

Klamath Siskiyou Oak Network Strategic Conservation Action Plan

Version 1.0

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Technical Authors: John D. Alexander and Caitlyn Gillespie

Contributing Authors: Sara Evans-Peters and Belinda Brown



Conserving oak habitats on private and public lands
in southern Oregon and northern California

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1. Introduction

The Klamath Siskiyou Oak Network (KSON) is a regional collaboration that works to conserve oak ecosystems on private and public lands in southern Oregon and northern California. KSON is striving to meet continental and regional conservation priorities in one of North America's most significant biodiversity hotspots and climate refugia. This Strategic Action Plan (SAP) outlines specific conservation foci for KSON over the short (6 year), medium (12 year), and long (30 year) term. We used the Open Standards for the Practice of Conservation (CMP 2020) process to develop this plan. This process served as a collaborative framework to:

- Describe and map four oak ecosystem *targets* (Oak Savanna, Oak Chaparral, Oak Woodland, and Oak Conifer)
- Choose *key ecological attributes (KEAs)* and *indicators* that further describe and measure the condition of our targets at both landscape and local scales
- Identify and rank the threats that stress and degrade aspects of the four oak targets
- Use the KEAs to assess the current and desired future status of the targets
- Develop and prioritize a combination of strategies that will be implemented to reduce the threats and improve the status of the targets
- Visualize how these strategies will reduce threats and change the status of the targets with theory of change *conceptual models* (i.e., results chains)
- Prioritize conservation focus areas based on occurrence, condition, and configuration of the targets; occurrence of threats; and land ownership
- Specify short-term *outputs* and longer-term *outcomes* that will be used to measure the effectiveness of conservation actions and adapt KSON's approach as the SAP strategies are implemented.
- Develop a long-term monitoring plan with protocols using KEA's for assessing status and trends of each of the four ecosystem targets.

Here, strategic planning elements are presented as a road map for achieving continued and accelerated oak woodland conservation in southern Oregon and northern California. This plan focuses on four oak woodland targets – Oak Savanna, Oak Chaparral, Oak Woodland, and Oak Conifer. Collectively, the conservation of these targets is intended to ensure the conservation of all native species associated with deciduous oak (e.g., Oregon White Oak and California Black Oak) ecosystems within the KSON geography.

This plan recognizes the importance of indigenous cultures and their land stewardship. The oak ecosystems of southern Oregon and northern California were shaped by traditional, time-tested, ecologically appropriate and sustainable indigenous cultural practices. As such, the conservation of these systems must be guided by *ecocultural restoration* approaches and *traditional ecological knowledge (TEK)*. This guidance will ensure the survival of both indigenous ecosystems and cultures.

In summary, we have prioritized seven strategies that will enable us to work more effectively by increasing the partnership's capacity (hereafter enabling strategies) and seven conservation implementation strategies. These strategies will be implemented simultaneously to reduce the eight highest and medium rated threats to the oak targets. The strategies and threats outlined in this SAP are in line with those outlined in the *Integrated Conservation Strategy For Western Temperate, Mexican Pine-oak, and Tropical Cloud Forest Birds: North America to Central America* (Alexander et al. 2020).

Highest rated threats:

- Agricultural conversion
- Fire exclusion
- Conifer encroachment

Medium rated threats:

- Urban development
- Commercial and industrial development
- Incompatible cattle grazing
- Solar farms
- Non-native grasses and forbs

Enabling strategies that increase regional capacities for oak conservation will result in:

- Increased ecocultural and TEK guidance, improved technical assistance (TA), and conservation implementation
- A conservation tool box that will offer a set of beneficial management practices and other decision support tools
- Increased support and funding for oak conservation through public and professional education and collaborative financial planning

With increased capacities, efforts to restore and retain oak ecosystems will be accelerated by:

- Offering TA for training, planning, and implementation
- Integrating oak conservation practices into public land management policies, guidelines, and activities
- Partnering with private land managers to protect and restore oak targets

By implementing these strategies KSON partners will maintain and increase the amount of oak target acres that:

- Include a diversity of smaller and regenerating oaks, legacy oaks, and native understories
- Produce acorns that, as a first food, offer a culturally beneficial use of oaks
- Are characterized by historic fire regime conditions
- Are drought- and climate-resilient

- Support conditions for focal bird species that are among the most at-risk songbirds in North America's western forests

KSON was selected as a Focused Investment Partnership (FIP) and this plan was completed with a FIP grant from the Oregon Watershed Enhancement Board (OWEB). KSON core partners also contributed significant time to completion of this SAP.

2. Partnership Roles

KSON has a history of using multi-million dollar conservation investments for effective oak woodland restoration efforts in southern Oregon and northern California. Our core partners have demonstrated a capacity to leverage funds for implementing oak conservation. Each partner brings significant and unique contributions in the form of financial assistance, TA, and in-kind contributions. Together, we accomplish project objectives in a cost-effective manner, incorporating diverse expertise into all phases of restoration planning, implementation, and monitoring. The partnership has received funding support from OWEB, the Natural Resource Conservation Service (NRCS), US Fish and Wildlife Service (USFWS), and many other sources. In 2012, KSON partners were awarded the Department of Interior Partners in Conservation Award, which recognizes "those who make exceptional contributions in achieving conservation goals through collaboration and partnering." KSON's efforts were also highlighted as a model of best practices for bird conservation in the *State of North America's Birds* report (NABCI 2016).

KSON was first established in 2011 as an informal working group made up of members from local agencies and non-profit organizations seeking to more effectively plan and implement oak restoration in southern Oregon and northern California. The Steering Committee was formalized in 2014 to direct the goals and activities of the collaboration using an adaptive management framework. KSON's Memorandum of Understanding (MOU) and Charter were adopted in 2015 (see ATTACHMENT 1. KSON DETAILS). These documents define KSON's purpose and geography, outline our organizational structure and administrative procedures, and describe expected roles and responsibilities of Steering Committee members. KSON communications and activities are organized by the KSON Coordinator, a staff position that is housed by a member organization.

Each of the following Steering Committee member organizations provides important expertise and fills a unique niche as KSON's core partners. These member organizations collectively identified the development of this SAP as critical to KSON's continued success. They participated in the planning process, with many serving as the Technical Advisory Committee (TAC) members during the development of this SAP.

- Klamath Bird Observatory (KBO)** brings conservation planning expertise to KSON with experience authoring multiple regionally, nationally, and internationally scaled strategic conservation business plans. KBO plays a key role in integrating science into KSON conservation planning efforts, contributing to adaptive science-driven restoration and management decision making. KBO leads the team that directs KSON's implementation and effectiveness monitoring and currently houses the KSON Coordinator. KBO staff facilitated KSON's strategic planning effort, conducted geospatial analyses for this plan, and served as the SAP technical authors. KBO brings a birds-eye indicator species view to KSON, integrating a value added approach to landscape restoration needs through Partners in Flight's continental and regional bird conservation priorities Alexander et al. 2020) and science-based tools that serve as a catalyst for improved strategic habitat conservation and adaptive management.

Science-based bird conservation objectives are used to guide KSON's conservation prioritization, design, implementation, and effectiveness monitoring. With over 6,500 acres restored to date, KSON's work has been recognized as an international bird conservation success story (NABCI 2016).
- Lomakatsi Restoration Project (LRP)** provides restoration planning and implementation leadership to the KSON partnership. They play a significant role in the development of landscape-scale initiatives and restoration management plans within the region. LRP works across federal, private and tribal trust lands, and is currently managing agreements within 26 million acres, with over 125,000 acres currently in various stages of planning and implementation. They develop and maintain private landowner relationships and are one of the main leaders of KSON's outreach efforts. LRP operates the Inter-Tribal Ecosystem Restoration Partnership (ITERP), led by tribal staff who advise and work with KSON to foster partnerships with regional tribes and integrate TEK into restoration efforts. LRP contributes a unique perspective on leveraging diverse funding sources to achieve large-scaled regional restoration. LRP brings a key perspective on restoration implementation and workforce development, provides TA to many local restoration practitioners, and serves as key restoration implementers who achieve significant conservation outcomes through their all lands restoration approach within the KSON geography.
- Bureau of Land Management (BLM)** contributes broadly to oak restoration planning and implementation on BLM managed lands, which make up a substantial portion of federally owned oak habitats within the KSON geography. BLM provides a strong foundation on fire ecology in oak ecosystems, offering ongoing expertise related to the role of wildfire, fuel reduction, and managed fire in creating resilient landscapes. BLM also provides KSON with funding support for various capacities. BLM will integrate KSON strategic conservation objectives and strategies within their land management programs, ensuring significant conservation outcomes on public lands within the KSON geography.
- The US Fish and Wildlife Service Partners for Fish and Wildlife Program (USFWS Partners Program)** provides expertise on oak restoration planning and implementation

on private lands. They develop and maintain relationships with private landowners and host field demonstration days. They foster the application of adaptive management and the evaluation of restoration success in support of large scale restoration partnerships and programs. The USFWS Partners Program also provides TA to local restoration practitioners. The USFWS will integrate KSON strategic conservation strategies within their restoration programs, ensuring conservation outcomes on private lands within the KSON geography.

- **The Natural Resources Conservation Service (NRCS)** facilitates oak restoration on private lands through application of Farm Bill funding, develops and maintains relationships with private landowners, and works with local practitioners to implement oak restoration. They foster the evaluation of restoration success and application of adaptive management by supporting partnerships as part of their large-scale restoration programs. They host field demonstration days for partners and private landowners. NRCS offers unique expertise that is essential to integrating private land restoration into landscape scale conservation planning, contributing to significant conservation outcomes in northern California and southern Oregon.
- **The Nature Conservancy (TNC)** promotes oak restoration on its land and has played a key role in science-driven restoration planning in dry, frequent forest ecotypes of the Rogue Basin, including high profile projects addressing wildfire risks and targeted fuel reduction, while managing for resilient landscapes. They contribute to KSON's adaptive management approach to restoration, providing expertise in conservation planning and monitoring in support of KSON restoration projects. They play a large role in hosting field tours at the Table Rocks Conservation Area, one of KSON's most popular demonstration sites in the Rogue Valley. TNC and its partners will integrate KSON restoration efforts with the OWEB sponsored Rogue Basin Strategy (Metlen et al. 2017) and the Rogue Forest Restoration Initiative (RFRI 2018) to help achieve significant oak conservation outcomes within the KSON geography.
- **The US Forest Service (USFS)** contributes broadly to oak restoration planning and implementation on USFS managed lands, which make up a substantial portion of federally owned oak habitats within the KSON geography. The USFS provides expertise on ecology, population biology, and insect and disease in oak ecosystems. USFS will integrate KSON strategic conservation objectives and strategies within forest restoration efforts and provide federal funding to help achieve SAP outcomes within their management planning and implementation efforts, and through restoration associated collaborations including the Rogue Forest Restoration Initiative (RFRI 2018), ensuring significant conservation outcomes on public lands in southern Oregon and northern California.

The following organizations have also been instrumental in the development of this SAP, serving as TAC members, facilitators, and/or advisors.

- Pacific Birds Habitat Joint Venture (Pacific Birds) works to create an ideal environment for habitat conservation to achieve their vision of a Pacific Region united for bird habitat

conservation. Their work to create effective partnerships is inspired by the beauty and diversity of migratory birds and is guided by their value for environmental sustainability. Joint ventures are the key habitat delivery arm of the North American Bird Conservation Initiatives and therefore Pacific Birds will be an essential partner in the implementation of this plan.

- Southern Oregon Forest Restoration Collaborative (SOFRC) increases the restoration of federal forests in southwest Oregon's Rogue River Basin. They work to improve forest health and resilience, reduce the risk of uncharacteristically severe wildfire to forests and communities, and strengthen regional forest restoration manufacturing and workforce capacity. As a lead partner in the Rogue Forest Restoration Initiative (RFRI 2018) SOFRC is committed to restoring over one million acres of forests, including oak habitats, in the Rogue Basin over the next 20 years.
- Understory Initiative (UI) facilitates the restoration and conservation of native species habitat through partnership and community engagement in southern Oregon and northern California. They support conservation and restoration by partnering with a variety of stakeholders and provide public education and outreach. UI is developing a collaborative farm that will provide the diverse mix of native seeds needed for ecological restoration and pollinator habitat in the region.
- Oregon Department of Fish and Wildlife (ODFW) protects and enhances Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations. ODFW works to conserve healthy fish and wildlife populations by preventing and reversing declines of at-risk species and by maintaining and restoring functioning habitats. Their work is guided by the *Oregon Conservation Strategy* (ODFW 2016). The strategy lists oak woodlands as a habitat of conservation concern that is essential to many strategy species within the state and outlines regional conservation priorities for this habitat that helped to inform KSON's strategic conservation priorities.
- The Inter-Tribal Ecosystem Restoration Partnership (ITERP) is a collaboration of regional tribes, tribal community leaders, federal and state agencies, and non-profit conservation organizations throughout Oregon and northern California. The goal of ITERP is to restore aquatic and terrestrial habitats, work collaboratively to plan and conduct landscape scale ecological restoration, and repair impacts to ecocultural systems that indigenous communities depend on for subsistence and survival. ITERP is committed to the creation of ecological restoration jobs that support tribal members to work on their time-immemorial ancestral land bases as the first and best stewards. They work towards incorporating TEK into forest and watershed restoration planning to recover as much as is recoverable of the key historic pre-contact ecosystem structure, composition, processes, and function, along with traditional time-tested, ecologically appropriate, and sustainable indigenous cultural practices that helped shape ecosystems.

ITERP will facilitate KSON's engagement with tribal governments, traditional tribal leaders, and tribal community representatives throughout the implementation and adaptive refinement of this SAP.

KSON is a partner-driven collaboration and, as with the development of this plan, the partners are committed to implementing this SAP. KSON will implement the SAP through strong cooperation with each other, through outreach and engagement with additional partners within the region, and through collaboration with partners beyond our geography, including the other oak partnerships in Oregon.

3. Scope

KSON's geography of southern Oregon and northern California contains some of the most extensive remaining oak ecosystems in the western United States, oak ecosystems that have the highest magnitude of restoration need in the Pacific Northwest (Altman et al. 2017). These systems make up a critical component of the biodiversity and endemism that characterizes the region as a globally significant biodiversity hotspot and area of conservation concern

For time immemorial, the indigenous people of the KSON geography have been an essential part of the region's oak ecosystems through ecological stewardship and beneficial uses. As such, the region's tribes have cultural knowledge of oak woodlands, and regard plants, animals, natural resources, and even natural processes as relations.

(Coleman and Kruckeberg 1999, DellaSala et al. 1999, Ricketts 1999, Dunk et al. 2006). The region also serves as an important climate refugium and area of connectivity between Oregon and California (Frost 2018). Reflecting the region's diversity, oak ecosystems within the KSON geography are among the most biodiverse in southern Oregon and northern California (ODFW 2016). These ecosystems host many endemic plants (Jimerson and Carothers 2002) and more than 300 vertebrate species considered to be oak obligates or oak associates (Barrett 1980, Verner 1980, Mayer et al. 1986, Block and Morrison 1998). These include a high diversity of oak associated birds, many of which are of continental conservation concern (Alexander et al. 2020, CalPIF 2002, Altman and Stephens 2012, NABCI 2016). Historically, the geography's oak ecosystems also provided culturally important plants that sustain indigenous communities. Given the extent of the region's oak ecosystems and the cultural, regional, and continental significance of this region as an area of conservation need, the conservation of the oak ecosystems within the KSON geography is a priority.

The KSON geography includes the Rogue and Klamath basins. These basins include the Upper Rogue, Middle Rogue, Lower Rogue, Applegate, Illinois, Chetco, Upper Klamath Lake, Upper Klamath, Scott, and Shasta sub-basins and represents a 6.1 million acre conservation planning area (Table 1; Figure 1). These sub-basins are unique in their vegetation structure and composition as compared to oak ecosystems in the Willamette and farther north, representing the convergence of the northern range extent of California Black Oak (*Q. kelloggii*) and the southern range extent of Oregon White Oak (*Q. garryana*). A unique diversity of oak types, including Oak Savanna, Oak Woodland, Oak Chaparral, and Oak Conifer, occur within this geography and are the conservation targets of this plan.

KSON's core partners are meeting continentally significant conservation needs (ODFW 2016, NABCI 2016, Altman et al. 2017) by focusing efforts on the oak ecosystems of this geographic area. Now, this SAP will serve as a guide for KSON's continued conservation activities over the short (6 year), medium (12 year), and long (30 year) term. Implementation will preserve, enhance, and restore structural diversity, ecological function, climate resilience, and overall health and persistence of oak targets in strategically selected areas in the KSON geography over these timeframes, meeting regional oak conservation priorities.

The KSON geography hosts North America's highest diversity of western forest birds (Trail et al. 1997, Berlanga et al. 2010). Many of these birds are in decline (Rosenberg et al. 2019) including several of the region's oak associated bird species (Alexander et al. 2020, NABCI 2014). Based on the abundance and diversity of these at-risk oak associated bird species the region has been prioritized as an important area for bird conservation and a climate refugium (Stralberg 2009, Veloz et al. 2013, Veloz et al. 2015).

4. Vision

KSON envisions healthy and resilient oak ecosystems with intact ecological processes across much of their historic range in the Klamath Siskiyou Bioregion, including diverse landscapes with historic, intrinsic, aesthetic, environmental, wildlife, and economic values that are shared by a wide cross-section of the public. These oak ecosystems are currently threatened with loss and degradation due to fire exclusion, certain agricultural practices, agricultural expansion, and rural and urban residential development. To address these threats KSON works to protect and restore oak ecosystems on both private and public lands through an effective partnership among non-governmental organizations, local state and federal agencies, as well as private community members, and other conservation and natural resource user groups.

Key to the vision of this SAP, is the development of a collaborative partnership with the sovereign tribal nations of our region. We are committed to planning for the restoration and retention of oak habitats within the KSON geography by utilizing best practices, protocols, and collective strategies through a focus on tribal engagement. Restoring the cultural beneficial use of acorns as a first food along with the other wildlife that depends on oak habitats being healthy is central to this SAP and indigenous fire, based on historical practices, is an essential present day conservation management tool for oak restoration.

5. Ecological Priorities and Goals

This strategic action plan is focused on the conservation and restoration of four priority oak targets – Oak Savanna, Oak Chaparral, Oak Woodland, and Oak Conifer. More details about these targets are provided in the following section (6. Profile of the Focus Area). Using a *viability assessment* framework, we 1) selected key ecological attributes (KEAs) that are used to describe the current and desired conditions of each of the four targets; 2) identified the indicators used to measure target conditions based on the KEAs; 3) used the KEAs and indicators to describe what constitutes a good condition for each target; and 4) assessed the

current and desired future condition of each target as Poor, Fair, or Good based on the KEAs and indicators (Table 2).

In summary, this plan outlines a set of parallel strategies that will be implemented simultaneously. These include a track of capacity building and public support/funding related strategies that will further enable an interrelated track of conservation implementation strategies. When implemented over the next six to 30 years, conservation implementation strategies will reduce the threats that most degrade our four targets (Table 2) to:

- Maintain and increase the amount of target acres
- Improve the condition of the plant communities by restoring native understory cover, increasing recruitment and diversity of smaller and regenerating oaks; retaining and protecting potential legacy oak trees, and boost acorn yields
- Reduce woody fuel loads and reintroduce low-severity surface fires
- Improve habitat conditions to increase focal bird species diversity

Restoration efforts implemented over the next six to 30 years will result in the following landscape level outcomes (Table 2):

- Increase the amount of the Oak Conifer target by 22,896 acres (7%); maintain the current amount of the other targets
- Increase the amount of Oak Savanna so that >26,250 acres (>25% of the target's total landscape) are characterized by >25% cover of high diversity native understory; maintain the amount of Oak Woodland acres with >25% native understory cover
- Increase the amount of Oak Woodland and Oak Conifer acres characterized by an abundance of younger age class oaks, 90% of legacy oaks retained, and abundant, accessible, and high quality acorn crops to 142,759 and 159,552 acres respectively (>50% of each target's total landscape)
- Increase the amount of Oak Woodland and Oak Conifer that are characterized by a low load surface behavior model to 143,759 and 171,000 acres respectively (>25 % of each target's total landscape)
- Increase the amount of Oak Savanna, Oak Woodland, and Oak Conifer acres that have burned within the last 36 years (Fire Regime Class I) to 26,250, 71,379, and 65,500 respectively (>25 % of each target's total landscape); increase the amount of Oak Chaparral that have burned within the last 100 years (Fire Regime Class III) to 19,904 acres (>50% of the landscape)

Healthy oak ecosystems produce healthy acorn crops. Acorns are an important traditional subsistence food for the indigenous people of the KSON geography.

- Increase the amount of Oak Woodland and Oak Conifer that have >75% of the focal bird species present to 14,259 and 171,000 acres respectively (>25 % of each target's total landscape); maintain the amount of the Oak Savanna and Oak Chaparral acres that have >75% of the focal bird species present

Partners in Flight bird conservation focal species are associated with key habitat components and their occurrence is indicative of functioning oak ecosystems (Stephens et al. 2019, Altman and Stephens et al. 2012). Focal species diversity served as an indicator measure for the breeding bird KEA (Table 2).

6. Profile of the Focus Area

a) Biophysical

KSON's work is focused in the Klamath Siskiyou Bioregion of southern Oregon and northern California, an area that is recognized globally as a region of great biological diversity and endemism and an area of conservation concern (Alexander 2011, Coleman and Kruckeberg 1999, DellaSala et al. 1999, Ricketts 1999, Dunk et al. 2006, Veloz et al. 2015). The biogeography of this region is largely influenced by proximity to the ocean and the convergence of the Cascade, Siskiyou, Klamath, and Coastal mountains ranges. The varied geology, soil, and climate, combined with correspondingly heterogeneous disturbance histories, contribute to diverse vegetation communities (Whittaker 1960, Franklin and Dyrness 1988). The region is dominated by coniferous and mixed conifer hardwood forests, with important components of grassland, meadow, chaparral, and shrub-steppe. The most extensive remaining woodlands in Oregon are found in southern Oregon, including oak ecosystems that fall within the KSON geography. The oak systems in this region are the most ecologically diverse in the Pacific Northwest (Altman and Stephens 2012, KBO and LRP 2014). They also support communities of plants and animals that are remarkably different from the coniferous forests that dominate the landscape.

Many federal and state listed species, and other species of conservation concern are associated with oak ecosystems and some are highly dependent upon oak habitats in this area. These species include mammals (e.g., Pacific fisher), plants (e.g. Gentner's fritillary), and birds (e.g., Lewis' Woodpecker, Oak Titmouse, Black-throated Gray Warbler, California Towhee, California Scrub-Jay). In addition, important game species such as migratory black-tailed deer, Roosevelt elk, and black bear are year-round or winter residents that depend on oak ecosystems. Of the many oak associated bird species that occur in the KSON geography, two have experienced extirpations (Streaked Horned Lark and Lewis's Woodpecker) from areas in their range which no longer contain sufficient quantity or quality of oak habitats to support their breeding populations (Altman et al. 2017).

Oak Titmouse, an oak ecosystem obligate, and Lewis' Woodpecker, an oak associate, are both on the Partners in Flight Watch List (Rosenberg et al. 2016). The primary purpose this Watch List is to foster proactive attention on the conservation needs of the continent's most vulnerable landbird species.

Oak ecosystems of the KSON geography are fire-adapted. Relatively frequent low- to mixed-severity fires historically occurred in the region's lower elevations where these oak systems occur. This historic fire regime created a shifting mosaic of habitat types and vegetation structures and served to maintain the regions oak ecosystems (Skinner et al. 2006, Lewis, 1993; Sugihara and Reed, 1987). Over the past several thousand years wildfires burned every

Aboriginal fire was an essential component of the ecological processes that maintained the KSON geography's oak ecosystems. The forced decline of this indigenous stewardship contributed to the loss of fire, a critical component of functioning oak systems.

two to 25 years at a given location (e.g., Lewis 1993, Taylor and Skinner 2003, Metlen et al. 2018). These wildfires mostly burned at low to moderate severities, with a small proportion burning at high severities. The occurrence of fire in plant communities with a significant oak component were also heavily influenced by Native American burning practices (Lewis 1990, Lewis 1993, LaLande and Pullen 1999). Lightning ignited fires that started during the spring or summer months likely burned until rains extinguished them in the fall, while aboriginal burning was usually practiced in the late summer, just prior to seasonal rainfall.

Historically, Native American management favored oak savannas and woodlands over mixed conifer habitats (Cole 1977, Blackburn and Anderson 1993). *Aboriginal fire (i.e., anthropogenic fire)* was a common practice used to manage vegetation for desired oak forest conditions (Boyd 1999).

The degradation and loss of healthy oak ecosystems coincides with the forced removal of Native Americans and their land stewardship and has been further exacerbated by European land management practices including clearing, fire suppression, overgrazing, conifer-centric forest management, increased agriculture, and the introduction of invasive plants (Hosten et al. 2006). Dramatic changes to the structure and composition of oak ecosystems have resulted from the interruption of natural fire regimes from fire suppression efforts that began in the 1850s (Skinner et al. 2006, Metlen et al. 2018), the loss of cultural burning by Native Americans, and agricultural conversion. These factors have resulted in changes driven by the amount of Douglas-fir saplings increasing within the historic range of the region's oak ecosystems (Gilligan and Muir 2011) as well as complete loss of oak ecosystems. The infilling of oak woodlands and savannas with conifers and other woody plant species has influenced understory plant communities and fuels, leading to lower species diversity, increased homogenization, and increased risk of uncharacteristic fire effects at a landscape scale (Engber et al 2011, Livingston et al 2016). These changes have led to the contemporaneous degradation of oak supported and associated species.

The elimination of indigenous burning and the effects of fire suppression and resulting lack of natural fires that represent a diversity of intensities are now being further exacerbated by more recent changes in climate, changing the nature of fire in this region. While the climate in this region had been relatively cool and moist (Mohr et al. 2000), a significant warming trend has occurred over the last several decades. In recent decades, the frequency of large wildfires and

the annual acres burned have also increased in this region (Westerling et al. 2006, Balch et al. 2018) and projections indicate this trend will continue (Littell et al. 2011, Sheehan et al. 2015, Davis et al 2017). Observed trends and forecasts suggest that wildfire will continue to be a major change agent (Mote et al. 2014) affecting ecosystem structure and spatial distribution, further exacerbating the problems of fire exclusion and previous land management activities.

This SAP focuses on four oak ecosystem targets – Oak Savanna, Oak Chaparral, Oak Woodland, and Oak Conifer (Figure 2). These targets represent the entire biodiversity array of deciduous oak (e.g., Oregon White Oak and California Black Oak) ecosystems within the KSON geography. These targets do not represent Tan Oak or Live Oak associated habitats. Here we provide a brief description of each target; see ATTACHMENT 2. KSON TARGETS for more detailed target descriptions.

Our four targets occur from the deep clay soils of the lowland valleys, into the drought-prone environments of the foothills, and in the higher precipitation montane environments.

- **Oak Savanna** is a grassland with scattered oak trees and an open canopy (<25% cover) with approximately 1-5 large trees or 1-10 younger trees per acre. Oak trees in savannas are “open-grown” (i.e., without nearby competition for resources); at maturity these trees are large and mushroom-shaped with well-developed limbs and canopies. Historically, the understory was typically dominated by a ground cover of grasses and forbs with <10% shrub cover.
- **Oak Chaparral** is a shrub-dominated habitat type (20-80% shrub cover, often >50%) that includes an open (<25% cover) canopy of oak trees with scattered grassy openings amid dense patches of shrubs, in particular evergreen shrubs such as *Ceanothus* spp. and *Manzanita* spp. Oak trees tend to be relatively short in stature and often take on a shrub-form growth in the driest sites.
- **Oak Woodland** is characterized by a relatively open canopy (25-50% cover) with approximately 5-10 large trees or 10-20 younger trees per acre. Oak trees in open oak woodlands are often a mixture of open-grown trees and columnar shaped trees with limited lower branch and foliage development. The understory was historically dominated by herbaceous ground cover with variable shrub cover <30% depending on site conditions. Oak Woodland also includes closed oak woodland (50-75% canopy cover) and oak forest (>75 canopy cover).
- **Oak Conifer** is typically a closed woodland or forest (30-60% canopy cover) where there is a relatively equal representation of oak and Douglas-fir in the canopy, with Ponderosa Pine as well. This oak ecosystem type occurs primarily in the foothill elevational transition into Douglas-fir forests, or where site-specific conditions (e.g., north aspects, moister soil types) are present at the interface of oak and conifer forests.

To illustrate and analyze the distribution, connectivity, and condition of the four oak targets, a comprehensive geospatial analysis was conducted; see ATTACHMENT 3. GEOSPATIAL ANALYSIS for more details. The four targets cover an estimated 893,428 acres (15%) of the KSON

geography (Table 1; Figures 3-7). The Oak Woodland and Oak Conifer targets are the most abundant, covering 285,517 and 319,104 acres respectively, or approximately 5% of the KSON geography each. Oak Savannas cover 248,999 acres (4%) of the planning area and Oak Chaparral covers an estimated 39,808 acres (1%) of the KSON geography. The mapping of Oak Savanna and Oak Chaparral targets warrant additional verification, especially in western portions of the geography. The four targets are distributed as a mosaic (Figures 3-7); following topographic and soil features, and often influenced by fires history, the targets often occur adjacent to each other, other forest ecosystems (e.g., mixed conifer), and agriculture or other rural development areas.

b) Social

Oak ecosystems have great importance to native peoples in this region, and their beauty and biology are valued by today's urban and rural residents. Even though oak habitats within the KSON geography face threats, there is great opportunity for multi-agency and multi-landowner conservation focused collaborations

Oak ecosystems provided many traditional benefits for the indigenous people of the KSON geography, including food and fiber resources and community protection from severe fire.

to result in significant oak restoration and protection outcomes. In addition to increasing ecological integrity, restoration and conservation management activities can provide economic benefits including job creation, sustainable forest product extraction, and recreation, including economic growth from developing bird-watching and other ecotourism industries.

Land ownership within the KSON geography reflects the biophysical diversity of the area, with a mix of ancestral tribal, public, and private lands (Figure 8). In areas where oak targets are concentrated (Figures 3-7) this mix is often reflected in a checkerboard pattern of one square mile parcels of BLM land. Seventy-one percent of the KSON geography is publicly owned with the vast majority of public lands being federally managed (Table 3). Twenty-seven percent of the 6.1 million acre geography is privately owned.

Only 11% of the KSON geography is in protected status (Table 3; Figure 8); most of this is in on public lands that are managed to maintain natural habitats (Alexander et al. 2017). The rest of the public management land base is designated for multiple use, with the primary activities on these lands being timber extraction and livestock grazing. Fuel reduction and the restoration of fire-adapted forest ecosystems has recently become a primary management objective on these lands (Metlen et al 2017).

Private land use within the KSON geography is mixed (Figure 9) and includes forest management, agriculture, (i.e. orchards, vegetables, vineyards, and cannabis), and rural development. Zoning classifications for the Oregon and California portions of the KSON geography differ (Figure 9). In Oregon, 8% of the KSON geography is zoned for forest management (i.e., working forests), 6% of the landscape is zoned for exclusive farm use, and 2%

is zoned for rural residential (Table 4). Agricultural lands in California are classified based on a variety of uses (Figure 9).

The economics of this region have historically been dependent on natural resource use, especially in the region's rural areas. However, in recent decades the region has seen significant economic shifts. Economic opportunities from logging on public lands has declined, resulting in increased demands on private timber lands. Transitions in agriculture have also occurred, with a decline in grazing, especially on public lands, and increases in the cannabis and viticulture industries. While residential development is concentrated within urban growth boundaries, rural residential development has also resulted in economic shifts from agricultural land use.

Effective oak ecosystem conservation will require engagement with urban and rural communities through targeted outreach. Key land use partners will include members of the cattle ranching and timber industry communities and outdoor recreation communities including hunters, hikers, and bird watchers. Outreach will focus on working to balance community land use priorities with the landscape level ecological priorities identified within this SAP.

Birds are good for rural economies. More than 45 million people in the U.S. watch birds, generating almost \$100 billion in economic impacts. Bird watchers and hunters spend money on hotels, sporting goods stores, gas stations, and other local businesses.

c) Historical – Indigenous Stewardship Oak Ecocultural Systems

For time immemorial, the oak ecosystems of the KSON geography have been stewarded by indigenous peoples. These tribes have a cultural knowledge of oak woodlands, and regard the plants, animals, natural resources, and even natural processes as relations. These relations include a cultural stewardship approach to managing for beneficial uses of traditional resources

With an integral relationship with oak ecosystem, the tribes of the KSON geography were cultural stewards, benefitting from a sophisticated and sustainable management of resources including oaks, acorns, and fire.

included oaks, acorns, fire, and many other oak woodland associated species. Overtime, tribal people developed sophisticated traditional practices that shaped landscapes that supported sustainable foraging, gathering and hunting for ceremonial and subsistence purposes. Some traditional benefits of managed oak habitats included food and fiber resources such as acorns, bulbs, deer meat, and regalia, as well as aesthetic benefits, and community protection from severe fire (Hosten et al 2006). As a reflection of their value to indigenous communities, oak woodland habitats are often located near ancestral village sites.

Aboriginal fire is an especially effective tool that tribes used to enhance production of resources and ecosystem services. The tribes regularly ignited low-intensity surface fires in oak stands (Kimmerer and Lake 2001, Blackburn and Anderson 1993). Regular burning maintained cultural landscapes of oak conifer forests, woodlands, and savanna in a more open state, enriching

natural resources and biodiversity, and enhancing the structure and quality of critical food and fiber resources (Boyd 1999, Rentz 2003, Halpern 2016).

Indigenous people of the KSON geography include members of several different tribal nations, languages, and/or bands. The KSON geography is within the aboriginal homelands of many different tribal descendants. These descendants may identify with one or more larger tribal nations or smaller autonomous bands or groups:

- Lower Rogue River Athabascan tribes include the Upper Coquille, Shasta Costa, Tutuni peoples
- Upper Rogue River Athabascan (Galice-Applegate) tribes include the Taltushtuntede (Galice Creek Area) and Dakubetede (Applegate Area) tribes
- The Takelma tribes include the Latgawa (Upland Takelma) and Dagelma (Lowland or River Takelma)
- Shasta tribe and associated bands span the Middle Rogue, Klamath, Shasta, Salmon, and Scott Rivers, and their tributaries
- Upper Klamath Tribe is of the Upper Klamath Basin and Rogue River watershed divide

The complicated history of treaties and forced removal of various native people of the Rogue and Klamath rivers resulted in several federally recognized tribal governments, including the Confederated Tribes of Siletz Indians, Confederated Tribes of Grand Ronde, Klamath Tribes, Cow Creek Band of the Umpqua Indians, Tolowa Dee-ni' Nation, Elk Valley Rancheria, Karuk Tribe, and Quartz Valley Indian Reservation. Because treaties were made with members of several different tribal nations without proper recognition of cultural groups, these federally recognized tribes most often include members that affiliate with one or more ancestral or cultural group. In addition, some indigenous people of KSON geography have thus far been denied treaty rights and federal recognition of their tribal affiliation.

The Euro-American suppression of natural and anthropogenic fire and the forced decline of indigenous communities playing an active role as ecological caretakers has caused widespread oak ecosystem degradation (Cocking et al. 2015, Crawford et al 2015, Gilligan and Muir 2011, Metlen et al 2018). The result of this process has been the loss of or reduced density and availability of the culturally and ecologically important plants that historically sustained human communities. Reduced access and opportunity for indigenous people to participate in culturally identified roles as ecological caretakers, and the impact on their ability to eat subsistence foods, such as acorns, fish, and the local plants and other wildlife, is linked to a rising incidence of health problems including Type II diabetes, heart disease, and mental health challenges (Norgaard 2019).

The success of this SAP will require effective engagement with indigenous people in restoring oak woodland habitats, as an act of restorative justice and as a means for realizing the multiple ecological and social benefits that come from incorporating TEK into restoration planning and evaluation (Long and Lake 2018). KSON will be engaging with tribal governments, traditional

tribal leaders and tribal community representatives throughout the refinement and implementation of this SAP. This engagement will include formal and informal consultation with federally recognized tribes, as well as invitations to delegated and individual cultural leaders and practitioners to participate in project development, implementation, and monitoring.

7. Conservation Needs and Opportunities

Oak woodlands are among the most imperiled habitats in the Pacific Northwest, due to removal of the aboriginal people from the land who managed the oaks with cultural beneficial fire which resulted in historic loss and degradation (Vesely and Rosenberg 2010, ODFW 2016). While habitat loss is a prominent *threat* throughout northern California, Oregon, and Washington, habitat degradation is of greater concern in the Klamath Siskiyou Bioregion and KSON geography (Altman et al. 2017). Several regional assessments cite the necessity of oak conservation and enhancement within this region (Altman 2000, Altman et al. 2017, Altman and Stephens 2012, CalPIF 2002, Myer 2013, ODFW 2006, USFWS 2003). The oak resources in southern Oregon addressed by these various conservation plans and strategies are critically valuable, providing a natural “refuge” to a unique biodiversity that is in a critically threatened condition across Oregon and the Pacific Northwest as a whole. Improving the extent and ecological function of remaining oak woodlands in southern Oregon and northern California will benefit the entire region by supporting and restoring populations of oak-dependent species that are in rapid decline or at risk of extirpation.

A number of biophysical factors are stressing the oak habitat targets as a result of a collection of direct threats to the oak ecosystems of the KSON geography. These include altered fire regimes and habitat loss, fragmentation, and altered habitat structure and species composition (Alexander et al. 2020, Cocking et al. 2015). These factors are interacting to limit the quantity and quality of extant oak systems in the KSON geography to be below what is necessary to support healthy and sustainable populations of oak-associated plant and animal species. These biophysical factors and effects are further compounded by climate change (Beckmann 2019).

Fire exclusion has altered the natural disturbance regime of frequent mixed-severity fires that historically shaped and maintained these oak stands (Reed and Sugihara 1987, Stewman 2001, Cocking et al. 2012). As a result, conifer-oak forests have replaced more open stands of large old trees. Encroachment by conifers has resulted in oak habitats experiencing a decline in health and vigor (Hunter and Barbour 2001). These conditions limit acorn production and make oak trees more susceptible to stressors such as drought. Oak population fragmentation and tree density reduction has been found to reduce wind pollination and acorn production (Knapp et al. 2001, Sork et al. 2002). In a sense, having more conifers between oaks increases their genetic isolation and is probably leading to a similar outcome of reduced acorn production. Big conifers are essentially like big pollen filters, removing it before it can get to another oak. Affected stands typically lack structural diversity; for example, they do not form the large cavities, platforms, mistletoes, and other microhabitat features required by many oak-adapted wildlife

species. Over-shading of the understory and invasion by exotic weeds crowds out native shrubs and bunchgrass species, reduces the structural and biological diversity of the understory, and degrades habitat suitability for wildlife (Ryan and Carey 1995, Haugo and Halpern 2007, DiGaudio et al. 2017). Encroaching conifers and exotic vegetation have affected watershed function by reducing water yield, changing fuel beds, and increasing the potential for high severity fire and subsequent erosion and sediment delivery to streams, which may negatively impact habitat for fishes and aquatic invertebrates and plants throughout the area. A high degree of habitat fragmentation and loss of connectivity of oak stands across the KSON geography creates challenges for dispersal of oak-dependent plant and animal species, limiting gene flow among populations and lowering resilience to natural and human-caused disturbance.

a) Threats Assessment

We completed a threats assessment to focus our SAP strategies on human-induced actions that directly degrade one or more of our oak targets. We classified threats using a standard taxonomy that provides a common nomenclature for describing threats and strategies (CMP 2020). We then rated each threat by assessing its impact on each of the four targets, plus the overall number of targets for which each threat was important (Table 5), based on the following three categories (for details about underlying threat rankings see ATTACHMENT 4. THREATS ASSESSMENT):

- Scope – Spatial proportion of the target affected within 10 years given continuation of current circumstances and trends
- Severity – Within the scope, the level of damage given continuation of current circumstances and trends
- Irreversibility – Degree to which the effects of a threat can be reversed, and the target restored, if the threat no longer existed

The following are the three highest rated threats:

- *Conversion to vineyard, cannabis, & orchards*
- *Fire exclusion, indirect*
- *Conifer encroachment*

Six additional threats have medium ratings:

- *Commercial and industrial development*
- *Incompatible livestock grazing*
- *Solar farms*
- *Severe fire*
- *Non-native grasses & forbs*

Based on the threats assessment, Oak Savanna, Oak Woodland, and Oak Conifer are more threatened than Oak Chaparral.

The highest threats to Oak Savanna are:

- *Conversion to vineyard, cannabis, & orchards*
- *Incompatible livestock grazing*
- *Non-native grasses & forbs*

The highest threats to Oak Woodland are:

- *Conversion to vineyard, cannabis, & orchards*
- *Fire Exclusion, indirect*
- *Conifer encroachment*

The highest threats to Oak Conifer are:

- *Fire exclusion, indirect*
- *Severe fire*
- *Conifer encroachment*

b) Opportunities Mapping

Using information about the distribution of the four oak targets we quantified the amount of each target within the ten sub-basins that define the KSON geography and the 67 watersheds contained within the sub-basins (Table 1; Figures 10-13). The Upper Rogue, Middle Rogue, Upper Klamath, and Scott sub-basins have the largest amounts of oak habitats (>100k acres within each; 15%, 27%, 19%, and 21% of each sub-basin respectively) in the region. These sub-basins also have the largest amounts of the Oak Savanna target (>34k acres; 4%, 6%, 6%, and 7% respectively). The largest amounts of the Oak Chaparral target (>6k acres) are found in the Upper Rogue, Upper Klamath, Shasta, and Scott sub-basins (1%, 1%, 1%, and 2% respectively). The Upper Rogue, Middle Rogue, Applegate, and Upper Klamath sub-basins have the largest amount of the Oak Woodland target (>35k acres; 6%, 13%, 8%, and 6%, respectively) and the Upper Rogue, Middle Rogue, Illinois, and Upper Klamath sub-basins have the largest amount of the Oak Conifer target (>40k acres; 4%, 7%, 7%, and 6%, respectively).

We developed a preliminary set of mapping tools to identify opportunity areas for implementing conservation strategies. Here we present an example conservation action opportunity analysis based on the occurrence of the targets (Figures 10-13), a climate vulnerability analyses (Figure 14), current vegetation condition (Figure 15), and geospatial information about risks associated with the three threats that most impact our target habitats – *Conversion to vineyard, cannabis, & orchards*; *Fire exclusion, indirect*; and *Conifer encroachment* (Table 5). It is a KSON priority to further develop our mapping capacities to operationalize this type of analysis for improved strategic project planning.

KSON mapping tools can be used to identify opportunity areas for implementing specific conservation strategies. For example, the SAP calls for increased restoration where conifer encroachment and fire exclusion are degrading oak woodland and oak-conifer target habitats. The geospatial data can be used to prioritize such areas for restoration based on watersheds (Table 6) that:

- 1) Include large amounts of the target's habitats (Table 1, Figures 5-6 and 2-13),*
- 2) Where vegetation conditions represent habitats that are in need of restoration (Figure 15); and*
- 3) Have high climate resilience scores based on current and potential future distributions of oak associated birds (Figure 14).*

With such watersheds identified, the mapping tools can then be used to identify opportunities based on land ownership (Table 3, Figure 8) and land use (Table 4, Figure 9).

We used the Pacific Northwest Climate Change Avian Vulnerability tool to prioritize watersheds for oak habitat conservation (Figure 14). Prioritization is based on scores that take into account current as well as potential future distributions of oak associated birds (Veloz et al. 2013, 2015). It is important to note that this tool does not cover the eastern most part of the KSON geography. Fifteen watersheds within the KSON geography that have high climate based conservation priority scores are also high priority watersheds based on the amount of one or more of the four target habitats (Table 6). Seven of these (Little Butte Creek, Bear Creek, Headwaters Applegate River, Upper Applegate River, Little Applegate River, Seiad Creek-Klamath River, and Lower Scott River) contain large amounts of all four targets. Josephine Creek-Illinois River, Klondike Creek-Illinois River, and Chetco River each contain large amounts of one or more target habitats.

Geospatial information about restoration need and departure (Figure 15) is used to identify watersheds where there may be opportunities to implement restoration activities that reduce the effect of fire suppression (e.g., controlled burning and conifer thinning). Three of the priority watersheds identified above (Upper Applegate River, Rogue River, and East Fork Illinois River) are high risk based on the restoration need and departure maps (Table 6). Five additional priority watersheds also represent areas where fire suppression related restoration actions may be warranted.

Data about land use zoning in Oregon (Figure 9), and specifically the zoning for mixed farm forest use, is used to assess agricultural conversion risk, which is a highly rated threat that impacts Oak Savanna, Oak Chaparral, and Oak Woodland targets. Eleven watersheds are high priority given high climate based conservation priority scores the amount of three targets in each watershed (Table 6). Of these, four represent watersheds where there may be risk driven opportunities to implement conservation actions that reduce the effects of agricultural conversion. These include Little Butte Creek, Bear Creek, Josephine Creek-Illinois River, and Chetco River.

KSON will use these kinds of analyses to focus our conservation efforts in a data-rich spatially explicit manor. As we further develop mapping capacities we will actively inform our strategic approach to planning through ongoing analyses of opportunity areas for conservation action implementation. The conservation action opportunity analysis presented above serves as a model for how we will use the data that we have in-hand.

8. Theory of Change

This SAP uses a theory of change approach to articulate the relationships and underlying assumptions between *strategy* implementation and resulting outputs and outcomes (CMP 2020). We present a parallel set of enabling and conservation implementation strategies (Table 7) that represent broad courses of actions designed to simultaneously:

- 1) Develop KSON's capacities, partnerships, and community support

- 2) Reduce highly rated threats (i.e., medium and high; Table 5) and related biophysical factors that stress our four targets

The enabling strategies will result in improved conditions for carrying out the core conservation implementation strategies in more effective and efficient ways. By executing the parallel strategies simultaneously, we will adaptively increase KSON's ability to realize conservation outputs and outcomes throughout the KSON geography.

The strategies address human-induced actions (i.e., *contributing factors*) that underlie and cause the direct threats that affect our oak ecosystem targets (Table 5). A conceptual model presented in Figure 16 illustrates how these strategies link to contributing factors (including indirect threats and opportunities) and direct threats that cause biophysical factors to degrade the SAP's four oak ecosystem targets. Additional conceptual models, referred to as results chains (Figures 17-22) further illustrate how our strategies will result in measurable action related outputs (Table 8), threat reduction outputs (Table 9), and stress reduction outputs that are tied to the biophysical factors (Table 10). The results chains also show how this series of outputs will lead to ecological outcomes (Table 10) as measured by KEA indicators that quantify the current and desired conditions of the four ecosystem targets (Table 2).

The results chains include one theory of change model that is focused on the enabling strategies relating to capacity building, partnership development, and public education and outreach (Figure 17). The outputs in this conceptual model then tie directly to all five of the additional threat-specific results chains that are focused on conservation implementation strategies (Figures 18-22). This theory of change approach provides a framework to monitor our progress and inform adaptive implementation of this SAP.

a) Strategies and Actions

We completed *situation analyses* (see ATTACHMENT 5: SITUATION ANALYSIS) to identify and prioritize the parallel set of enabling and conservation implementation strategies (Table 7) that will be carried out simultaneously (Table 7). The analyses focused on specific threats within both socioeconomic and biological contexts. We identified contributing factors including indirect threats and opportunities based on human-induced factors that underlie or lead to one or more direct threats. These contributing factors highlight points of intervention that we used to develop and prioritize strategies that specify how we will achieve capacity building, partnership development, and education and outreach outputs that will enable conservation implementation strategies and related outputs.

Enabling Strategies

The enabling strategies outlined here are designed to build KSON partner capacities for TA, research and monitoring, and science delivery; develop and maintain key partnerships; and

meet education and outreach objectives. These enabling strategies are designed to increase the ability of the KSON partnership to efficiently and effectively address the multiple threats that impact target habitats.

Capacity Building. Three enabling strategies are designed to increase KSON's human resource, infrastructure, and information delivery capacities. These will result in increased conservation planning and implementation, science-based decision support, and multi-party monitoring capacities. These capacities will allow KSON to more effectively design and implement suites of projects using a strategic habitat conservation approach, ensuring site and landscape level effectiveness of our conservation actions. The enabling strategies for capacity building are (Table 7):

- *Build capacity for TA with increased human resources & equipment for planning, implementing, & monitoring*
- *RESEARCH & MONITORING- Threat impacts and conservation management effectiveness*
- *Develop decision support tools*

KSON partners will collaborate to ensure existing and/or new personnel are available to meet SAP implementation needs. Through essential research and monitoring efforts KSON partners will fill information gaps regarding how specific threats impact target habitats. Robust monitoring will be used to track outputs and outcomes, allowing us to measure the effectiveness of our conservation actions. With research and monitoring results that fill information gaps, we will use best practices for science delivery (Alexander 2011) to develop decision support tools that inform KSON's strategic conservation implementation. With relevant research and monitoring results we will ensure the effective design and implementation of projects that meet this SAP's landscape level objectives through successful conservation action.

Partnership Development. Two enabling strategies are designed to support KSON's partnership structure by formalizing new partnerships while also strengthening existing ones (Table 7):

- *PARTNERSHIP- Partner with tribes to ensure conservation planning is guided by TEK and that tribes benefit from strategic plan implementation*
- *PARTNERSHIP- Partner with public land managers to protect, retain, and restore target habitats*

Actions will involve partnering on conservation planning and strategy implementation, including multi-party and cultural monitoring, while creating new collaborative and programmatic partnerships. A key aspect of our partnership development will include working with ITERP through an MOU tribal engagement strategy focused on combining applied ecological restoration and adaptive management approaches with TEK of the diverse and unique tribes of the KSON geography.

Outreach and Education. Outreach and education strategies will focus on building public and political awareness and support for oak habitat conservation. These outreach and education enabling strategies include (Table 7):

- *Develop education materials*
- *Educate the public & political representatives about the importance of oak habitat conservation*

Actions associated with these enabling strategies will focus on building public and political awareness and support for oak habitat conservation.

Through the implementation of these seven enabling strategies for capacity building, partnership development, and outreach and education, KSON will continue to improve conditions that will allow us to increase our effectiveness and accelerate implementation of our priority conservation implementation strategies.

Conservation Implementation Strategies

Conservation implementation strategies are at the core of this SAP. The majority of KSON partner efforts will focus on implementing conservation actions that are associated with two priority strategies focused on reducing threats and improving target habitat conditions at both site and landscape scales. These strategies are designed to address contributing factors, reduce threats, and decrease biophysical stresses to achieve desired target habitat conditions. The priority conservation implementation strategies include (Table 7):

- *IMPLEMENTATION- Protect target habitats from conversion*
- *IMPLEMENTATION- Increase restoration of target habitats*

Our most important conservation actions will involve reducing conifer encroachment and fire exclusion threats through restorative conifer thinning and prescribed burning. We will also work to reduce threats from agricultural conversion by implementing projects focused on protecting target habitats from conversion and restoring target habitats within these working lands.

Two additional conservation implementation strategies are also prioritized (Table 7):

- *IMPLEMENTATION- Offer TA for training, planning, & implementation*
- *PARTNERSHIP- Partner with private land managers to protect, retain, and restore target habitats*

These strategies focus on providing TA for large scale conservation planning efforts and for project-by-project planning and implementation. We will also develop partnerships with private landowners to plan for and implement restoration actions on private lands.

The interrelated enabling and conservation implementation strategies outlined in this SAP focus on points of intervention, take advantage of an array of conservation opportunities, and aim to meet the broad goal of improving target conditions at both site and landscape scales. The parallel set of strategies are designed to adaptively improve and accelerate KSON's efforts to meet intermediate outputs (Tables 8-10) and longer-term outcomes (Table 2), thereby achieve effective oak ecosystem conservation within the KSON geography.

b) Outputs and Outcomes

A series of results chains illustrate how a parallel set of enabling and conservation implementation strategies represent broad courses of action designed to increase KSON partner capacities, develop and strengthen partnerships, and meet public education and outreach objectives, thereby improving and increasing our ability to reduce the most pressing threats and restore our oak targets throughout the KSON geography. The results chains illustrate measurable outputs that will result from implementing our strategies (Tables 8-9). When achieved, our conservation actions will lead to the desired short-, medium-, and/or long-term ecological outcomes relating to the reduction of the biophysical factors that stress the four SAP targets (Table 10) and improvement of KEAs conditions (Table 2).

Enabling Strategies Outputs

Figure 17 presents a *results chain* that illustrates how our enabling strategies are designed to increase KSON's partnership, human resource, infrastructure, and information delivery capacities. Outputs relating to the KSON capacity building strategy relate to ensuring that personnel are in place for network coordination, project planning, TA, conservation implementation, and community outreach (Table 8). Efforts to develop a science delivery tool box will result in a specific set of tools for mapping threats and KEAs. We will also compile a series of beneficial management practices, including ecocultural restoration practices. These include prescribed burning, thinning, private lands habitat protection and restoration, compatible livestock grazing, non-native plant prevention and restoration, and solar farm habitat loss prevention and habitat restoration. In addition, KSON will develop and implement a program for monitoring outputs and outcomes that will include both geospatial and site monitoring of KEA indicators, cultural monitoring, and SAP progress monitoring.

Additional enabling strategies focus on strengthening and expanding our existing partnership. This will result in specific outputs that relate to integrating oak habitat conservation objectives into broad scale planning efforts (e.g., the US Forest Service Northwest Forest Plan), implementing conservation strategies through land management programs and projects (e.g., Rogue Forest Restoration Initiative), and creating new collaborative opportunities (e.g., NRCS Regional Conservation Partnership Program) (Table 8). A new collaborative burn partnership will enable KSON to accelerate the rate at which we are able to implement prescribed burning as an essential target habitat restoration tool. Our partnership related strategies will result in a

memorandum of understanding with ITERP. This will facilitate tribal engagement in project planning and guidance, restoration implementation, and cultural monitoring. Implemented conservation actions associated with target habitat restoration and protection will require additional project-specific partnership outputs including private landowner agreements and collaborations on public land management projects (Figures 18-22). With this array of partnership related outputs in place, KSON will be better able to offer TA for training, planning, and implementation at the programmatic and project levels.

A final set of enabling strategies are focused on building public and political awareness and support for oak habitat conservation. Outputs include education materials focused on the ecological, social, and economic benefits of fire and of oak habitat conservation (Table 8). Other output will result from education efforts designed to generate policies and laws that favor oak habitat conservation and funding support for implementing this SAP (Figure 17).

Together, our enabling strategies will increase organizational and science delivery capacities, public and political awareness, and conservation friendly policies and funding streams. This will increase KSON's ability to improve and increase our efforts to implement conservation implementation strategies that result in the more protection and restoration of the oak habitat targets.

Conservation Implementation Strategies

Implementing this SAP will involve significant investments in the conservation implementation strategies. This will result in project based outputs (Table 8) that are focused on specific actions and threat reduction efforts (Table 9) designed to address the biophysical factors that stress the oak targets across the KSON geography (i.e., more acres protected and restored) (Figures 17-22). Such acre-based stress reduction outcomes (Table 10) will scale up to landscape level conservation outcomes. These target-based outcomes relate to the KEAs that we use to describe current and desired conditions at both site and landscape scales (Table 2).

Conifer thinning and prescribed burning (including aboriginal burning approaches) are the primary actions that will be implemented to reduce the effects of conifer encroachment and fires suppression threats in oak woodland and oak conifer habitat targets (Table 8-9; Figure 18). KSON will collaborate with partners to provide TA for planning and implementing conifer thinning and prescribed burning projects. These outputs will result in outcomes associated with reducing biophysical factors related stressors (Table 9) and restoring species composition and habitat structure characteristics, while also protecting these targets from the risk of severe fire (Table 2).

Habitat protection projects will be implemented to reduce agricultural conversion and urban and industrial development threats on private lands (Tables 8-9; Figure 19). Working with private land managers, KSON TA will result in projects that reduce the loss and fragmentation of

oak woodland, oak chaparral, and oak conifer targets (Table 10). There are also opportunities to implement restoration actions to improve species composition and habitat structure conditions on private lands where conversion threats are high. Similar habitat protection and restoration actions will be used to reduce threats associated with solar farm development on both private and public lands.

KSON will partner with private and public land managers to implement habitat protection and restoration projects (e.g., fencing, rotation, easements) designed to reduce the impacts of incompatible livestock grazing (Table 8-9; Figure 20). Incompatible livestock grazing is a threat in the oak savanna, oak woodland, and oak conifer habitat targets. Similarly, we will implement collaborative habitat protection and restoration projects to reduce impacts of the non-native grasses and forbs on oak savanna, oak chaparral, and woodland habitat targets (Tables 8-9; Figure 21). Our ability to implement restoration that addresses this non-native plant threat will require partnership outputs that relate to increasing the production of native plant seed sources.

By specifying these outputs (Table 8-9) that result from implementing projects designed to reduce threats and increase the amount of acres where habitat targets are protected and improved, this theory of change approach will enable us to measure our SAP implementation effectiveness and adapt our approach when necessary to maximize our conservation outcomes relating to biophysical factors (Table 10) and target conditions (Table 2).

Monitoring Outputs and Outcomes: Adaptive Implementation of Interrelated Enabling and Conservation Strategies

Our adaptive management approach will involve simultaneously implementing enabling and conservation implementation strategies. We will actively monitor outputs that quantify both our actions to improve organizational, social, and economic conditions (Table 8) and our conservation implementation actions (Table 9-10). Monitoring will also focus on and improving conservation outcomes relating to the site- and landscape-scaled condition of the four KSON targets, as measures by KEA indicators (Table 2).

9. Progress Monitoring Framework

KSON will develop and implement a program for monitoring outputs and outcomes that result from implementing this SAP. This will include geospatial and site monitoring of KEA indicators (Table 2), SAP progress monitoring indicators, and cultural monitoring (see section b. Cultural Monitoring). Specific indicators will be used to track outputs and outcome measurements. Outputs relate to implementing strategic actions and reducing threats and stresses relating to biophysical factors (Tables 8-10). Successful conservation actions will lead to the desired short-, medium-, and/or long-term ecological outcomes (Table 2). Monitoring results will be used to evaluate our capacity growth, partnership development, education and outreach objectives,

and progress towards meeting ecological conditions. Therefore, monitoring is a critical part of KSON's adaptive approach to implementing this SAP and achieving our conservation goals.

Here we outline details relating to the indicators we will use for output and outcome monitoring. Specifics about output quantities and timeframes will be tracked using Miradi Software (CMP 2020). These will be driven by the six, and 12, and 30 year goals that are the basis of the desired habitat target conditions (Table 2).

a) Output and Outcome Indicators

During our viability assessment, threats assessment, and situation analyses we derived indicator metrics that will be used to quantify our conservation action, threat reduction, and habitat restoration and protection outputs (Tables 8-10). We also identified KEA indicator metrics for measuring conservation outcomes regarding the amount and condition of our four oak targets across the KSON geography (Table 2). We will monitor action based indicators to track our progress in implementing our enabling and conservation implementation strategies (Table 8). The monitoring of enabling strategies will involve tracking outputs relating to human resource, partnerships, information delivery, infrastructure, conservation integration, and project development and implementation.

KSON capacity building strategies will be tracked by monitoring the number of positions created or dedicated to meet coordination, planning and guidance, science support, TA expertise, and implementation capacity needs (Table 8). Product and equipment based metrics will be used to track science delivery, education tool development, and progress on meeting other infrastructure needs. Outcomes that result from public and political awareness efforts will be tracked by documenting details about policies and laws that favor oak habitat conservation, economic mechanisms such as eco-labeling and financial benefits, and specifics about other public and private funding support for implementing this KSON SAP (Table 9). We will track our partnership building actions by documenting partnership and programmatic details as well as information about various partnership agreements, land management program and project planning efforts, and the development of new collaborative opportunities.

While tracking the programmatic outputs we will also gather data and document details about the conservation projects that result from KSON's increased capacities (Table 8). We will use threat reduction and habitat restoration specific indicators to monitor detailed outputs from implementing projects that protect and restore target habitats (Table 9). We will also track habitat restoration outputs that relate to the specific biophysical factors that stress our targets (Table 10). We will collect data to track the number of acres protected and restored to reduce habitat loss and fragmentation, restore habitat structure, and improve species composition conditions.

Output monitoring will provide details about our efforts to implement the strategies in this SAP. However, monitoring outcomes will be essential to measuring our effectiveness in achieving our goal to conserve and restore our four oak targets – Oak Savanna, Oak Chaparral, Oak Woodland, and Oak Conifer. This will require the monitoring of KEAs that are used to describe the current and desired conditions of each of the four targets (Table 2). In our viability assessment we identified specific KEA indicators as measures of target conditions to assess the current and desired future condition of each target (Table 2). This viability assessment serves as the basis for our outcomes monitoring.

Outcomes monitoring will include site level monitoring and landscape level monitoring. Site level monitoring will be designed to measure changes in habitat conditions that result from restoration efforts. This site level monitoring will be used to evaluate conservation outcomes that ensure the effectiveness of restoration efforts. These data will be integrated into mapping tools that will be used to scale up monitoring of outcomes to measure the effectiveness of our target habitat restoration and protection efforts at larger scales (e.g., sub basin and KSON geography) (Figure 1). Outcomes monitoring ensure that our conservation actions lead to the desired short-, medium-, and/or long-term ecological outcomes at ecologically meaningful scales.

b) Cultural Monitoring

With tribal involvement in the planning, implementing, and long-term monitoring will help to ensure that indicators of healthy oak ecosystems, as well as culturally significant archeological sites, are considered in all aspects of the adaptive implementation and evaluation of this SAP. Including cultural monitoring will greatly enhance KSON's multi-party monitoring efforts and help to ensure conservation implementation of this plan is informed by TEK and is in sync with ecocultural restoration approaches. The aboriginal people of this bioregion carefully stewarded and managed oak habitats for time immemorial and to this present day. As such, regional tribes are positioned to provide place-based ecocultural knowledge to guide and evaluate the implementation of this SAP. Cultural monitoring will be used to ensure cultural stewardship approaches are integrated into conservation implementation within the framework of this SAP and that KSON conservation efforts enhance the traditional resources associated with the beneficial uses including sustainable foraging, gathering, and hunting for ceremonial and subsistence purposes. Tribal cultural monitors involved will also help to ensure that culturally significant sites are protected. With a strong cultural monitoring component, implementation and evaluation of this SAP will be greatly improved by integrating both indigenous knowledge and western science to gather, process, and mine data for measuring indicators associated with oak habitats ecosystem conservation outputs and outcomes.

b) Communicating Progress

Regular communications regarding the implementation of this SAP will be audience specific. Progress reports will be tailored for communicating information that is relevant to the KSON Steering Committee, local implementation partners, regional oak conservation partners, funders, and the public. Documentation of output and outcome monitoring will be kept in MIRADI. This will ensure indicators relating to implementing strategies (Table 8), reducing direct threats (Table 9) and *biophysical factor* related stresses (Table 10), and achieving desired target conditions (Table 2) are maintained and delivered in format that is consistent with the framework of this SAP.

- The KSON Steering Committee will receive annual reports that present indicator metrics. Progress will be reported within the context of current condition estimates and 10-year future condition status goals (see section a) Output and Outcome Indicators]. KSON also uses project outlines to facilitate planning and implementation; these will be regularly maintained and archived in an online KSON library that can be accessed by Steering Committee members.
- KSON project outlines will be shared with local implementation partners within the KSON geography, and when appropriate more formal project-level reports will also be provided and archived in an online KSON library.
- KSON representatives will continue to engage with the broader oak conservation partners through networking with collaborators who coordinate efforts within the framework of the Pacific Northwest prairie-oak conservation business plan (Altman et al. 2017), as part of the OWEB FIPs that are partnering to implement cross cutting strategies for oak and prairie conservation in Oregon (Manness and Neuhausere 2020), and as part of the Cascadia Prairie-Oak Partnership. KSON progress will be communicated to these partners through informal updates and formal presentations.
- Regular communications with funders will be maintained by KSON representatives and formal reports will be generated based on funder requirements and archived in an online KSON library.
- Regular communications with the public and will be distributed through online mediums including KSON Steering Committee member blogs and social media platforms, news outlets, and public presentations.

The KSON Steering Committee will use progress reporting as a basis for evaluating and adapting implementation of this SAP. Implementation of the enabling strategies outlined in this plan will include further development of a formal monitoring plan.

10. Adaptive Management

The Open Standards for the Practice of Conservation framework used to develop this SAP is an adaptive management process that lays out clear steps and focuses on engagement, program

planning, implementation, and evaluation (CMP 2020). A key goal of this approach is to demonstrate the outcomes of collective action on conservation problems and be able to talk about shared conservation goals and objectives in a common language. Open Standards is designed to facilitate more rigorous and effective planning for conservation initiatives. With standard application of common *adaptive management* concepts, approaches, and terminology in conservation project design, management and monitoring, the framework helps practitioners improve the practice of conservation.

The KSON Steering Committee will be responsible for managing implementation of this SAP following the Open Standards adaptive framework. Adaptive management activities will include the development of annual work plans based on the implementation of the strategies outlined in this plan. This SAP progress and KSON's work plans will be evaluated annually based on the monitoring of outputs and outcomes as outlined in Section 9. Progress Monitoring Framework. KSON implementation of the SAP will be evaluated and adapted based on the ability of KSON partners to achieve outputs and outcomes associated with implementing the SAP strategies (Table 8), reducing threats through project implementation (Table 9), reducing biophysical factor associated stresses (Table 20), and achieve desired conditions based on KEAs at both site and landscape scales. Results from research and monitoring efforts tied to putting the enabling and conservation implementation strategies into action will be used to evaluate and reduce the uncertainties associated with this plan that relate to the data that underlie our mapping tools, our planning assumptions, climate factors, and the possibility of large severe fires.

11. Sustainability

The KSON Steering Committee has demonstrated its ability to sustain its conservation planning and implementation efforts. Through the development of this SAP and the associated financial plans, KSON has outlined a clear path towards building capacities to sustain our trajectory of increased implementation of oak ecosystem conservation effort in the KSON geography. Key to KSON's model of sustainability is the diversity of the KSON's Steering Committee and partner organizations. With a mix of NGO and state and federal partners, KSON's sustainable growth has been based on collaborative fundraising, and the integration of oak conservation with ongoing natural resource management programs. KSON has a strong history of leveraging diverse funding sources to sustain oak ecosystem conservation efforts within the KSON geography. Now, with this SAP as a road map for accelerating KSON conservation efforts, the enabling and conservation implementation strategies will guide our partnership ensuring growth and sustainability over the next six, 12, and 30 years.

12. Glossary

Aboriginal fire fire (anthropogenic fire)

Adaptive management is the intentional practice of adjusting strategies through a cycle of assessing, planning, implementing, monitoring, and evaluation.

A **biophysical factor** is a biological and physical stress that results from a direct threat and influences the health of a conservation target.

A **contributing factor** is a human-induced action or event that underlies or leads to one or more direct threats; contributing factors include indirect threats and opportunities.

A **conceptual model** is a diagram of a set of relationships between certain factors that are believed to impact or lead to a conservation target.

Ecocultural restoration is the process of recovering as much as is recoverable of the key historic pre-contact ecosystem structure, composition, processes, and function, along with traditional, time-tested, ecologically appropriate and sustainable Indigenous cultural practices that helped shape ecosystems, while simultaneously building-in resilience to future rapid climate disruptions and other environmental changes in order to maintain ecological integrity in a way that ensures the survival of both Indigenous ecosystems and cultures.

An **indicator** is a measurable entity related to the status of a target, change in a threat, or progress towards an objective and that indicates the condition of the target, stress, threat, or progress.

A **key ecological attribute (KEA)** represents a target's biology or ecology that if present, defines a healthy target and if missing or altered, would lead to the outright loss or extreme degradation of that target over time.

Outcomes are short, medium, and long-term ecological results.

Outputs are intermediate, measurable, on-the-ground results from implementing an action.

A **results chain** shows the expected outcomes from the implementation of a strategy a sequence of linked factors in a diagram.

A **situation analysis** is a process that helps develop a common understanding of a project's context, including the biological environment and the social, economic, political, and institutional systems that affect biodiversity targets.

A **strategy** is a broad course of action designed to restore natural systems, reduce threats, and/or develop capacity.

A **target** is a suite of species, communities, and ecological systems that are chosen to represent and encompass the full array of biodiversity found in a project area. They are the basis for setting goals, carrying out conservation actions, and measuring conservation effectiveness. The conservation of the focal targets will ensure the conservation of all native biodiversity within functional landscapes.

A **threat** is a proximate agent or factor that directly degrades one or more conservation targets.

Traditional Ecological Knowledge (TEK) refers to the evolving knowledge acquired by indigenous and local peoples over hundreds or thousands of years through direct contact with the environment.

A **viability assessment** helps identify what a target's "healthy state" might look like, identify how the target is doing today, and determine how to measure a target's "health" over time. A viability assessment results in an overview of the status of each conservation target, a description of the desired conditions that help define short- and long-term conservation outcomes, and measures for monitoring the effectiveness of conservation actions over time.

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14. Tables and Figures

Table 1. Size (acres) of the ten sub-basins and 67 watersheds that define the KSON geography and the number of acres of each of the four target habitats within each sub-basin and watershed.

	Watershed			Target Habitats			
Sub-basin	#	Name	Total	Oak Savanna	Oak Chaparral	Oak Woodland	Oak Confifer
Upper Rogue							
	1	Headwaters Rogue River	248,571	584	46	274	92
	2	South Fork Rogue River	160,769	689	27	454	338
	3	Lost Creek-Rogue River	32,088	1,278	228	1,488	2,206
	4	Big Butte Creek	158,253	6,574	1,583	5,824	7,508
	5	Elk Creek	85,471	1,670	73	3,046	3,604
	6	Trail Creek	35,336	1,380	218	3,180	3,337
	7	Shady Cove-Rogue River	74,276	9,730	2,660	14,388	12,479
	8	Little Butte Creek	238,887	16,914	1,593	37,173	16,214
Sub-basin Totals			1,033,651	38,819	6,428	65,826	45,778
Middle Rogue							
	9	Bear Creek	231,244	13,112	2,101	29,262	13,727
	10	Gold Hill-Rogue River	136,062	13,051	785	24,417	12,986
	11	Evans Creek	143,397	4,897	375	9,149	11,602
	12	Grants Pass-Rogue River	53,808	3,897	169	8,942	3,670
Sub-basin Totals			564,510	34,957	3,430	71,770	41,985
Applegate							
	13	Headwaters Applegate River	142,276	1,334	40	2,055	4,035
	14	Upper Applegate River	52,300	2,619	62	6,047	6,467
	15	Little Applegate River	72,297	5,417	118	8,611	6,886
	16	Middle Applegate River	82,602	6,003	212	11,654	10,578
	17	Williams Creek	52,958	1,349	101	2,217	3,835
	18	Lower Applegate River	90,606	3,583	248	8,087	7,536
Sub-basin Totals			493,038	20,305	781	38,671	39,337
Lower Rogue							
	19	Jumpoff Joe Creek	69,731	6,290	95	9,831	3,947
	20	Hellgate Canyon-Rogue River	93,370	2,261	57	2,701	3,858
	21	Grave Creek	104,517	2,538	39	2,657	5,894
	22	Horseshoe Bend-Rogue River	104,128	2,102	14	392	4,262
	23	Stair Creek-Rogue River	36,542	363	0	266	1,526
	24	Shasta Costa Creek-Rogue River	45,022	216	0	83	1,900
	25	Lobster Creek	44,309	0	0	48	779
	26	Rogue River	82,259	164	0	81	3,282
Sub-basin Totals			579,879	13,936	205	16,059	25,448
Illinois							
	27	Althouse Creek	30,244	325	4	296	1,241
	28	Sucker Creek	61,508	213	2	144	777
	29	East Fork Illinois River	57,775	837	36	645	2,627
	30	West Fork Illinois River	76,993	796	6	436	3,760
	31	Deer Creek	72,606	1,241	13	830	5,003
	32	Josephine Creek-Illinois River	81,743	3,767	1	878	7,015
	33	Briggs Creek	43,760	724	0	130	2,270
	34	Klondike Creek-Illinois River	67,126	8,288	0	616	8,555
	35	Silver Creek	51,619	8,272	0	588	6,121
	36	Indigo Creek	48,985	4,430	0	271	5,133
	37	Lawson Creek-Illinois River	41,184	1,011	2	184	3,602
	Sub-basin Totals			633,543	29,904	64	5,017

	Watershed			Target Habitats			
Sub-basin	#	Name	Total	Oak Savanna	Oak Chaparral	Oak Woodland	Oak Confifer
Chetco							
	38	Chetco River	225,121	6,731	0	300	13,308
	39	Winchuck River	45,632	18	0	51	544
	40	Whalehead Creek-Frontal Cape Ferrelo	39,024	2	0	19	610
	41	Pistol River	67,282	24	0	66	3,134
	42	Hunter Creek	28,458	1	0	12	1,105
Sub-basin Totals			405,516	6,776	0	448	18,702
Upper Klamath Lake							
	43	Wood River	120,969	0	0	0	0
	44	Fourmile Creek	73,940	0	0	0	0
	45	Long Lake Valley-Upper Klamath Lake	268,431	2	1	163	99
Sub-basin Totals			463,341	2	1	163	99
Upper Klamath							
	46	Spencer Creek	54,244	1	1	11	9
	47	John C Boyle Reservoir-Klamath River	100,359	1,409	320	4,346	1,164
	48	Copco Reservoir-Klamath River	86,401	3,692	368	5,074	2,262
	49	Jenny Creek	134,459	3,168	788	5,026	3,601
	50	Iron Gate Reservoir-Klamath River	42,271	6,698	1,071	5,446	4,000
	51	Cottonwood Creek	63,561	9,154	2,726	7,303	5,919
	52	Bogus Creek-Klamath River	111,494	9,695	2,422	5,836	9,361
	53	Humbug Creek-Klamath River	68,072	8,286	4,563	9,022	9,907
	54	Beaver Creek	69,662	1,620	48	1,762	2,611
	55	Horse Creek-Klamath River	98,690	6,547	997	8,213	9,525
56	Seiad Creek-Klamath River	81,769	1,583	84	2,270	4,775	
Sub-basin Totals			910,982	51,853	13,389	54,309	53,136
Shasta							
	57	Lake Shastina-Shasta River	80,776	4,400	405	1,592	938
	58	Willow Creek	56,184	2,343	316	1,408	2,244
	59	Little Shasta River	81,522	580	144	172	1,356
	60	Parks Creek-Shasta River	210,537	3,348	1,134	2,000	2,848
	61	Yreka Creek-Shasta River	79,150	4,230	4,198	4,015	5,026
Sub-basin Totals			508,169	14,901	6,197	9,187	12,412
Scott							
	62	East Fork Scott River	73,925	3,071	1,435	2,556	2,800
	63	French Creek-Scott River	115,304	9,652	1,453	3,508	5,893
	64	Moffett Creek	78,926	7,356	3,376	4,978	7,812
	65	Kidder Creek-Scott River	78,772	6,757	1,279	3,262	5,013
	66	Indian Creek-Scott River	76,441	6,283	1,579	4,495	6,800
	67	Lower Scott River	97,679	4,428	191	5,269	7,782
Sub-basin Totals			521,047	37,547	9,313	24,067	36,102
TOTALS			6,113,677	248,999	39,808	285,517	319,104

Table 2. A viability assessment of the KSON geography including current condition ratings and desired future condition ratings for each target habitat based on key ecological attributes (KEAs) and indicator measures; this viability assessment identifies what the "healthy state" of each target looks like, how the target is doing today, and how to measure a target's "health" over time.

KEA	Indicator	Oak Savannah		Oak Chaparral		Oak Woodland		Oak Conifer	
		Current	Desired	Current	Desired	Current	Desired	Current	Desired
Size - Amount on landscape	Total area by region	 Fair	 Fair	 Good	 Good	 Fair	 Fair	 Fair	 Good
		249k acres	249k acres	40k acres	40k acres	286k acres	286k acres	319k acres	342k acres
Condition - Plant Community	>25% native understory cover with high diversity	 Poor	 Fair			 Fair	 Fair		
		<25% of landscape	>25% of landscape			>25% of landscape	>25% of landscape		
Condition - Oak trees	Abundance of younger age class oaks					 Fair	 Good	 Fair	 Good
						>25% of landscape	>50% of landscape	>25% of landscape	>50% of landscape
Condition - Oak trees	90% potential legacy oaks					 Fair	 Good	 Fair	 Good
						>25% of landscape	>50% of landscape	>25% of landscape	>50% of landscape
Condition - Oak trees	Abundant, accessible, & high quality acorn crops					 Fair	 Good	 Fair	 Good
						>25% of landscape	>50% of landscape	>25% of landscape	>50% of landscape
Condition - Fuel Load	Low load surface fire behavior model					 Fair	 Good	 Fair	 Good
						>25% of landscape	>50% of landscape	>25% of landscape	>50% of landscape
Condition - Fire regime	Fire frequency within regime class interval (*1)	 Poor	 Fair	 Fair	 Good	 Poor	 Fair	 Poor	 Fair
		< 25% of landscape as Fire Regime I	>25% of landscape as Fire Regime I	>25% of landscape as Fire Regime III	>50% of landscape as Fire Regime III	< 25% of landscape as Fire Regime I	>25% of landscape as Fire Regime I	< 25% of landscape as Fire Regime I	>25% of landscape as Fire Regime I
Condition - Breeding Birds	>75% of focal bird species present (*2)	 Fair	 Fair	 Good	 Good	 Fair	 Good	 Fair	 Good
		>25% of landscape	>25% of landscape	>50% of landscape	>50% of landscape	>25% of landscape	>50% of landscape	>25% of landscape	>50% of landscape

Poor - Restoration increasingly difficult, may result in extirpation of target; **Fair** - Outside acceptable range of variation, requires human intervention; **Good** - Within acceptable range of variation, some intervention required to maintain

*1: Fire Regime I - <36 years since low severity fire; Fire Regime III - 36-100 years since mixed severity fire

*2: Four of six Oak Savannah focal species; Four of six Oak Chaparral focal species; Eight of 11 Oak Woodland focal species; Eight of 11 Oak Conifer focal species

Table 3. Amount (acres) of private (tribal, industrial, nonprofit, and other combined) and public lands within the KSON geography and in each sub-basin and watershed; protected lands based on GAP Codes 1 and 2 (Alexander et al. 2017). See ATTACHMENT 3. GEOSPATIAL ANALYSIS for geospatial analysis details.

	Watershed			Public			
Sub-basin	#	Name	Private	Federal	State	Local	Protected
Upper Rogue							
	1	Headwaters Rogue River	17,687	230,788	116		83,953
	2	South Fork Rogue River	33,130	127,684			66,197
	3	Lost Creek-Rogue River	14,237	16,803	1,056		
	4	Big Butte Creek	66,820	87,805		3,697	
	5	Elk Creek	34,576	50,915			
	6	Trail Creek	16,210	19,062	79		
	7	Shady Cove-Rogue River	50,300	22,785	889	246	
	8	Little Butte Creek	123,567	114,812	644		5,407
Sub-basin Totals			356,527	670,654	2,783	3,942	155,557
Middle Rogue							
	9	Bear Creek	177,204	52,237	439	1,542	16,860
	10	Gold Hill-Rogue River	99,921	33,752	2,405	49	
	11	Evans Creek	83,014	60,427			
	12	Grants Pass-Rogue River	40,698	12,489	412	23	
Sub-basin Totals			400,837	158,904	3,255	1,614	16,860
Applegate							
	13	Headwaters Applegate River	5,941	135,623	634		19,077
	14	Upper Applegate River	6,740	45,603			
	15	Little Applegate River	19,707	52,294	320	37	
	16	Middle Applegate River	33,416	49,155		94	
	17	Williams Creek	24,767	28,238			
	18	Lower Applegate River	51,276	39,361			
Sub-basin Totals			141,847	350,273	954	131	19,077
Lower Rogue							
	19	Jumpoff Joe Creek	47,778	21,529	48	405	
	20	Hellgate Canyon-Rogue River	23,619	67,416	1,244	27	
	21	Grave Creek	51,973	50,095	2,491		
	22	Horseshoe Bend-Rogue River	2,688	100,196	985		15,530
	23	Stair Creek-Rogue River	612	35,439			29,516
	24	Shasta Costa Creek-Rogue River	1,152	43,277	226		4,580
	25	Lobster Creek	15,950	28,378	4		
	26	Rogue River	34,271	46,164	686		5,894
Sub-basin Totals			178,043	392,494	5,683	433	55,520
Illinois							
	27	Althouse Creek	11,096	18,102	649		
	28	Sucker Creek	11,016	50,515	40		3,522
	29	East Fork Illinois River	16,269	16,310	98		
	30	West Fork Illinois River	21,474	42,810	804		
	31	Deer Creek	33,197	38,158	1,301		
	32	Josephine Creek-Illinois River	10,637	70,855	154	161	6,728
	33	Briggs Creek	2,354	41,428			NA
	34	Klondike Creek-Illinois River	0	67,162			65,831
	35	Silver Creek	80	51,565			586
	36	Indigo Creek	29	48,970	5		
	37	Lawson Creek-Illinois River	1,030	39,501	374		3,486
Sub-basin Totals			107,182	485,374	3,425	161	80,154

	Watershed			Public			
Sub-basin	#	Name	Private	Federal	State	Local	Protected
Chetco							
	38	Chetco River	38,196	186,888	318		112,893
	39	Winchuck River	5,012	32,562	216		
	40	Whalehead Creek-Frontal Cape Ferrelo	30,582	420	4,154		
	41	Pistol River	28,897	38,300	134		
	42	Hunter Creek	17,697	10,761	17		
Sub-basin Totals			120,384	268,930	4,839	0	112,893
Upper Klamath Lake							
	43	Wood River	34,337	70,959	15,708		48,430
	44	Fourmile Creek	1,754	72,226			
	45	Long Lake Valley-Upper Klamath Lake	111,814	89,172	1,601	2	62,365
Sub-basin Totals			147,905	232,358	17,310	2	110,796
Upper Klamath							
	46	Spencer Creek	23,195	31,088			
	47	John C Boyle Reservoir-Klamath River	61,165	38,024	1,216		
	48	Copco Reservoir-Klamath River	26,840	59,434	66		
	49	Jenny Creek	65,287	69,167	119		
	50	Iron Gate Reservoir-Klamath River	5,797	32,303	4,200		30,384
	51	Cottonwood Creek	9,379	54,076	108		
	52	Bogus Creek-Klamath River		110,759	871		
	53	Humbug Creek-Klamath River		67,816	346		
	54	Beaver Creek	861	68,754			
	55	Horse Creek-Klamath River		98,814			
	56	Seiad Creek-Klamath River		81,880			13,422
Sub-basin Totals			192,525	712,115	6,926	0	43,805
Shasta							
	57	Lake Shastina-Shasta River		79,436	1	1,458	10,631
	58	Willow Creek		56,278			
	59	Little Shasta River		79,187	2,455		
	60	Parks Creek-Shasta River	5,838	201,859	3,189	4	16,697
	61	Yreka Creek-Shasta River		78,674	141	445	
Sub-basin Totals			5,838	495,434	5,786	1,906	27,328
Scott							
	62	East Fork Scott River		73,992			
	63	French Creek-Scott River		115,529			
	64	Moffett Creek		78,811	240	4	
	65	Kidder Creek-Scott River		78,911		6	
	66	Indian Creek-Scott River		76,564			
	67	Lower Scott River		97,826			25,838
Sub-basin Totals			0	521,632	240	10	25,838
TOTALS			1,651,089	4,288,168	51,201	8,199	647,829

Table 4. Amount (acres) of lands designated within Oregon land use categories within the KSON geography and in each sub-basin and watershed (Working Forest is the sum of Mixed Farm Forest and Secondary Forest). See ATTACHMENT 3. GEOSPATIAL ANALYSIS for geospatial analysis details.

	Watershed				
Sub-basin	#	Name	Exclusive Farm Use	Working Forest	Rural Residential
Upper Rogue					
	1	Headwaters Rogue River	453	780	262
	2	South Fork Rogue River	695	21	14
	3	Lost Creek-Rogue River	308	8,206	267
	4	Big Butte Creek	5,402	8,737	195
	5	Elk Creek	322	3,702	61
	6	Trail Creek	1,390	3,010	183
	7	Shady Cove-Rogue River	25,962	17,873	4,100
	8	Little Butte Creek	64,778	27,704	3,038
Sub-basin Totals			99,312	70,033	8,119
Middle Rogue					
	9	Bear Creek	76,484	28,850	15,622
	10	Gold Hill-Rogue River	35,905	31,021	7,262
	11	Evans Creek	8,859	15,667	3,548
	12	Grants Pass-Rogue River	2,193	10,964	15,494
Sub-basin Totals			123,442	86,501	41,926
Applegate					
	13	Headwaters Applegate River	161	3,073	0
	14	Upper Applegate River	1,824	968	590
	15	Little Applegate River	2,569	10,556	394
	16	Middle Applegate River	11,384	15,848	3,428
	17	Williams Creek	5,250	5,123	3,708
	18	Lower Applegate River	6,355	19,030	12,450
Sub-basin Totals			27,543	54,599	20,569
Lower Rogue					
	19	Jumpoff Joe Creek	2,115	16,906	14,643
	20	Hellgate Canyon-Rogue River	2,471	15,017	4,655
	21	Grave Creek	884	7,487	1,707
	22	Horseshoe Bend-Rogue River	0	0	0
	23	Stair Creek-Rogue River	0	0	0
	24	Shasta Costa Creek-Rogue River	0	0	155
	25	Lobster Creek	0	6	0
	26	Rogue River	0	13,744	1,316
Sub-basin Totals			5,469	53,159	22,475
Illinois					
	27	Althouse Creek	3,916	2,314	2,116
	28	Sucker Creek	1,267	1,566	711
	29	East Fork Illinois River	3,142	4,621	3,776
	30	West Fork Illinois River	1,132	42,540	2,614
	31	Deer Creek	2,537	13,067	3,855
	32	Josephine Creek-Illinois River	2,009	43,034	1,190
	33	Briggs Creek	0	21,843	0
	34	Klondike Creek-Illinois River	0	653	0
	35	Silver Creek	0	4,092	0
	36	Indigo Creek	0	0	0
	37	Lawson Creek-Illinois River	0	0	48
Sub-basin Totals			14,003	133,729	14,310
TOTALS			357,816	502,728	119,597

	Watershed				
Sub-basin	#	Name	Exclusive Farm Use	Working Forest	Rural Residential
Chetco					
	38	Chetco River	97	25,415	1,486
	39	Winchuck River	1,068	4,079	470
	40	Whalehead Creek-Frontal Cape Ferrelo	663	21,795	3,787
	41	Pistol River	0	11,174	262
	42	Hunter Creek	0	1,955	442
Sub-basin Totals			1,827	64,418	6,447
Upper Klamath Lake					
	43	Wood River	34,199	0	173
	44	Fourmile Creek	972	0	396
	45	Long Lake Valley-Upper Klamath Lake	43,225	12,241	3,936
Sub-basin Totals			78,396	12,241	4,504
Upper Klamath					
	46	Spencer Creek	0	27	127
	47	John C Boyle Reservoir-Klamath River	0	1,817	428
	48	Copco Reservoir-Klamath River	639	527	0
	49	Jenny Creek	3,506	9,368	595
	50	Iron Gate Reservoir-Klamath River	710	7,944	0
	51	Cottonwood Creek	2,969	8,364	97
	52	Bogus Creek-Klamath River			
	53	Humbug Creek-Klamath River			
	54	Beaver Creek	0	0	0
	55	Horse Creek-Klamath River			
	56	Seiad Creek-Klamath River			
Sub-basin Totals			7,824	28,048	1,248
Shasta					
	57	Lake Shastina-Shasta River			
	58	Willow Creek			
	59	Little Shasta River			
	60	Parks Creek-Shasta River			
	61	Yreka Creek-Shasta River			
Sub-basin Totals			0	0	0
Scott					
	62	East Fork Scott River			
	63	French Creek-Scott River			
	64	Moffett Creek			
	65	Kidder Creek-Scott River			
	66	Indian Creek-Scott River			
	67	Lower Scott River			
Sub-basin Totals			0	0	0
TOTALS			357,816	502,728	119,597

Table 5. Results from an assessment and rating of the degree to which each target is degraded by direct threats; threats are classified based on CMP (2020). For details about underlying threat rankings see ATTACHMENT 4. THREATS ASSESSMENT.

		Threat Ratings							
				Oak Savanna	Oak Chaparral	Oak Woodland	Oak Conifer		
Threat Classification	Summary			High	Medium	High	High		
1. RESIDENTIAL & COMMERCIAL DEVELOPMENT									
1.1. Housing & Urban Areas	Summary								
1.1.2 Urban development	Medium			Medium	Medium	Medium	Medium		
1.2. Commercial & Industrial Areas									
1.2.1 Commercial & industrial development	Medium			Medium		Medium			
2. AGRICULTURE & AQUACULTURE									
2.1. Annual & Perennial Non-Timber Crops									
2.1.1 Conversion to vineyard, cannadis, & orchards	High			High	Medium	High			
2.3. Livestock Farming & Ranching									
2.3.1 Incompatible livestock grazing	Medium			High	Low	Medium	Medium		
3. ENERGY PRODUCTION & MINING									
3.3. Renewable Energy									
3.3.1 Solar farms	Medium			Medium	Medium				
7. NATURAL SYSTEM MODIFICATIONS									
7.1. Fire & Fire Suppression									
7.1.1 Fire Exclusion (Indirect)	High			Low	Low	High	High		
7.1.3 Severe fire	Medium			Low	Low	Medium	High		
8. INVASIVE & PROBLEMATIC SPECIES, PATHOGENS & GENES									
8.1. Invasive Non-Native / Alien Plants & Animals									
8.1.1 Non-native grasses & forbs	Medium			High	Medium	Medium	Low		
8.2. Problematic Native Plants & Animals									
8.2.1 Conifer encroachment	High			Low	Low	High	High		

Table 6. High (red diamond), medium (yellow triangle), and low (green circle) oak habitat conservation priority watersheds based on scores that take into account current as well as potential future distributions of oak associated birds (Figure 14) (Veloz et al. 2013, 2015) as well as watersheds where larger amounts of one or more of the four targets occur (indicated by a red diamond). Geospatial information about restoration need and departure (Figure 15) were used to identify watersheds where there may be opportunities to implement restoration activities that reduce the effect of fire suppression. Data about land use zoning in Oregon (Figure 9), and specifically the zoning for mixed farm forest use, were used to assess agricultural conversion risk.



























































































Watershed								
#	Name	Oak Savanna (Total Area)	Oak Chaparral (Total Area)	Oak Woodland (Total Area)	Oak Conifer (Total Area)	OR Restoration Need (Risk)	CA Departure (Risk)	Mixed Farm Forest (Risk)
8	Little Butte Creek							
9	Bear Creek							
13	Headwaters Applegate River							
14	Upper Applegate River							
15	Little Applegate River							
26	Rogue River							
29	East Fork Illinois River							
30	West Fork Illinois River							
32	Josephine Creek-Illinois River							
34	Klondike Creek-Illinois River							
37	Lawson Creek-Illinois River							
38	Chetco River							
41	Pistol River							
56	Seiad Creek-Klamath River							
67	Lower Scott River							

Table 7. High (red diamond), medium (yellow triangle), and low (green circle) priority strategies, including enabling strategies (underlined) and conservation implementation strategies, that will be carried out to reduce threats (Table 5) to KSON oak habitat targets. Strategies are classified based on CMP (2020). For details about the situation analysis and prioritization see ATTACHMENT 5. SITUATION ANALYSIS.

Conservation Strategies		Weighted Priority	2.1.1 Conversion to vineyard, cannabis, & orchards (HIGH)	7.1.1 Fire exclusion, indirect (HIGH)	8.2.1 Conifer encroachment (HIGH)	1.1.2 Urban development (MEDIUM)	1.2.1 Commercial & industrial development (MEDIUM)	2.3.1 Incompatible livestock grazing (MEDIUM)	3.3.1 Solar farms (MEDIUM)	7.1.3 Severe fires (MEDIUM)	8.1.1 Non-native grasses & forbs (MEDIUM)
1. Land / Water Protection											
	1.1. Site/Area Protection										
	1.1.A IMPLEMENTATION- Protect target habitats from conversion	—	—	—	—	—	—	—	—	—	—
2. Land / Water Management											
	2.1. Site/Area Management										
	2.1.A IMPLEMENTATION- Increase restoration of target habitats	—	—	—	—	—	—	—	—	—	—
	2.1.B IMPLEMENTATION- Increase retention of target habitats	—	—			—	—	—	—		
3. Species Management											
	3.3. Species Re-Introduction										
	<u>3.3.A Increase availability of native plant materials/seeds</u>	—									—
4. Education & Awareness											
	4.3. Awareness & Communications										
	4.3.A Educate the public & political representatives about the importance of oak habitat conservation	—	—	—	—	—	—	—	—	—	—
	4.3.B Design, implement, & market demonstration projects	—	—								
5. Law & Policy											
	5.2. Policies & Regulations										
	<u>5.2.A Integrate oak conservation practices into policies</u>	—		—	—	—	—	—	—	—	—
6. Livelihood, Economic & Other Incentives											
	6.3. Market Forces										
	6.3.A Develop oak conservation certification/eco-labeling program	—	—					—			
	6.4. Conservation Payments										
	6.4.A Increase payments & tax benefits for protection, retention, & restoration	—	—			—	—	—	—		—
7. External Capacity Building											
	7.1 Institutional Development										
	7.1.A Build capacity for technical assistance with increased human resources & equipment for planning, implementing, & monitoring	—	—	—	—	—	—	—	—	—	—
	7.1.B RESEARCH & MONITORING- Threat impacts and conservation management effectiveness	—	—	—	—	—	—	—	—	—	—
	7.1.C Develop decision support tools	—	—	—	—	—	—	—	—	—	—
	7.1.E Develop education materials	—	—	—	—	—	—	—	—	—	—
	7.2 Alliance & Partnership Development										
	7.2.A PARTNERSHIP- Partner with tribes to ensure conservation planning is guided by ecocultural approaches & traditional ecological knowledge & that tribes benefit from strategic plan implementation	—		—	—			—		—	—
	7.2.B PARTNERSHIP- Partner with private land managers to protect, retain, & restore target habitats	—	—	—	—	—	—	—	—	—	—
	7.2.C PARTNERSHIP- Partner with public land managers to protect, retain, & restore target habitats	—		—	—			—	—	—	—
	7.2.D IMPLEMENTATION- Offer technical assistance for training, planning, & implementation	—	—	—	—	—	—	—	—	—	—
	7.2.E RESEARCH & MONITORING - Create a community monitoring program for EDDR	—	—								—

Table 8. Indicators for measuring action outputs that will result from carrying out enabling and conservation implementation strategies (Table 7). Strategies are classified based on CMP (2020).

Strategy Indicator		Associated Strategy	Indicator Type / Metric / Details
1. Land / Water Protection			
	1.1.A.1. PROJECTS- Protect target habitats	IMPLEMENTATION- Protect target habitats from conversion	Strategy: # of projects with details
	1.1.A.1. PROJECTS- Protect target habitats	IMPLEMENTATION- Protect target habitats from severe fire	Strategy: # of projects with details
2. Land / Water Management			
	2.1.A.1. PROJECTS- Restore target habitats	IMPLEMENTATION- Increase restoration of target habitats	Strategy: # of projects with details
4. Education & Awareness			
	<u>4.3.A.1. Demonstration project</u>	Design, implement, and market demonstration projects	Strategy: # of projects with details
5. Law & Policy			
	<u>5.2.A.1. Integrate oak conservation practices into policies</u>	Integrate oak conservation practices into policies	Strategy: # of policies with details
6. Livelihood, Economic & Other Incentives			
	<u>6.3.A.1. Oak conservator product label</u>	Develop oak conservation certification / eco-labeling program	Strategy: # of labels with details
	<u>6.4.A.1. Payments & tax benefits for oak habitats conservation available</u>	Increase payments & tax benefits for protection, retention, & restoration	Strategy: # of mechanisms with details
7. External Capacity Building			
	<u>7.1.A. KSON capacity</u>	Build capacity for technical assistance with increased human resources, information, equipment, and other materials for planning, implementing, & monitoring	Strategy: # of positions with details; coordination, planning, science support, TA expertise, implementation workforce, infrastructure, partnership agreements
	<u>7.1.B.1. Outcome & output monitoring</u>	RESEARCH & MONITORING- Threat impacts and conservation management effectiveness	Strategy: Monitoring designs in place; Geospatial & site monitoring of KEA indicators, SAP programmatic monitoring in MIRADI, & cultural monitoring
	<u>7.1.C.1. Develop decision support tools</u>	Develop Decision Support Tools	Strategy: DSTs available; Mapping tools and beneficial management practices
	<u>7.1.D.1. Develop education materials</u>	Develop education materials	Strategy: education piece available; Fire and conservation benefits
	<u>7.2.A.1. Tribal leadership positions & workforce</u>	PARTNERSHIP- Partner with tribes to ensure conservation planning is guided by traditional ecological knowledge and that tribes benefit from strategic plan implementation	Strategy: # of positions with details; strategic planning, tribal guidance, implementation workforce, cultural monitors
	7.2.B.1. Land owner agreements	PARTNERSHIP- Partner with private land managers to protect, retain, & restore target habitats	Strategy: # of agreements and details
	7.2.B.2. Collaborate on private lands conservation programs	PARTNERSHIP- Partner with private land managers to protect, retain, & restore target habitats	Strategy: # of programs and details
	7.2.B.3. Collaborations with working lands partnerships	PARTNERSHIP- Partner with private land managers to protect, retain, & restore target habitats	Strategy: # of partnerships and details
	7.2.C.1. Collaborate on public lands management planning	PARTNERSHIP- Partner with public land managers to protect, retain, & restore target habitats	Strategy: # of plans and details
	7.2.C.2. Collaborate on public lands management programs/projects	PARTNERSHIP- Partner with public land managers to protect, retain, & restore target habitats	Strategy: # of programs/projects details
	7.2.D.1. PROJECTS- Protect target habitats	IMPLEMENTATION- Offer technical assistance for training, planning, implementation, & monitoring	Strategy: # of projects with details
	7.2.D.2. PROJECTS- Restore target habitats	IMPLEMENTATION- Offer technical assistance for training, planning, implementation, & monitoring	Strategy: # of projects with details
	7.2.E.1. Active monitoring efforts	RESEARCH & MONITORING- Create a community monitoring program for early detection rapid response	Strategy: # of programs with details

Table 9. Indicators for tracking and measuring threat reduction outputs that will result from conservation implementation strategies (Table 7). Threats (Table 5) are classified based on CMP (2020).

Strategy Indicator		Associated Threat	Indicator Type / Metric / Details
1. RESIDENTIAL & COMMERCIAL DEVELOPMENT			
	1.1.2. PROJECTS- Protect target habitats	Urban development	Threat reduction: # of projects with details
	1.1.2. PROJECTS- Restore target habitats	Urban development	Threat reduction: # of projects with details
	1.2.1. PROJECTS- Protect target habitats	Commercial & industrial development	Threat reduction: # of projects with details
	1.2.1. PROJECTS- Restore target habitats	Commercial & industrial development	Threat reduction: # of projects with details
2. AGRICULTURE & AQUACULTURE			
	2.1.1. PROJECTS- Protect target habitats	Agricultural conversion	Threat reduction: # of projects with details
	2.1.1. PROJECTS- Restore target habitats	Reduce effects of solar farm development	Threat reduction: # of projects with details
	2.1.1. PROJECTS- Restore target habitats	Agricultural conversion	Threat reduction: # of projects with details
	2.1.1.A. PROJECTS- Restore target habitats	Reduce incompatible livestock grazing effects	Threat reduction: # of projects with details
	2.3.1.B. PROJECTS- Protect target habitats	Reduce incompatible livestock grazing effects	Threat reduction: # of projects with details
3. ENERGY PRODUCTION & MINING			
	3.1.1. PROJECTS- Protect target habitats	Reduce effects of solar farm development	Threat reduction: # of projects with details
7. NATURAL SYSTEM MODIFICATIONS			
	7.1.1.A. PROJECTS- Restore target habitats	Reduce fire exclusion effects	Threat reduction: # of projects with details
	7.1.3.A. PROJECTS- Protect target habitats	Reduce risk of severe fire	Threat reduction: # of projects with details
8. INVASIVE & PROBLEMATIC SPECIES, PATHOGENS & GENES			
	8.1.1.A. PROJECTS- Protect target habitats	Reduce effects of non-native grasses & forbs	Threat reduction: # of projects with details
	8.1.1.B. PROJECTS- Restore target habitats	Reduce effects of non-native grasses & forbs	Threat reduction: # of projects with details
	8.2.1.A. PROJECTS- Restore target habitats	Reduce conifer encroachment	Threat reduction: # of projects with details

Table 10. Indicators for tracking and measuring biophysical stress reduction outcomes that will result from carrying out conservation implementation strategies (Table 7).

Stress Reduction Indicator		Associated Biophysical Factor	Indicator Type / Metric / Details
	Amount protected	Protect habitat from degradation	Biophysical stress reduction: # of acres
	Amount protected	Reduce risk of habitat loss & fragmentation	Biophysical stress reduction: # of acres
	Amount protected	Protect habitat from loss & fragmentation	Biophysical stress reduction: # of acres
	Amount restored	Restore habitat structure & species composition	Biophysical stress reduction: # of acres

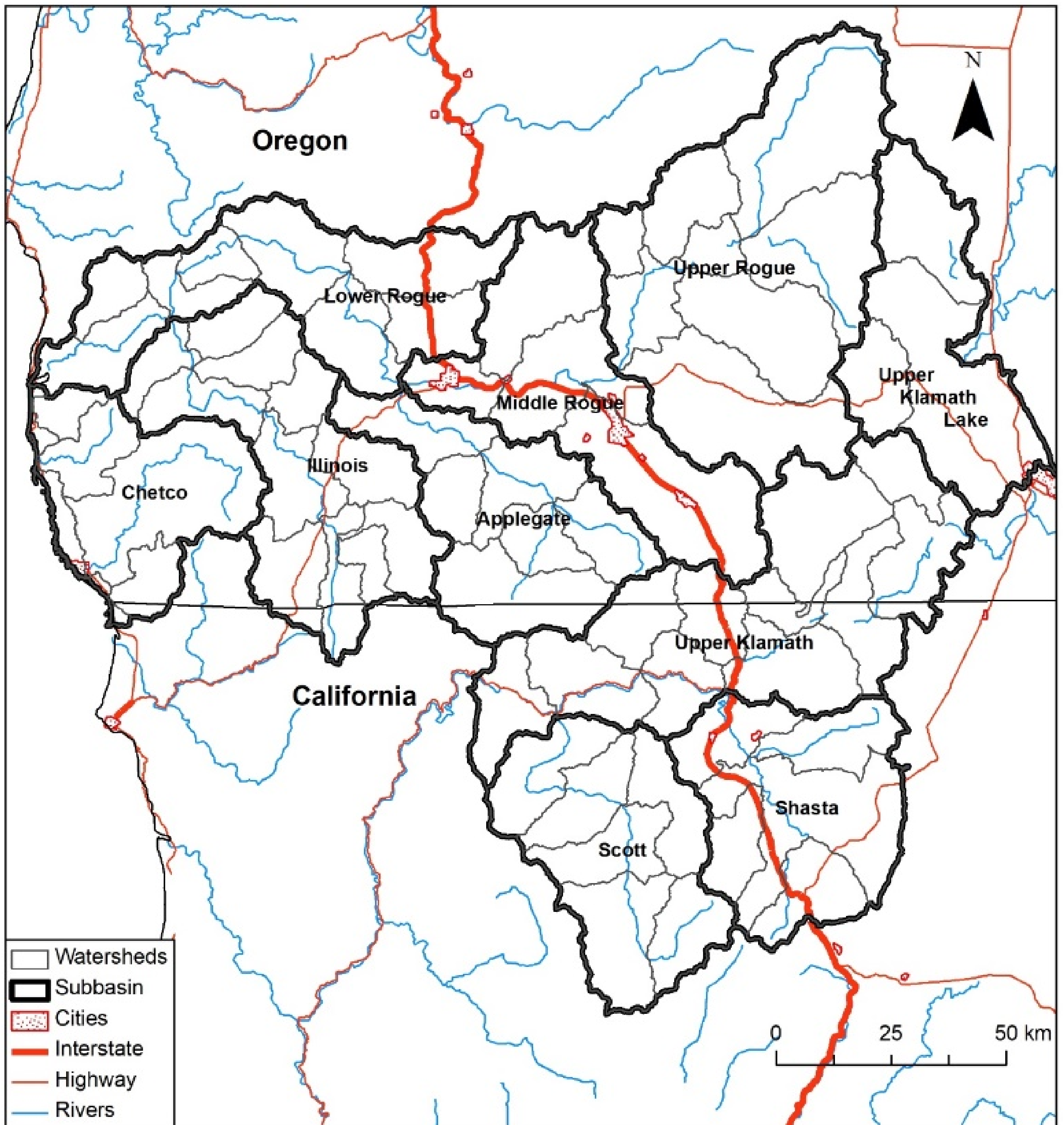


Figure 1. Map of KSON geography including the ten sub-basins that define the conservation planning area.

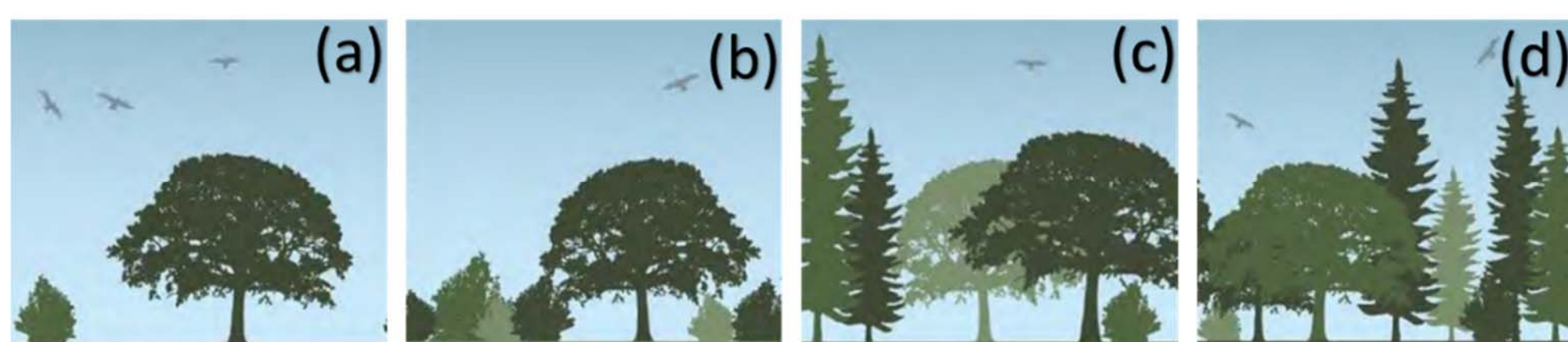


Figure 2. The four KSON strategic action plan target habitats -- Oak Savanna (a), Oak Chaparral (b), Oak Woodland (c), and Oak Conifer (d).

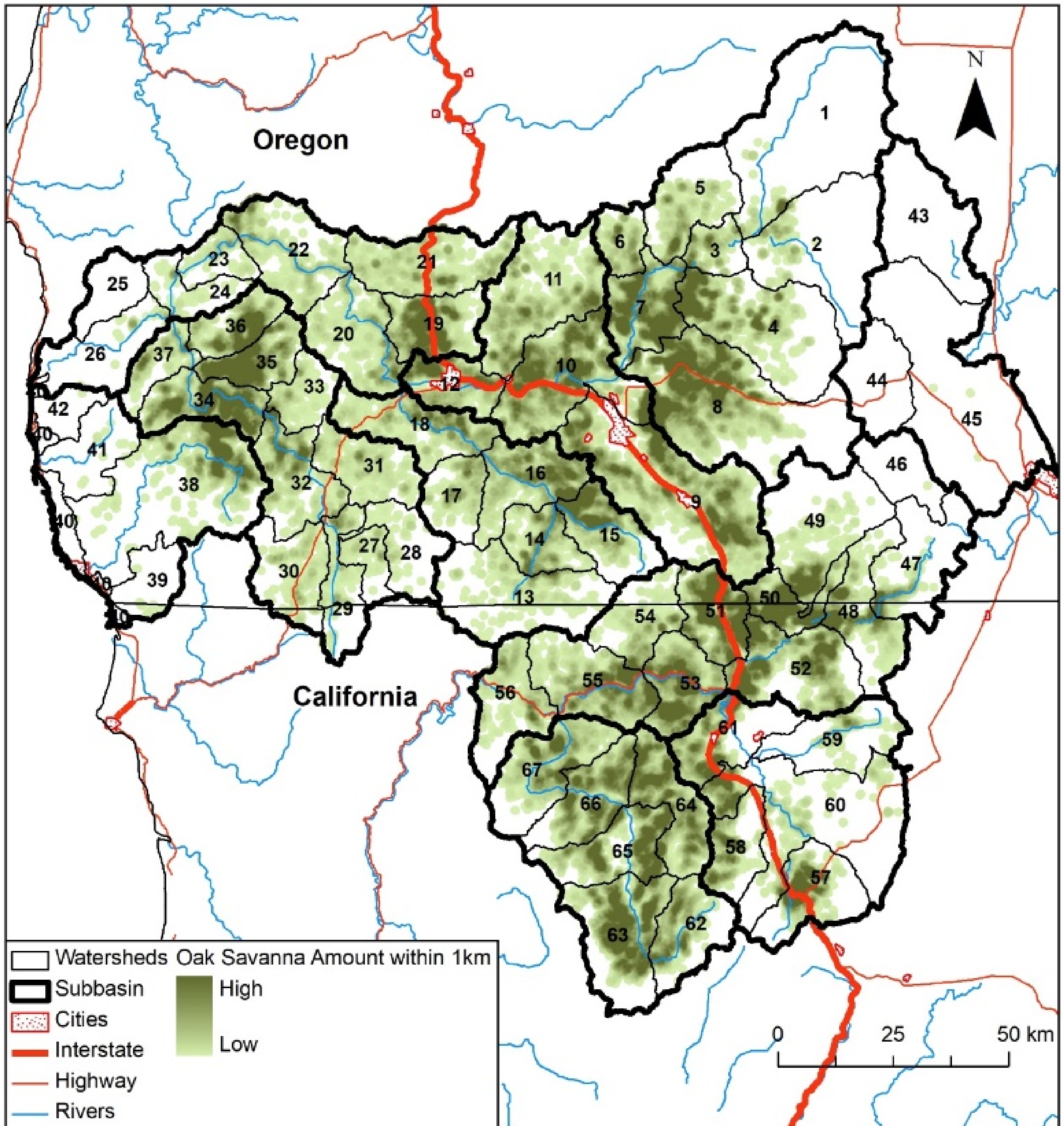


Figure 3. Amount of Oak Savanna within a 1km radius inside the KSON geography. Darker areas of the map identify the largest clusters of pixels classified as Oak Savanna, representing both relative amount and connectivity of this target. See ATTACHMENT 3. GEOSPATIAL ANALYSIS for geospatial analysis details.

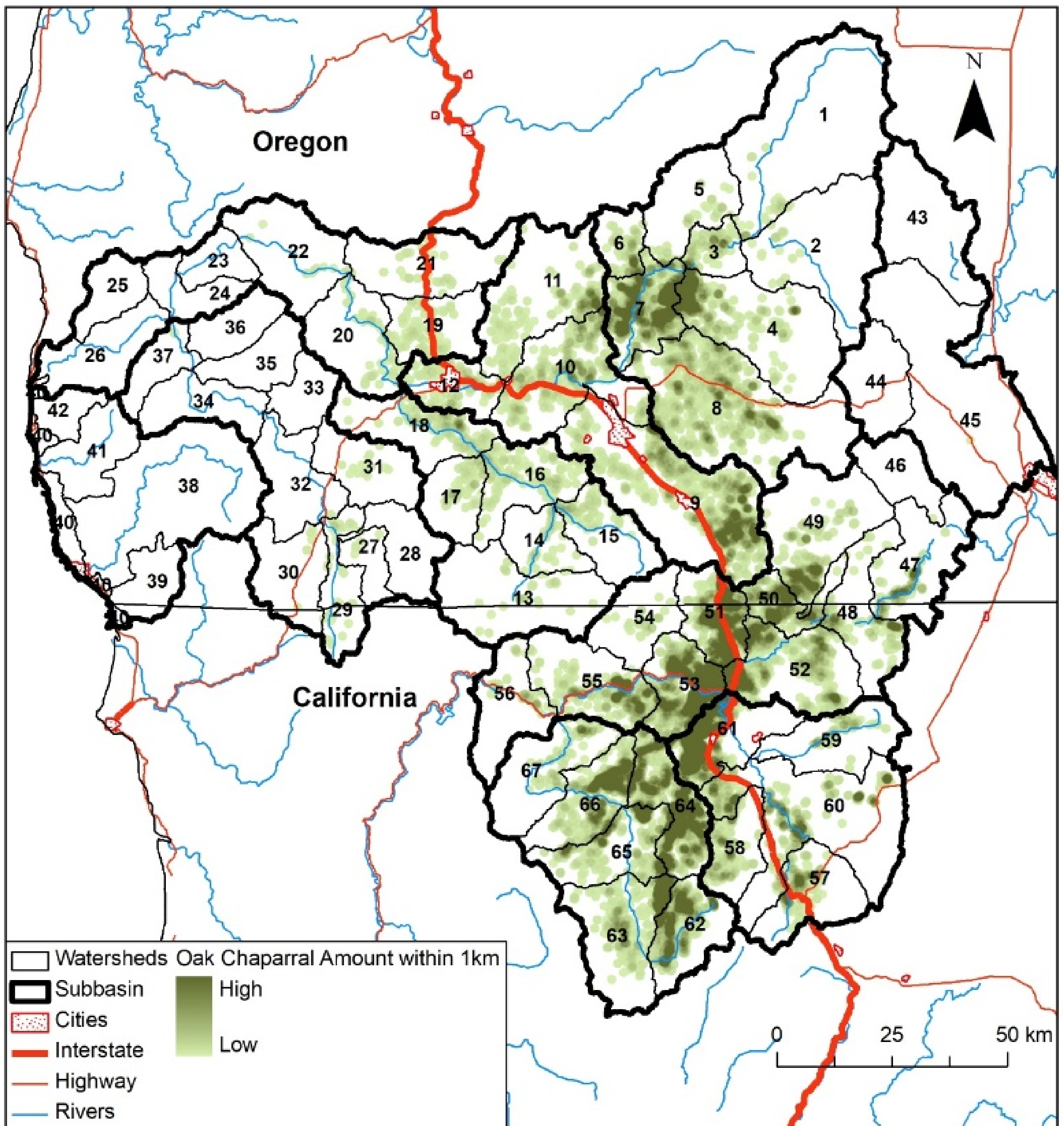


Figure 4. Amount of Oak Chaparral within a 1km radius inside the KSON geography. Darker areas of the map identify the largest clusters of pixels classified as Oak Chaparral, representing both relative amount and connectivity of this target. See ATTACHMENT 3. GEOSPATIAL ANALYSIS for geospatial analysis details.

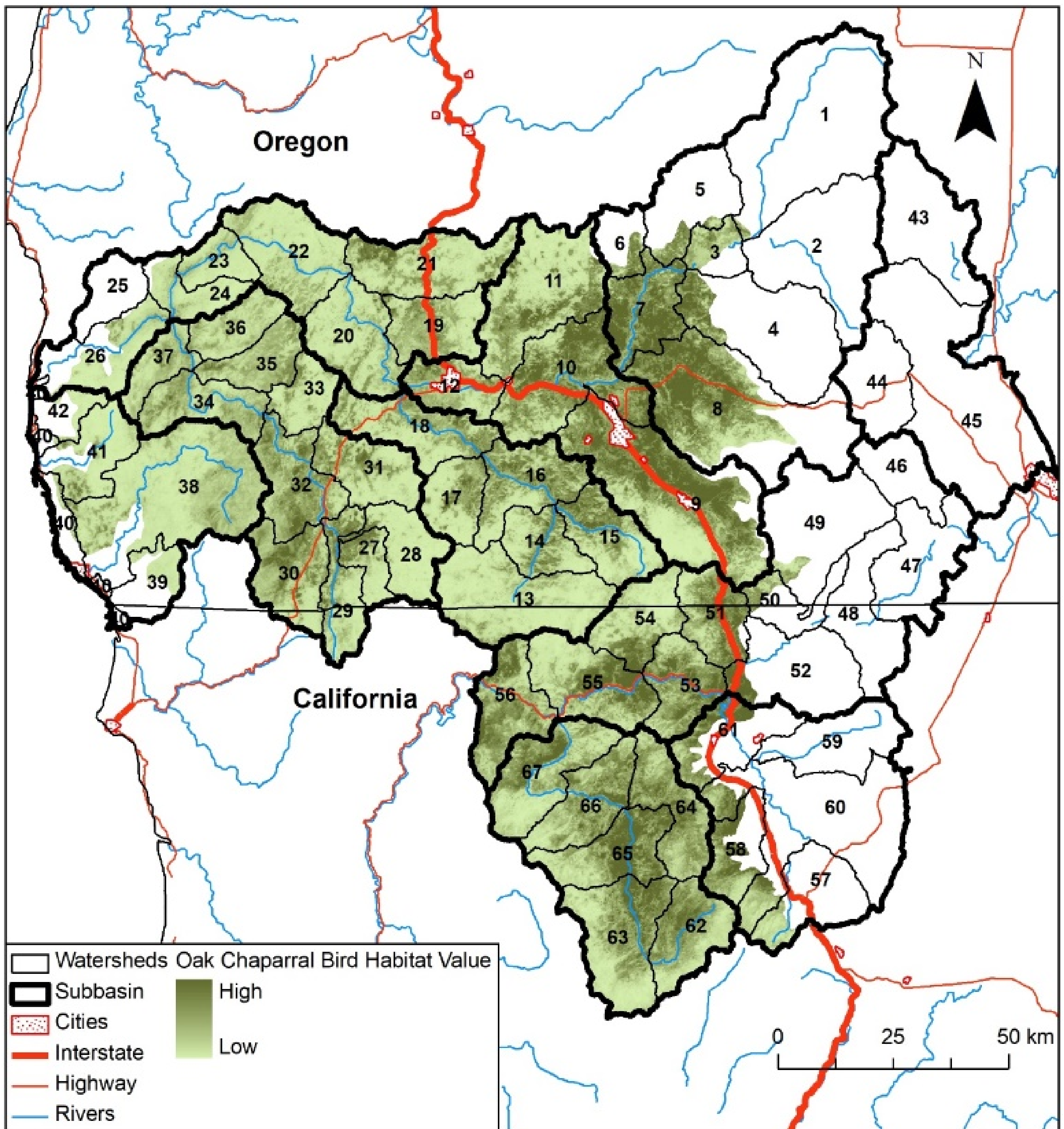


Figure 5. Oak Chaparral habitat value based on the predicted distribution of five focal chaparral associated bird species (Lazuli Bunting, Bewick's Wren, Spotted Towhee, California Towhee, and Blue-gray Gnatcatcher; Gillespie et al 2017). See ATTACHMENT 3. GEOSPATIAL ANALYSIS for geospatial analysis details.

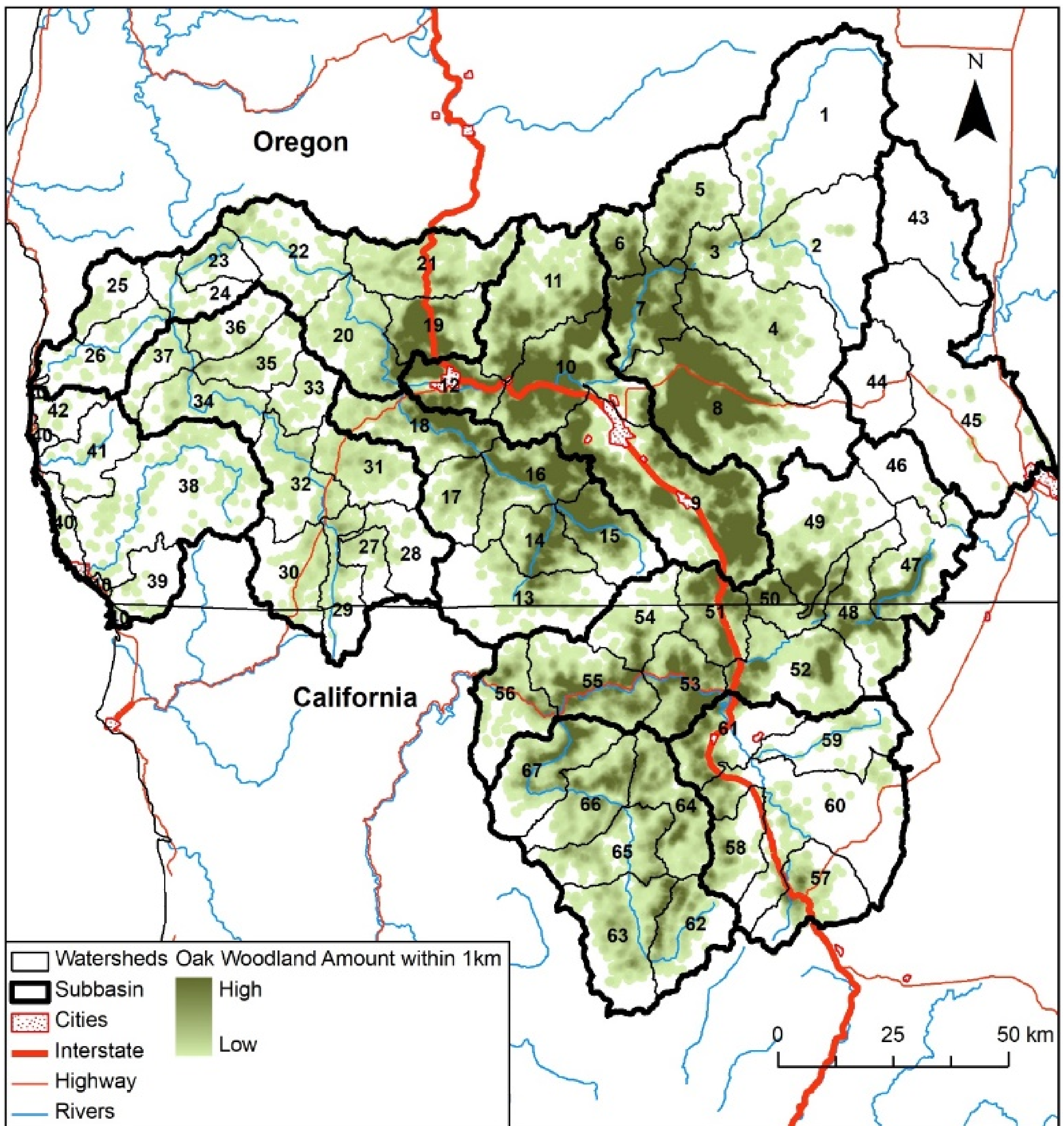


Figure 6. Amount of Oak Woodland within a 1km radius inside the KSON geography. Darker areas of the map identify the largest clusters of pixels classified as Oak Woodland, representing both relative amount and connectivity of this target. See ATTACHMENT 3. GEOSPATIAL ANALYSIS for geospatial analysis details.

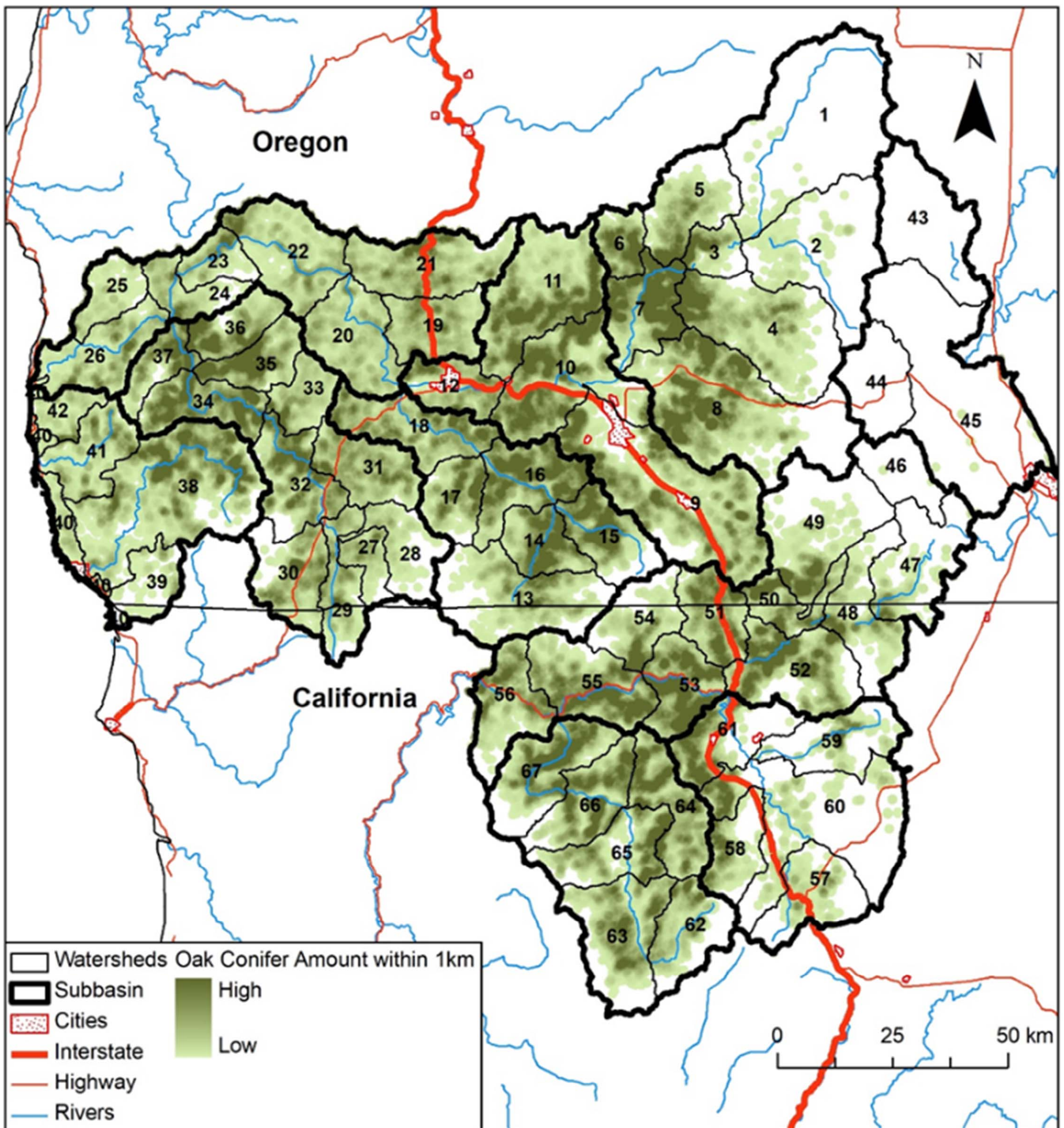


Figure 7. Amount of Oak Conifer within a 1km radius inside the KSON geography. Darker areas of the map identify the largest clusters of pixels classified as Oak Conifer, representing both relative amount and connectivity of this target. See ATTACHMENT 3. GEOSPATIAL ANALYSIS for geospatial analysis details.

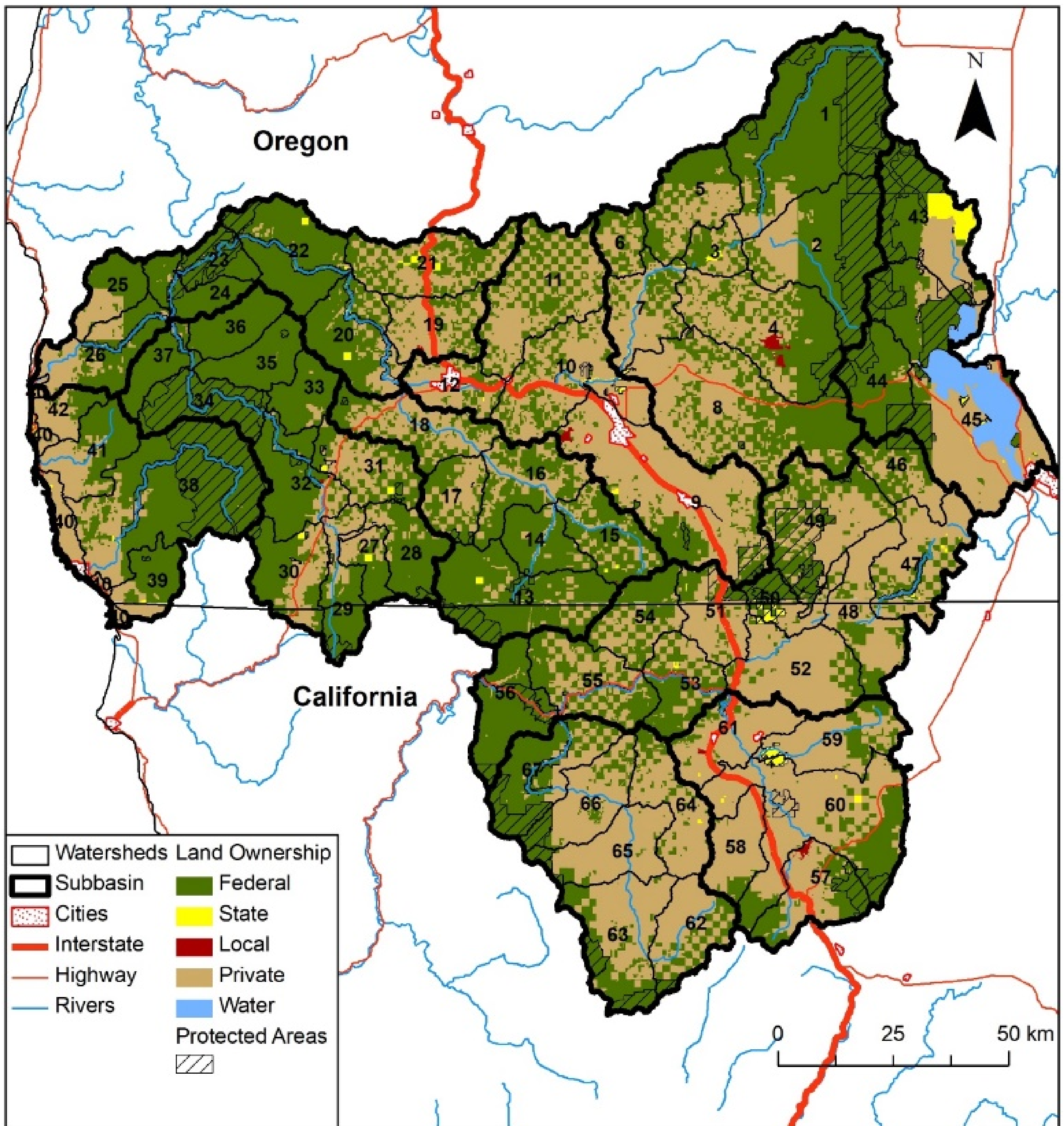


Figure 8. Land ownership [public (federal, state, local) and private (tribal, industrial, nonprofit, and other)] and protected areas based on GAP Status Codes 1 and 2 (Alexander et al. 2017) in the KSON geography. See ATTACHMENT 3. GEOSPATIAL ANALYSIS for geospatial analysis details.

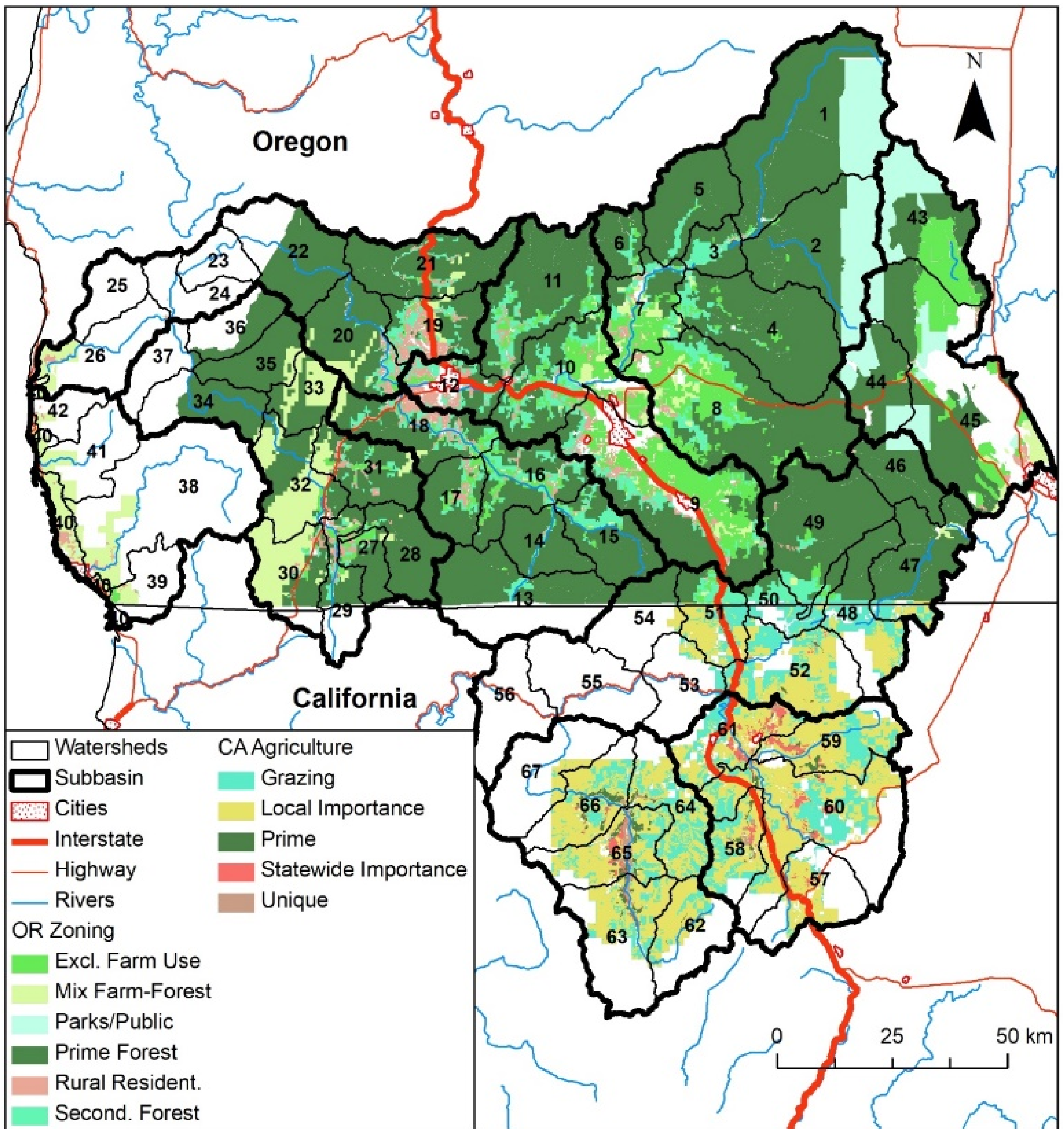


Figure 9. Oregon zoning categories and California private agricultural land use categories within the KSON geography. See ATTACHMENT 3. GEOSPATIAL ANALYSIS for geospatial analysis details.

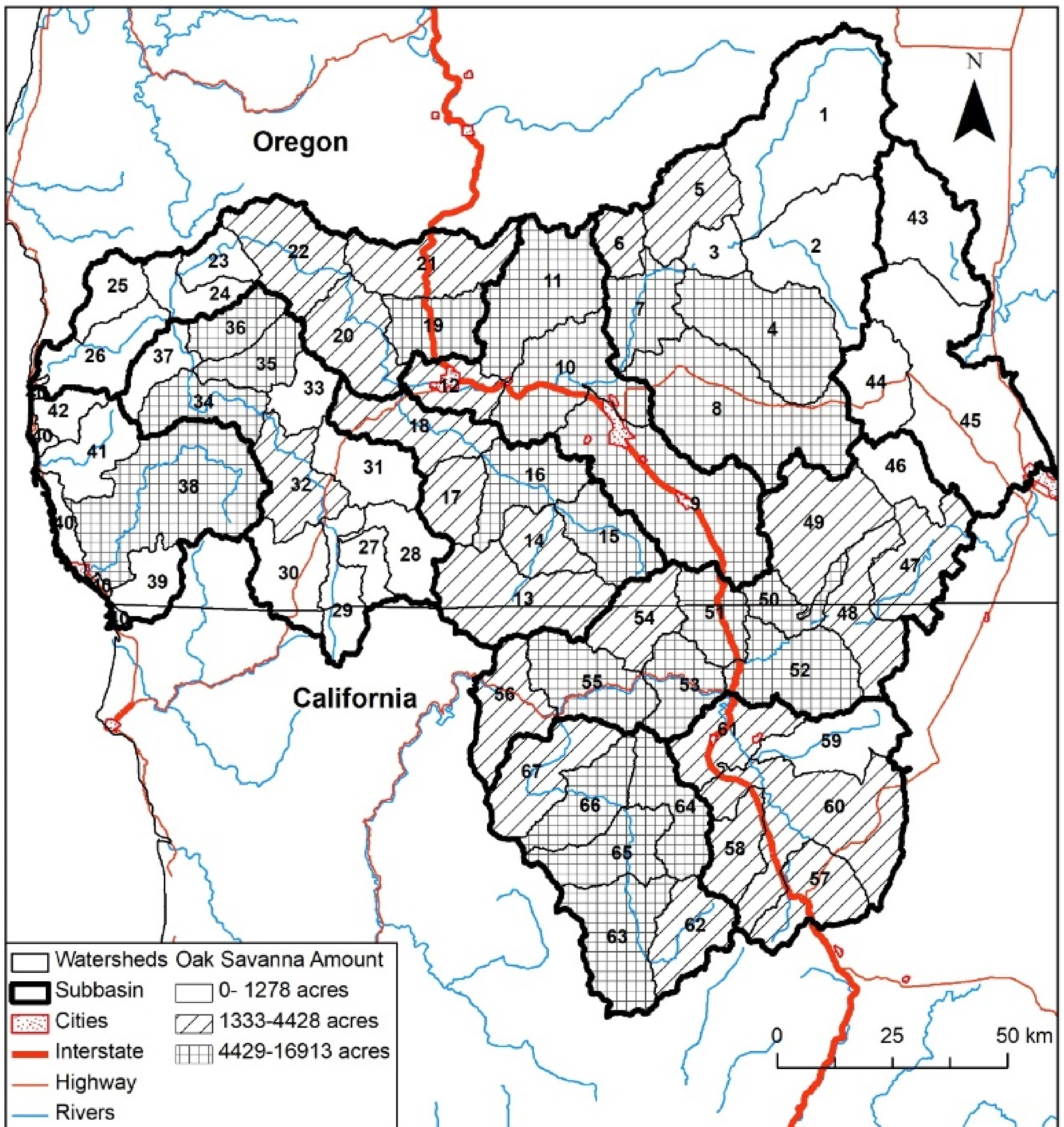


Figure 10. Amount of the Oak Savanna target within each watershed of the KSON geography. See ATTACHMENT 3. GEOSPATIAL ANALYSIS for geospatial analysis details.

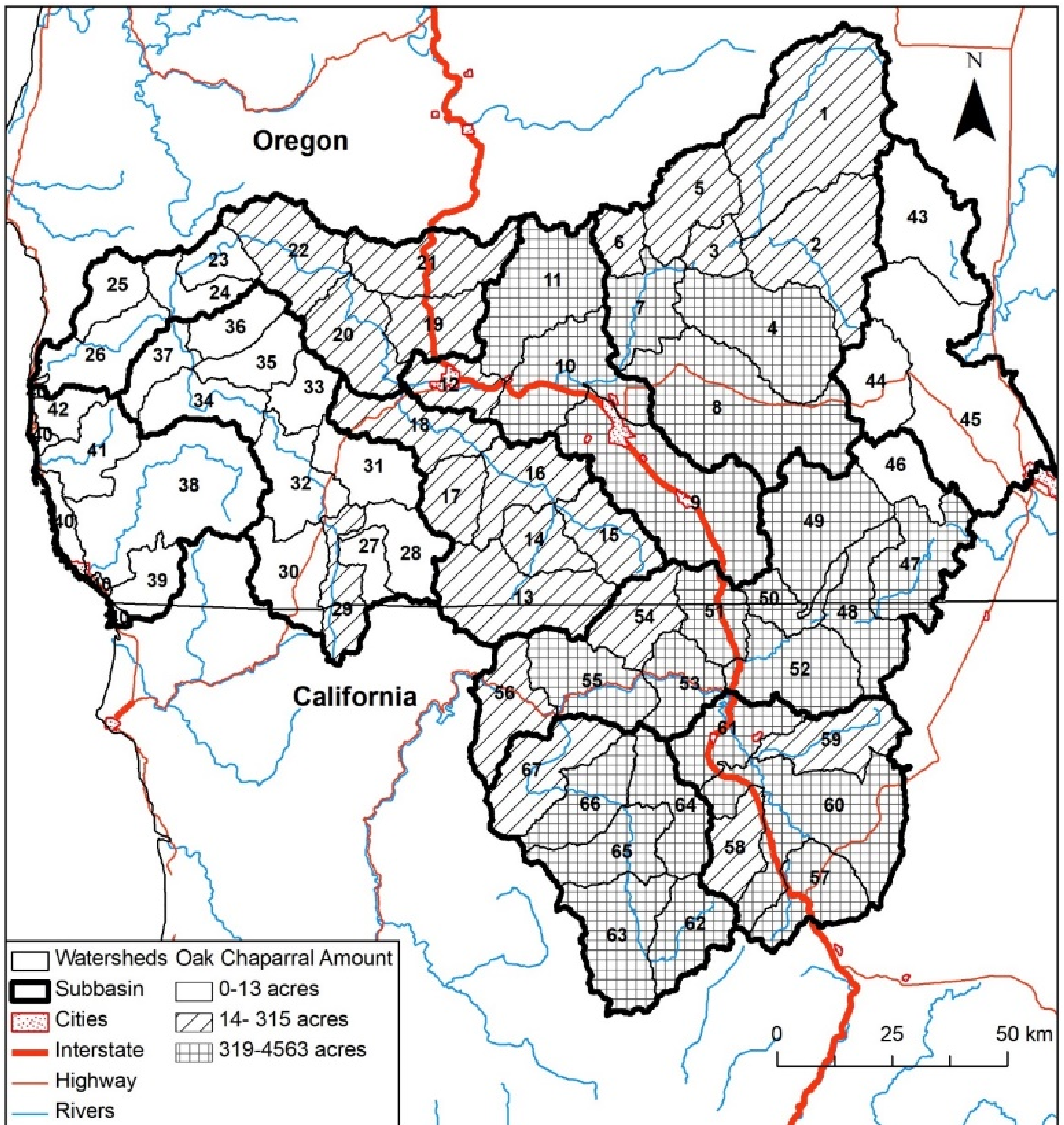


Figure 11. Amount of the Oak Chaparral target within each watershed of the KSON geography. See ATTACHMENT 3. GEOSPATIAL ANALYSIS for geospatial analysis details.

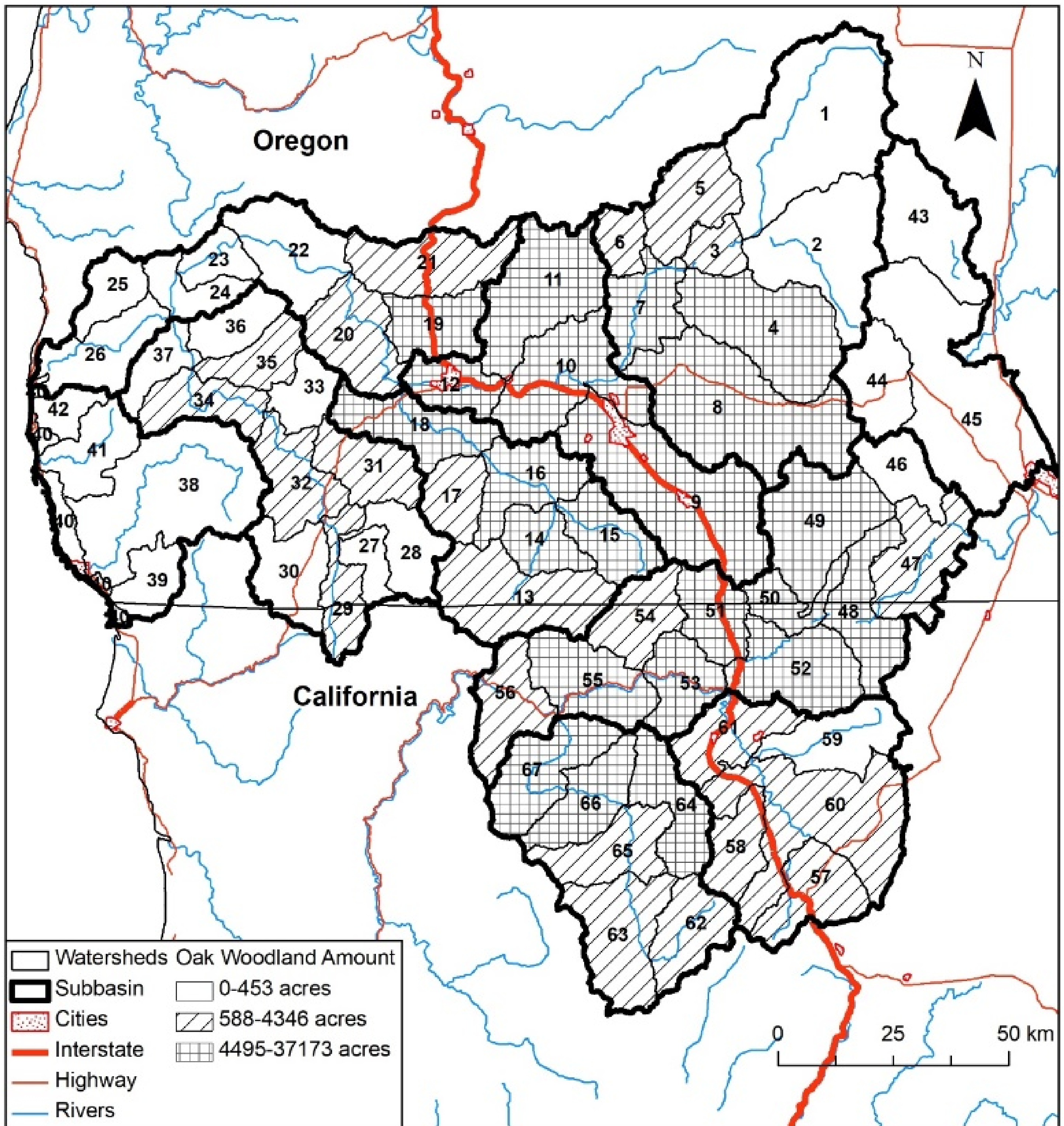


Figure 12. Amount of the Oak Woodland target within each watershed of the KSON geography. See ATTACHMENT 3. GEOSPATIAL ANALYSIS for geospatial analysis details.

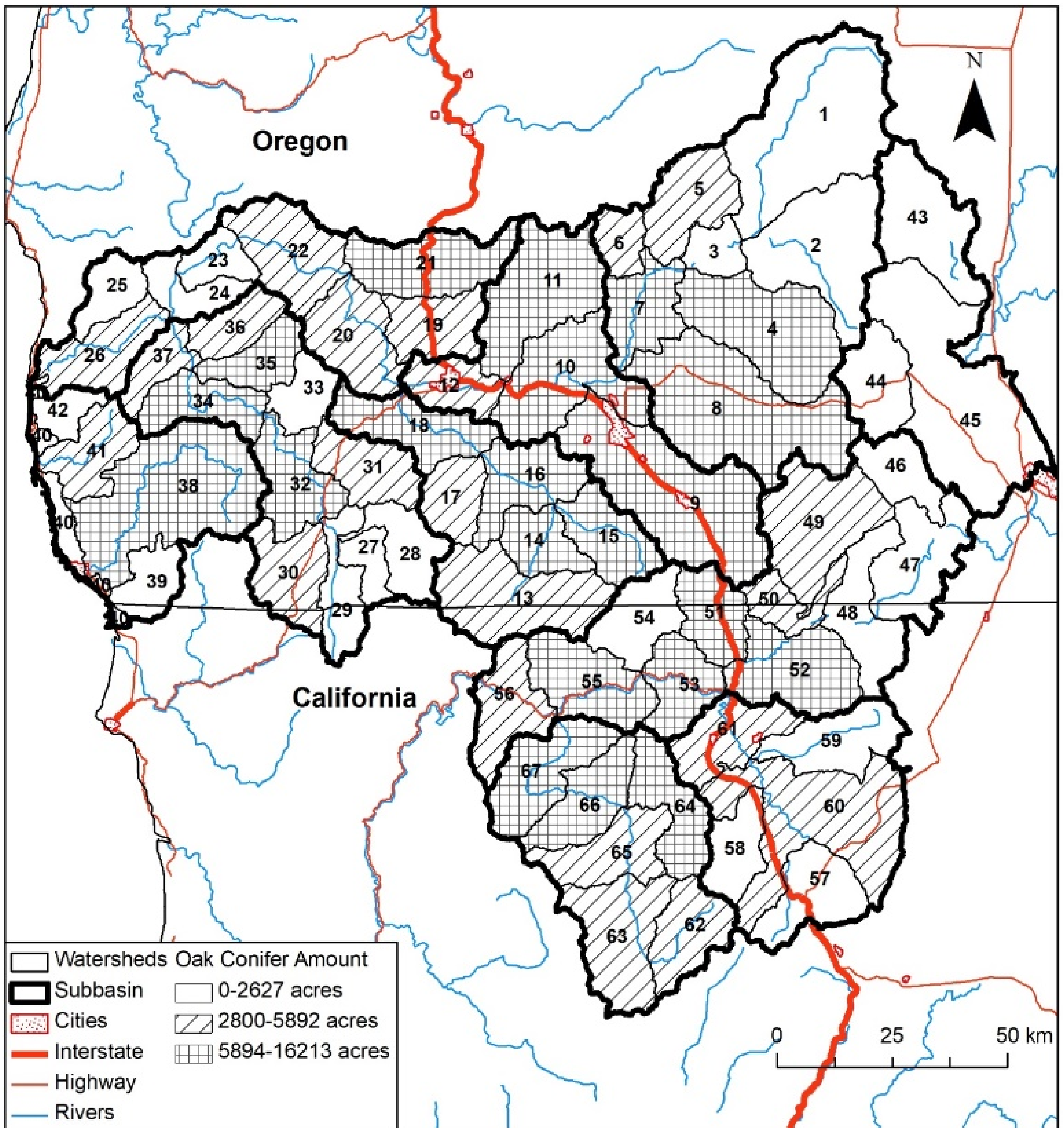


Figure 13. Amount of the Oak Conifer target within each watershed of the KSON geography. See ATTACHMENT 3. GEOSPATIAL ANALYSIS for geospatial analysis details.

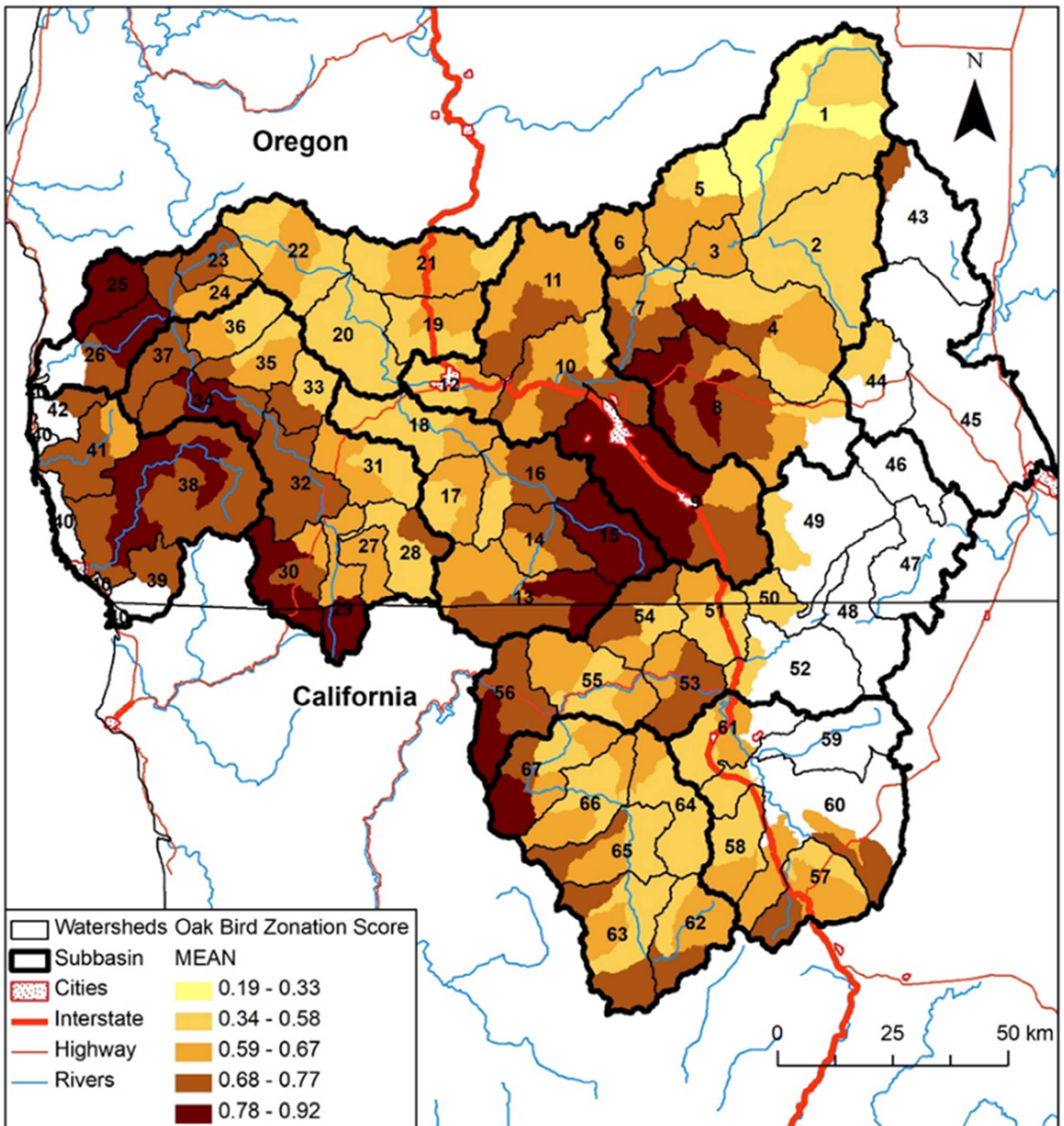


Figure 14. Oak Bird Zonation Scores (summarized by watershed) that use current and future species distribution and abundance models to provide conservation prioritizations [0 (low priority) to 1 (high priority)]. Future models consider 50-year climate change projections. Data and methodology from Veloz et al. (2013, 2015). See ATTACHMENT 3. GEOSPATIAL ANALYSIS for geospatial analysis details.

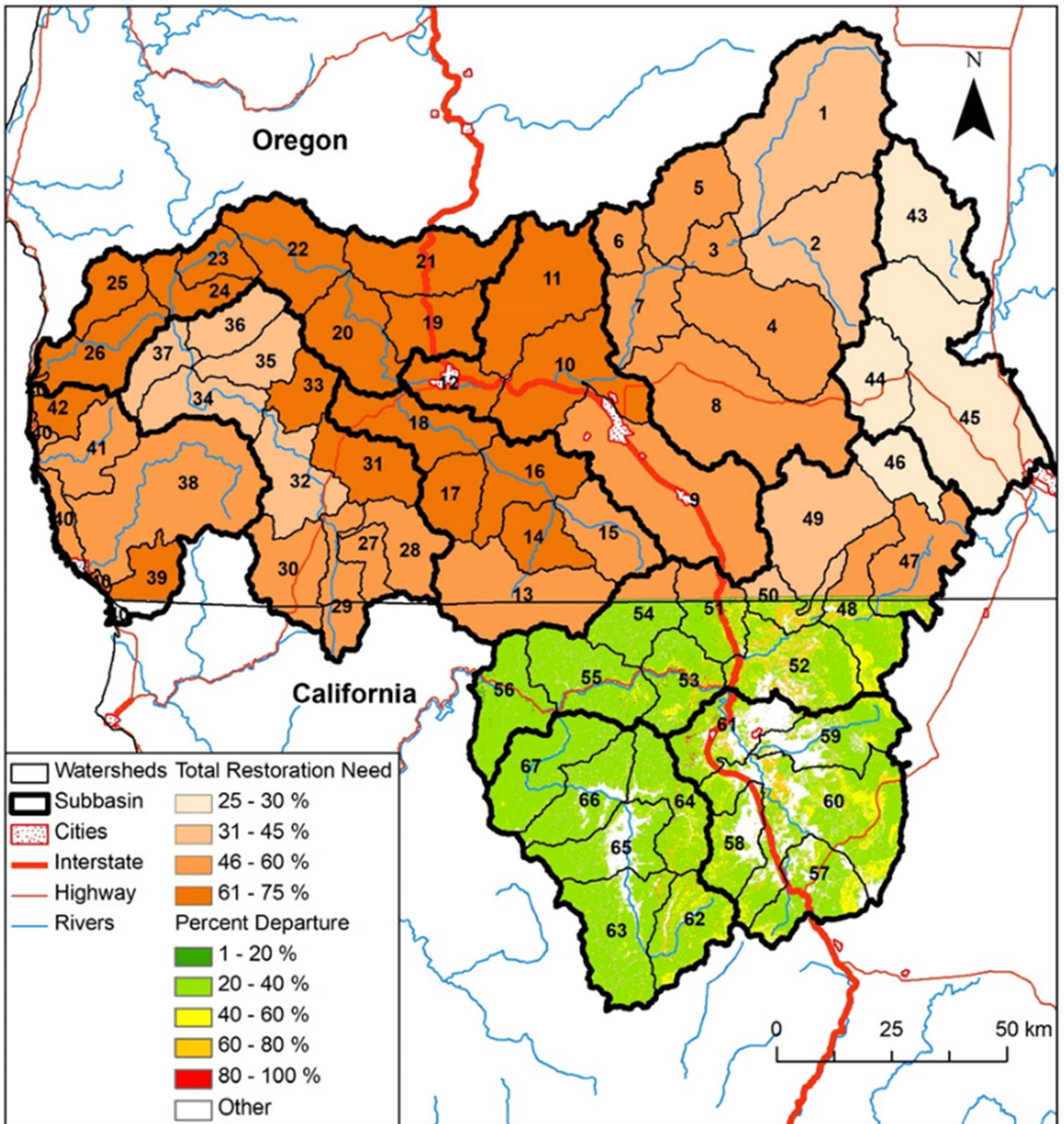


Figure 15. Vegetation condition (summarized by watershed) representing restoration need in Oregon (Haugo et. al 2015) and vegetation departure in California (LANDFIRE 2014). See ATTACHMENT 3. GEOSPATIAL ANALYSIS for geospatial analysis details.

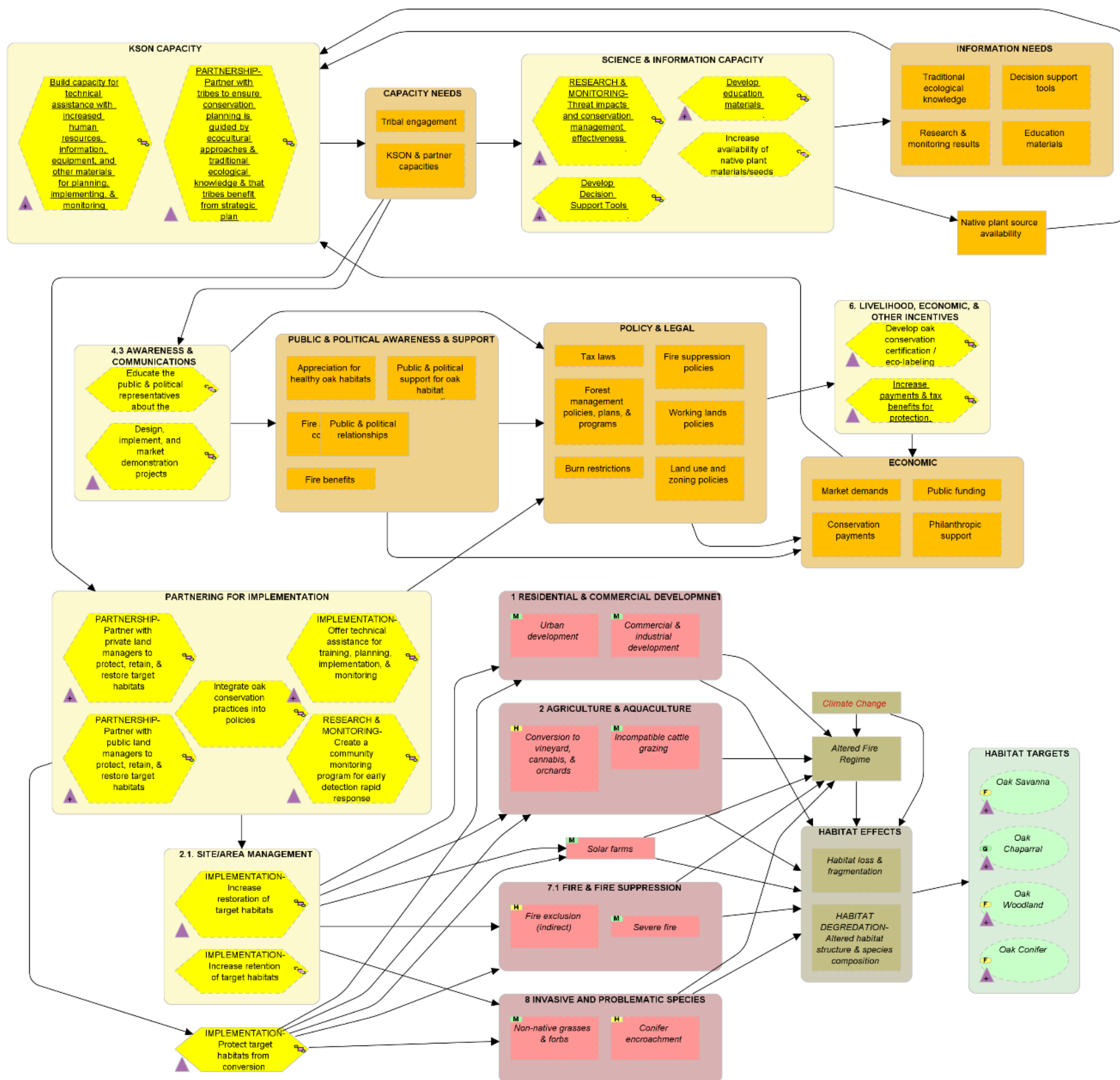


Figure 16. Conceptual model illustrating the relationships between targets (green ovals), biophysical factors (green rectangles), direct threats (pink rectangles), contributing factors that include indirect threats and opportunities (orange rectangles), and strategies (yellow hexagons). Purple triangles link to indicators for measuring action outputs (Table 8) from implementing each strategy and outcomes from achieving desired KEA condition for each target habitat (Table 2). This logical framework illustrates how a set of enabling strategies (underlined) and conservation implementation strategies connect to the threats they are designed to reduce and the KSON oak targets that will benefit from strategy implementation. This model was developed using the MIRADI Adaptive Management Software for Conservation Projects Version 4.5 (CMP 2020).

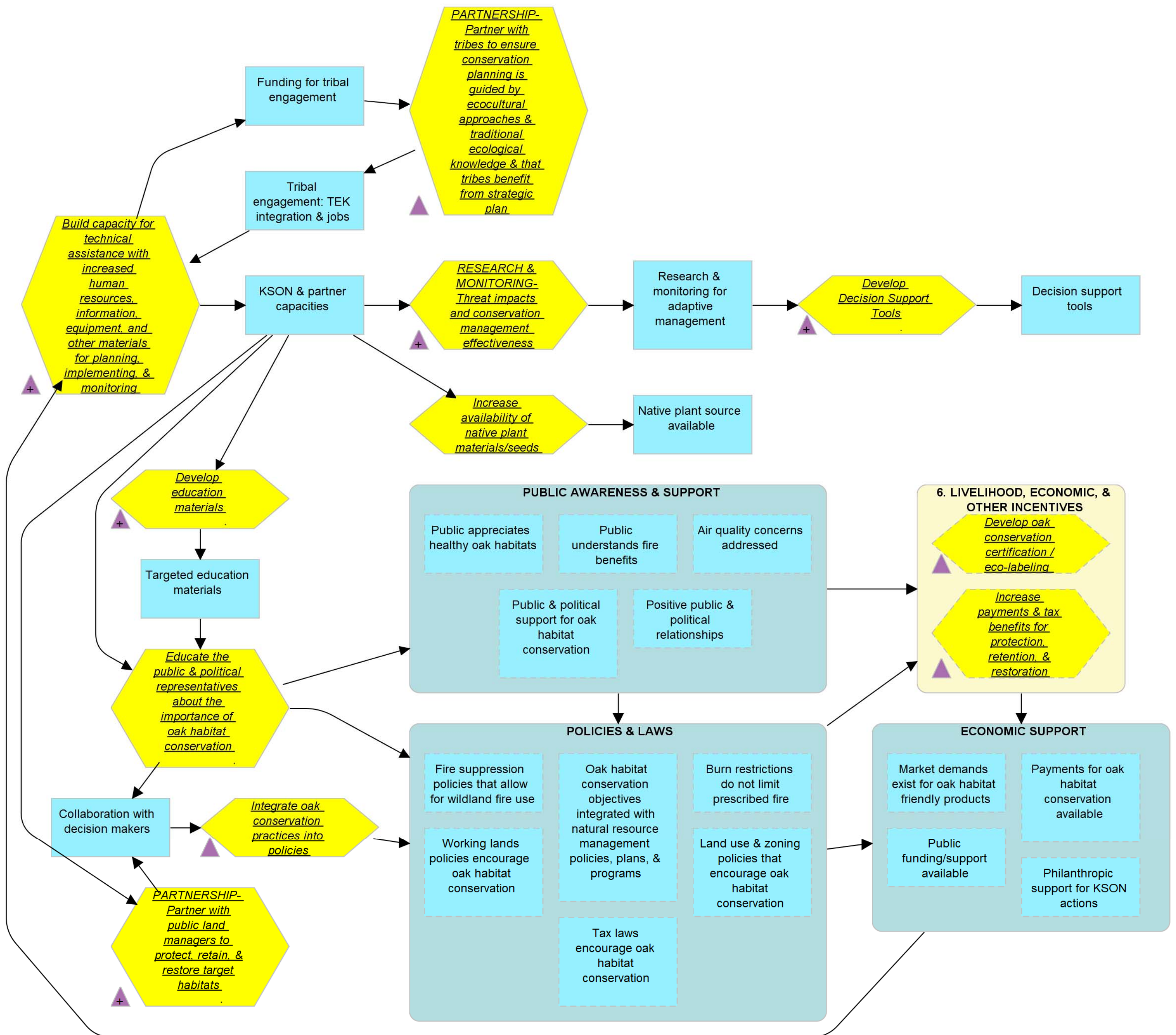


Figure 17. Results chain illustrating the relationships between enabling strategies (yellow hexagons) and action outputs (blue rectangle). Purple triangles link to indicators for measuring action outputs (Table 8) from implementing each strategy. The enabling strategies will increase capacities and improve conditions for implementing conservation strategies. This model was developed using the MIRADI Adaptive Management Software for Conservation Projects Version 4.5 (CMP 2020).

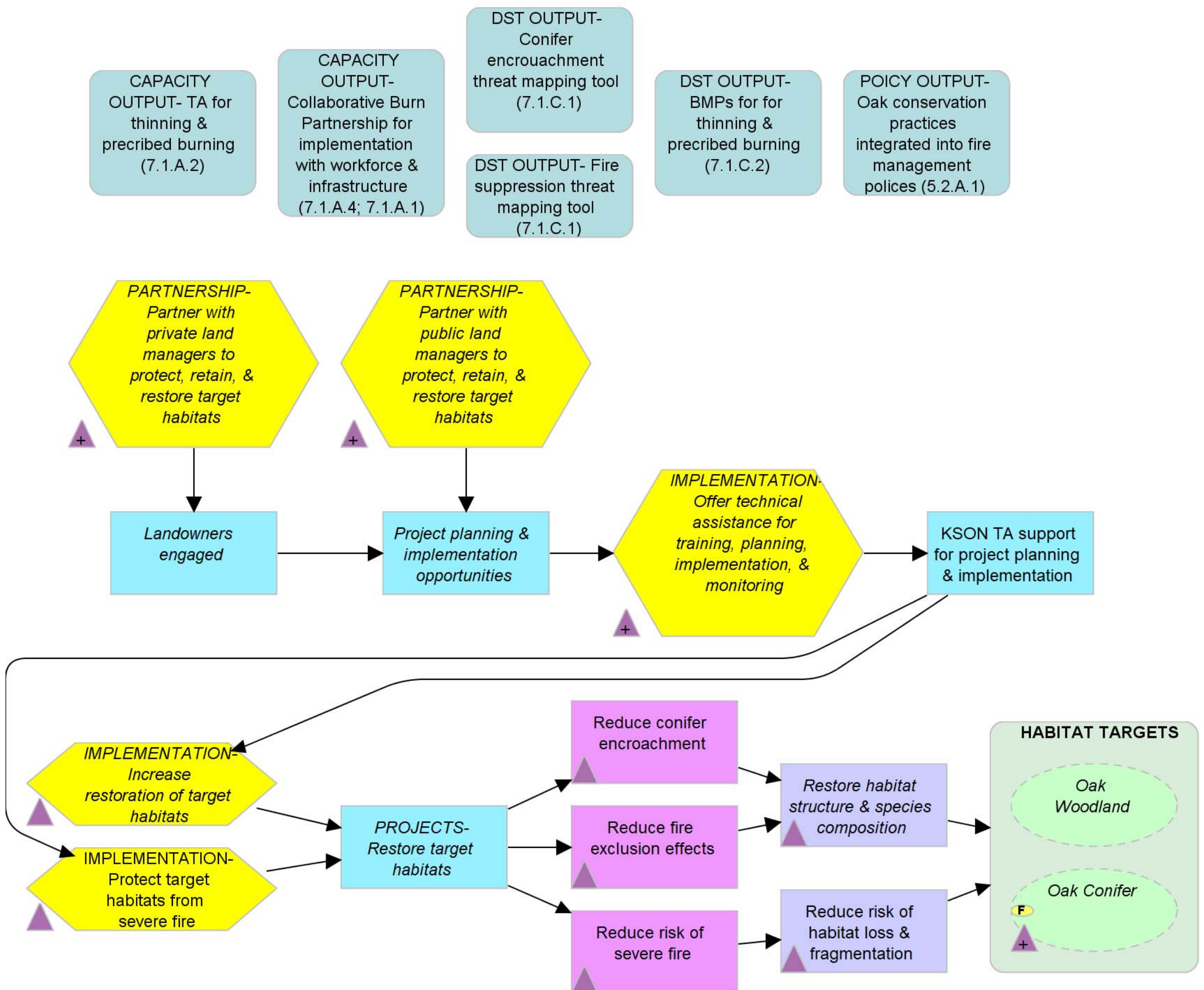


Figure 18. Results chain addressing fire exclusion and conifer encroachment threats illustrating the relationships between conservation strategies (yellow hexagons), actions (blue rectangles), threat reduction outputs (pink rectangles), and outcomes relating to biophysical factors (lavender rectangles) and the KEAs of target habitats (green oval). Greenish rectangles at the top represent intermediate outputs from implementing capacity

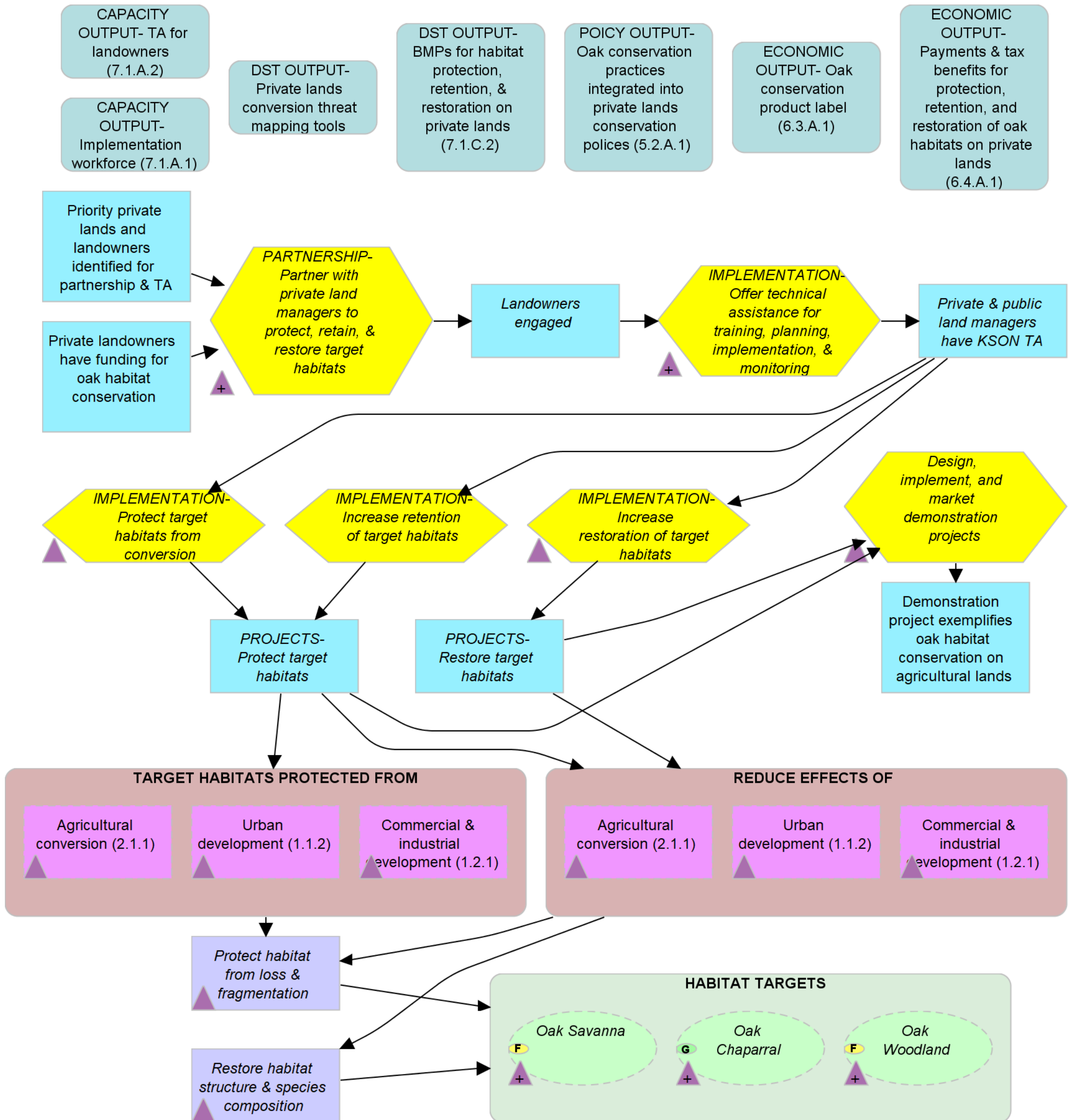


Figure 19. Results chain for the threat of private lands conversion illustrating the relationships between conservation implementation strategies (yellow hexagons), actions (blue rectangles), and threat reduction outputs (pink rectangles), and outcomes relating to biophysical factors (lavender rectangles) and the KEAs of target habitats (green oval). Greenish rectangles at the top represent intermediate outputs from implementing capacity building strategists (Table 8, Figure 17). Purple triangles link to indicators for measuring action (Table 8) and threat reduction outputs (Table 9) from implementing each strategy and outcomes from improving biophysical factors (Table 10) and achieving desired KEA condition for each target habitat (Table 2). This model was developed using the MIRADI Adaptive Management Software for Conservation Projects Version 4.5 (CMP 2020).

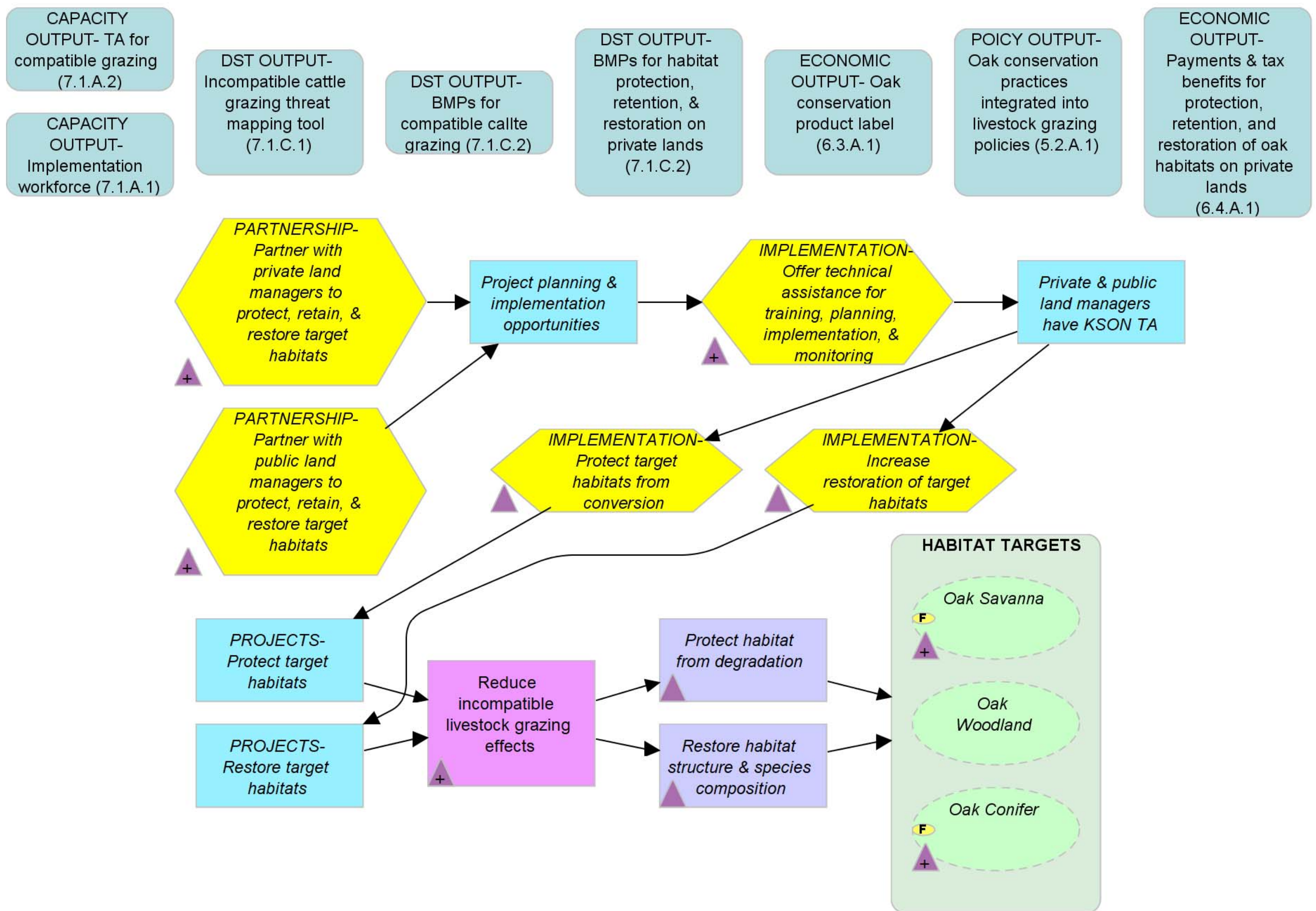


Figure 20. Results chain for the threat of incompatible grazing illustrating the relationships between conservation implementation strategies (yellow hexagons), action (blue rectangles) and threat reduction outputs (pink rectangles), and outcomes relating to biophysical factors (lavender rectangles) and the KEAs of target habitats (green oval). Greenish rectangles at the top represent intermediate outputs from implementing capacity building strategists (Table 8, Figure 17). Purple triangles link to indicators for measuring action (Table 8) and threat reduction outputs (Table 9) from implementing each strategy and outcomes from improving biophysical factors (Table 10) and achieving desired KEA conditions for each target habitat (Table 2). This model was developed using the MIRADI Adaptive Management Software for Conservation Projects Version 4.5 (CMP 2020).

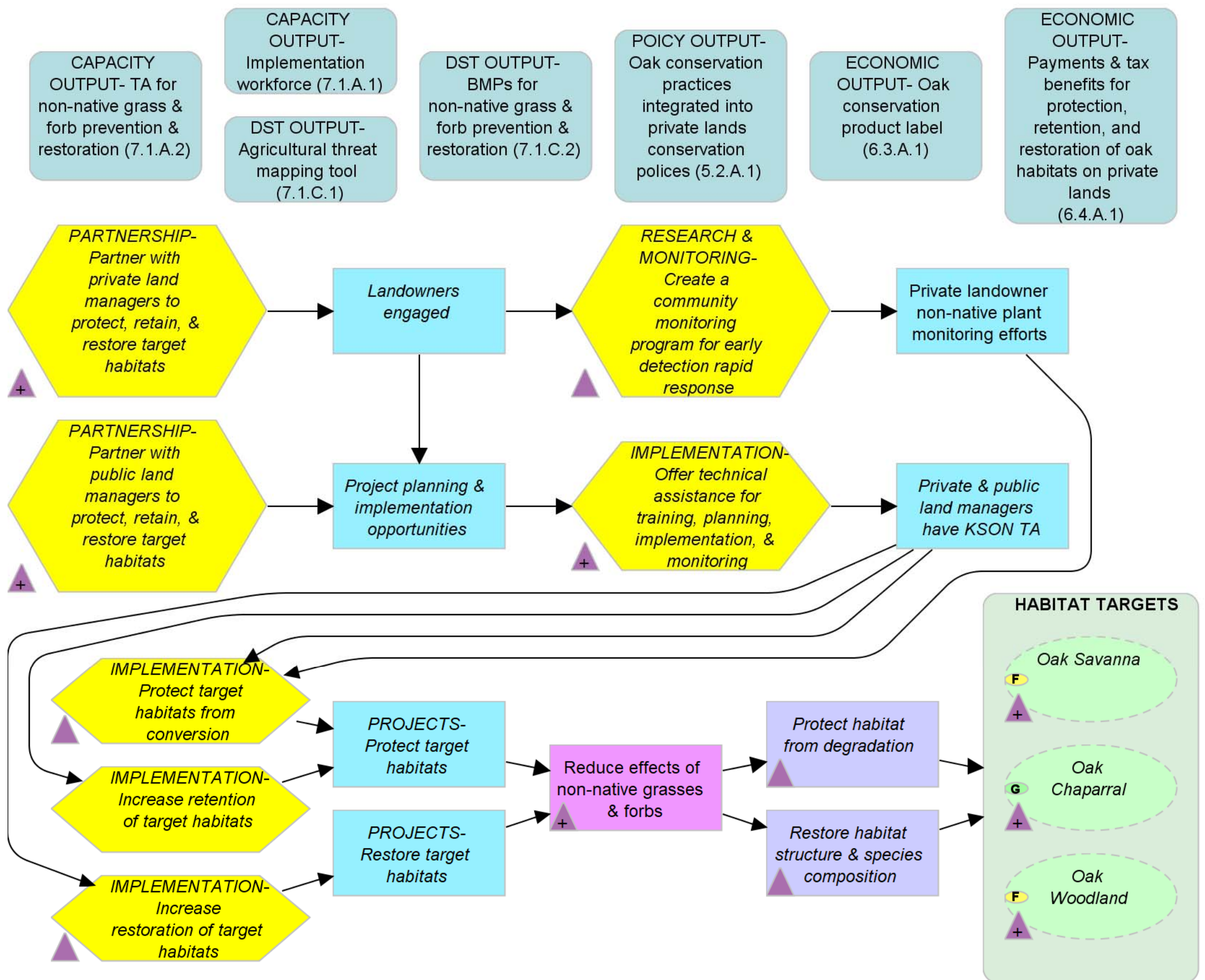


Figure 21. Results chain for the threat of non-native grasses and shrubs illustrating the relationships between conservation implementation strategies (yellow hexagons), action (blue rectangles) and threat reduction outputs (pink rectangles), and outcomes relating to biophysical factors (lavender rectangles) and the KEAs of target habitats (green oval). Greenish rectangles at the top represent intermediate outputs from implementing capacity building strategists (Table 8, Figure 17). Purple triangles link to indicators for measuring action (Table 8) and threat reduction outputs (Table 9) from implementing each strategy and outcomes from improving biophysical factors (Table 10) and achieving desired KEA condition for each target habitat (Table 2). This model was developed using the MIRADI Adaptive Management Software for Conservation Projects Version 4.5 (Conservation Measures Partnership 2018).

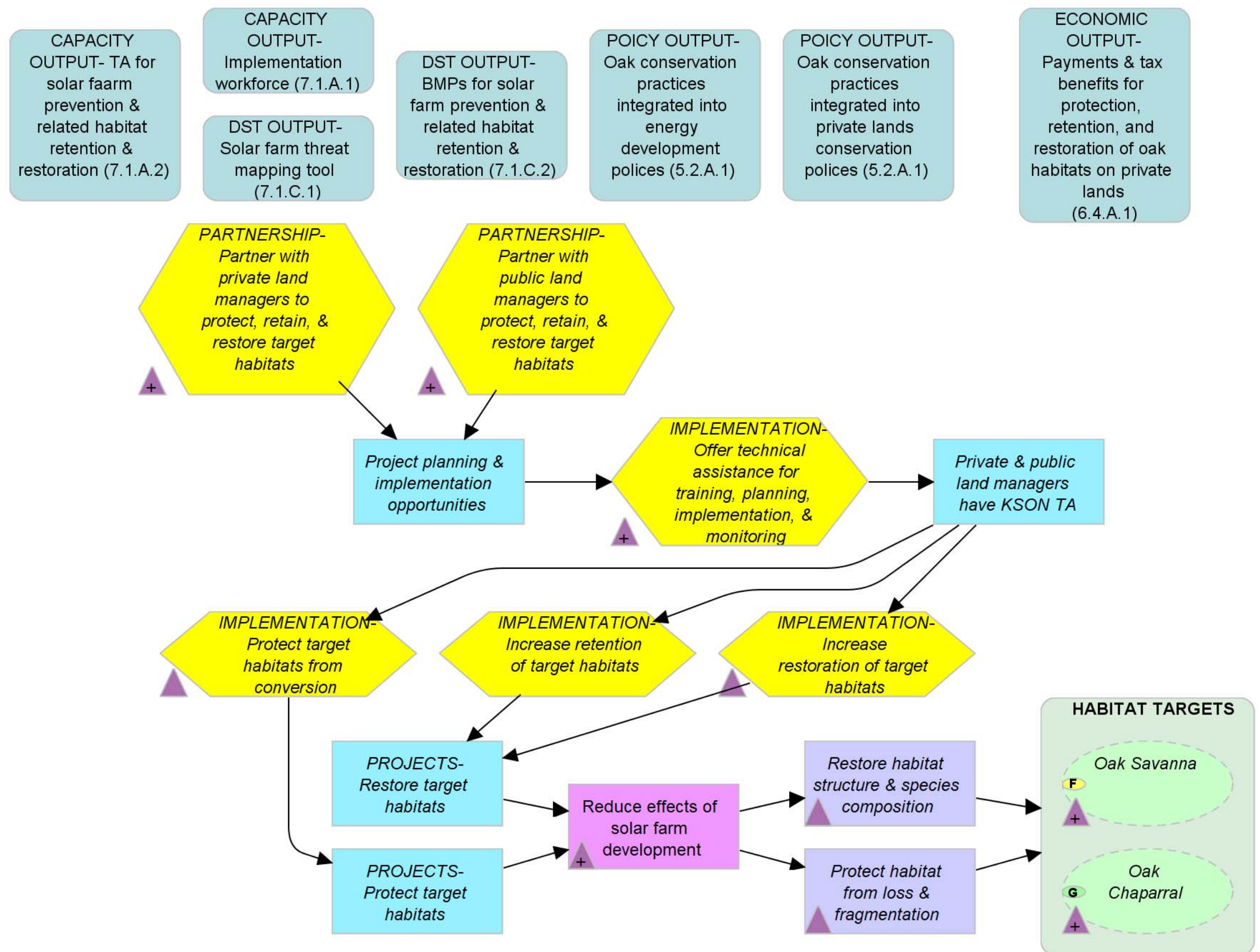


Figure 22. Results chain for the threat of solar farms illustrating the relationships between conservation implementation strategies (yellow hexagons), action (blue rectangles) and threat reduction outputs (pink rectangles), and outcomes relating to biophysical factors (lavender rectangles) and the KEAs of target habitats (green oval). Greenish rectangles at the top represent intermediate outputs from implementing capacity building strategists (Table 8, Figure 17). Purple triangles link to indicators for measuring action (Table 8) and threat reduction outputs (Table 9) from implementing each strategy and outcomes from improving biophysical factors (Table 10) and achieving desired KEA condition for each target habitat (Table 2). This model was developed using the MIRADI Adaptive Management Software for Conservation Projects Version 4.5 (Conservation Measures Partnership 2018).

15. Appendices

ATTACHMENT 1. KSON DETAILS

KSON Charter

The purpose of this Charter is to define the purpose and structure of the Klamath Siskiyou Oak Network (KSON). It additionally establishes roles, responsibilities, and operating rules. This document will be reviewed annually at the January Steering Committee meeting. An additional Memorandum of Understanding (MOU) document will serve as a formal but non-binding agreement among all current members of the KSON Steering Committee (defined below) regarding the details of the KSON geography and purpose, the specific expectations for all Steering Committee members in contributing to the collaboration, and the details of how the collaboration will be administered. The MOU shall remain in effect for five years from the date of execution, and may be renewed with written approval of all parties.

Mission

To conserve oak habitats on private and public lands in southern Oregon and northern California

Purpose

The Klamath-Siskiyou Oak Network (KSON) is a collaborative regional partnership composed of active participants focused on fostering the conservation, restoration and long term health of oak habitats, including both Oregon white oak (*Quercus garryana*) and California black oak (*Q. kelloggii*) woodlands, mixed forest, chaparral, and savanna.

The Klamath-Siskiyou Bioregion holds some of the highest terrestrial biodiversity in Oregon or and California. Oak habitats within the bioregion are currently threatened with loss and degradation due to fire exclusion, certain agricultural practices, and rural and urban residential development. Individual oak trees and oak habitats have intrinsic aesthetic, environmental, wildlife, and economic values shared by a wide cross section of the public.

KSON participants include non- governmental organizations, local state and federal agencies, as well as private citizens and watershed-based groups.

Goals

- a) Promote habitat restoration and conservation efforts toward long-term sustainability of oak habitats, on both publicly and privately owned lands,

- b) Provide a forum for community engagement including outreach and education, and
- c) Encourage applied science including monitoring and adaptive management strategies.

Structure

The KSON organizational structure is two-tiered, composed of a Steering Committee and Participants. The Steering Committee is the governing body of KSON, with positions held by representatives of the organizations signed to the Memorandum of Understanding (MOU). The Steering Committee will function as a committee with all members having equal standing. Decisions will be made by consensus (i.e., agreement by 100% of members) when possible. If consensus is not possible, decisions will be made by a 2/3 majority. Generally, one voting member will be allowed for each organization represented on the Steering Committee, with one member per state allowed for organizations that have representatives from both Oregon and California. New Steering Committee members will be considered on a case-by-case basis upon recommendation by a current member during the January committee meeting (see below), and must be approved by the current Steering Committee. Steering Committee members must be able to serve for at least one year. A KSON Steering Committee listserve will be used for communication regarding Steering Committee business (e.g., upcoming meetings, potential funding).

Participants will consist of members of the community who are involved and/or interested in regional oak conservation and restoration issues. Participants may include (but will not be limited to) members of non-governmental organizations; local, state, federal, and tribal agencies; private citizens and landowners; watershed-based groups; researchers; and interested parties located within the Klamath-Siskiyou Bioregion. A separate listserve for Participants will be used to contact Participants regarding upcoming events and other items of interest.

A KSON Coordinator position will be held by the Klamath Bird Observatory, pending available funding, until such time as the Steering Committee decides to rotate the position. KSON Coordinator responsibilities are to 1) serve as the primary KSON contact (including managing the Steering Committee and Participant listserves, 2) coordinate and facilitate KSON meetings and events (e.g., Steering Committee meetings, landowner outreach days), 3) develop outreach materials, and 4) assess needs and aid in future development of the network.

KSON structure will additionally include sub-committees composed of both Steering Committee members and Participants that form to address specific topics and projects. There are opportunities for persons with strong knowledge or interests to be closely involved with solving the needs of the oak habitats within southern Oregon and northern California.

Duration and time commitment

Steering Committee meetings will be held once quarterly each year. Steering Committee members will commit to attending or calling in to at least 3 of the 4 quarterly meetings each year, or will send an alternate in their place.

Participant meetings will be held at least once per year. KSON Participant meetings will be used for the purposes of community outreach and engagement, as well as recruitment of additional Participants. The location/hosting of Participant meetings will be rotated among the Steering Committee member organizations. Participant meetings will be scheduled to coincide with Steering Committee meetings when possible.

KSON MOU

AGREEMENT NUMBERS:

NRCS: A-0436-15-0039

USFS: #16-MU-11061000-021

USFWS: #6360.1501

KBO: KBO-MOU-2016-001

BLM: MOUORM0002016-004

**MEMORANDUM OF UNDERSTANDING
BETWEEN
KLAMATH BIRD OBSERVATORY (KBO),
LOMAKATSI RESTORATION PROJECT (LRP); THE NATURE CONSERVANCY (TNC); UNITED
STATES DEPARTMENT OF THE INTERIOR-
BUREAU OF LAND MANAGEMENT (BLM), MEDFORD DISTRICT;
U.S. DEPARTMENT OF THE INTERIOR- FISH AND WILDLIFE SERVICE, (USFWS); U.S.
DEPARTMENT OF AGRICULTURE- NATURAL RESOURCES CONSERVATION SERVICE (NRCS); AND
U.S. DEPARTMENT OF AGRICULTURE - FOREST SERVICE (USFS), ROGUE RIVER-SISKIYOU
NATIONAL FOREST

CONCERNING
Klamath-Siskiyou Oak Network (KSON)**

I. SUMMARY

The Klamath-Siskiyou Bioregion holds some of the highest terrestrial biodiversity in Oregon and California. Oak habitats within the bioregion are currently threatened with loss and degradation due to fire exclusion, certain agricultural practices, and rural and urban residential development. The purpose of this MOU is to document the cooperation between the parties listed above to:

- A. Promote habitat restoration and conservation efforts toward long-term sustainability of oak habitats of all types, on both publicly and privately owned lands,
- B. Provide a forum for community engagement including outreach and education, and
- C. Encourage applied science including monitoring and adaptive management strategies in accordance with the following provisions:

The **Klamath-Siskiyou Oak Network (KSON)** is composed of a Steering Committee and Participants. The goal of KSON is to foster conservation and restoration of oak habitats, including Oregon white oak (*Quercus garryana*), California black oak (*Q. kelloggii*), and tanoak (*Notholithocarpus densiflorus*) plant communities in the Klamath-Siskiyou Bioregion. These habitats include woodlands, mixed forest, chaparral, and savanna. Active management of these oak habitats would benefit the bioregion's native flora and fauna. The core geography covered by KSON includes much of the Klamath-Siskiyou Bioregion of southern Oregon and northern

California, and is composed of the following watersheds: Upper Rogue, Middle Rogue, Lower Rogue, Applegate, Illinois, Upper Klamath, Scott, and Shasta.

Public and private lands within the bioregion are highly intermingled. Many of the threats to oak habitats, such as lack of appropriate natural resource management, wildfires, insects, disease, climate change, and invasive non-native plant and animal species encroachment, play out across multiple ownership boundaries.

Significant ecological and economic advantages will be achieved if the management of these threats is shared and coordinated with public and private land managers through actions implemented across geographic and political boundaries.

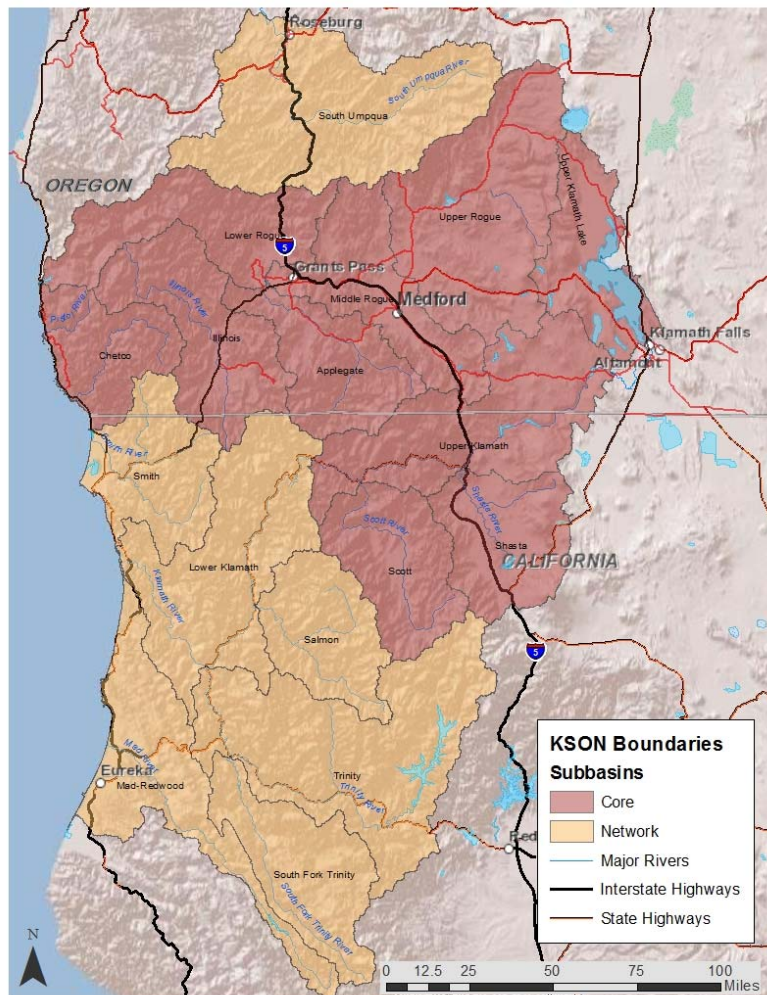


Figure 1. The extent of the Klamath-Siskiyou Bioregion covered by the Klamath Siskiyou Oak Network. “Core” watersheds are those where current major projects of Steering Committee organizations are located. “Network” watersheds are areas of additional interest.

KSON Steering Committee

The KSON Steering Committee is presently comprised of the following organizations, though its composition may periodically change:

Klamath Bird Observatory (KBO): Klamath Bird Observatory is a scientific non-profit organization that achieves bird conservation in the Pacific Northwest and throughout the migratory ranges of the birds of that region. KBO has developed an award-winning conservation model in the Klamath-Siskiyou Bioregion, and applies this model broadly. KBO emphasizes high caliber science and the role of birds as indicators of the health of the land, and uses that approach to specialize in cost-effective bird monitoring and research projects that help to improve natural resource management. KBO recognizes that conservation occurs across many fronts and also nurtures a conservation ethic in surrounding communities through outreach and educational programs.

Lomakatsi Restoration Project (LRP): Lomakatsi Restoration Project is a non-profit grassroots organization that develops and implements forest and watershed restoration projects in Oregon and northern California. Since 1995, LRP has established a proven record of success implementing restoration projects across thousands of acres of forests and miles of streams. In cooperation with a broad range of partners including federal and state land management agencies, non-governmental organizations, private landowners, watershed councils, city and county governments, and Native American tribes, LRP's work on nationally recognized projects has been precedent-setting. LRP provides expertise and capacity in project development, planning, management, fine-scale ecological treatment design, monitoring, and implementation for ecosystem restoration projects, and integrates restoration practice with science delivery, education and workforce training. LRP coordinates closely with multiple funding partners and manages a diverse workforce in complex social settings supported by critical community outreach.

The Nature Conservancy (TNC): The Nature Conservancy is an international non-profit organization, whose mission is to preserve plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. Located in all 50 U.S. states and 33 different countries, TNC achieves this with the help of many partners, from individuals and governments to local nonprofits and corporations, and does so by using a non-confrontational, collaborative approach and staying true to their core values.

U.S. Department of Interior – United States Fish and Wildlife Service (USFWS): The US Fish and Wildlife Service works with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. This statement acknowledges that working cooperatively with partner organizations, private landowners, and local communities is the best way to approach long-term conservation of native ecosystems. The USFWS has a number of programs designed to provide technical assistance, coordination, and cost-share funding for conservation projects.

U.S. Department of Agriculture – Natural Resources Conservation Service (NRCS): The Natural Resources Conservation Service, an agency of the U.S. Department of Agriculture, works hand-in-hand with people and organizations, conservation districts, and other agencies to conserve natural resources primarily on private lands. The mission of NRCS is to provide leadership in a partnership effort to help people conserve, improve, and sustain our natural resources and environment. NRCS

has a number of costshare programs designed to provide technical assistance, coordination and funding for conservation projects.

U.S. Department of Agriculture – U.S. Forest Service (USFS): The mission of the US Forest Service is to sustain the health, diversity, and productivity of the Nation's forests and grasslands (*those lands under USFS management jurisdiction*) to meet the needs of present and future generations.

U.S. Department of Interior – Bureau of Land Management (BLM): The Bureau of Land Management's mission is to sustain the health, diversity, and productivity of publicly owned lands (*those lands under BLM management jurisdiction*) for the use and enjoyment of present and future generations. BLM administers more public land – over 245 million surface acres – than any other Federal agency in the United States and most of this land is located in the 12 Western states, including Alaska.

II. AUTHORITIES

Listed below are regulations, policies, and legal citations for entering into this agreement:

- A. Section 307(b) of the Federal Land Policy and Management Act of 1976, 43 U.S.C. 1737(b), authorizes the Secretary, subject to the provisions of applicable law, to enter into contracts and cooperative agreements involving the management, protection, development and sale of public lands.
- B. The Endangered Species Act of 1973 (16 U.S.C. §§ 1531-1544)
- C. Fish and Wildlife Act of 1956 (16 U.S.C. 742 et seq.)
- D. Fish and Wildlife Conservation Act of 1980 (16 U.S.C. 2901-2911)
- E. Fish and Wildlife Coordination Act (16 U.S.C. 661-667)
- F. Partners for Fish and Wildlife Act of 2006 (16 USC 3771)
- G. Executive Order 13352 of August 26, 2004, Facilitation of Cooperative Conservation
- H. Conservation Technical Assistance Program, 16 U.S.C. 590a-f, 590q, 7 C.F.R. 610 (CFDA 10.902)

III. PROCEDURE

Specific Provisions

- A. Attachment A: Additional U.S. Forest Service Provisions are hereby incorporated and attached to this MOU
- B. All participants in the MOU shall serve on the Steering Committee and agree to follow KSON charter regarding meeting management, organizational structure, and outreach.
- C. Participants in the MOU shall collaborate to:
 - 1. Fulfill the KSON mission: ***Conserve oak habitats on private and public lands in southern Oregon and northern California***
 - 2. Secure support for oak vegetation management activities

3. Inform and share information about oak habitat management objectives and strategies
 4. When feasible, engage in education and outreach activities
 5. Support science and research regarding oak habitat within the region
 6. Form partnerships and alliances with other organizations that share KSON's interest in conservation and restoration of oak habitats
- D. Participants in the MOU acknowledge that the above activities are subject to Provision IV-F below, Non-Fund Obligation and Attachment A, Provision I-F, Nonbinding Agreement.

IV. ADMINISTRATION

- A. RECORDS MANAGEMENT: Klamath Bird Observatory will keep all data/records produced as part of this agreement. All records (in all media, paper and electronic) created or produced in part or in whole are to be maintained for the duration of the agreement, made available upon request, and upon termination of the agreement copies will be turned over to all parties joined in this MOU and the original records will be turned over to NRCS.
- B. Parties to this agreement shall not use, sell or disseminate data/records without permission of affected parties in this agreement.
- C. CONFIDENTIAL INFORMATION: No partner will disclose confidential or proprietary information received as a result of this Memorandum of Understanding except pursuant to an agreement duly executed by affected parties.
- D. This MOU is not intended to, and does not create, any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity, by a party against the United States, its agencies, its officers, or any person.
- E. MODIFICATION: Modifications within the scope of the agreement shall be made by mutual consent of the parties, by the issuance of a written modification, signed and dated by all parties, prior to any changes being performed. Requests for modification should be made, in writing, at least 30 days prior to implementation of the requested change, and are subject to written approval by all parties.
- F. NON-FUND OBLIGATING DOCUMENT: This agreement is neither a fiscal nor a funds obligation document. Any endeavor to transfer anything of value involving reimbursement or contribution of funds between the parties to this agreement will be handled in accordance with applicable laws, regulations, and procedures including those for Government procurement and printing. Such endeavors will be outlined in separate agreements that shall be made in writing by representatives of the parties and shall be independently authorized by appropriate statutory authority. This agreement does not provide such authority. Specifically, this agreement does not establish authority for noncompetitive award to the cooperator of any contract or other agreement.
- G. TERMINATION: Any of the parties, in writing, may terminate the agreement in whole, or in part, with a 60-day written notice before the date of expiration (see also Section VI. Commencement/Expiration date).

V. STEERING COMMITTEE CONTACTS

KLAMATH BIRD OBSERVATORY PROGRAM CONTACT Name: Jaime Stephens, Science Director Address: PO Box 758 Ashland OR 97520 Phone: (541) 201-0866 x2# E-mail: jlh@klamathbird.org	LOMAKATSI RESTORATION PROJECT PROGRAM CONTACT Name: Marko Bey, Executive Director Address: 1287 Oak St Ashland, OR 97520 Phone: (541) 488-0208 E-mail: marko@lomakatsi.org
THE NATURE CONSERVANCY PROGRAM CONTACT Name: Darren Borgias, Southwestern Oregon Program Director Address: 33 N. Central Ave Medford OR 97501 Phone: (541) 770-7933 x1# E-mail: dborgias@tnc.org	U.S. DEPARTMENT OF INTERIOR - UNITED STATES FISH AND WILDLIFE SERVICE (USFWS), KLAMATH BASIN PROGRAM CONTACT Name: Mike Edwards, Klamath Basin Coordinator Address: 1936 California Ave Klamath Falls, OR 97601 Phone: (541) 885-2505 E-mail: mike_edwards@fws.gov
U.S. DEPARTMENT OF INTERIOR - UNITED STATES FISH AND WILDLIFE SERVICE (USFWS), OREGON PROGRAM CONTACT Name: CalLee Davenport, Oregon State Coordinator Address: 2600 SE 98 th Ave Suite 100, Portland, OR 97266 Phone: (503) 231-6924 E-mail: callee_davenport@fws.gov	U.S. DEPARTMENT OF AGRICULTURE - NATURAL RESOURCE CONSERVATION SERVICE (NRCS), CALIFORNIA PROGRAM CONTACT Name: James Patterson, District Conservationist Address: 215 Executive Ct STE A Yreka, CA 96097 Phone: (530) 842-6123 x105 E-mail: James.Patterson@ca.usda.gov
U.S. DEPARTMENT OF AGRICULTURE - NATURAL RESOURCE CONSERVATION SERVICE (NRCS), OREGON PROGRAM CONTACT Name: Erin Kurtz, District Conservationist Address: 89 Alder St Central Point, OR 97502 Phone: (541) 664-1070 x 408 E-mail: erin.kurtz@or.usda.gov	U.S. DEPARTMENT OF AGRICULTURE - US FOREST SERVICE (USFS), ROGUE SISKIYOU NATIONAL FOREST PROGRAM CONTACT Name: Ellen Goheen, Plant Pathologist Address: 2606 Old Stage Rd Central Point, OR 97502 Phone: (541) 858-6126 E-mail: egoheen@fs.fed.us
U.S. DEPARTMENT OF INTERIOR BUREAU OF LAND MANAGEMENT (BLM), MEDFORD PROGRAM CONTACT Name: Terry Fairbanks, District Silviculturist Address: 3040 Biddle Rd Medford, OR 97504 Phone: (541) 618-2422 E-mail: tfairban@blm.gov	U.S. DEPARTMENT OF INTERIOR - UNITED STATES FISH AND WILDLIFE SERVICE (USFWS), SISKIYOU COUNTY PROGRAM CONTACT Name: Dave Johnson, Wildlife Biologist Address: 1829 South Oregon St Yreka, CA 96097 Phone: (530) 841-3106 E-mail: david_e_johnson@fws.gov

VI. COMMENCEMENT/EXPIRATION DATE

This MOU takes effect upon the date of last signature by any of the parties and shall remain in effect for five years from the date of execution. This MOU may be extended upon written request of any party, and the subsequent written approval of all other parties. Any party may terminate this MOU with a 60-day written notice to the other(s).

This agreement is executed as of the date of last signature and is effective for five years from the date of execution at which time it will expire.

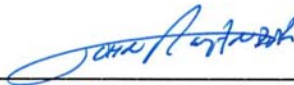
This agreement is executed as of the date of last signature and 12/30/2021 at which time it will expire.

VII. SIGNATURES

AUTHORIZED REPRESENTATIVES. By signature below, each party certifies that the individuals listed in this document as representatives of the individual parties are authorized to act in their respective areas for matters related to this MOU.

IN WITNESS WHEREOF, the parties hereto have executed this agreement as of the last date written below:

Klamath Bird Observatory:

By:  Date: 6/15/2017
(Signature)
Name: John Alexander
Title: Executive Director

Lomakatsi Restoration Project:

By:  Date: 9-5-2017
(Signature)
Name: Marko Bey
Title: Executive Director

The Nature Conservancy:

By:  Date: 13 Sept 2017
(Signature)
Name: Darren Borgias
Title: Southwestern Oregon Program Director

U.S.D.I. – U.S. Fish and Wildlife Service, Klamath Basin:

By: [Signature] Date: 5 Sept 2017
(Signature)
Name: Mike Edwards
Title: Klamath Basin Coordinator - Partners Program

U.S.D.I. – U.S. Fish and Wildlife Service, Oregon:

By: [Signature] Date: 6/12/17
(Signature)
Name: Paul Henson, Ph.D
Title: State Supervisor

U.S.D.A. – Natural Resources Conservation Service, Oregon:

By: [Signature] Date: 06/06/17
(Signature)
Name: Ronald Alvarado
Title: STC

Em 6/5/17

U.S.D.A. – U.S. Forest Service, Rogue River-Siskiyou National Forest:

By: [Signature] Date: 9/8/17
(Signature)
Name: Robert G. MacWhorter
Title: Forest Supervisor
See Attachment A for USFS Grants & Agreement Review

U.S.D.I. – Bureau of Land Management, Medford District:

By: [Signature], Acting Date: 6.21.17
(Signature)
Name:
Title: Jen Smith, Associate District Manager

**Additional Mandatory U.S. Forest Service Provisions Applicable to
Klamath-Siskiyou Oak Network (KSON) MOU**

I. IT IS MUTUALLY UNDERSTOOD AND AGREED BY AND BETWEEN THE PARTIES THAT:

- A. PRINCIPAL CONTACTS. Individuals listed in item V, STEERING COMMITTEE CONTACTS, of the KSON MOU are authorized to act in their respective areas for matters related to this instrument.

(See contact information shown in provision V on the MOU).

- B. ASSURANCE REGARDING FELONY CONVICTION OR TAX DELINQUENT STATUS FOR CORPORATE ENTITIES. This agreement is subject to the provisions contained in the Department of Interior, Environment, and Related Agencies Appropriations Act, 2012, P.L. No. 112-74, Division E, Section 433 and 434 regarding corporate felony convictions and corporate federal tax delinquencies. Accordingly, by entering into this agreement, incorporated entity (KBO, LRP, TNC) acknowledge that: 1) it does not have a tax delinquency, meaning that it is not subject to any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability, and (2) has not been convicted (or had an officer or agent acting on its behalf convicted) of a felony criminal violation under any Federal law within 24 months preceding the agreement, unless a suspending and debarring official of the United States Department of Agriculture has considered suspension or debarment is not necessary to protect the interests of the Government. If the incorporated entity fails to comply with these provisions, the U.S. Forest Service will annul this agreement and may recover any funds incorporated entity has expended in violation of sections 433 and 434.
- C. NOTICES. Any communications affecting the operations covered by this agreement given by the U.S. Forest Service or any KSON Steering Committee is sufficient only if in writing and delivered in person, mailed, or transmitted electronically by e-mail or fax, as follows:

To the U.S. Forest Service Program Manager, at the address specified in the MOU.

To other KSON contacts, at the address shown in the MOU or such other address designated within the MOU.

Notices are effective when delivered in accordance with this provision, or on the effective date of the notice, whichever is later.

- D. PARTICIPATION IN SIMILAR ACTIVITIES. This MOU in no way restricts the U.S. Forest Service or KSON parties from participating in similar activities with other public or private agencies, organizations, and individuals.
- E. ENDORSEMENT. Any of KSON's contributions made under this MOU do not by direct reference or implication convey U.S. Forest Service endorsement of KSON's products or activities.
- F. NONBINDING AGREEMENT. This MOU creates no right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity. The parties shall manage their respective resources and activities in a separate, coordinated and mutually beneficial manner to meet the purpose(s) of this MOU. Nothing in this MOU authorizes any of the parties to obligate or transfer anything of value.

Specific, prospective projects or activities that involve the transfer of funds, services, property, and/or anything of value to a party requires the execution of separate instruments and are contingent upon numerous factors, including, as applicable, but not limited to: agency availability of appropriated funds and other resources; cooperator availability of funds and other resources; agency and cooperator administrative and legal requirements (including agency authorization by statute); etc. This MOU neither provides, nor meets these criteria. If the parties elect to enter into an obligation instrument that involves the transfer of funds, services, property, and/or anything of value to a party, then the applicable criteria must be met. Additionally, under a prospective instrument, each party operates under its own laws, regulations, and/or policies, and any U.S. Forest Service obligation is subject to the availability of appropriated funds and other resources. The negotiation, execution, and administration of these prospective instruments must comply with all applicable law.

Nothing in this MOU is intended to alter, limit, or expand the agencies' statutory and regulatory authority.

- G. USE OF U.S. FOREST SERVICE INSIGNIA. In order for KSON to use the U.S. Forest Service insignia on any published media, such as a webpage, printed publication, or audiovisual production, permission must be granted from the U.S. Forest Service's Office of Communications. A written request must be submitted and approval granted in writing by the Office of Communications (Washington Office) prior to use of the insignia.
- H. MEMBERS OF U.S. CONGRESS. Pursuant to 41 U.S.C. 22, no United States member of, or U.S. delegate to, Congress shall be admitted to any share or part of this instrument, or benefits that may arise therefrom, either directly or indirectly.
- I. FREEDOM OF INFORMATION ACT (FOIA). Public access to MOU or agreement records must not be limited, except when such records must be kept confidential and would

have been exempted from disclosure pursuant to Freedom of Information regulations (5 U.S.C. 552).

- J. TEXT MESSAGING WHILE DRIVING. In accordance with Executive Order (EO) 13513, "Federal Leadership on Reducing Text Messaging While Driving," any and all text messaging by Federal employees is banned: a) while driving a Government owned vehicle (GOV) or driving a privately owned vehicle (POV) while on official Government business; or b) using any electronic equipment supplied by the Government when driving any vehicle at any time. All cooperators, their employees, volunteers, and contractors are encouraged to adopt and enforce policies that ban text messaging when driving company owned, leased or rented vehicles or GOVs when driving while on official Government business or when performing any work for or on behalf of the Government.
- K. U.S. FOREST SERVICE ACKNOWLEDGED IN PUBLICATIONS, AUDIOVISUALS, AND ELECTRONIC MEDIA. KSON shall acknowledge U.S. Forest Service support in any publications, audiovisuals, and electronic media developed as a result of this MOU.
- L. NONDISCRIMINATION STATEMENT – PRINTED, ELECTRONIC, OR AUDIOVISUAL MATERIAL. KSON shall include the following statement, in full, in any printed, audiovisual material, or electronic media for public distribution developed or printed with any Federal funding.

"In accordance with Federal law and U.S. Department of Agriculture policy, this institution is prohibited from discriminating on the basis of race, color, national origin, sex, age, or disability. (Not all prohibited bases apply to all programs.)"

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer."

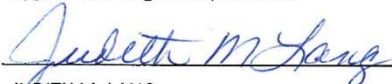
If the material is too small to permit the full statement to be included, the material must, at minimum, include the following statement, in print size no smaller than the text:

"This institution is an equal opportunity provider."

- M. DEBARMENT AND SUSPENSION. KSON shall immediately inform the U.S. Forest Service if they or any of their principals are presently excluded, debarred, or suspended from entering into covered transactions with the federal government according to the terms of 2 CFR Part 180. Additionally, should KSON or any of their principals receive a transmittal letter or other official Federal notice of debarment or suspension, then they

shall notify the U.S. Forest Service without undue delay. This applies whether the exclusion, debarment, or suspension is voluntary or involuntary.

The authority and format of MOU #16-MU-11061000-021 have been reviewed and approved for signature, as noted.


JUDITH M. LANG


Date

U.S. Forest Service Grants & Agreements Specialist

ATTACHMENT 2. KSON TARGETS

Oak Forest Types of the Klamath Mountains Ecoregion

The following is a summary of oak woodland forest types from Altman and Stephens (2012) and KBO and LRP (2014). Oak habitats of the Klamath Mountains ecoregion in southwest Oregon are the most ecologically diverse oak habitats in the Pacific Northwest. Here, the occurrence of multiple oak tree species represents the convergence of California and Pacific Northwest oak communities. Oaks occur from the deep clay soils of the lowland valleys, into the drought-prone environments of the foothills, and in the higher precipitation montane environments. Oak/chaparral habitats, where shrub cover dominates, also are a prominent feature of these foothill and montane oak habitats. In many of the dry, south-facing slopes, oak trees often occur as short, shrub-layer trees, or a multi-stemmed growth form that functions like chaparral shrubs. Within the Klamath Mountain ecoregion, two sub-regions are recognized, the Umpqua Valley and the Rogue Basin. The latter is referred to as basin rather than valley because oak distribution extends into much higher elevations outside the valley.

Target 1: Oak Savanna



Figure2.1 --20-30% total tree canopy cover with non-oak canopy cover <5%. Native shrub cover at no more than 15%.

Oak Savannah habitats are grasslands with scattered oak trees and an open canopy (<25% cover) with approximately 1-5 large trees or 1-10 younger trees per acre. Oak trees in savannahs are “open-grown” (i.e., without nearby competition for resources), which at maturity results in large mushroom-shaped trees with well-developed limbs and canopies. Historically, the understory was typically dominated by a ground cover of grasses and forbs with < 10% shrub cover. Under current conditions of fire suppression and associated habitat degradation, the understory may include significantly more shrub and small tree cover depending on land use and management. Characteristic bird species include Lazuli Bunting and Western Bluebird.

Target 2: Oak Chaparral



Figure 2.2-- 20-30% total tree canopy cover with non-oak canopy cover <5%. Native shrub cover 20-80%.

Oak/Chaparral is a shrub-dominated habitat type (often >50% shrub cover) that includes an open canopy of oak trees with scattered grassy openings amid dense patches of shrubs, in particular evergreen shrubs such as ceanothus and manzanita. Oak trees tend to be relatively short in stature and often take on a shrub-form growth in the driest sites. Oak/Chaparral occurs nearly exclusively in the Rogue Basin and Umpqua Valley sub-regions of the Klamath Mountains ecoregion as valley chaparral or montane chaparral. Characteristic bird species include Blue-gray Gnatcatcher and California Towhee.

Target 3: Oak woodland



Figure 2.3-- 30-60% total tree canopy cover with non-oak canopy cover <10%, favoring ponderosa pine and sugar pine. Native shrub cover should be 10-20% in variably-sized patches.

Oak woodland includes the following habitat types:

Oak Woodland Open. Oak Woodland Open habitats are characterized by a relatively open canopy (25-50% cover) with approximately 5-10 large trees or 10-20 younger trees per acre. Oak trees in open oak woodlands are often a mixture of open-grown trees and columnar shaped trees with limited lower branch and foliage development. The understory was historically dominated by herbaceous ground cover with variable shrub cover <30% depending on site conditions. Under current conditions of fire suppression and associated habitat degradation, the understory may include significantly more shrub and small tree cover in the

absence of management or disturbance. Alternatively, the understory may include limited or no shrub cover where management is occurring (e.g., grazing, mowing). Characteristic bird species include Chipping Sparrow in the understory and Western Wood-pewee in the canopy.

Oak Woodland Closed. Oak Woodland Closed habitats are characterized by a relatively closed canopy (50-75% cover) with approximately 10-30 large trees or 20-40 younger trees per acre. Oak trees in closed oak woodlands are mostly columnar shaped with limited lower branch and foliage development. The understory was historically dominated by herbaceous ground cover with variable shrub cover <30% depending on site conditions. Under current conditions of fire suppression and associated habitat degradation, the understory may include some patches of shrub and small tree cover in forest canopy openings. Characteristic bird species include Purple Finch and White-breasted Nuthatch (subspecies).

Oak/Pine. Oak/Pine habitats are typically woodlands or savannahs characterized by the co-dominance of oak and ponderosa pine. These habitats predominantly occur in the east-slope Cascades ecoregion, and to a lesser extent in the Klamath Mountains ecoregion at relatively drier sites, often on moderate to steep slopes in canyons and foothills or on plateaus. The understory may include pockets of shrubs, but is more typically dominated by grasses and forbs. Characteristic bird species include Lewis's Woodpecker in savannah habitats and Western Tanager in woodland and forest habitats.

Oak/Hardwood

Oak/Hardwood habitats are typically closed woodland or forests characterized by the co-dominance of oak with other hardwood species such as madrone, big leaf maple, or Oregon ash. The former is characteristic of dry sites, and the latter two of wetter sites such as riparian. The understory is variable in extent-typically limited in both open-grown conditions where tree branching occupies much of the space, or in closed canopies where lack of sunlight limits development; but more robust in the wetter sites, which support shrub and sapling tree development. This habitat type occurs throughout the region, but is most prominent in the Klamath Mountains ecoregion. Characteristic bird species include Hutton's Vireo and Black-capped Chickadee.

Oak Forest. Oak Forest habitats are characterized by a nearly closed canopy (greater than 75% cover) with typically >30 large trees or >40 younger trees per acre. Oak trees in a dense oak forest compete for resources and are almost exclusively columnar in shape with limited branching and crown foliage volume. The sub-canopy and understory can be devoid of woody vegetation where there is a lack of sunlight reaching the forest floor. Alternatively, in moist, productive soils, the sub-canopy and understory can be densely vegetated with shade tolerant shrub and tree species. Characteristic bird species include Nashville Warbler in the dense understory and Black-headed Grosbeak in the canopy and sub-canopy.

Target 4: Mixed-oak conifer



Figure 2.4-- 30-60% total tree canopy cover with conifer tree cover <50% of the total tree cover, favoring med-large conifers (>15" dbh), preferably in pockets not encroaching on oaks. Native shrub cover 10-40%, in variably sized, dense patches.

Mixed-oak Conifer includes the following habitat types:

Oak/Fir. Oak/Fir habitats are typically closed woodland or forests where there is a relatively equal representation of oak and Douglas-fir in the canopy. This may be a natural community type which occurred primarily in the foothill elevational transition into Douglas-fir forests, or where site-specific conditions (e.g., north aspects, moister soil types) were present at the interface with oak habitats. However, the most common manifestation of this co-dominance today is the result of the encroachment of Douglas-fir as a result of fire suppression. There is often some representation of dying or dead oak trees in the canopy or sub-canopy as a result of the competition and over-topping of Douglas fir. The understory is typically limited because of the closed canopy, but shade-tolerant conifer tree species (e.g., Douglas-fir, grand fir) are often a component of the sub-canopy and shrub layers. Characteristic bird species include Black-throated Gray Warbler and Cassin's Vireo.

Black Oak California black oaks occur in ponderosa pine forests, mixed-conifer forests, or pure stands. They occur alongside ponderosa pine, incense cedar, white fir, Douglas -fir, and sugar pine. California black oaks also occur in oak woodlands with other trees including Oregon white oak, canyon live oak, tanoak, and Pacific madrone.

ATTACHMENT 3. GEOSPATIAL ANALYSIS

Oak Target Habitat Maps

Data Sources

To map each of the four Oak Habitat Targets defined in our Strategic Action Plan (see above), we used GNN structure (species-size) raster data layers from the Oregon State University Landscape Ecology, Modeling, Mapping, and Analysis project (LEMMA). GNN structure maps provide a modeled 30-m resolution grid of forest vegetation structure developed from a Greatest Nearest Neighbor analysis utilizing satellite imagery and regional plot samples to model vegetation structure across Washington, Oregon, and California. GNN models apply primarily to forested land because a consistent regional plot sample of nonforest areas is unavailable. We used the publicly available ‘masked’ version of the GNN species-size map developed using 2012 satellite imagery and available for download at <https://lemma.forestry.oregonstate.edu/data/structure-maps>.

Because the GNN structure maps do not provide understory information, we used additional datasets to define Oak Chaparral habitat across our planning region. We used 2014 LANDFIRE Existing Vegetation Cover (EVC) (<https://www.landfire.gov/evc.php>), which represents the vertically projected percent cover of the live canopy at a 30-m grid resolution and is calculated separately for trees, shrubs, and herbaceous cover using a combination of plot-level data and lidar. LANDFIRE EVC classifies pixels by shrub cover in 10% intervals, so we were able to extract pixels with 20% shrub cover or higher to classify as chaparral habitat as needed according to our rule set (see below).

Finally, to supplement the Oak Chaparral Target map, we also mapped Oak Chaparral using ‘stacked’ bird habitat distribution models (Gillespie et al. 2017).

Rule Set to define Oak Targets

We developed a ‘rule set’ to classify raster pixels in the GNN structure data to develop maps of each of the four oak habitat targets in the Strategic Action Plan. (Figure 1). We identified plots (i.e. 30 pixels) first by the primary Forest Type (FORTYPBA) defined in the GNN, which describes all plots in the dataset based with the dominant tree species (one or two species), based on basal area of the current vegetation. We selected all plots within our study area if at least one of the dominant species was oak (including all deciduous *Quercus* species; we excluded TanOak and Live Oak species). We classified pixels that did not contain an oak species dominant forest type differently (see below).

We further defined plots using Cover Class (COVCL), which classifies the canopy of each plot by percent cover: Sparse (less than 10%), Open (10-40%), Moderate (40-70%), and Closed (greater than 70%).

We used the broad categories of Hardwood Canopy Cover (CANCOV_HDW) and Conifer Canopy Cover (CANCOV_CON) to further define plots, primarily to determine whether a plot would be considered Oak Conifer.

Finally, to describe plots that likely contained oak but did not include oak as a dominant forest type species, we used species-level basal area variables in the dataset and identified all pixels in our study area that included at least one oak species (all *Quercus* and Tan Oak) with a basal area >0. This included QUDO_BA, QUGA4_BA, QUGAG2_BA, QUKE_BA, QULO_BA. (Few of these had any value in our region except QUGA4_BA, and QUKE_BA). In the rule set, these pixels are classified as OAK_BA>0.

We used the GNN rule set to classify all plots within the dataset that fell within our study region and to define Oak Savanna/Oak Chaparral, Oak Woodland, and Oak Conifer. Pixels that fell outside of the definitions of our targets were further classified as Not Oak, Forest with Oak, or Forest with Tan Oak.

We used overlapping pixels from the LANDFIRE EVC data, which identified shrub cover, to distinguish pixels categorized by the above GNN rule set as either Oak Savanna/Oak Chaparral. Plots with >20% shrub cover were classified as Oak Chaparral; all other pixels in this category were classified as Oak Savanna.

Smoothing and Mapping methods

We used the Combine function in Spatial Analyst in ARCMAP v. 10.3 to merge the GNN and LANDFIRE EVC rasters. We then exported the attribute table and classified pixels in R using the rule set above. We used the resulting output table and the Reclassify by Table function (ARCMAP v 9.3) to reclassify the grid by habitat type and create a grid of Oak Habitat Classes. To simplify and smooth the oak habitat class map, we utilized a Majority Filter function with eight nearest neighbors and a Boundary Clean function. This function reclassified a pixel using the value of the surrounding cells if at least 5 out of 8 contiguous cells surrounding the pixel have the same value. This reclassified the final raster slightly to create a more contiguous habitat map.

Ranking watersheds by habitat amount

We generated 4 maps of each target by extracting pixels from the final map that were classified as Oak Savanna, Oak Chaparral, Oak Woodland, or Oak Conifer. We calculated total area of each target within HUC 10 level watersheds using Tabulate Area function in Spatial Analyst in ARCMAP v 9.3 (excluding watersheds that contained no pixels of the target).

We created simplified maps for each target by dividing the HUC 10 watersheds into Low, Medium, and High classifications by classifying the top, middle, and lower third of total area of each target within the watershed. We used total area instead of percent cover because it more accurately represented large concentrations of habitat pixels and we were interested in identifying watersheds with greater connectivity of our Targets. The simplified maps allowed us to overlay a map of watersheds with high, medium, and low amounts of each target with maps of data associated with our Threats (see “Threat mapping”).

Oak Target Connectivity maps

We created maps to visually represent habitat “connectivity” using a moving window analysis in Spatial Analyst. After reclassifying pixels in each of the four target habitat maps as “0” or “1”, we ran a simple focal statistics analysis to calculate the mean value within a 1km radius across our focal region. The moving window analysis generated a visual “heat map” which we used to assess areas with high concentrations of Target habitat and likely greater connectivity.

Notes on data sources, fire history, and habitat classifications

Although the data sources we used to define our habitat targets use imagery that pre-dates several large fires in our study region since 2012, it is challenging to correctly assume how a variable-severity fire across our geography would directly transform our habitat Targets. Thus, while we can map the perimeter of those fires as a reference for understanding the limitations of our current Target distribution maps, it is challenging to reclassify those areas systematically. For the purposes of this Strategic Action Plan, we present target distribution maps as of the 2012 data, but the priority geographic planning areas were developed using a combination of mapping resources, including maps that identify those more recent fire perimeters.

If FORTYPBA contains "QUGA or QUKE or QULO or QUDO"

If COVCL = Sparse and IF OAK_BA*>0, IS Oak Savanna or Oak Chaparral

If COVCL = Open AND CANCOV_HDW <25% AND CANCOV_CON <10% IS Oak Savanna or Oak Chaparral

If COVCL = Open AND CANCOV_HDW <25% AND CANCOV_CON >10% IS Mixed-Oak Conifer

If COVCL = Open AND CANCOV_HDW >25% AND CANCOV_CON < 10% IS Oak Woodland

If COVCL = Open AND CANCOV_HDW >25% AND CANCOV_CON > 10% IS Mixed-Oak Conifer

IF COVCL = Moderate AND CANCOV_CON <10% IS Oak Woodland

IF COVCL = Closed AND CANCOV_CON <10% IS Oak Woodland (oak forest)

IF COVCL = Moderate AND CANCOV_CON >10% and <35% IS Mixed-Oak Conifer

IF COVCL = Closed AND CANCOV_CON >10% and <35% IS Mixed-Oak Conifer

If FORTYPBA contains "QUGA or QUKE or QULO or QUDO"

IF COVCL = Moderate AND CANCOV_CON >35% IS Forest with Oak

IF COVCL = Closed AND CANCOV_CON >10% IS Forest with Oak

If FORTYPBA contains "LIDE"

IF COVCL = Moderate AND CANCOV_CON >35% IS Forest with TanOak

IF COVCL = Closed AND CANCOV_CON >10% IS Forest with TanOak

If FORTYPBA= REMNANT

IF OAK_BA>0, IS Oak Savanna or Oak Chaparral

ALL FOREST TYPES NOT PREVIOUSLY EVALUATEDIF OAK_BA>0

IF COVCL = Moderate AND CANCOV_CON >10% and <35% IS Mixed-Oak Conifer

IF COVCL = Moderate AND CANCOV_CON >35% IS Forest with Oak or Forest with TanOak*

IF COVCL = Closed AND CANCOV_CON >10% and IS Forest with Oak or Forest with TanOak*

If COVCL = Open AND CANCOV_HDW <25% AND CANCOV_CON >10% IS Mixed-Oak Conifer

If COVCL = Open AND CANCOV_HDW >25% AND CANCOV_CON > 10% IS Mixed-Oak Conifer

*For these pixels, IF FORTYPBA contains "LIDE", IS Forest with TanOak

FOR PIXELS CLASSIFIED AS Oak Savanna or Oak Chaparral:

Used overlapping pixels in LANDFIRE EVC Map to identify shrub cover:

IF Shrub Cover >20%, IS Oak Chaparral, ELSE Oak Savanna

Figure 3.1. Rule set used to define Oak Targets in mapping exercise for the Strategic Action Plan.

Land Ownership and Protected Areas

Land ownership data was downloaded for Oregon from the 2015 Oregon Public Land Management Layer (<https://www.oregon.gov/ODF/AboutODF/Pages/MapsData.aspx>) and for California from the California Department of Forestry and Fire Projection land Ownership layer, updated October 2018 (<https://frap.fire.ca.gov/mapping/gis-data/>). Land ownership was summarized into 4 major categories: Federal, State, Local (including county, city, and special district ownership) and Private (including tribal, private, industrial, and non-profit ownership).

Protected areas information for Oregon and California was downloaded from the Protected Areas Database, version 1.4 (2016) (<https://www.usgs.gov/core-science-systems/science-analytics-and-synthesis/gap/science/protected-areas>), which includes a compilation of public and privately owned areas that are protected or have been put in conservation easements. Protected lands were summarized based on GAP status codes. Hashed areas on the map represent protected areas with GAP status codes 1 or 2, based on State of the Birds Category 1 protection ranking, which corresponds to lands protected to maintain natural habitats (Alexander et al. 2017).

We used the Tabulate Area tool in Spatial Analyst for ArcGIS 9.3 to calculate the amount of each target within each land ownership category and within protected areas.

Zoning and Land Use

We used compiled 2017 Oregon Zoning data compiled by the Oregon Department of Fish and Wildlife to assess zoning in Oregon. A California zoning map for Siskiyou county was unavailable, but we assessed private land use in California by downloading the important agricultural area data from the California Department of Conservation Agricultural Monitoring and Mapping program (2016) (<https://www.conservation.ca.gov/dlrp/fmmp>). The Farmland Mapping and Monitoring Program (FMMP) provides data to decision makers for use in planning for the present and future use of California's agricultural land resources. The data is a current inventory of agricultural resources. This data is for general planning purposes and has a minimum mapping unit of ten acres.

For visual simplicity, we grouped zoning categories and only mapped those that were directly related to our rated threats. We mapped Exclusive Farm Use (all acreage categories grouped), Mixed Farm-Forest (all acreage categories grouped), Parks and Open Public Spaces (Open Space/Conservation, Parks and Open Space, and Public or semi-public uses grouped), Prime Forest, Rural Residential (all acreage categories grouped), and Secondary Forest. Likewise, we only mapped important agriculture areas that were related to our threats: Grazing, Farmland of Local Importance, Farmland of Statewide Importance, Prime Farmland, and Unique Farmland.

We used the Tabulate Area tool in Spatial Analyst for ArcGIS 9.3 to calculate the amount of each target within each zoning category and within important agricultural areas.

Climate Zonation

We downloaded oak bird zonation map data from the Pacific Northwest Conservation Rankings Map (<https://www.avianknowledgepnw.net/dsts/interactive-maps/1-pnw-models>) (Veloz et al. 2013, 2015). Conservation rankings summarize the conservation priority for a group of bird species (in this case, oak-associated bird species) based on current and 50 year future climate projection distribution models. We downloaded the mean conservation rankings that were summarized and mapped at the HUC 12 level. For the geospatial prioritization analysis, we summarize the mean value of the original raster data containing the oak bird zonation scores at the HUC 10 watershed level.

Vegetation Condition

We downloaded data from analyses in Haugo et al. (2015) (<https://ecoshare.info/products/r6-analysis/data/>). This dataset was a product of an analysis that considered a comprehensive approach to forest restoration need, including both departure and successional restoration need. The results include a map of restoration need, as a percentage of forested acres, from eastern Washington to southwest Oregon. The vegetation condition data mapped using this dataset represent more comprehensive understanding of forest restoration need that considers current and historical vegetation conditions as well as fire regime.

For California, we downloaded LANDFIRE vegetation condition data on vegetation departure (VDEP, v. 1.4.0, 2014) (<https://www.landfire.gov/vdep.php>). While less comprehensive than the restoration need analysis done in Oregon, it still indicates how different current vegetation is from estimated historical conditions (species composition, structural stage, canopy closures). This dataset is only based on departure from reference vegetation conditions and doesn't include information on fire regimes.

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ATTACHMENT 4. THREATS ASSESSMENT

Assessment of human-induced actions (i.e., threats) that directly degrade one or more of the four KSON SAP targets. Threats are classified using a standard taxonomy (CMP 2020) and rated based on an assessment of each threat's impact on each target, plus the overall number of targets for which each threat is important. Ratings are based on the following categories: Scope – Spatial proportion of the target affected within 10 years giving continuation of current circumstances and trends; Severity – Within the scope, the level of damage given continuation of current circumstances and trends; and Irreversibility – Degree to which the effects of a threat can be reversed, and the target restored, if the threat no longer existed.

			Oak Savanna				Oak Chaparral				Oak Woodland				Oak Confier				
			Threat Rankings				Threat Rankings				Threat Rankings				Threat Rankings				
			Scope	Severity	Irreversibility	Summary Rating	Scope	Severity	Irreversibility	Summary Rating	Scope	Severity	Irreversibility	Summary Rating	Scope	Severity	Irreversibility	Summary Rating	
Threat Classifications			SUMMARY TARGET RATING			High				Medium				High				High	
1. RESIDENTIAL & COMMERCIAL DEVELOPMENT																			
	1.1. Housing & Urban Areas																		
	1.1.1 - Rural development		Low	Low	Medium	High	Low	Low	Medium	High	Low	Low	Medium	High	Low	Low	Medium	High	Low
	1.1.2 - Urban development		Medium	Low	High	Very High	Medium	Low	High	Very High	Medium	Low	High	Very High	Medium	Low	High	Very High	Medium
	1.2. Commercial & Industrial Areas																		
	1.2.1 - Commercial and industrial development		Medium	Low	Very High	Very High	Medium				Low	Very High	Very High	Medium					
	1.3. Tourism & Recreation Areas																		
	1.3.1 - Golf course development		Low	Medium	High	High	Low	Low	High	High	Low	Low	High	High	Low				
2. AGRICULTURE & AQUACULTURE																			
	2.1. Annual & Perennial Non-Timber Crops																		
	2.1.1 - Conversion to vineyard, marijuana, and orchards		High	High	Very High	High	High	Medium	Very High	High	Medium	High	Very High	High	High				
	2.2. Wood & Pulp Plantations																		
	2.2.1 - Conversion to conifer plantations		Low												Low	High	High	Low	
	2.3. Livestock Farming & Ranching																		
	2.3.1 - Incompatible cattle grazing		Medium	High	High	Medium	High	Low	Medium	Medium	Low	Medium	High	Medium	Medium	Medium	Medium	Medium	
	2.3.2 - Conversion to pasture		Low	Low	High	Medium	Low				Low	High	Medium	Low					
3. ENERGY PRODUCTION & MINING																			
	3.3. Renewable Energy																		
	3.3.1 - Solar farms		Medium	Low	Very High	Very High	Medium	Low	Very High	Very High	Medium								
4. TRANSPORTATION & SERVICE CORRIDORS																			
	4.1. Roads & Railroads																		
	4.1.1 - Roads		Low	Low	Very High	Medium	Low	Low	Very High	Medium	Low	Low	Very High	Medium	Low	Low	Very High	Medium	Low
	4.2. Utility & Service Lines																		
	4.2.1 - Utility & service lines		Low	Low	Medium	High	Low	Low	Medium	High	Low	Low	Medium	High	Low	Low	High	High	Low
5. BIOLOGICAL RESOURCE USE																			
	5.2. Gathering Terrestrial Plants																		
	5.2.1 - Commercial acorn harvesting		Low	Low	Low	Low	Low					Low	Low	Low	Low	Low	Low	Low	Low
	5.3. Logging & Wood Harvesting																		
	5.3.1 - Conifer-centric management actions		Low	Low	High	Low	Low				Low	High	Low	Low	Medium	High	Low	Low	Low
	5.3.2 - Firewood cutting		Low	Low	High	Medium	Low	Low	High	Medium	Low	Low	High	Medium	Low	Low	High	Medium	Low

			Oak Savanna				Oak Chaparral				Oak Woodland				Oak Confier				
			Threat Rankings				Threat Rankings				Threat Rankings				Threat Rankings				
			Scope	Severity	Irreversibility	Summary Rating	Scope	Severity	Irreversibility	Summary Rating	Scope	Severity	Irreversibility	Summary Rating	Scope	Severity	Irreversibility	Summary Rating	
Threat Classifications			SUMMARY TARGET RATING			High				Medium				High				High	
6. HUMAN INTRUSIONS & DISTURBANCE																			
6.1. Recreational Activities																			
	6.1.1 - Trails (motorized)		Low	Low	Medium	Medium	Low	Low	Medium	Medium	Low	Low	Medium	Medium	Low	Low	Medium	Medium	Low
	6.1.2 - Trails (non-motorized)		Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
	6.1.3 - Illegal trails use (motorized)		Low	Low	Medium	Medium	Low	Low	Medium	Medium	Low	Low	Medium	Medium	Low	Low	Medium	Medium	Low
	6.1.4 - Illegal trails use (non-motorized)		Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
7. NATURAL SYSTEM MODIFICATIONS																			
7.1. Fire & Fire Suppression																			
	7.1.1 - Fire Exclusion (Indirect)		High	Very High	Low	Medium	Low	Very High	Low	High	Low	Very High	High	Medium	High	Very High	High	Medium	High
	7.1.2 - Incompatible wildfire response		Low	Low	High	Medium	Low	Low	High	Medium	Low	Low	High	Medium	Low	Low	High	Medium	Low
	7.1.3 - Severe fire		Medium	Low	High	Medium	Low	Low	Medium	Low	Low	Medium	High	Medium	Medium	High	High	Medium	High
	7.1.4 - Shrub removal		Low				Medium	High	Low	Low	Low	Medium	Medium	Low	Low				
	7.1.5 - Limbing		Low	Low	Medium	High	Low	Low	Low	High	Low	Low	Medium	High	Low				
	7.1.6 - Thinning		Low													Medium	Medium	Medium	Medium
7.3. Other Ecosystem Modifications																			
	7.3.1 - Incompatible mistletoe management		Low	Low	Low	Low	Low				Low	Low	Low	Low	Low	Low	Low	Low	Low
	7.3.2 - Lack of indigenous burning		Low	Very High	Low	Medium	Low				Very High	Low	Medium	Low	High	Low	Medium	Low	Low
	7.3.3 - Lack of indigenous gathering		Low	High	Low	Medium	Low	High	Low	Medium	Low	Medium	Low	Medium	Low	Low	Medium	Low	Low
8. INVASIVE & PROBLEMATIC SPECIES, PATHOGENS, & GENES																			
8.1. Invasive Non-Native / Alien Plants & Animals																			
	8.1.1 - Non-native grasses & forbs		Medium	Very High	High	High	High	Medium	Medium	High	Medium	High	Medium	High	Medium	Low	Low	High	Low
	8.1.2 - Non-native shrubs		Low	Low	Low	Medium	Low				Low	Medium	Medium	Low	Low	Medium	Medium	Low	Low
	8.1.3 - Wild Turkey		Low	Very High	Low	High	Low				High	Low	Medium	Low	Medium	Low	Medium	Low	Low
8.2. Problematic Native Plants & Animals																			
	8.2.1 - Conifer encroachment		High	Low	Medium	Low	Low	Low	Medium	Low	Low	High	High	Medium	High	Very High	High	Medium	High
	8.2.2 - Shrub encroachment		Low	Low	Medium	Low	Low					Medium	Low	Low	Low				
9. POLLUTION																			
9.3. Agricultural & Forestry Effluents																			
	9.3.1 - Rodenticides and other chemicals		Low	Low	Medium	Medium	Low				Low	Medium	Medium	Low	Low	Medium	Medium	Low	Low
9.5. Air-Borne Pollutants																			
	9.5.1 - Nitrogen		Low	Low	Medium	Medium	Low												

ATTACHMENT 5. SITUATION ANALYSIS

The KSON situation analyses evaluated specific threats within both biological and socioeconomic contexts to identify and prioritize conservation strategies. Contributing factors, including indirect threats and opportunities based on human-induced factors that underlie or lead to one or more direct threats are identified. These contributing factors highlight points of intervention that were used to develop and prioritize a set of strategies that specify how KSON will achieve capacity building and conservation action related outputs to meet longer-term conservation outcome driven goals.

