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STAFF REPORT

Date: November 3, 2025

To: Threshold Update Initiative Stakeholders Working Group

From: TRPA Staff

Subject: Update to the Vegetation Preservation Threshold Standards

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Summary and Staff Recommendation:
The Governing Board identified forest health and wildfire resilience, as well as updating the environmental threshold carrying capacities (threshold standards), as priorities in the 2025-2026 work plan. Staff will provide an overview of the proposal to update the vegetation preservation threshold standards related to forest health. The proposed updates modernize the forest health standards to reflect current scientific knowledge, management practices, and regional objectives.

Required Motions:
To recommend the proposal to the Governing Board, the Threshold Update Initiative Stakeholders Working Group must make the following motion based on this staff report:

1) A motion to recommend adoption of the forest health threshold standards as presented in Attachment B.

For the motion to pass, an affirmative vote of a majority of the quorum is required.

Background:
The Bi-State Compact requires adoption of threshold standards for five categories, including vegetation preservation. Standards related to forests are adopted within the vegetation preservation category under both the “common vegetation” and “late-seral/old-growth forests” headers.

The current forest health standards include a mix of standards adopted in 1982 and 2001. Over the past five decades, scientific understanding and management of forest ecosystems in the Tahoe Basin have progressed substantially. The proposed update includes four new standards for forest health and fire dynamics. The proposed standards draw heavily from recent work to establish desired conditions for forests of Lake Tahoe and the Sierra Nevada. The standards set clear, measurable targets for stand density, seral stage, canopy cover, and potential fire severity. These standards reflect the best available science, align with partner goals, and provide a roadmap for restoring resilient forests across the Basin.

At the upcoming meeting, staff will present the proposed updates to the forest health standards and the scientific basis supporting them. No changes are proposed to the vegetation preservation standards in either the sensitive plants or uncommon plants categories.

Contact Information:

For questions regarding this agenda item, please contact Mason Bindl, Senior GIS Analyst, at mdbindl@trpa.gov, (775) 589-5209.

To submit a written public comment, email publiccomment@trpa.gov with the appropriate agenda item in the subject line. Written comments received by 4 p.m. the day before a scheduled public meeting will be distributed and posted to the TRPA website before the meeting begins. TRPA does not guarantee written comments received after 4 p.m. the day before a meeting will be distributed and posted in time for the meeting.

Attachments:

A. Forest Health Threshold Standard Report
B. Proposed edits to vegetation preservation threshold standards (Redline)

Attachment A

Forest Health Threshold Standard Report

TAHOE REGIONAL PLANNING AGENCY

Threshold Update

FOREST HEALTH
THRESHOLD STANDARDS

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SUMMARY

Forests in the Tahoe Basin reflect a widespread pattern across the western United States. Past land management actions and fire exclusion created overstocked, even-aged forests with limited structural and species diversity. These conditions reduce resilience to destructive fire, drought, insect outbreaks and disease. As a result, forests are more vulnerable, and the region faces growing threats to wildlife, habitat, water quality, recreation, and scenic resources.

The Tahoe Regional Planning Agency (TRPA) and its partners propose new forest health thresholds that focus on three key areas: stand density, stage and canopy cover, and fire severity. These indicators align with the best available science and provide measurable targets to guide forest restoration. The fire-severity thresholds vary by forest management zone to account for ecological conditions and values at risk that differ across the landscape. In contrast, the stand density, seral stage and canopy cover thresholds apply consistently Basin-wide but exclude private-urbanized areas.

With this update, TRPA formally recognizes fire as a central ecological process. Fire historically shaped the structure and function of Tahoe's forests. TRPA and its partners aim to restore ecological balance, and prepare the region's forest for the subsequent fire. This will require reducing fuel loads and likely reintroducing beneficial fire. These efforts help prevent high-severity wildfires, while also restoring ecosystem function and protecting both communities and natural resources. As climate change drives more extreme fire behavior and longer fire seasons, incorporating fire into forest management becomes more critical.

The proposed standards set the trajectory for a more resilient forest. Resilience describes the ability of a system to retain its structure, composition, and functional integrity in response to stresses and disturbance (North et al. 2022). For TRPA and partners, a resilient forest landscape means maintaining forests at the landscape level in response to disturbances or stressors such as fire, drought, insects, and disease. Resilience should not be confused with resistance to the stressors (North et al. 2022). Even if we meet all our goals, fire, drought, insects, and disease are natural processes that will continue to shape our forested landscapes, as they always have, but the forested landscape will persist despite these stressors.

Managing the resilience of the forest is not a new concept, but understanding of what makes a resilient

forest has changed over the last forty years. When the current standards were adopted in 1982, the study recommending the standards wrote, "To enhance the stability of Tahoe's vegetation and to make it more resilient to unwanted changes, certain forest management practices need to be implemented to enhance the structural and species diversity of the forest communities (TRPA 1982a)."

HISTORY OF TAHOE FOREST MANAGEMENT

People have lived in the Tahoe Region for at least 8,000 years (Elliot-Fisk et al. 1997). Past and current human activities have shaped the region's vegetation pattern and condition (Elliot-Fisk et al. 1997, Murphy and Knopp 2000, Taylor 2007). Prior to the early 1800s, the Washoe people occupied the Tahoe Region. The Washoe people managed natural resources for at least 1,300 years, in combination with natural processes, and had maintained a diversity of forest types (Murphy and Knopp 2000). Extensive logging activities to support the Comstock era mining boom began in 1859, and within 40 years, loggers clear-cut approximately 60% of the Tahoe watershed (Elliot-Fisk et al. 1997, Murphy and Knopp 2000). Alpine, barren, and inaccessible lands made up most of the unlogged lands (Murphy and Knopp 2000). As a result, most forest stands in Tahoe are less than 150 years old, with few examples of young and very old forest stands (Elliot-Fisk et al. 1997, Murphy and Knopp 2000). Livestock grazing also had pervasive effects on the region's vegetation during and after the Comstock era. Sheep grazing was ubiquitous in the region's forests and shrublands, and intensively grazed understory vegetation, often denuding it and extirpating browse species (Elliot-Fisk et al. 1997, Murphy and Knopp 2000). Cattle were grazed in all the region's meadows and in subalpine areas (Elliot-Fisk et al. 1997, Murphy and Knopp 2000). Agencies implemented a grazing allotment system in the 1930s, limiting livestock to specific areas. After intensive logging, federal and state governments began acquiring lands in and around the Tahoe Region in 1899 and accelerated acquisitions in the 1930s. Today, the Forest Service manages 78 percent of the region (Elliott-Fisk et al. 1996; USFS LTBMU 2015).

During most of the 20th century, forest management in the Tahoe Basin and throughout the western United States was primarily focused on fire suppression, which altered the natural fire regime and densified yellow pine and mixed conifer forests in the region (McKelvey et al. 1996, Elliot-Fisk et al. 1997, Taylor 2007, Beaty and Taylor 2008). Historically, fires occurred in the montane forests of the Tahoe Basin every 9-13 years (Taylor 2008). These low-intensity fires worked to remove smaller trees and fire-intolerant species growing under the canopy, reducing future fire risk and providing ample sunlight for pine regeneration. The lack of fire in the forest has altered the vegetation composition, where pines are gradually being replaced by shade-tolerant species such as white fir (*Abies concolor*)

that fill the understory with a dense continuous layer of trees that connect to the overstory (McKelvey et al. 1996, Elliot-Fisk et al. 1997, Taylor 2007). This change in the density and structure of the forest has increased the overall fire hazard and risk of Tahoe forests.

The long history of fire suppression, combined with periods of drought and insect-induced mortality, has resulted in stands with high concentrations of hazardous fuels (Murphy and Knopp 2000, Barbour et al. 2002, Beaty and Taylor 2008, Raumann and Cablk 2008). This condition has heightened the threat of catastrophic wildfire, typically in forests where natural disturbance is absent. Since the 2007 Angora fire in South Lake Tahoe, land management agencies have collaborated to increase pace and scale of fuel reduction treatments in conifer forests in the region, especially in areas surrounding the wildland urban interface (e.g Marlow et al. 2007).

The 2007 Angora Fire marked a shift in forest management in the Tahoe Basin. After the fire, and the findings of the Bi-State Blue Ribbon Commission, agencies have directed greater focus to coordinated fuels reduction and community protection from wildfire. The Bi-State Commission was created to identify recommendations regarding policy changes, education, funding, government structures, and environmental practices as they relate to wildland fuels management and community fire safety in the Tahoe Basin. In 2008, agencies created the Tahoe Fire and Fuels Team (TFFT) to implement the multi-jurisdictional fuel reduction and wildfire prevention strategy, which strives to collaboratively coordinate and implement cross-boundary forest health and wildfire reduction treatments. Today the TFFT includes representatives from 21 agencies and organizations and leads the prioritization of critical restoration work, identifies opportunities for regulatory and permit streamlining, and coordinates funding among partners.

In the last decade, concerns over the impacts of climate change on forest health have risen to the forefront of resource management and decision-making across the states of California and Nevada. The extended drought and resulting widespread tree mortality in the middle of the last decade (Goulden & Bales 2019) has prompted a new push towards large-scale restoration efforts throughout the region. With so many dead trees, concerns about wildfire risk have heightened urgency and accelerated agency efforts to reduce the extreme hazard across the forested landscapes of the Sierra Nevada. The worsening forest health situation has spurred collaborative restoration planning, where land management agencies and stakeholders are coming together to tackle forest health issues with a focus on large, landscape-scale restoration.

In 2016, the Lake Tahoe West Restoration Partnership (Partnership) formed to begin planning and implementing landscape-scale forest restoration on the west shore of Lake Tahoe. The Partnership invested significant time and resources in reviewing forest resilience literature and developing regional goals. The proposed standards presented here draw heavily from that work, notably from the Landscape Resilience Assessment (Gross et al. 2017), the Landscape Restoration Strategy (LTW 2019), and the Lake Tahoe West Science Summary of Findings Report (LTW Science Team 2020). We also drew from the desired conditions outlined in the LTBMU Forest Plan (LTBMU 2015) and a more recent review of the literature.

BACKGROUND

TRPA operates under the authority of the states of California and Nevada and the federal government through the Bi-State Compact, which was ratified by Congress and signed by the President of the United States. The revised Bi-State Compact, signed nearly forty years ago, states “the waters of Lake Tahoe and other resources of the region are threatened with deterioration or degeneration, which endangers the natural beauty and economic productivity of the region (TRPA 1982)”. To ensure the natural beauty and economic productivity of the region persist for generations to come, the Bi-State Compact directs TRPA to establish “environmental threshold carrying capacities”, defined as "an environmental standard necessary to maintain a significant scenic, recreational, educational, scientific or natural value of the region or to maintain public health and safety within the region." The environmental threshold carrying capacities (threshold standards) establishes goals for environmental quality and expresses the shared aspiration for environmental restoration of the Tahoe region. The Compact mandates threshold standards in specific areas, including the preservation of vegetation in the Region.

The threshold standards shape the goals and policies of the Regional Plan and guide public and private investment in the basin through the Environmental Improvement Program. Most of the current threshold standards were adopted in 1982 based on science that is now over 45 years old. In addition, the cost of comprehensively monitoring and reporting on the status of all standards in the current threshold system has always been beyond the means of the agencies in the region. Numerous recommendations for modifying the system have been put forward, including over 90 recommendations in the 2011 Threshold Evaluation Report (TRPA 2012), and the standards have been repeatedly critiqued by partners, members of the threshold evaluation team, and external scientific peer reviewers (Hall et al. 2016). Prior attempts to review and revise the threshold standards, including the multi-year Pathway 2007 process, proposed but failed to produce significant revisions to the standards.

The TRPA Governing Board identified the review and updating of the threshold standards and performance measures as a strategic priority for the agency. TRPA staff is currently leading the process to incorporate new scientific information to ensure that the standards that guide investments and restoration work are representative, relevant, and scientifically rigorous. The goals of the initiative are:

- A representative, relevant, and scientifically rigorous set of threshold standards.

- Performance measures that are informative, cost-efficient, and support adaptive management towards threshold standard attainment.
- A robust and repeatable process for reviewing threshold standards in the future.

TRPA uses threshold standards to guide resource management, and Environmental Improvement Program (EIP) projects aim to attain and maintain them. In the more than 40 years since the original vegetation preservation thresholds were adopted, resource management objectives and forest health treatments have progressed with advances in our scientific understanding of the ecology of Sierra Nevada ecosystems. Forests are increasingly at risk to wildfire, drought, and insect-related mortality throughout the Sierra Nevada region, and these pressing concerns are reshaping forest management goals and objectives.

CURRENT THRESHOLD STANDARDS

The Bi-State Compact requires that TRPA adopt threshold standards in five areas, one of which is "vegetation preservation." TRPA adopted 20 standards for the preservation of regional vegetation in 1982, and the standards have been amended twice, most recently in 2001.

TRPA adopted twelve standards for the preservation of "common vegetation" in 1982 (TRPA 1982a). TRPA described common vegetation at the time as "readily viewed by the public (TRPA 1982a)." The rationale for the standards was, "Preservation of natural vegetation in the aforementioned diversity is necessary to protect the various scenic, recreational, and wildlife viewing opportunities in the basin while providing for the maintenance of such functional capabilities as water cleansing, soil conservation, air purification, and wildlife habitat (TRPA 1982a)."

TRPA guided standard development using two value statements (TRPA 1982a):

1) Provide for a wide mix and increased diversity of plant communities in the Tahoe Basin, including such unique ecosystems as wetlands, meadows and other riparian vegetation.
2) Conserve threatened endangered and sensitive plant species, and uncommon plant communities of the Lake Tahoe Basin.

TRPA stated that implementing the recommended thresholds would retain "the existing plant associations in the Basin while providing for opportunities to increase plant diversity and increase the total extent of wetland, meadow, and deciduous riparian vegetation. Improvement and or maintenance of existing conditions requires adherence to the Bailey system of allowable impervious coverage and use of the management practice to increase forest diversity. The attainability of the desired diversity

conditions is a long-term goal; possibly requiring up to 20 years to achieve (TRPA 1982a)."

TRPA described the expected implication of the threshold standards at the time of adoption as, "the visual, recreational, aquatic, wildlife, and other environmental resources will be enhanced as a consequence." TRPA also described the expected management implications at the time as, "allow management practices intended to increase the structural diversity of conifer forests (TRPA 1982a)."

LATE SERAL AND OLD GROWTH FOREST ECOSYSTEMS

When TRPA first adopted the threshold standards in 1982, no standards related explicitly to old-growth forests (TRPA 1982b). After the 1991 threshold evaluation, the Governing Board directed staff to develop standards for old-growth forests and associated wildlife species. The Interagency Forest Health Consensus Group led the consultation process to develop threshold standards and associated regional plan and code updates to protect old growth forest. In May of 1997 the Governing Board adopted the following two standards within the Common Vegetation Category, for the protection of the old growth forest (TRPA 1997).

1) Provide for the promotion and perpetuation of the late successional/old growth forest. The goal is to increase late successional/old growth conditions across elevational ranges of the Lake Tahoe Basin Forest cover types.
2) Individual trees greater than 30" diameter at breast height (DBH) shall also be favored for retention because of their late seral attributes.

The second standard, referencing a 30" DBH threshold, was informed by U.S. Forest Service research at the time, which suggested that in some Sierra Nevada forest stands, trees of that size, typically 150 to 200 years old, were associated with the development of old-growth characteristics. Standards for the protection of Late Seral and Old Growth Forest Ecosystems were refined and adopted as a separate threshold category in 2001. As part of that action, the two old-growth standards adopted in 1997 within the common vegetation threshold category were removed, and three threshold standards were adopted in the Late Seral and Old Growth Forest Ecosystems category (TRPA 2001). At the time the standards were adopted, most forested stands in the basin were estimated to be 100-120 years old, and TRPA estimated a timeline for attainment of 50-60 years (2050 or 2060), based on a projected stand age for attainment of 150 years.

OUTLOOK

Climate change is, and will remain, one of the greatest threats to attaining our collective goals of sustaining Tahoe's forests for future generations. Warming temperatures are already exacerbating catastrophic wildfires and are forecast to increase the area burned each year significantly (LTW Science Team 2020). Climate change poses a threat to the integrity of the Region's vegetation communities and plant species. Warming temperatures and decreased snowpack, driven by more rain, less snow, and earlier snowmelt, are already occurring and are expected to continue in the Sierra Nevada (e.g. Hayhoe et al. 2004, Dettinger 2005, Safford et al. 2012). In the Lake Tahoe Region, these changes appear to be happening at an accelerated pace (Coats 2010). These changes are expected to drive range shifts, re-sorting of species associations, local extirpation, and even extinctions. High-elevation vegetation communities in the Lake Tahoe Region are particularly vulnerable (e.g. Seastedt et al. 2004, Loarie et al. 2008, Tomback and Achuff 2010). These changes have already begun and will likely affect both common and uncommon plant communities and species. For example, Jeffrey pine is widespread in montane elevations in the Region today, but populations are declining in low elevation areas, expanding in mid elevations, and slowly expanding in higher elevations (Gworek et al. 2007). White bark pine, a keystone high elevation conifer of western North America including the Sierra Nevada, has experienced widespread mortality due to warming and increased severity of pathogens such as native mountain pine beetle and non-native white pine blister rust (Tomback and Achuff 2010), and has since been listed as a threatened species. Many of the region's high elevation species could be extirpated given the relatively low elevations of the area (e.g. Loarie et al. 2008). This includes the Freel Peak cushion plant community, and many of the region's sensitive plant species. The region's wetlands are also vulnerable, with a drier climate potentially leading to lower water tables which are critical for sustaining wetlands (e.g. Cooper et al. 1998), while earlier and more intensive snow melt and rain events may alter flow regimes and increase erosion.

Many of the proposed standards are rooted in the practice of looking at properly functioning systems to identify historical reference for goal articulation. The practice has dominated forest health restoration (Safford et al. 2012). As the climate continues to change, we may need to revisit the quantitative targets derived from reference conditions. In a warmer world with altered precipitation, reference conditions may serve better as guides to ecological processes than as specific restoration targets, particularly when historical forest states may no longer be feasible (Safford et al. 2012).

SERAL STAGE & CANOPY COVER

Forest age is often described in terms of seral stage, a concept from forest ecology that refers to the developmental phase of a forest stand, from early regeneration to late-successional maturity. Seral stages reflect how forests change over time in response to disturbances such as fire, insects, or harvest. In healthy Sierra Nevada forests, a diversity of seral stages exists across the landscape, creating structural complexity and supporting a wide range of species and ecological functions (Manley et al. 2020).

Historically, frequent low- to moderate-intensity fires maintained this diversity of seral stages in the Sierra Nevada and Tahoe Region (Manley et al. 2020). Fire created a mosaic of young, mid-, and late-seral patches, contributing to structural heterogeneity and biodiversity. Healthy, resilient forests in the region continue to be characterized by a balanced mix of these stages.

A century of fire suppression has disrupted this balance. Many forest stands across the Sierra now exhibit dense, homogeneous structure and high concentrations of hazardous fuels (Murphy and Knopp 2000; Barbour et al. 2002; Beaty and Taylor 2008; Raumann and Cablk 2008). This shift not only increases the risk of high-severity wildfire but also reduces the habitat diversity required by many wildlife species.

Canopy cover is the percentage of the forest floor shaded by the vertical projection of tree crowns (Jennings 1999; North 2012). It is a critical habitat determinant, influencing understory light availability, moisture, and temperature, which in turn, affect plant regeneration, fuel structure, and wildlife use (North 2012).

CURRENT STANDARDS

Six standards currently relate to the seral stage of the Region's Forest. Targets for Yellow Pine and Red Fir in stages other than mature are established by VP7 and VP8. Targets for total old-growth forest, and old-growth within different elevation zones are established by standards VP12-VP15.

PROPOSED STANDARD

At least 75% of the forested area in the Basin will fall within the ranges for dominant seral stage and canopy cover (open vs closed) described in Table 2

TABLE 2: TARGET SERAL STAGE DISTRIBUTION RANGES BY VEGETATION TYPE

Forest Type	Canopy Cover	Seral Stage	Desired % Range
Jeffrey Pine	N/A	Early Seral (<10" DBH)	5–15%
Jeffrey Pine	Open (<40% Canopy Cover)	Mid Seral (10–25" DBH)	25–30%
Jeffrey Pine	Closed (>40% Canopy Cover)	Mid Seral (10–25" DBH)	5–10%
Jeffrey Pine	Open (<40% Canopy Cover)	Late Seral (>25" DBH)	40–50%
Jeffrey Pine	Closed (>40% Canopy Cover)	Late Seral (>25" DBH)	5–10%
Sierra Mixed Conifer	N/A	Early Seral (<10" DBH)	10–20%
Sierra Mixed Conifer	Open (<50% Canopy Cover)	Mid Seral (10–25" DBH)	15–20%
Sierra Mixed Conifer	Closed (>50% Canopy Cover)	Mid Seral (10–25" DBH)	5–15%
Sierra Mixed Conifer	Open (<50% Canopy Cover)	Late Seral (>25" DBH)	25–35%
Sierra Mixed Conifer	Closed (>50% Canopy Cover)	Late Seral (>25" DBH)	15–25%

Red Fir	N/A	Early Seral (<10" DBH)	10–20%
Red Fir	Open (<50% Canopy Cover)	Mid Seral (10–25" DBH)	15–25%
Red Fir	Closed (>50% Canopy Cover)	Mid Seral (10–25" DBH)	15–25%
Red Fir	Open (<50% Canopy Cover)	Late Seral (>25" DBH)	30–40%
Red Fir	Closed (>50% Canopy Cover)	Late Seral (>25" DBH)	20–30%

Seral stage and canopy cover are defined based on tree diameter at breast height (DBH) and overstory tree canopy cover from above (% overstory canopy). The target ranges for the proposed standard draw from the work of the Lake Tahoe West Partnership and the LTBMU Forest Plan (Lydersen et al. 2013; USFS LTBMU 2015; Gross et al. 2017). The targets also incorporate guidance from the peer review of earlier drafts (see appendix III).

Forest systems are dynamic and change slowly over time. The proposed target establishes a goal that will likely take years to attain through the management of overstocked stands and the maturation of existing stands. The target establishes a milestone to work towards on the way to restoring the health of all forests in the region. After attainment of the target, the goal can be updated.

The proposed standard improves the existing thresholds in several important ways. It uses the latest science to establish desired ranges for each seral stage. It distinguishes between early- and mid-seral conditions and sets specific targets for each (Swanson et al. 2011; DellaSala et al. 2014). It also recognizes that open- and closed-canopy forests provide functionally distinct ecological conditions within each seral stage and establishes separate targets for each.

CURRENT CONDITION

We used seral stage and canopy cover data from the toolkit to assess conditions relative to the standard

based on targets in Table 3. Table 3 also summarizes stage and canopy cover relative to desired ranges for each forest type. The difference between current and desired conditions is shown as the minimum number of acres that must be added or removed to meet targets. Targets were established only for areas where data were available for seral stage and forest type. Within those areas, the assessed acres included Jeffrey pine (28,783 acres), Sierra mixed conifer (60,276 acres), and red fir (22,365 acres), which together make up the 111,425 acres evaluated. There are ~205,000 terrestrial acres in the Lake Tahoe Basin.

Table 4 summarizes the minimum acreage required to change classes to meet the target distribution for each forest type. It includes acres that could be managed from closed to open canopy, acres that would need to transition to early seral stages, acres that would need to mature into late seral types, and the total acreage needed to achieve the target distribution.

TABLE 3: CURRENT DISTRIBUTION OF SERAL STAGE BY FOREST TYPE IN THE TAHOE REGION.

Jeffrey Pine	Early	5–15%	Underrepresented	2.77%	797	28,783	643
	Mid (open canopy)	25–30%	Within	27.7%	7,972	28,783	-
	Mid (closed canopy)	5–10%	Overrepresented	30.53%	8,787	28,783	(5,909)
	Late (open canopy)	40–50%	Underrepresented	25.89%	7,451	28,783	4,063
	Late (closed canopy)	5–10%	Overrepresented	13.12%	3,776	28,783	(898)
Sierra Mixed Conifer	Early	10–20%	Underrepresented	3.66%	2,206	60,276	3,822
	Mid (open canopy)	15–20%	Overrepresented	22.38%	13,492	60,276	(1,437)

	Mid (closed canopy)	5–15%	Overrepresented	37.09%	22,354	60,276	(13,313)
	Late (open canopy)	25–35%	Underrepresented	19.63%	11,833	60,276	3,236
	Late (closed canopy)	15–25%	Within	17.24%	10,390	60,276	-
Red Fir	Early	10–20%	Underrepresented	2.2%	491	22,365	1,745
	Mid (open canopy)	15–25%	Underrepresented	12.48%	2,792	22,365	563
	Mid (closed canopy)	15–25%	Overrepresented	36.52%	8,168	22,365	(2,577)
	Late (open canopy)	30–40%	Underrepresented	19.34%	4,326	22,365	2,383
	Late (closed canopy)	20–30%	Within	29.45%	6,587	22,365	-

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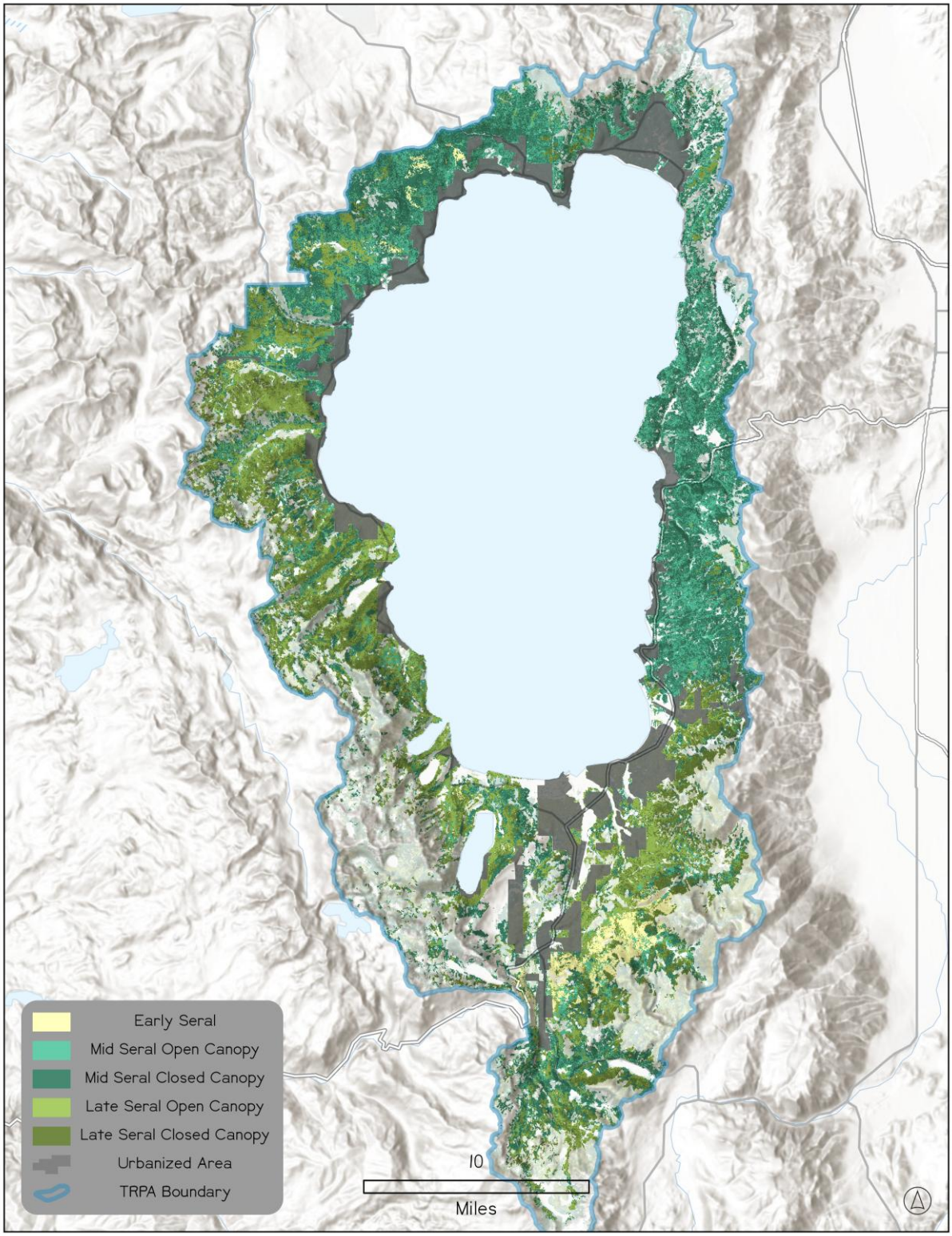
TABLE 4: MINIMUM ACREAGE TO TRANSITION TO MEET DESIRED RANGE DISTRIBUTION

Forest Type	Transition Canopy from Closed to Open	Transition to Early Seral	Grow into Late Seral	Total Acres to Desired Range
Jeffrey pine	6,807	643	5,246	12,696
Sierra mixed conifer	13,313	3,822	14,750	31,885
red fir	2,577	1,745	2,452	6,774
Total	**22,697**	**6,210**	**22,448**	**51,355**

TABLE 5. ATTAINMENT PATHWAY

Seral Stage and Canopy Cover	Attainment Pathway (overrepresented)	Attainment Pathway (underrepresented)
Early	Growth into mid stages; stand-replacement disturbance that converts to other vegetation type	Stand-replacement disturbance; regeneration or planting that converts from shrub type to conifer type
Mid (open canopy)	Growth to late stages; Stand replacement disturbance	Growth from early stage; Thinning of mid-closed canopy
Mid (closed canopy)	Thinning to mid-open; stand-replacement disturbance	Growth from early stage;
Late (open canopy)	Stand replacement disturbance	Mid grows into class
Late (closed canopy)	Thin to late open canopy Stand replacement disturbance	Mid grows into class

FIGURE 1: MAP OF FOREST STAGE AND CANOPY COVER IN THE TAHOE BASIN


Early Seral
Mid Seral Open Canopy
Mid Seral Closed Canopy
Late Seral Open Canopy
Late Seral Closed Canopy
Urbanized Area
TRPA Boundary
10
Miles

EVALUATION OF PROPOSED STANDARD

The proposed standard establishes a goal of 75% of the forested area being within its target range. The standard established targets for 111,425 acres of forest. As outlined in Tables 3 and 4, 70,836 (64%) acres are within the desired range, and 40,589 acres of forest are outside the desired conditions. Relative to the target of 75% (83,568 acres), the 70,836 is 85% of the area required to meet the standard, so the status is out of attainment and assessed as Somewhat Worse than Target. This follows the convention of assessment of threshold standards used since 2011 which identifies standards where the status is not in attainment but is within 25% of the attainment value as "somewhat worse than target" (see appendix II).

STAND DENSITY

Stand density is the number of trees within a given area, commonly expressed as trees per acre. Over a century of fire suppression has caused forests in the Lake Tahoe Basin and much of the Sierra Nevada to become overcrowded, with tree densities far above historic levels. These densities mean that fuel loads are far higher than historic levels. (Murphy and Knopp 2000; Barbour et al. 2002; Beaty and Taylor 2008; Raumann and Cablk 2008) High stand densities are associated with increased tree stress, making forests more vulnerable to drought, insect infestations, and disease. These conditions, combined with prolonged drought, triggered widespread tree mortality across the Sierra Nevada (Goulden & Bales 2019). The megadrought intensified in the Northern Sierra in 2021, causing widespread tree mortality in forests around Lake Tahoe. Tree mortality in the Tahoe Basin increased from approximately 1.4 million dead trees across 58,000 acres in 2022 to an estimated 1.7 million dead trees across 66,000 acres in 2023. While mortality was widespread across eastern and northern areas, the most severe impacts occurred west of the lake (USFS 2023). Research has shown that thinning treatments improve drought resilience, help large fire-resistant trees survive, reduce overall tree mortality by reducing overall competition, and slow wildfire spread and intensity (LTW Science Team 2020; Low et al. 2021).

The LTBMU and the Tahoe West Partnership identified stand density as a key indicator of landscape resilience and include it in desired forest condition targets (USFS LTBMU 2015; Gross et al. 2017; LTW 2019). Recent studies indicate that current thinning treatments may still leave the landscape with too many trees to be resilient. Sustaining forests under future climate scenarios may require more aggressive treatment strategies (North et al. 2022). Managers may need to adjust target densities by vegetation type as climate conditions shift.

CURRENT STANDARDS

No current threshold standards relate to stand density.

PROPOSED STANDARD

A minimum of fifty percent of the forested area in the Basin falls within the ranges described in Table

6.

TABLE 6: MAXIMUM DENSITY OF STEMS (TREES PER ACRE) AND BASAL AREA (FT^2/ACRE) BY VEGETATION TYPE AND SERAL STAGE

Forest Type	Early Seral Stems	Mid Seral Stems	Late Seral Stems	Early Seral Basal Area	Mid Seral Basal Area	Late Seral Basal Area
Jeffrey Pine	200	70	55	30	80	100
Sierra Mixed Conifer	300	90	75	40	130	180
Red Fir	300	100	80	50	175	250

The proposed standard aligns with the ranges recommended by the Lake Tahoe Basin Management Unit and the Tahoe West Partnership (USFS LTBMU 2015; Gross et al. 2017). The targets also incorporate guidance from the peer review (see appendix III).

Aspen and subalpine conifer forest types were excluded from this analysis because the Forest Plan does not define stand density targets for those types. The resilience targets developed for Tahoe West included a standard for aspen stands, but current data limitations prevent quantifying aspen stand density at the regional scale. When reliable methods become available to measure aspen density across the region, the standards should be considered.

CURRENT CONDITION

Current data show that 31,804 acres (28 percent) of the 111,425 forested acres in the Lake Tahoe Basin for which density targets could be established meet the target. The targets include thresholds for both trees per acre and basal area, categorized by seral stage. The remaining 79,621 acres, or 72 percent, exceed those targets and are considered overstocked. Targets were established only for areas where data were available for stems per acre, basal area, and forest type. Within those areas, the assessed acres included Jeffrey pine (28,783 acres), Sierra mixed conifer (60,276 acres), and red fir (22,365

acres), totaling 111,425 acres evaluated.

Results vary by species and seral stage. In Jeffrey pine stands, 99 percent of early-seral acres meet the target, but only 4 percent of mid-seral and 5 percent of late-seral acres fall within the desired range. In Sierra mixed conifer, 100 percent of early-seral, 18 percent of mid-seral, and 38 percent of late-seral acres meet the standard. Red fir shows higher overall alignment with desired conditions: 99 percent of early-seral, 43 percent of mid-seral, and 67 percent of late-seral acres meet the density goals.

FIGURE 2: TOTAL ACRES WITHIN EACH DENSITY CLASS.

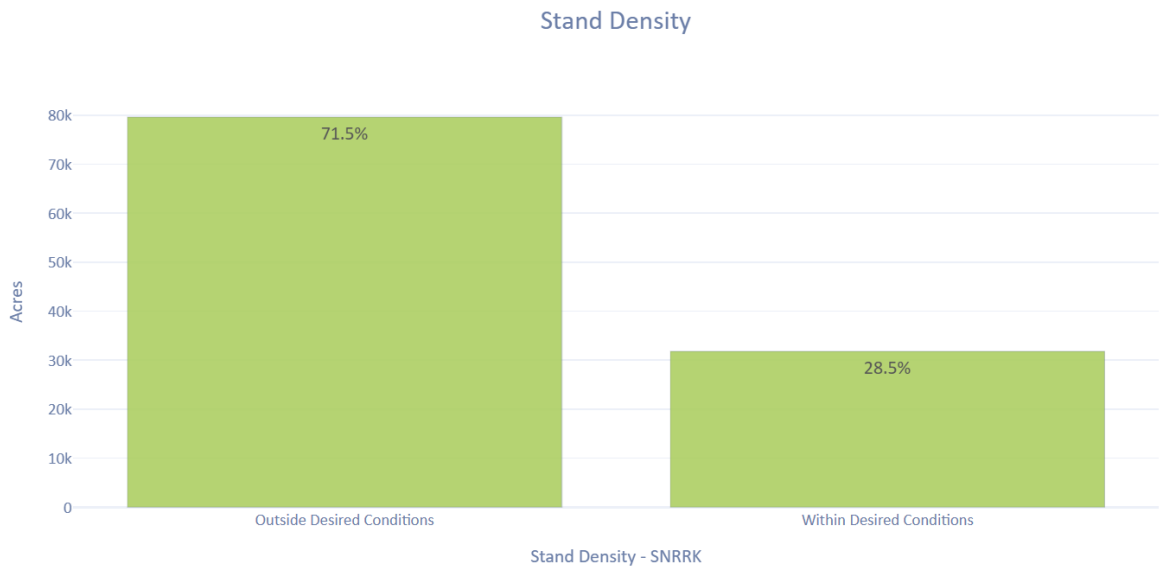
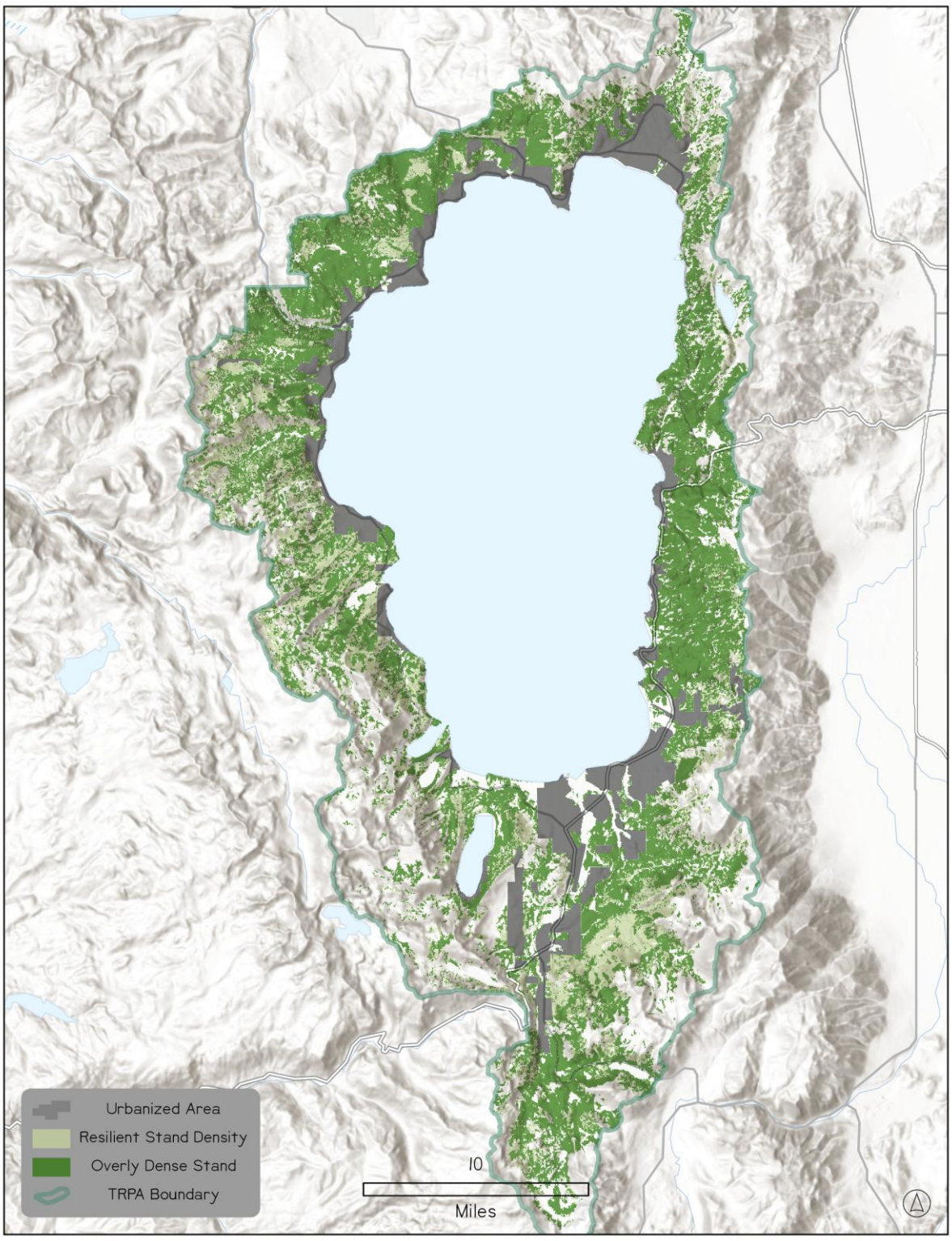


FIGURE 3: MAP OF TREE DENSITY IN THE TAHOE REGION


Urbanized Area
Resilient Stand Density
Overly Dense Stand
TRPA Boundary
10
Miles

EVALUATION OF PROPOSED STANDARD

To meet the threshold target of at least 50% of the landscape falling within the desired conditions, at least 55,713 acres would have to meet the criteria described in Table 6. The total of 31,804 acres within the desired stand density condition was only 57 percent of that minimum acreage, so the standard is Considerably Worse than the Target.

WILDLAND URBAN INTERFACE DEFENSE ZONE FIRE DYNAMICS

The Wildland Urban Interface (WUI) is the area where houses are adjacent to or intermingle with the wild, undeveloped landscape (Radeloff et al. 2005). Tahoe's WUI includes 117,954 acres adjacent to its communities, roughly half the total area of the region (TFFT 2015). In Tahoe, WUI is categorized into two zones: Defense Zone and Threat Zone. The WUI Defense Zone is the area directly adjoining structures and evacuation routes. In total, it includes 68,048 acres (TFFT 2015). The defense zone extends for at least 0.25 miles from the edge of the community and is the highest priority for fuels reduction. The management goal for the defense zone is to reduce fuels so that flame lengths during extreme fire weather will burn at a length of 4 feet or less, enabling firefighters to engage the fire before it can reach the built environment (TFFT 2015). The WUI threat zone is an area adjacent to the WUI defense zone, where treatments are designed to reduce fuels in target areas where fires are known to start.

CURRENT STANDARDS

No threshold standards relate to wildfire or wildfire protection for the region.

PROPOSED STANDARD

Predicted flame lengths of 4ft or less under 90th percentile fire weather conditions in a minimum of 90% of the wildland-urban interface defense zone.

While not part of the proposed standard, the evaluation and management should consider the distribution of areas with predicted flame lengths of four feet or more to ensure they are generally well distributed, do not exceed one acre per patch, and are not within 100 feet of structures or infrastructure.

CURRENT CONDITION

To assess fire severity conditions relevant to the standard, we used fire severity probability raster data from the Regional Resource Toolkit, which estimates the likelihood of low, moderate (>4 ft flame length), and high (>8 ft flame length) fire severity classes. For each pixel, we classified the dominant fire

severity class as the one with the highest probability among the three categories using a conditional raster workflow. Pixels where moderate or high flame length probabilities dominated were selected, reflecting the likelihood of fire behavior that challenges suppression efforts.

We then converted the dominant fire severity raster to polygons and spatially joined these with management zone boundaries to quantify acreage by severity class within each zone. This approach enabled a detailed landscape-scale assessment of fire severity patterns. The underlying fire behavior modeling follows the framework of Scott and Thompson (2013) with custom enhancements by Pyrologix LLC (Vogler et al., 2021) and simulates fire potential under 90th percentile weather conditions typical of peak wildfire season.

Spatial analysis considered 200,984 total acres, and identified 58,316 acres that were predicted to burn at flame lengths exceeding four feet. This includes 29 percent of the WUI Defense Zone, 19,807 of 68,048 acres, and 30% of WUI Threat Zone (13,920 of 45,791 acres) that are likely to burn at flame lengths exceeding four feet (Table 7). These results can be used to strategically inform fuel treatments and other mitigation strategies to meet the desired fire behavior targets and enhance community protection.

TABLE 7: FOREST MANAGEMENT ZONE BY AREA AT RISK OF GREATER THAN FOUR FOOT FLAME LENGTHS

Forest Management Zone	Total Area (acres)	Area where >4 ft Flames Predicted (acres)	Area Vulnerable (%)
WUI Defense Zone	68,048	19,807	29%
WUI Threat Zone	45,791	13,920	30%
General Forest	63,193	18,565	29%
Wilderness	23,952	6,024	25%
Total	**200,984**	**58,316**	**N/A**

FIGURE 3: PROBABLE FIRE SEVERITY BY MANAGEMENT ZONE

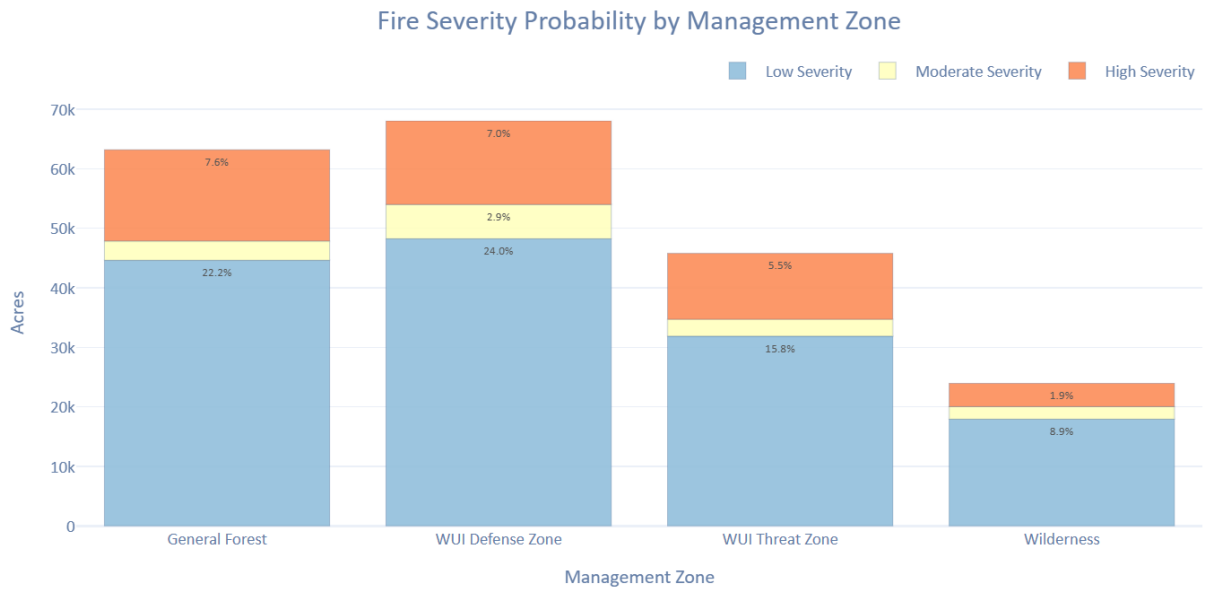
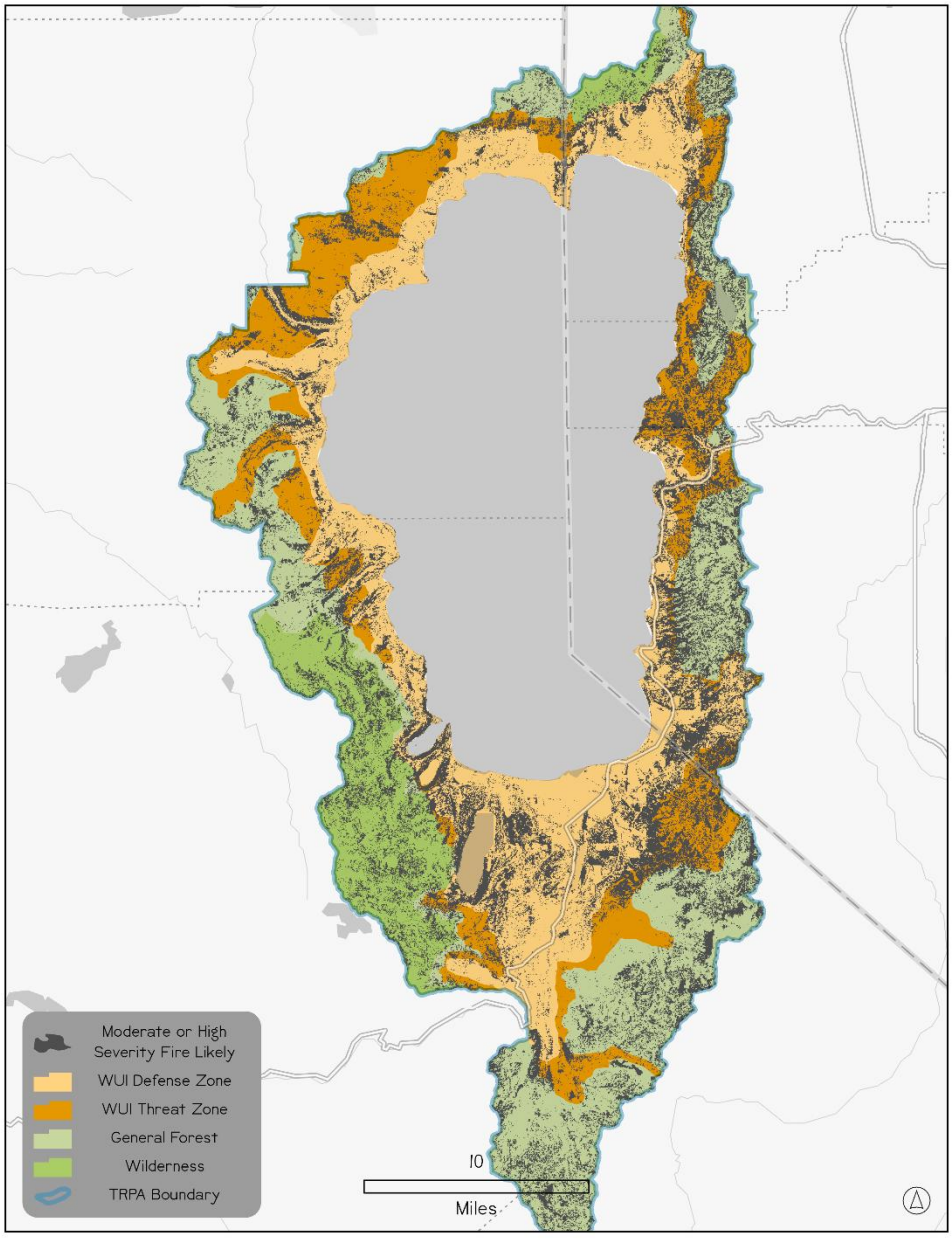


FIGURE 4: AREA WITHIN TAHOE WITH PREDICTED FLAME LENGTH GREATER THAN FOUR FEET BY MANAGEMENT ZONE



EVALUATION OF PROPOSED STANDARD

In 2023, the attainment of the WUI Defense Zone fire severity threshold standard would have been assessed as Considerably Worse than Target.

The proposed standard requires that, under 90th percentile fire weather conditions, at least 90 percent of the Wildland-Urban Interface (WUI) Defense Zone supports only passive or low-intensity surface fire behavior, with flame lengths below four feet. The modeled wildfire behavior estimates that 19,807 acres, or 29 percent of the 68,048-acre WUI Defense Zone, are currently susceptible to flame lengths greater than four feet. To meet the standard, no more than 6,805 acres of the WUI Defense Zone can be susceptible to flame lengths greater than four feet. The current total of 19,807 acres is approximately three times that goal, so the threshold standard would have been assessed as Considerably Worse than Target.

LANDSCAPE FIRE DYNAMICS

Fire is a natural disturbance that has shaped the forests of the Sierra for millennia. Pre-settlement, Tahoe's forests burned frequently but at relatively low-intensity (Safford & Schmidt 2007; TFFT 2015). Regionally, fire return interval was between 5-128 years, but in the lower elevation portions of the Region, the fire return interval was shorter, generally less than 20 years (TFFT 2015). Years of wildfire suppression have led to higher fuel loads on the landscape and increased frequency of high-severity fires across the Sierra (Miller et al. 2009). The lack of low-severity burns has been implicated in large-scale tree mortality across the Sierra (Stephens et al. 2018), lack of forest diversity (McKelvey et al. 1996, Elliot-Fisk et al. 1997, Taylor 2007), and increased the likelihood of high-severity fires. High-severity fire often burns hotter, decimating soil and vegetation with complete combustion (citation?). High-severity fires are more difficult to control and provide little opportunity for first responders to manage the fire and direct it away from communities and critical infrastructure.

Fire severity patch size identifies areas on the landscape that are more prone to large patches of high-severity fire and are associated with high tree mortality. Large patches of high-severity fire remove mid- and late-seral forest characteristics, which degrade the resilience of these ecosystems and the value of wildlife habitat, and place such ecosystems on uncharacteristic trajectories (e.g., transitioning from a forest to a shrub ecosystem). Forest health treatments have been found to help moderate high-severity fire and promote resilience (Lydersen et al. 2017).

CURRENT STANDARDS

No threshold standards relate to wildfire or wildfire protection for the region.

PROPOSED STANDARD

Limit the area of modeled high-severity fire patches of 40 acres or greater to less than 5 percent of the forested landscape, **under 90th percentile fire weather conditions.**

CURRENT CONDITION

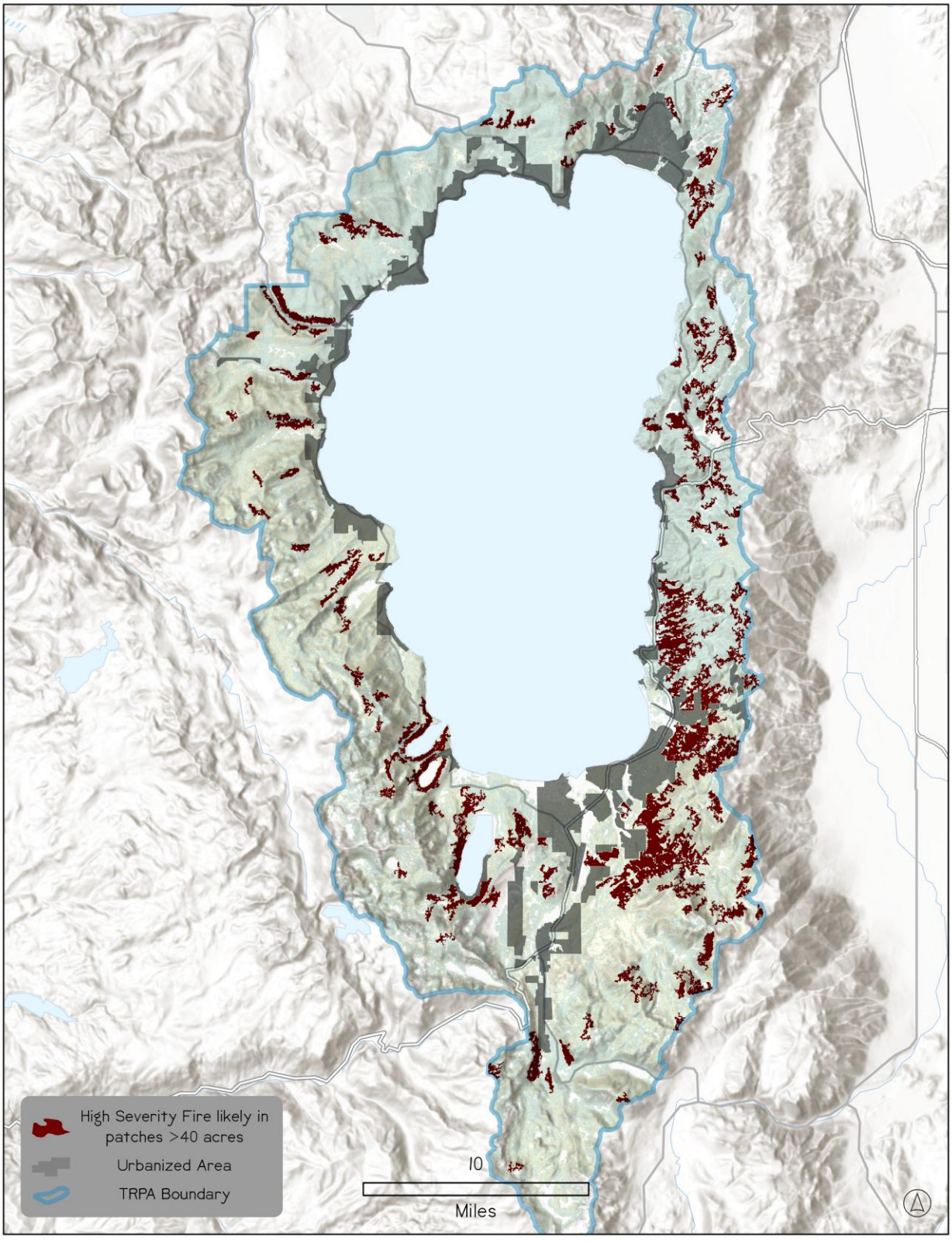
The Lake Tahoe West Partnership defined high-severity as areas with the potential to burn at greater

than eight-foot flame length. Large patch size was defined as areas greater than 40 acres in size (Gross et al. 2017). Areas that met these criteria were identified using the Pyrologix fire severity probability modeling. The modeling produces probability raster data for different flame length classes under 90th percentile fire weather conditions. Each pixel represents the likelihood that a location will experience a particular fire intensity class. To identify large patches of high-severity fire, we selected cells where the dominant flame length class was greater than eight feet and grouped contiguous pixels together that totaled 40 acres or greater.

In total, there are 19,885 acres in the region at risk of high-severity fire with patch sizes greater than 40 acres, representing 11.2% of forested areas in the basin. The lower elevations along the east and north sides of the Tahoe Basin have the potential to burn large areas at high severity, while on the West Shore, potential large patches are concentrated in canyons and drainages (Figure 6). On the South Shore, most of the large-patch high-severity potential is within the wildland-urban interface.

During the Caldor Fire, 4,930 acres of the 9,930 acres that burned in the Tahoe Basin burned at high severity in large contiguous areas. These observed high-severity patches align with the 2017 Pyrologix model output and affirm the model's utility for predicting fire behavior under extreme weather scenarios.

FIGURE 5: MAP OF POTENTIAL FOR HIGH SEVERITY PATCH SIZE IN EXCESS OF 40 ACRES


High Severity Fire likely in patches >40 acres
Urbanized Area
TRPA Boundary
10
Miles

EVALUATION OF PROPOSED STANDARD

In 2023, the large high-severity patch size standard would have been Considerably Worse Than Target. The area of modeled high-severity fire patches of 40 acres or greater was 11 percent of the forested landscape, which is more than 25% worse than the target of no more than 5% of the forested landscape.

APPENDIX I –THRESHOLD STANDARDS FOR COMMON VEGETATION (CURRENTLY ADOPTED)

COMMON VEGETATION

MANAGEMENT STANDARDS

VP1) A non-degradation standard shall apply to native deciduous trees, wetlands, and meadows to preserve plant communities and significant wildlife habitat, while providing for opportunities to increase the acreage of such riparian associations to be consistent with the SEZ threshold.

VP2) Increase plant and structural diversity of forest communities through appropriate management practices as measured by diversity indices of species richness, relative abundance, and pattern.

VP3) Maintain the existing species richness of the Basin by providing for the perpetuation of the following plant associations:

Yellow Pine Forest: Jeffrey pine, White fir, Incense cedar, Sugar pine.

Red Fir Forest: Red fir, Jeffrey pine, Lodgepole pine, Western white pine, Mountain hemlock, Western juniper.

Subalpine Forest: Whitebark pine, Mountain hemlock, Mountain mahogany.

Shrub Association: Greenleaf and Pinemat manzanita, Tobacco brush, Sierra chinquapin, Huckleberry oak, Mountain whitethorn.

Sagebrush Scrub Vegetation: Basin sagebrush, Bitterbrush, Douglas chaenactis.

Deciduous Riparian: Quaking aspen, Mountain alder, Black cotton-wood, Willow.

Meadow Associations (Wet and Dry Meadow): Mountain squirrel tail, Alpine gentian, Whorled penstemon, Asters, Fescues, Mountain brome, Corn lilies, Mountain bentgrass, Hairgrass, Marsh marigold, Elephant heads, Tinker's penney, Mountain Timothy, Sedges, Rushes, Buttercups.

Wetland Associations (Marsh Vegetation): Pond lilies, Buckbean, Mare's tail, Pondweed, Common bladderwort, Bottle sedge, Common spikerush.

Cushion Plant Association (Alpine Scrub): Alpine phlox, Dwarf ragwort, Draba.

VP4) Relative Abundance - Of the total amount of undisturbed vegetation in the Tahoe Basin: Maintain at least four percent meadow and wetland vegetation.

VP5) Relative Abundance - Of the total amount of undisturbed vegetation in the Tahoe Basin: Maintain at least four percent deciduous riparian vegetation.

VP6) Relative Abundance - Of the total amount of undisturbed vegetation in the Tahoe Basin: Maintain no more than 25 percent dominant shrub association vegetation.

VP7) Relative Abundance - Of the total amount of undisturbed vegetation in the Tahoe Basin: Maintain 15-25 percent of the Yellow Pine Forest in seral stages other than mature.

VP8) Relative Abundance - Of the total amount of undisturbed vegetation in the Tahoe Basin: Maintain 15-25 percent of the Red Fir Forest in seral stages other than mature.

VP9) Pattern - Provide for the proper juxtaposition of vegetation communities and age classes by; 1. Limiting acreage size of new forest openings to no more than eight acres

VP10) Pattern –Provide for the proper juxtaposition of vegetation communities and age classes by; 2. Adjacent openings shall not be of the same relative age class or successional stage to avoid uniformity in stand composition and age.

VP11) Native vegetation shall be maintained at a maximum level to be consistent with the limits defined in the Land-Capability Classification of the Lake Tahoe Basin, California-Nevada, A Guide For Planning, Bailey, 1974[1], for allowable impervious cover and permanent site disturbance.

LATE SERAL AND OLD GROWTH FOREST ECOSYSTEMS[2]

NUMERICAL STANDARDS

VP13) Attain and maintain a minimum percentage of 55 percent by area of forested lands within

[1] See attachment B

[2] For standards VP13 - VP16: Forested lands within TRPA designated urban areas are excluded in the calculation for threshold attainment. Areas of the montane zone within 1,250 feet of urban areas may be included in the calculation for threshold attainment if the area is actively being managed for late seral and old growth conditions and has been mapped by TRPA. A maximum value of 40 percent of the lands within 1,250 feet of urban areas may be included in the calculation.

the Tahoe Region in a late seral or old growth condition, and distributed across elevation zones. Standards VP 14, VP15, and VP16 must be attained to achieve this threshold.

VP14) 61 percent of the Subalpine zone (greater than 8,500 feet elevation) must be in a late seral or old growth condition. The Subalpine zone will contribute 5 percent (7,600 acres) of forested lands towards VP13.

VP15) 60 percent of the Upper Montane zone (between 7,000 and 8,500 feet elevation) must be in a late seral or old growth condition. The Upper Montane zone will contribute 30 percent (45,900 acres) of forested lands towards VP13.

VP16) 48 percent of the Montane zone (lower than 7,000 feet elevation) must be in a late seral or old growth condition; the Montane zone will contribute 20 percent (30,600 acres) of forested lands towards VP13.

UNCOMMON PLANT COMMUNITIES

NUMERICAL STANDARDS

VP17-VP18) Provide for the non-degradation of the natural qualities of any plant community that is uncommon to the Basin or of exceptional scientific, ecological, or scenic value. This threshold shall apply but not be limited to:

VP17) The deep-water plants of Lake Tahoe.

VP18) The Freel Peak Cushion Plant community.

SENSITIVE PLANTS

NUMERICAL STANDARDS

Maintain a minimum number of population sites for each of five sensitive plant species.

VP19) Maintain a minimum of 2 Lewisia pygmaea longipetala population sites.

VP20) Maintain a minimum of 2 Draba asterophora v. macrocarpa population sites.

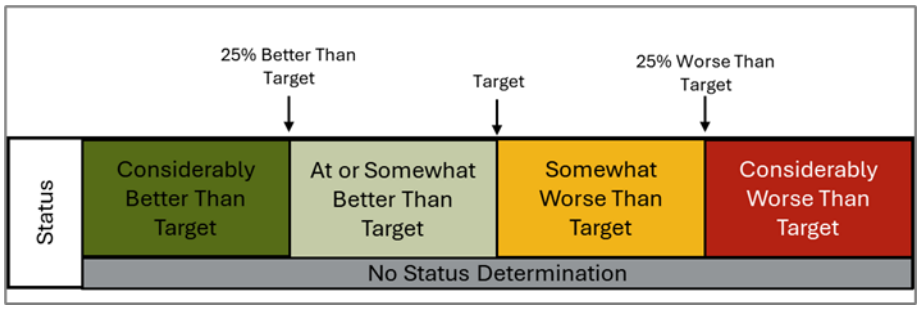
VP21) Maintain a minimum of 5 Draba asterophora v. asterophora macrocarpa population sites.

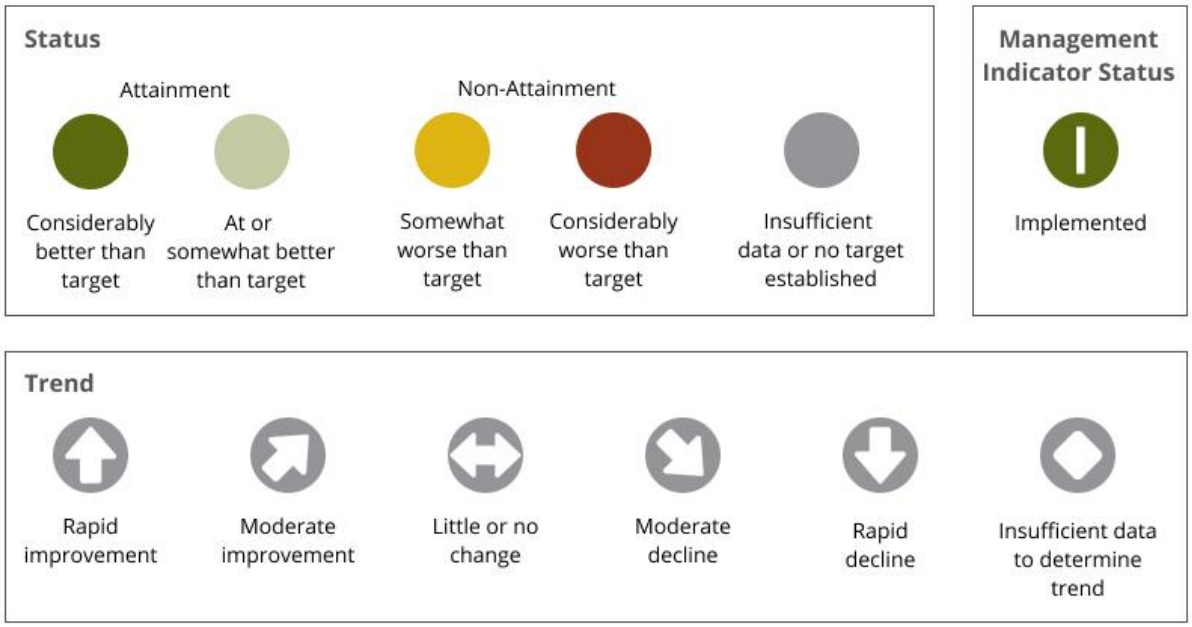
VP22) Maintain a minimum of 26 Rorippa subumbellata population sites.

VP23) Maintain a minimum of 7 Arabis rigidissima v. demote population sites.

APPENDIX II - THRESHOLD EVALUATION STATUS AND TREND METHODS

The threshold evaluation assigns a status to an indicator relative to the adopted standard. As shown on the icon legend below, the background color of the reporting icon communicates the indicator "status" or estimate of current condition. For numerical standards, the status of an indicator is classified into "better" or "worse" categories based on the percent divergence of the current indicator value from the standard or interim target. For most indicators, the current value is taken directly from the value recorded in the most recent year. In some cases, the average value calculated from all data collected during the evaluation period is used. When an average value is used, it is noted and explained on the indicator evaluation page for that specific evaluation year.





APPENDIX III – PEER REVIEW RESULTS

Coming soon.

APPENDIX IV - METHODS AND DATA USED

We used spatial datasets from the Sierra Nevada Regional Resource Toolkit (toolkit), developed by the California Wildfire & Forest Resilience Task Force, to support consistent, landscape-scale forest and fire planning (Sierra Nevada Regional Resource Kit, June 2024). The toolkit includes outputs from the F3 framework, which integrates FIA plot data, Forest Vegetation Simulator (FVS) projections, and FastEMAP remote sensing to estimate current forest structure and composition (Huang et al. 2018). It also includes separate fire severity data products developed by Pyrologix LLC, based on calibrated fuelscapes and modeled flame-length probability (Vogler et al., 2021).

Each standard assessment of attainment utilizes a specific dataset from the toolkit. Forest stage, canopy cover, and density are based on F3-derived raster data, while fire severity standards rely on the fire severity probability of flame length raster data from Pyrologix.

The Wildlife Habitat Relationship (WHR) type data from the toolkit to define forest types. For Jeffrey Pine, we included stands classified as Jefferey Pine and Eastside Pine WHR Types. We excluded Lodgepole Pine because land managers do not set targets for it and often aim to remove it. For Sierran Mixed Conifer, we included Sierra Mixed Conifer and White fir WHR Types. Red Fir has just one corresponding WHR Type. We did not consider subalpine forest types because they lack specific management objectives. Table 1 shows the acreage distribution for all vegetation types based on WHR Type classifications in the Tahoe Basin.

Table 1.WHR Type to TRPA Vegetation Type Category Mapping and Total Acres in the Tahoe Basin

WHR Type	TRPA Forest Type	Acres
Sierra Mixed Conifer	Sierra mixed conifer	55,846
Montane Chaparral	N/A	24,050
Red Fir	Red fir	23,077
Jeffrey Pine	Jeffrey pine	20,276
Subalpine Conifer	N/A	13,357
Barren	N/A	10,535
Lodgepole Pine	N/A	9,261
White Fir	Sierra mixed conifer	5,887
Perennial Grassland	N/A	4,300
Lacustrine	N/A	3,407
Wet Meadow	N/A	2,537
Montane Riparian	N/A	1,611
Alpine-Dwarf Shrub	N/A	1,560
Sagebrush	N/A	1,440
Urban	N/A	1,241
Eastside Pine	Jeffrey pine	1,194
Aspen	N/A	874
Low Sage	N/A	584
Wet Meadow	N/A	409
Montane Hardwood	N/A	257
Montane Hardwood-Conifer	N/A	189
Perennial Grassland	N/A	31
Valley Foothill Riparian	N/A	11

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Attachment B

Proposed edits to vegetation preservation threshold standards (Redline)

THRESHOLD STANDARDS

Threshold standards establish the Environmental Improvement Program partners' shared goals for restoration and maintenance of the qualities of the Tahoe Region.

The adopted current threshold standards are stated below. The agency will maintain and update online inventories of the administrative status and disposition of each threshold standard.

VEGETATION PRESERVATION

COMMON VEGETATION

MANAGEMENT STANDARDS

VP1) A non-degradation standard shall apply to native deciduous trees, wetlands, and meadows to preserve plant communities and significant wildlife habitat, while providing for opportunities to increase the acreage of such riparian associations to be consistent with the SEZ threshold.

VP2) Increase plant and structural diversity of forest communities through appropriate management practices as measured by diversity indices of species richness, relative abundance, and pattern.

VP3) Maintain the existing species richness of the Basin by providing for the perpetuation of the following plant associations:
Yellow Pine Forest: Jeffrey pine, White fir, Incense cedar, Sugar pine.
Red Fir Forest: Red fir, Jeffrey pine, Lodgepole pine, Western white pine, Mountain hemlock, Western juniper.
Subalpine Forest: Whitebark pine, Mountain hemlock, Mountain mahogany.
Shrub Association: Greenleaf and Pinemat manzanita, Tobacco brush, Sierra chinquapin, Huckleberry oak, Mountain whitethorn.
Sagebrush Scrub Vegetation: Basin sagebrush, Bitterbrush, Douglas chaenactis.
Deciduous Riparian: Quaking aspen, Mountain alder, Black cotton-wood, Willow.
Meadow Associations (Wet and Dry Meadow): Mountain squirrel tail, Alpine gentian, Whorled penstemon, Asters, Fescues, Mountain brome, Corn lilies, Mountain bentgrass, Hairgrass, Marsh marigold, Elephant heads, Tinker's penney, Mountain Timothy, Sedges, Rushes, Buttercups.
Wetland Associations (Marsh Vegetation): Pond lilies, Buckbean, Mare's tail, Pondweed, Common bladderwort, Bottle sedge, Common spikerush.
Cushion Plant Association (Alpine Scrub): Alpine phlox, Dwarf ragwort, Draba.

VP4) Relative Abundance - Of the total amount of undisturbed vegetation in the Tahoe Basin: Maintain at least four percent meadow and wetland vegetation.

VP5) Relative Abundance - Of the total amount of undisturbed vegetation in the Tahoe Basin: Maintain at least four percent deciduous riparian vegetation.

~~VP6) Relative Abundance - Of the total amount of undisturbed vegetation in the Tahoe Basin: Maintain no more than 25 percent dominant shrub association vegetation.~~

~~VP7) Relative Abundance - Of the total amount of undisturbed vegetation in the Tahoe Basin: Maintain 15-25 percent of the Yellow Pine Forest in seral stages other than mature.~~

~~VP8) Relative Abundance - Of the total amount of undisturbed vegetation in the Tahoe Basin: Maintain 15-25 percent of the Red Fir Forest in seral stages other than mature.~~

VP9) Pattern - Provide for the proper juxtaposition of vegetation communities and age classes by; 1. Limiting acreage size of new forest openings to no more than eight acres

~~VP10) Pattern –Provide for the proper juxtaposition of vegetation communities and age classes by; 2. Adjacent openings shall not be of the same relative age class or successional stage to avoid uniformity in stand composition and age.~~

VP11) Native vegetation shall be maintained at a maximum level to be consistent with the limits defined in the Land-Capability Classification of the Lake Tahoe Basin, California-Nevada, A Guide For Planning, Bailey, 1974[3], for allowable impervious cover and permanent site disturbance.

FOREST HEALTH

1) At least 75% of the forested area in the Basin will fall within the ranges for dominant seral stage and canopy cover (open vs closed) described in Table 2
2) A minimum of fifty percent of the forested area in the Basin falls within the ranges described in Table 6.

FIRE DYNAMICS

1) Predicted flame lengths of 4ft or less under 90th percentile fire weather conditions in a minimum of 90% of the wildland-urban interface defense zone.
2) Limit the area of modeled high-severity fire patches of 40 acres or greater to less than 5 percent of the forested landscape, under 90th percentile fire weather conditions.

~~LATE SERAL AND OLD GROWTH FOREST ECOSYSTEMS~~[4]

~~NUMERICAL STANDARDS~~

~~VP12) Attain and maintain a minimum percentage of 55 percent by area of forested lands within the Tahoe Region in a late seral or old growth condition, and distributed across elevation zones. Standards VP 13, VP14, and VP15 must be attained to achieve this threshold.~~

~~VP13) 61 percent of the Subalpine zone (greater than 8,500 feet elevation) must be in a late seral or old growth condition. The Subalpine zone will contribute 5 percent (7,600 acres) of forested lands towards VP13.~~

~~[3] See attachment B~~

~~[4] For standards VP13 - VP16: Forested lands within TRPA designated urban areas are excluded in the calculation for threshold attainment. Areas of the montane zone within 1,250 feet of urban areas may be included in the calculation for threshold attainment if the area is actively being managed for late seral and old growth conditions and has been mapped by TRPA. A maximum value of 40 percent of the lands within 1,250 feet of urban areas may be included in the calculation.~~

~~VP14) 60 percent of the Upper Montane zone (between 7,000 and 8,500 feet elevation) must be in a late seral or old growth condition. The Upper Montane zone will contribute 30 percent (45,900 acres) of forested lands towards VP13.~~

~~VP15) 48 percent of the Montane zone (lower than 7,000 feet elevation) must be in a late seral or old growth condition; the Montane zone will contribute 20 percent (30,600 acres) of forested lands towards VP13.~~