, and monitoring data will provide partners with the treatment pace and placement relative to values at risk. Pre- and post-treatment implementation data will illustrate treatment effectiveness, thinning stands to target densities, and transitioning between fuel models and successional states. Prescriptions and/or location of treatments may be adjusted if needed to meet objectives as informed by ongoing landscape prioritization by the partners, emerging monitoring data collected by Lake County Resources Initiative, or new science. Prescribed fire implementation may trigger a review of the burning objectives, operational communications, and ignition patterns. The KLFHP will continue with regular meetings, networking with science colleagues, community groups, and professional conferences, and incorporating ongoing individual professional development.

11. Sustainability

The KLFHP fully embraces the recent recommendations identified in the recent USDA Forest Service report titled Toward Shared Stewardship across Landscapes: An Outcome Based Strategy (2018). As recommended in this report, the KLFHP is already working together with partners and stakeholders across shared landscapes to set goals and priorities, to implement science-based forest restoration, and to share the responsibilities of reducing the potential of high severity wildfire; capitalizing on all agreements, authorities and active management tools; stepping up the use of prescribed fire in concert with thinning; reintroducing the right kind of fire at the right times in the right place; and applying a risk based response to wildfire. In many ways, the KLFHP is a leader in the state of Oregon for actively managing through shared stewardship as outlined in the Shared Stewardship in Klamath and Lake Counties Memorandum of Understanding, and each agency and partner involved in the KLFHP is committed to continuing this high priority work.

"...each agency and partner involved in the KLFHP is committed to continuing this high priority work."

Through the success of the North Warner and Thomas Creek Projects in gaining grants for implementation, as well as support from agency leadership, the partnership has added capacity to sustain these programs. Newly hired positions include a project manager with the LCUWC to manage and implement forest health projects, a trained forester to manage the overall implementation on private lands within the LCALRI landscape with ODF, a Cohesive Strategy Coordinator to coordinate programs across public and private for the USFS, and an OSU Extension Fire Specialist to assist with landowner outreach and engagement and to advance the use of prescribed fire for OSU Extension. Local efforts are consistent with a study by Nielsen-Pincus and Mosely that suggests that a sustained investment in restoration creates both new local organizational capacity in watershed councils and other community-based partners and business opportunities especially in rural Oregon (2013).

The core partners in the KLFHP have a proven track-record and commitment to sustaining these types of efforts and successfully executing active management with funding from multiple federal, state, and private funding sources. There are multiple agreements in place between all partners that can be used into the future to complete work and/or transfer funding as needed. The partners coordinate at monthly KLFHP meetings and more frequently at project level sub-committee meetings, so projects are always moving forward at a surprisingly rapid pace. For example, in a three-year time frame, the partnership has a proven track record of going from planning to landowner outreach to grant writing to implementation of several thousand acres of dry forest restoration treatments. With much pride, the KLFHP will continue to focus their actions toward on-the-ground treatments to accomplish ridgetop-to-ridgetop restoration in coordination between public and private lands.

The Partnership has added capacity to sustain these programs

LCUWC Forest Health Project Manager
ODF Natural Resource Specialist 2
USFS Cohesive Strategy Coordinator
OSU Extension Fire Specialist Extension Agent

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13. Partnership Certification

I certify that this strategic action plan is a true and accurate presentation of the proposed work and that I am authorized to sign as the Partner Representative or Co-Representative(s).

9-20-23
Name: Autumn Muir Date
Title: Project Leader
Lae County Umbrella Watershed Council

9/22/2023
Name: Leigh Ann Vradenburg Date
Title: Secretary
Klamath Lake Forest Health Partnership

9-20-23
Name: Amy Markus Date
Title: Cohesive Strategy Coordinator
Fremont-Winema National Forest

9-22-23
Name: Abby Wicks Date
Title: District Conservationist
Natural Resources Conservation Service

9-20-23
Name: Kevin Burdon Date
Title: Interim Unit Protection Forester
Oregon Department of Forestry

9-21-23
Name: Ariel Cowan Date
Title: Regional Fire Specialists, Central Area
Oregon State University Extension Service

9-20-23
Name: Johnathan Van Roekel Date
Title: Director
Lake County Resources Initiative

9-20-23
Name: Jason Jaeger Date
Title: Project Leader
Lake County Cooperative Weed Management Area

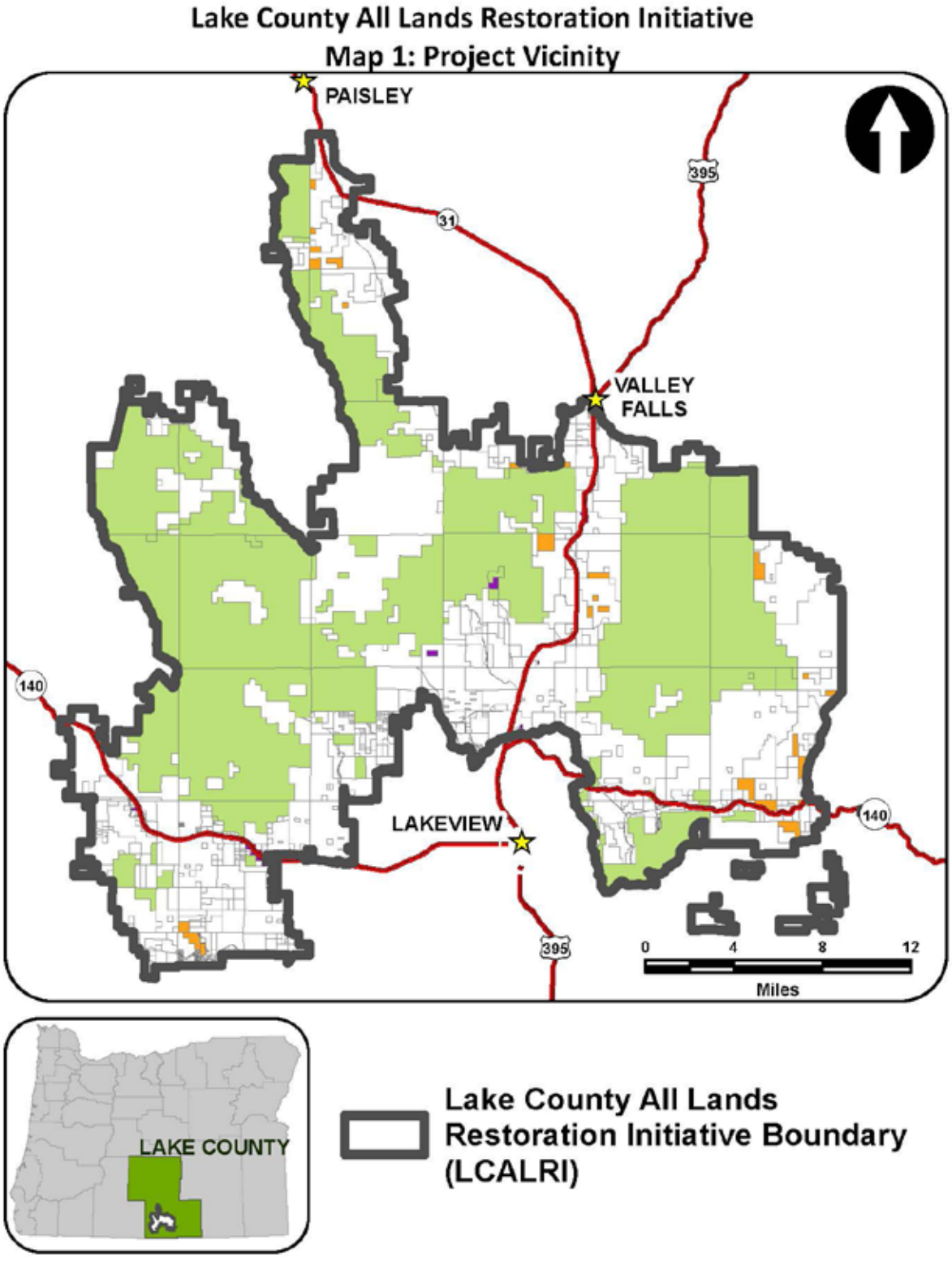
09/20/23
Name: Mike Moore Date
Title: Regional Habitat Biologist
Oregon Department of Fish and Wildlife

10/5/23
Name: Pete Caligiuri Date
Title: Oregon Forest Strategy Director
The Nature Conservancy

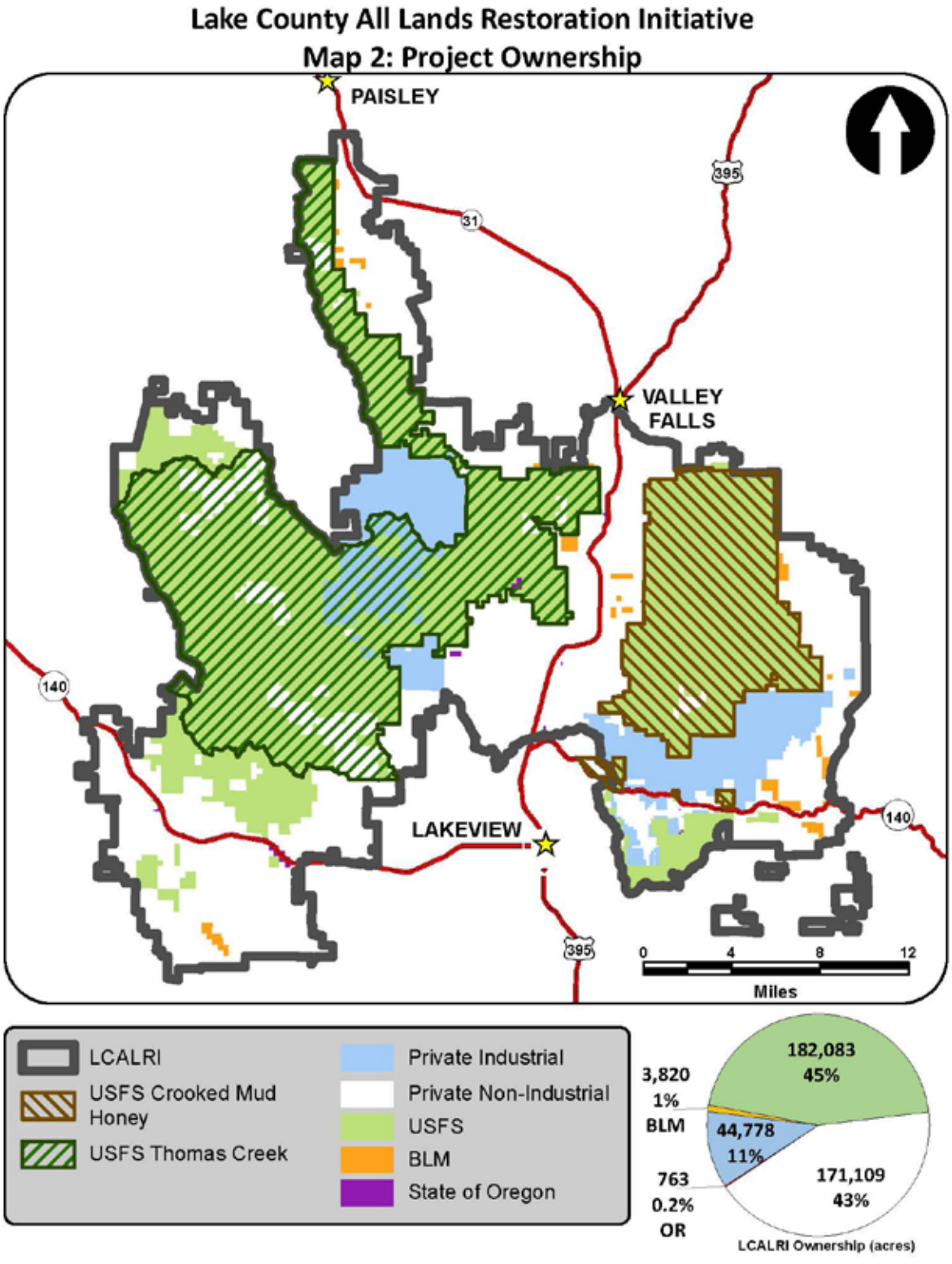
09/22/2023
Andrew Gray Date
Executive Director, Sponsored Projects Services
University of Oregon

14. Maps

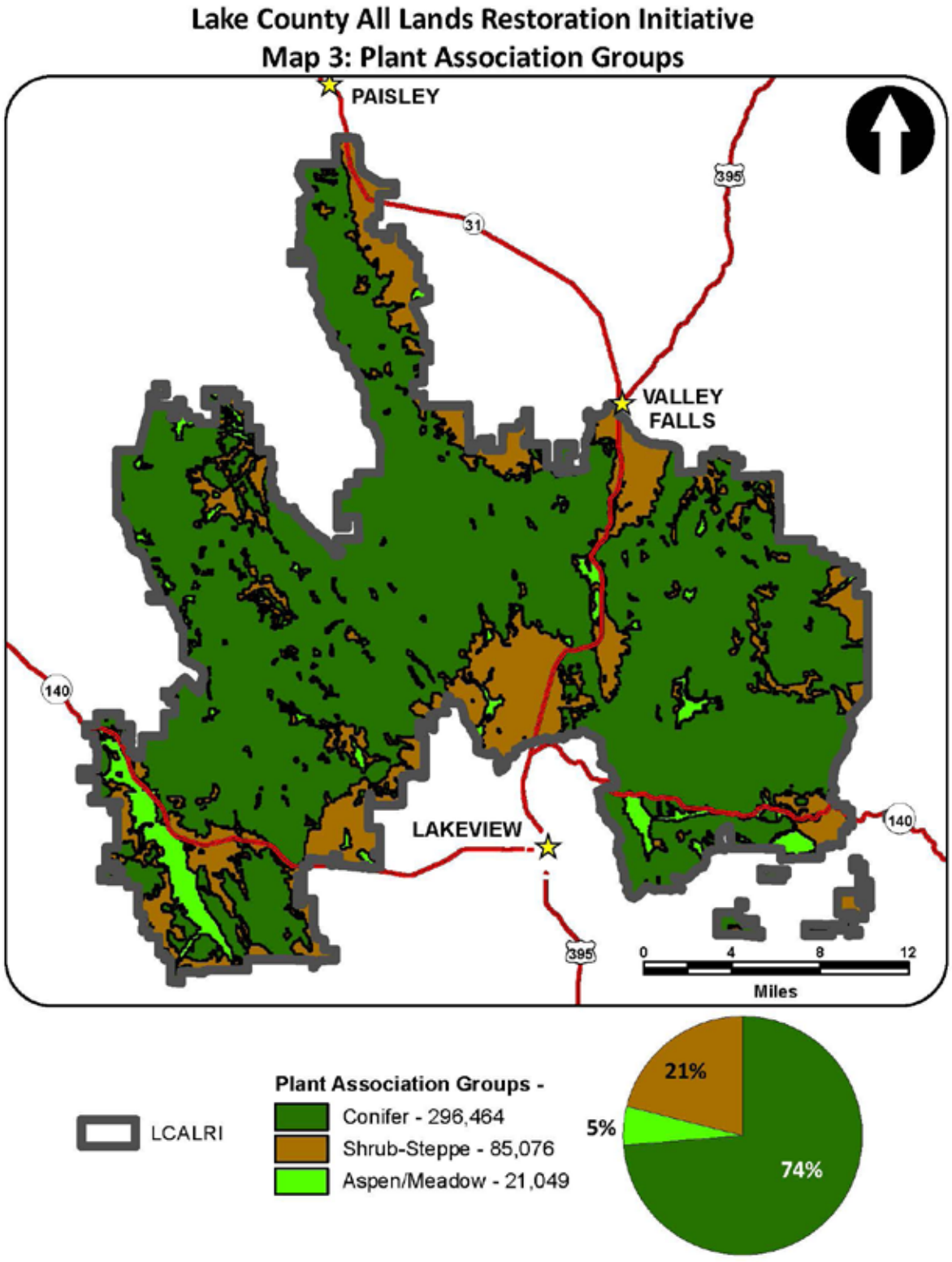
Map 1. Project Vicinity



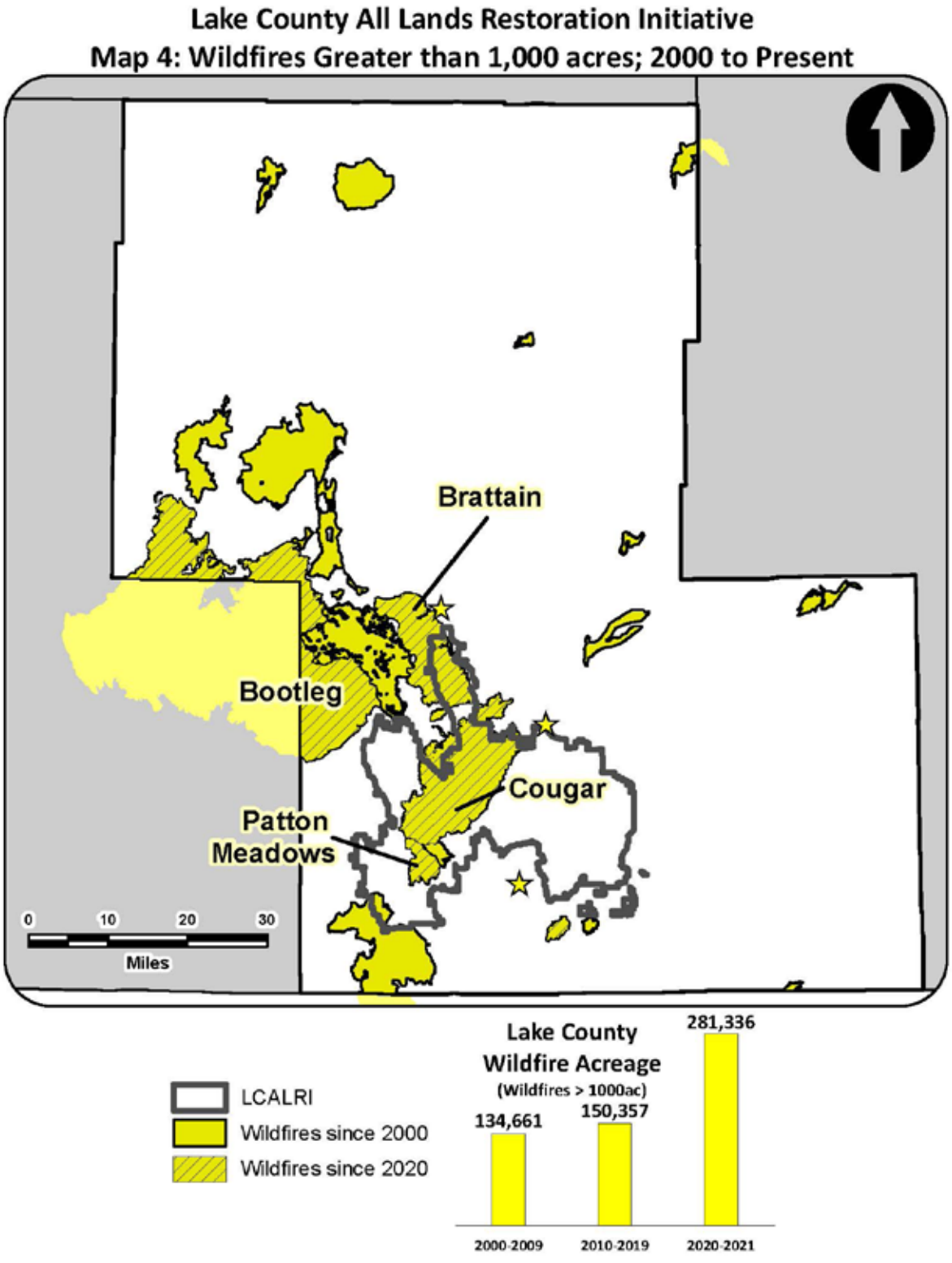
Map 2. Project Ownership



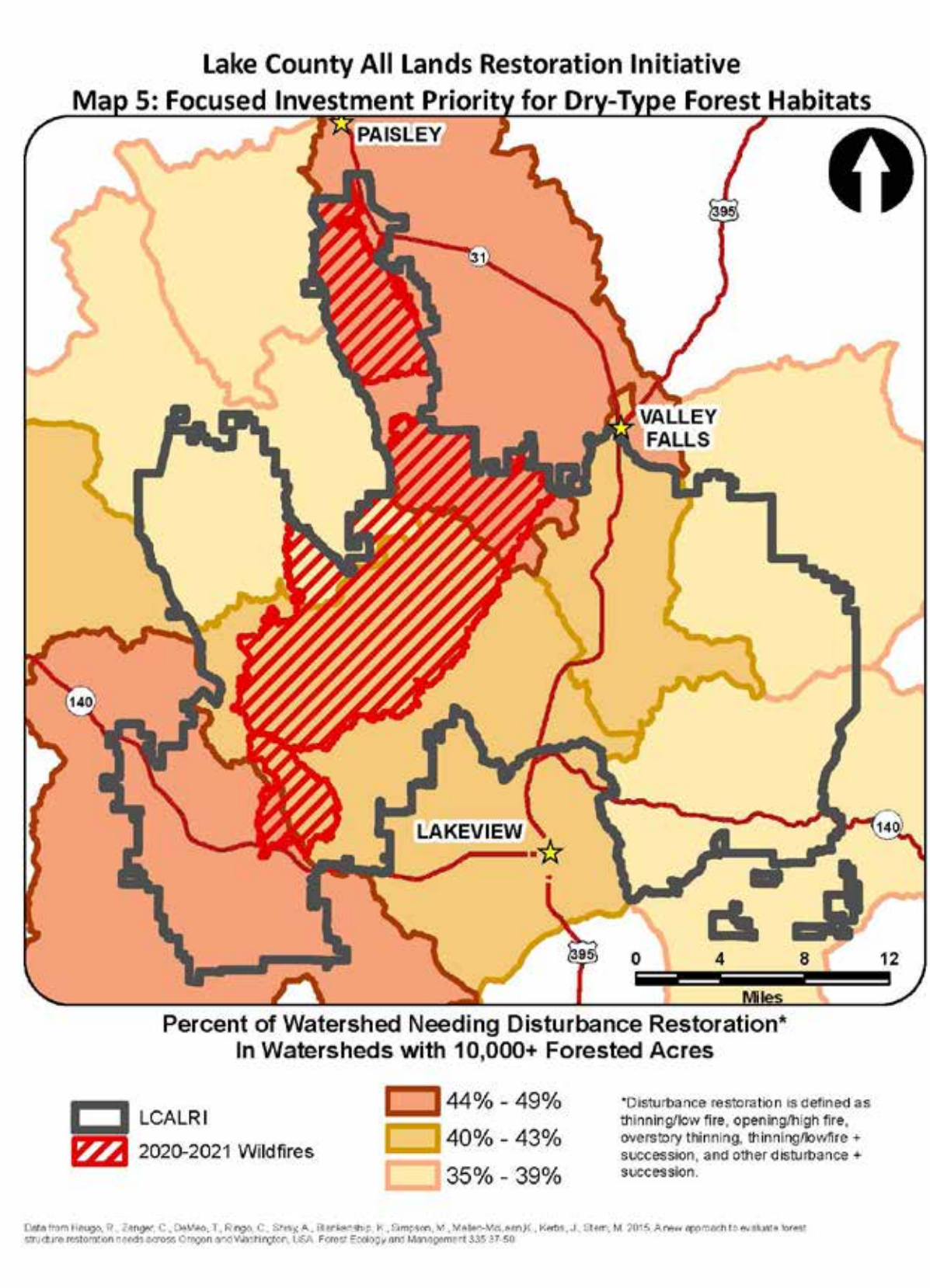
Map 3. Plant Association Groups



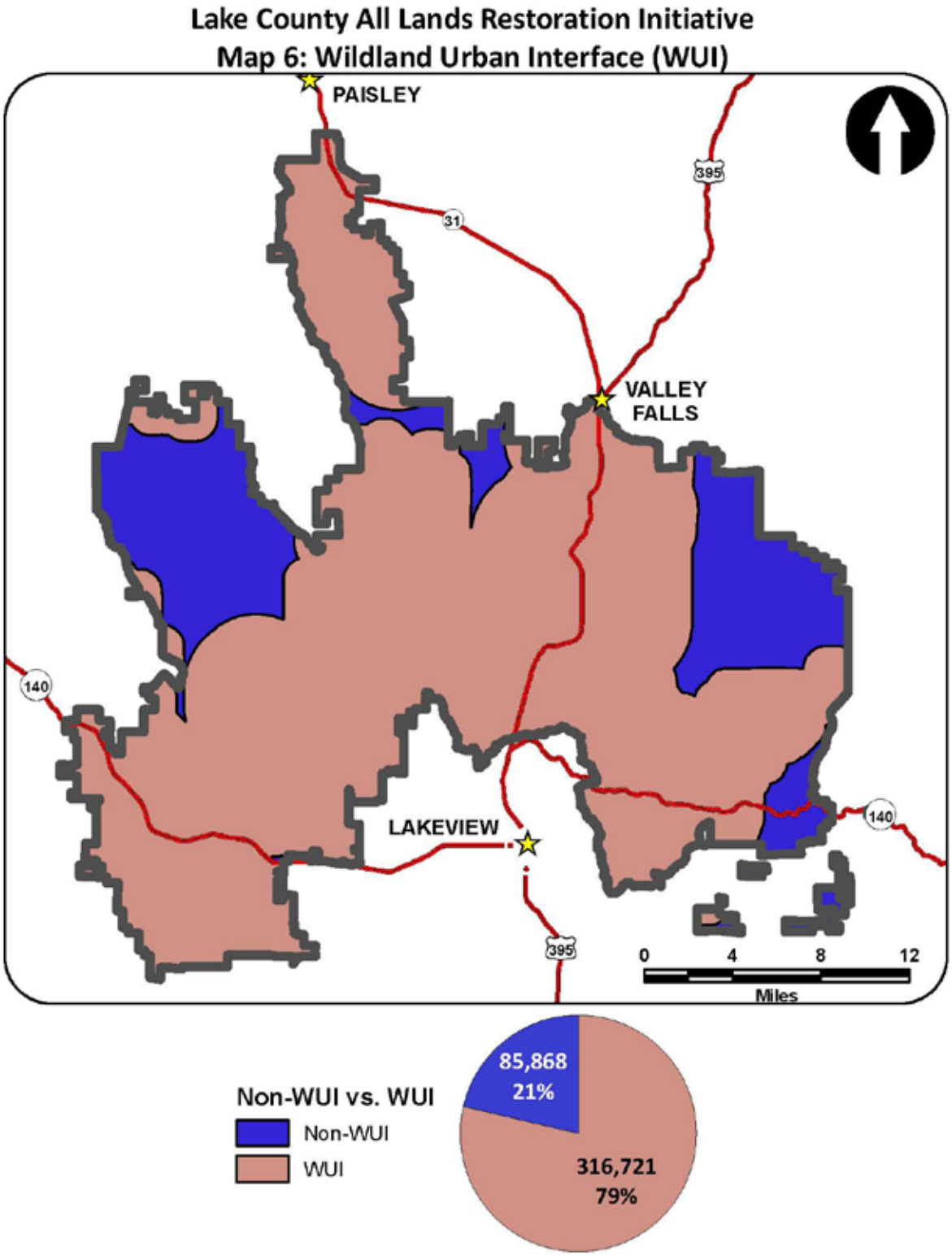
Map 4. Wildfires Greater than 1,000; 2000 to Present



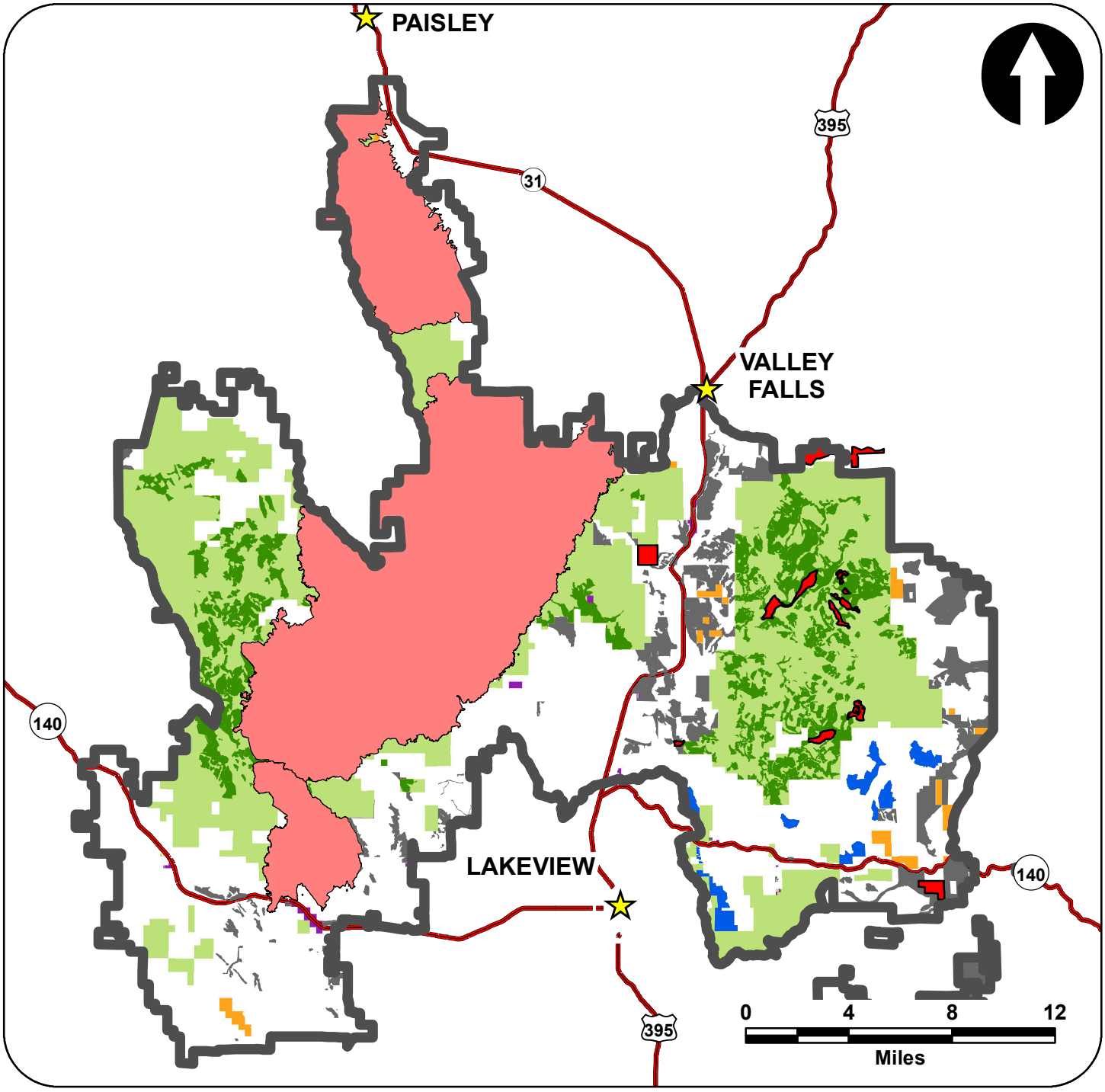
Map 5. Focused Investment Priority for Dry-Type Forest Habitats



Map 6. Wildland Urban Interface (WUI)



Lake County All Lands Restoration Initiative
Map 7: Completed & In-Progress Treatments



Treatments: Acres

LCALRI

2020-2021 Wildfires

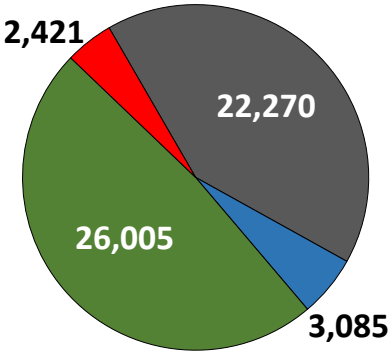
Prescribed Fire

Thinning and Pile Burning

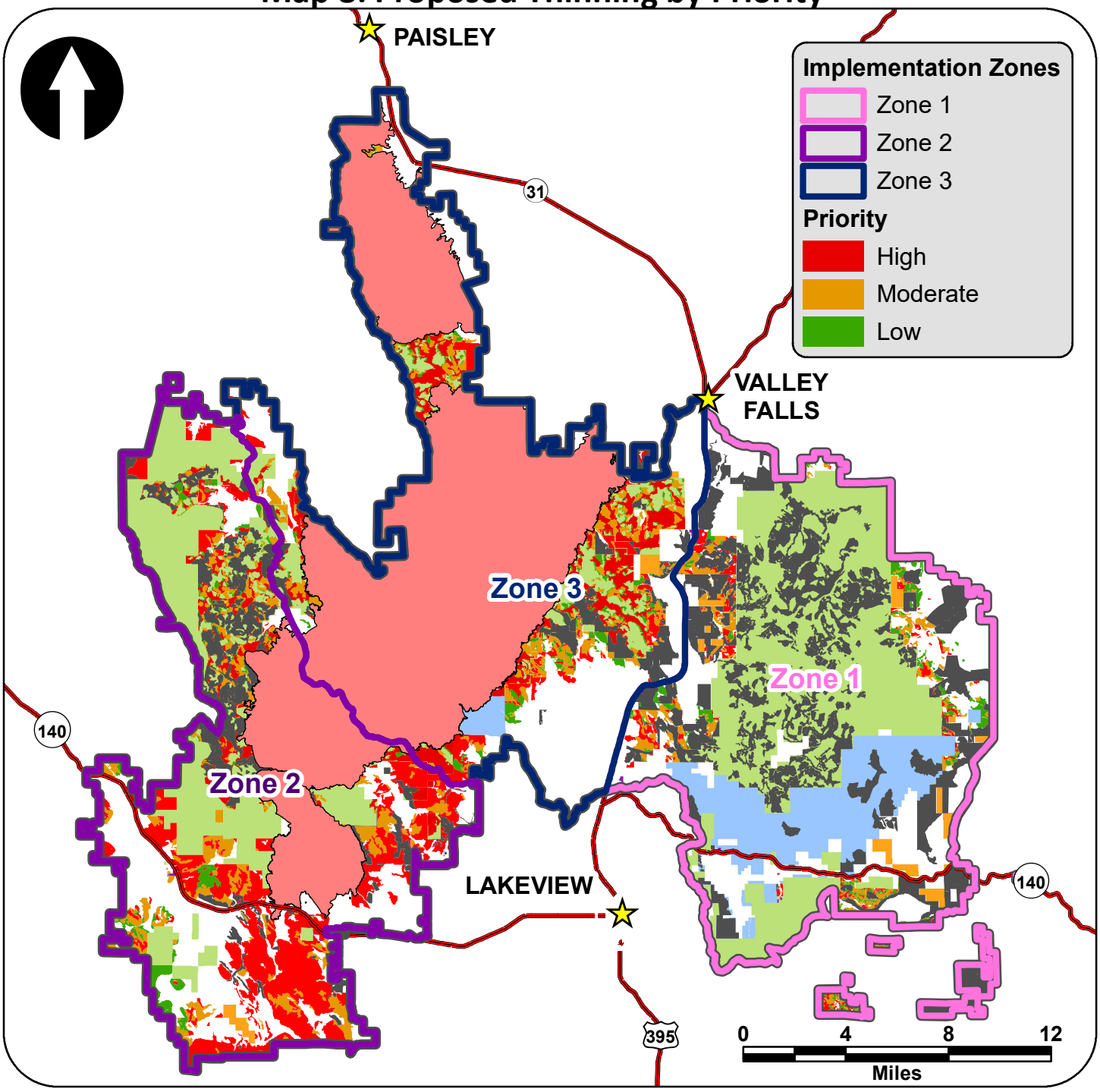
Private Non-Industrial

Private Industrial

USFS

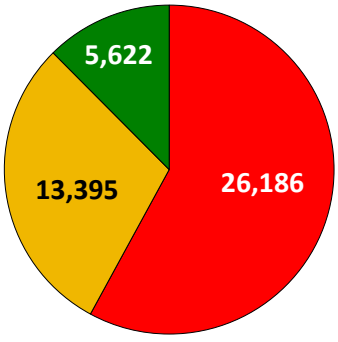


Lake County All Lands Restoration Initiative
Map 8: Proposed Thinning by Priority*

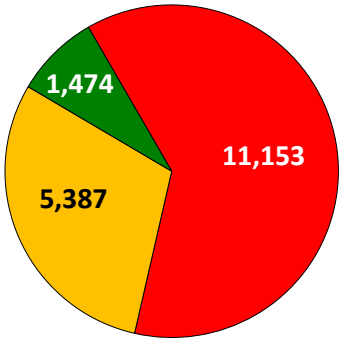


*Priority acreage calculations exclude those assesd within fire perimeters

LCALRI
2020-2021 Wildfires
Completed & In-Progress Treatments (51,360 acres)

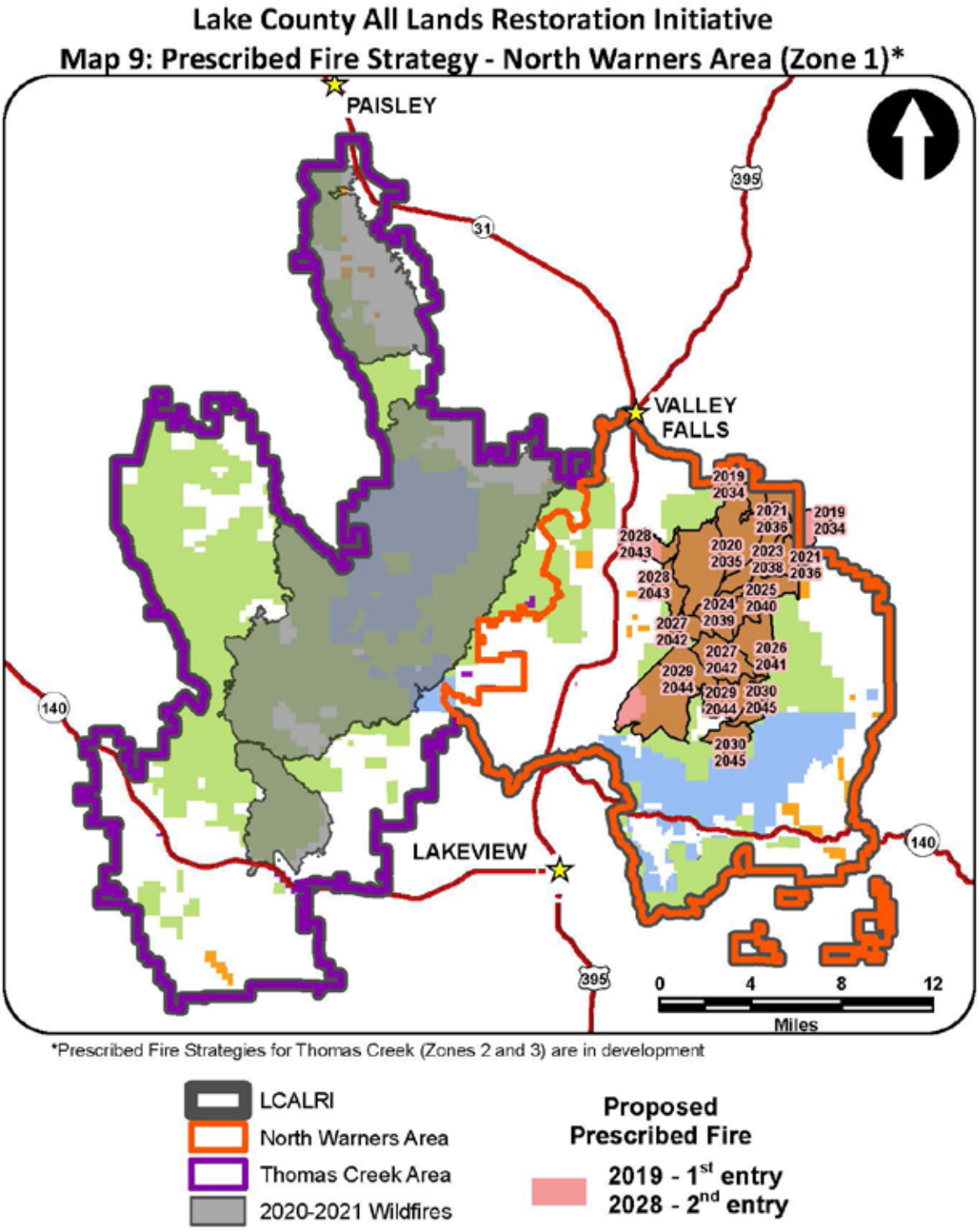


Thinning Priority Acres (Private Land)

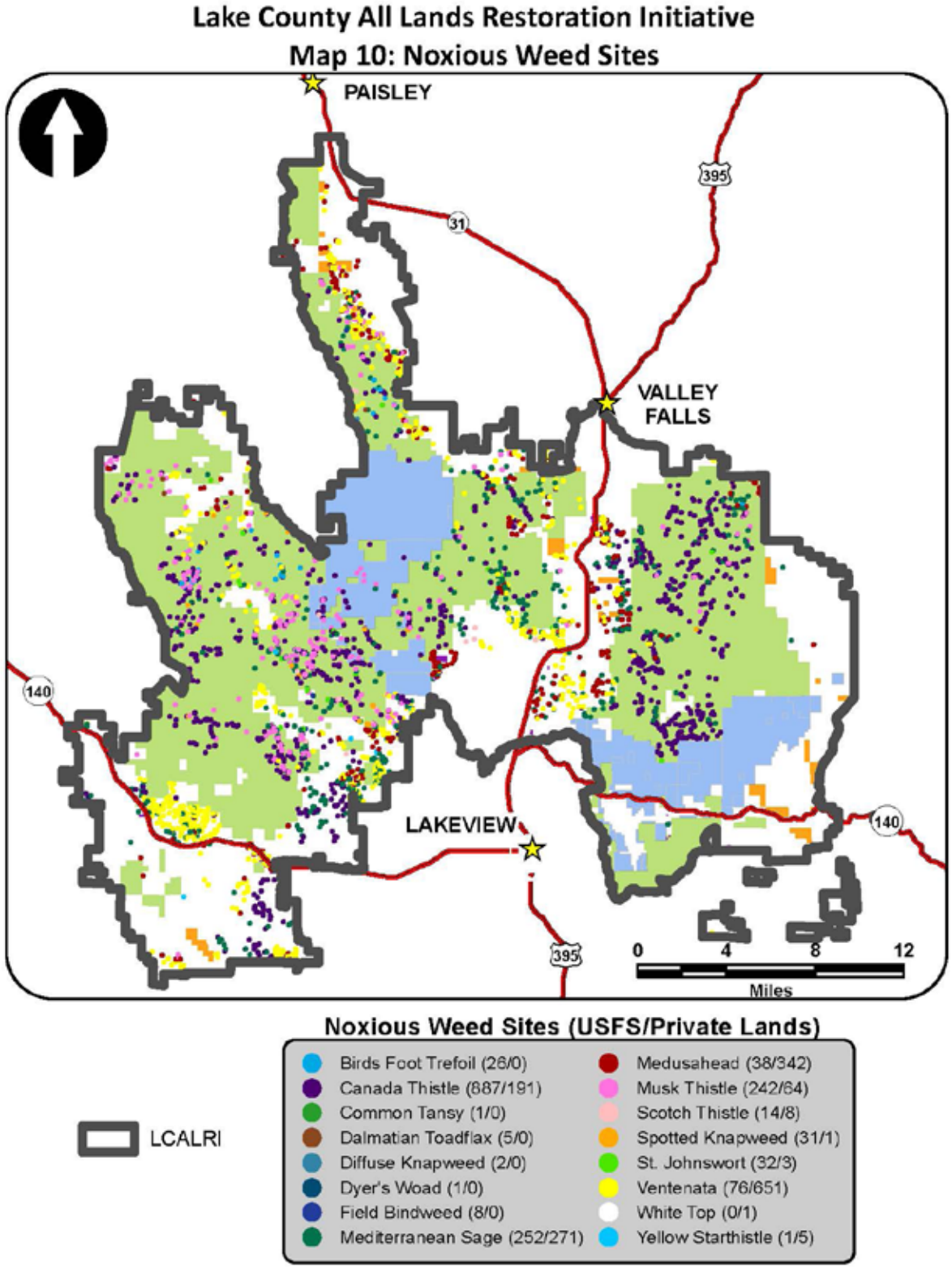


Thinning Priority Acres (USFS Land)

Map 9. Prescribed Fire Strategy - North Warners Area (Zone 1)

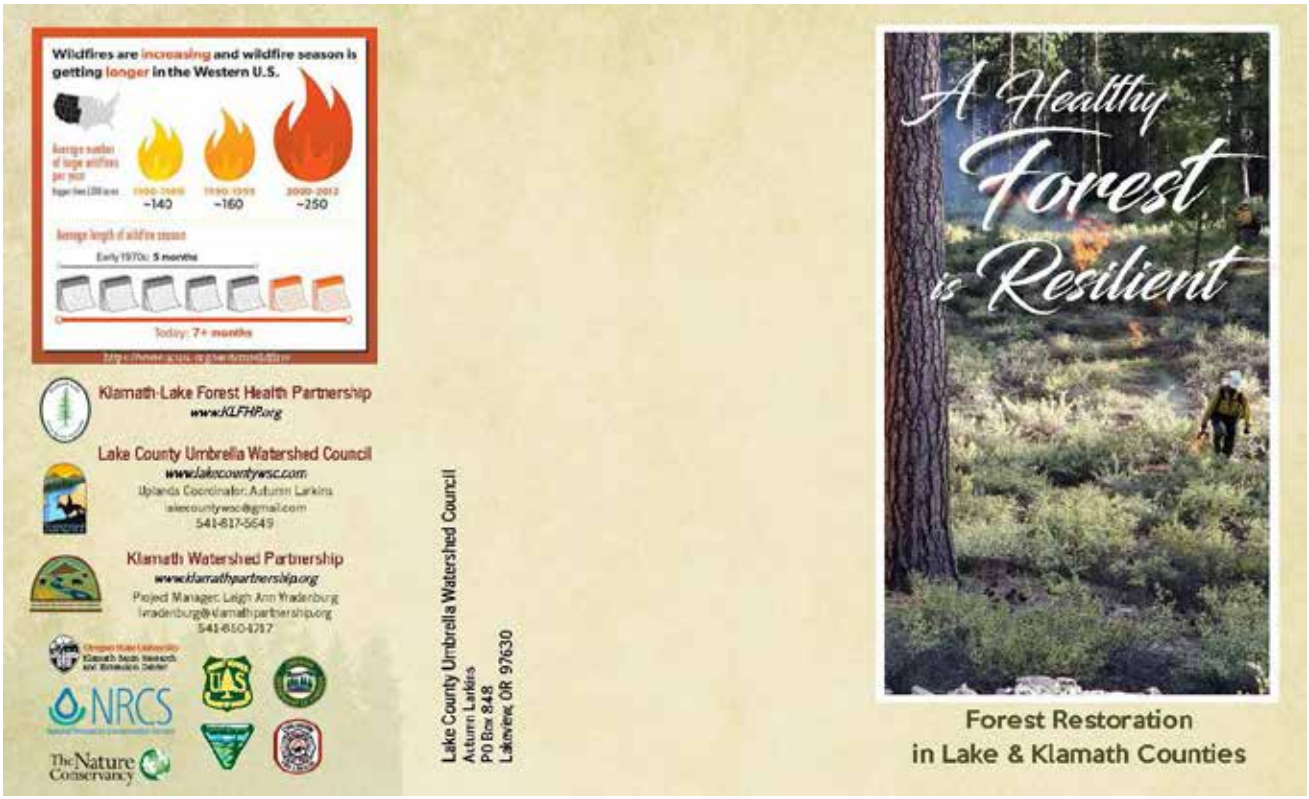


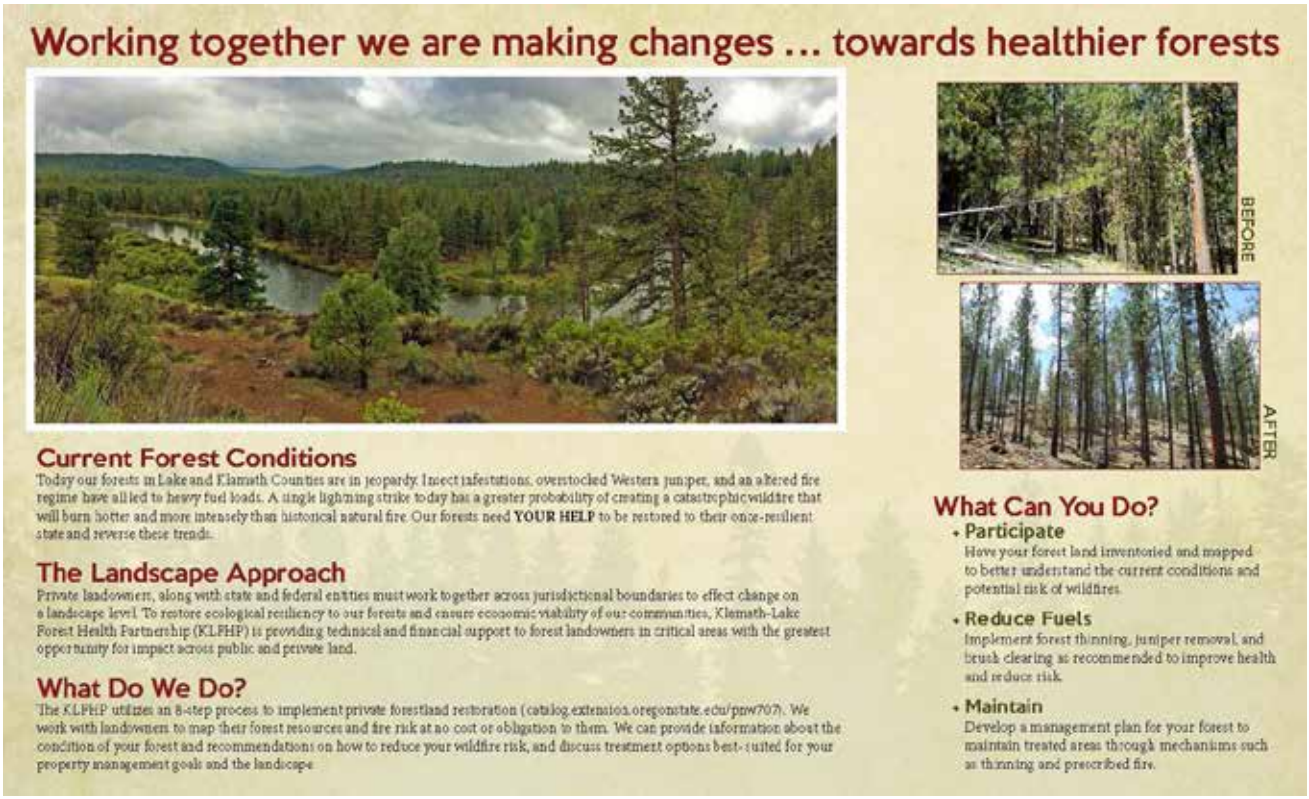
Map 10. Noxious Weed Sites



15. APPENDIX A.

Forest Resiliency Brochure for Private Landowners





16. APPENDIX B.

Example of Newsletter for Private Landowners

Lake County Umbrella Watershed Council
P.O. Box 848
Lakeview, OR 97630
www.lakecountywsc.com

March 19, 2020

Dear Property Owner,

The Lake County Umbrella Watershed Council is reaching out to you once again in regards to the Thomas Creek Watershed Forest Health Project (TCWFHP), as your property has been identified within this project boundary. The goal of the TCWFHP is to initiate a landscape-level forest management effort aimed at improving forest health conditions that will reverse the current fire trend and increase ecosystem resiliency.

Update:

Outreach began summer 2019 with contacting the 172 different private land owners with ownership greater than 10 acres. Efforts included mailings, phone calls, and in-person meetings to explain the scope of the project and the unique opportunity for each property owner to improve their forest land and reach their restoration goals and objectives. By September, 90 of the 172 landowners (52%) have confirmed their interest in future restoration work on their land.

Mapping began in spring 2019 and was validated by a crew hired through an Oregon Watershed Enhancement Board (OWEB) grant to conduct surveys and inventory forest characteristics on the ground. Permission to access was received by property owners where the crews could work to obtain overstory and understory cover type, stand density, and fuel loading, along with location of invasive weeds, springs, aspen, and mountain mahogany. The information gathered was compiled to create priority area maps for resource managers and landowners (see enclosed map). By October approximately 46,000 acres of private forest land has been mapped and assessed for restoration needs.

Next Steps:

With mapping efforts close to completion, the Lake County Umbrella Watershed Council (LCUWC) would like to extend a big THANK YOU to those who have participated and let you know that the information gathered will provide valuable data as we pursue future funding for restoration. For those of you who allowed us to map and inventory your property we are in the process of making your individual landowner map packets and will be holding a workshop in the late summer/early fall to review these for you and also provide you with a template for producing your own land management plan.

Currently, LCUWC and other partners are also working towards the application of a substantial OWEB Focused Investment Partnership (FIP) grant due in June 2020. We are calling this grant the Lake County All Lands Restoration Initiative which is the North Warner and Thomas Creek Projects combined. While the Thomas Creek Project is at the beginning phases of planning, the North Warner Project is moving into the maintenance stage with the use of prescribed fire. If awarded, this grant will provide money to restore the areas identified through the 2019 assessment in the Thomas Creek Watershed, with the goal to start the first phase of implementation in 2021.

Meanwhile we would like to continue to focus on landowner outreach, education and engagement for those who have yet to sign up. For this type of restoration treatment to be most effective the entire landscape needs to be within the scope of treatment; this includes federal, state and private lands in the Thomas Creek Watershed. Just as wildfire crosses jurisdictional boundaries, so should treatment efforts. Treatment on your land is at your discretion, taking your goals and objectives into account where we will work together throughout this process.

Project partners include the Fremont Winema National Forest, Oregon Department of Forestry, Natural Resource Conservation Service, Oregon Department of Fish and Wildlife, Oregon State University Extensions, and members of the Klamath- Lake Forest Health Partnership.

More Information:

Check out the Lake County Umbrella Watershed Council's website: www.lakecountywsc.com or the Klamath-Lake Forest Health Partnership's website: www.klfhp.org

Please contact us if you are interested in being a part of this exciting opportunity to positively impact your forestland and help improve the health and condition of the forest on a landscape level. Together we can make a significant impact!

THOMAS CREEK WATERSHED FOREST HEALTH PROJECT

A brief history of Partnership Collaboration: funding pursuits and on the ground results:

Project Manager-Uplands
Autumn Larkins, 541.817.5649
lakecountywsc@gmail.com

ProjectManager-Stream &Riparian
Brandi Neider, 541.219.0493
bdneider23@gmail.com

Program Manager, Fiscal Administrator
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