PATHWAYS TO 30x30 CALIFORNIA

APPENDIX C

2025-2026 • BIODIVERSITY ASSESSMENT

California's 30x30 Initiative in 2026: A Biodiversity Assessment of the State's 30x30 Conservation Areas

California Biodiversity Network

September, 2026

© Sue Pollock/TNC | Carrizo Plain wildflowers

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Portions of this report have been added and/or adapted from "30x30 at Its Midpoint" by Jeanette Howard, Carrie Schloss, Rachael Olliff Yang, Alicia Canales, Charlotte K. Stanley, Megan Webb, David Ackerly, Carl Boettiger, Cassie Buhler, Steven Monfort, Gary Bucciarelli, Rachel Meyer, Ariel Levi Simons, Jun Bando, Liz Chamberlin, Sam Veloz, Cole Dickison, Avery Hill, Rebecca Johnson, Ryan Hill, Amanda Kochanek, Dan Rademacher, Lisa Micheli, Kristeen Penrod, Giovanni Rapacciuolo, Nathaniel Roth, Dena Spatz, and Daniel Gluesenkamp, published in the California Native Plant Society journal Artemisia (Volume 51, issue 2; February 2026).

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Executive Summary

The 30x30 movement is the historic commitment to conserve 30% of lands and waters by the year 2030. In 2022, 190 countries adopted the Kunming–Montreal Global Biodiversity Framework, an international agreement with 23 targets aimed at halting and reversing biodiversity loss. Target 3, widely known as "30x30," calls for 30% of the world's terrestrial, inland water, and coastal and marine areas to be "effectively conserved and managed through ecologically representative, well-connected, and equitably governed systems" by 2030. California, USA, has been historically progressive in its biodiversity protection initiatives, and released "Pathways to 30x30" in 2022 following executive order N-82-20 by Governor Gavin Newsom in 2020 (State of California, 2020), committing the state to protecting 30% of its lands and coastal waters. Pathways to 30x30 defines the lands and coastal waters included as "30x30 Conservation Areas" and outlines ten pathways to reaching the 30% goal by 2030.

The California Biodiversity Network (CBN) is a group of academic institutions, NGOs, government agencies, and private entities with expertise in biodiversity conservation science and practice. CBN is a key partner in the implementation of California's 30x30 Initiative, and has provided science support throughout its implementation, including the development of "Conserving California: Advancing Science in Support of 30x30," a report outlining research and information priorities to advance California's 30x30 key objectives (CNRA, 2022: Appendix D). In 2024, a working group of CBN formed to evaluate the biodiversity attributes of the State's 30x30 Conservation Areas, evaluate gaps in habitat and feature representation within the 30x30 Conservation Areas, and identify opportunities for future conservation.

In this report, we examine the 30x30 Conservation Areas network with respect to network composition and representation and gaps of habitats and other ecological features important for sustaining biodiversity. We include the evaluation of habitats not only in the 30x30 Conservation Land Areas (i.e., GAP 1 and 2) but also other conservation areas, public lands, or conservation areas with unknown status (GAP 3 and 4), and non-conserved lands (privately-owned without legal protections and Department of Defense (DOD)). Here, the term non-conserved refers only to the protection status, and is not a reflection of the habitat value or resource management strategies of landowners. The holistic evaluation of the landscape across conservation status provides insight into not only representation and gaps, but additional pathways and opportunities to improve representation of habitats and features in the remainder of this commitment. We find that some habitats and features are under-represented and in need of additional protection statewide, while others are on par with or above representation levels in California. For these, future conservation can focus on enhancing ecoregional representation or protecting examples of those habitats that also protect fine-filter species or areas of cultural significance, improve connectivity, or enhance access for disadvantaged communities.

As the state continues to work towards conserving 30% of its lands, directing new conservation toward the most-species-rich areas, under-represented habitats at statewide and ecoregional scales and landscapes that support rare and/or threatened habitats and species will ensure that 30x30 delivers the greatest benefit for biodiversity. Our results indicate that multiple pathways including land acquisition, the establishment of conservation easements, investments in improved management, and enhancement of protection durability on public lands will all be necessary strategies for expanding the portfolio of 30x30 Conservation Areas.

This assessment is intended to inform opportunities to fill gaps necessary to achieve 30x30 key objectives and conservation priorities. It complements the tracking of statewide progress by CA Nature, a suite of interactive mapping and visualization tools to advance 30x30, by evaluating additional datasets on composition and representation and incorporating further metrics to identify pathway opportunities to close those gaps. These findings provide essential guidance for natural areas managers, stewards, and agencies as California advances toward its 30x30 goal, and they offer a model that other governments can adapt to their own jurisdictions.

Background

Biodiversity refers to the variety of life, from genes to species to ecosystems (Gaston and Spicer, 2013). Protecting biodiversity is essential, not only for human health and quality of life, but also in maintaining functional ecosystems,

our food systems, healthy soils, clean air and water, and so much more (Mooney et al., 2005). Our planet is in the midst of a severe biodiversity decline, and California is no exception. Across North America, large numbers of birds, insects, amphibians, and mammals have declined, and many species' historic ranges have contracted (Rosenberg et al., 2019, Crossley et al. 2020, Liebert and Ripple, 2004, Muths 2012). Nearly one million of the earth's species are at risk of extinction (IPBES, 2019, CNRA, 2022).

California is the most biologically diverse state in the country (CDFW, 2025; Hamilton et al., 2022) and is home to the most unprotected, range-restricted imperiled species in the continental United States (Hamilton et al., 2022). Additionally, California is one of 36 global biodiversity hotspots, which are designated regions with high biodiversity that are also threatened by development or conversion to other land uses (Myers et al., 2000). The 36 global hotspots together make up only 2.5% of the earth's land but account for more than 50% of endemic plants and terrestrial vertebrate species (Habel et al., 2019).

Land protection has long been a central strategy for addressing biodiversity decline and will remain critical in responding to the current crisis both globally and within California. Many protected areas established in past decades were designated opportunistically, reflecting historical conservation priorities and political circumstances rather than today's more systematic planning approaches. As a result, as of 2020, California's existing protected lands did not necessarily capture the full ecological diversity of the state (The Nature Conservancy, 2021). If conservation efforts fail to encompass the breadth of California's ecosystems, the species and ecological processes that depend on unprotected habitats will remain vulnerable. Ideally, the future network of conserved lands will represent the full diversity of each region—across species, communities, and ecological systems—and will be well connected. Representation of biodiversity within a connected network of protected areas is a foundational principle of conservation planning (Margules and Pressey, 2000; Olson and Dinerstein, 1998; Kukkala and Moilanen, 2013; Dinerstein et al., 2019) and an essential first step toward ecological resilience (Halpin, 1997). Ensuring representation not just across the state, but also within each ecoregion enhances resilience by conserving examples of each system under different climate conditions and with genetic or phenotypic variation to provide some redundancy against climate impacts or other catastrophic disturbances (Halpin, 1997). Systematic conservation planning seeks to ensure that protected areas are both effective at conserving biodiversity and meeting these goals for a protected area network with efficient use of limited resources.

The 30x30 Initiative: A Bold Step Toward Biodiversity Conservation

In December 2022, over 190 countries adopted the Kunming-Montreal Global Biodiversity Framework (CBD, 2022; the "Biodiversity Plan"), an international commitment to better protect the planet that sustains us all. The framework includes 23 targets aimed at reversing habitat and species loss. Target 3, colloquially known as "30x30" (read "thirty by thirty"), specifically calls for 30% of the world's terrestrial, inland water, and coastal and marine areas to be "*effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures*" by the year 2030. Put simply, 30x30 is an essential component of the biggest conservation commitment the world has ever made.

While the global 30x30 commitment was officially ratified in 2022, California was ahead of the curve. In October 2020, Governor Gavin Newsom issued Executive Order N-82-20, launching the state's own 30x30 initiative. This executive order set a bold target: to conserve 30% of California's lands and coastal waters by 2030.

By doing so, California joined this coalition in a united response to the accelerating global biodiversity crisis. The Governor tasked the California Natural Resources Agency (CNRA) with leading the charge, coordinating efforts across state agencies and stakeholders. Their first major milestone was the release of the Pathways to 30x30 strategy in April 2022 (CNRA, 2022), which laid out a roadmap for achieving the state's conservation goals.

The Pathways to 30x30 strategy identifies three key objectives:

1. Protect and Restore Biodiversity
2. Expand Equitable Access to Nature
3. Mitigate and Build Resilience to Climate Change

To qualify as a "30x30 Conservation Area," land or coastal waters must be:

- "Durably protected and managed to sustain functional ecosystems—both intact and restored—and the diversity of life they support."
- To determine which areas meet this definition, California uses a national classification system known as GAP (Gap Analysis Project) status codes. Specifically, lands with GAP Status 1 and 2 are considered to have strong, long-term protections in place for biodiversity and ecosystem health (Figure 1).

Protected Area GAP Status Codes	Biodiversity Assessment Classification	Description
1	30x30 Conservation Area	An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a natural state within which disturbance events (of natural type, frequency, intensity, and legacy) are allowed to proceed without interference or are mimicked through management.
2	30x30 Conservation Area	An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a primarily natural state, but which may receive uses or management practices that degrade the quality of existing natural communities, including suppression of natural disturbance (for example, wildland fire or native insect outbreaks.
3	Other Conserved or public lands	An area having permanent protection from conversion of natural land cover for the majority of the area, but subject to extractive uses of either a broad, low intensity type (for example, logging, OHV recreation) or localized intense type (for example, mining). It also confers protection to federally listed endangered and threatened species throughout the area.
4	Other Conserved or Public lands	There are no known public or private institutional mandates or legally recognized easements or deed restrictions held by the managing entity to prevent conversion of natural habitat types to anthropogenic habitat types. The area generally allows conversion to unnatural land cover throughout or management intent is unknown.
Not applicable	Non-conserved lands	Private lands with no legal protections. Here, the term non-conserved refers only to the protection status, and is not a reflection of the habitat value or resource management strategies of the land owners.

FIGURE 1. GAP STATUS CODES AND DESCRIPTIONS ADAPTED FROM THE PROTECTED AREAS DATABASE OF THE U.S. (PAD-US, USGS).

GAP status was originally sourced from PAD-US (USGS, 2022); then, to improve its accuracy, GreenInfo Network and CNRA led a data improvement effort enabling agencies and organizations to review and update their own GAP codes using a standardized toolkit. Figure 2 illustrates the decision flow used in that toolkit to guide GAP status updates.

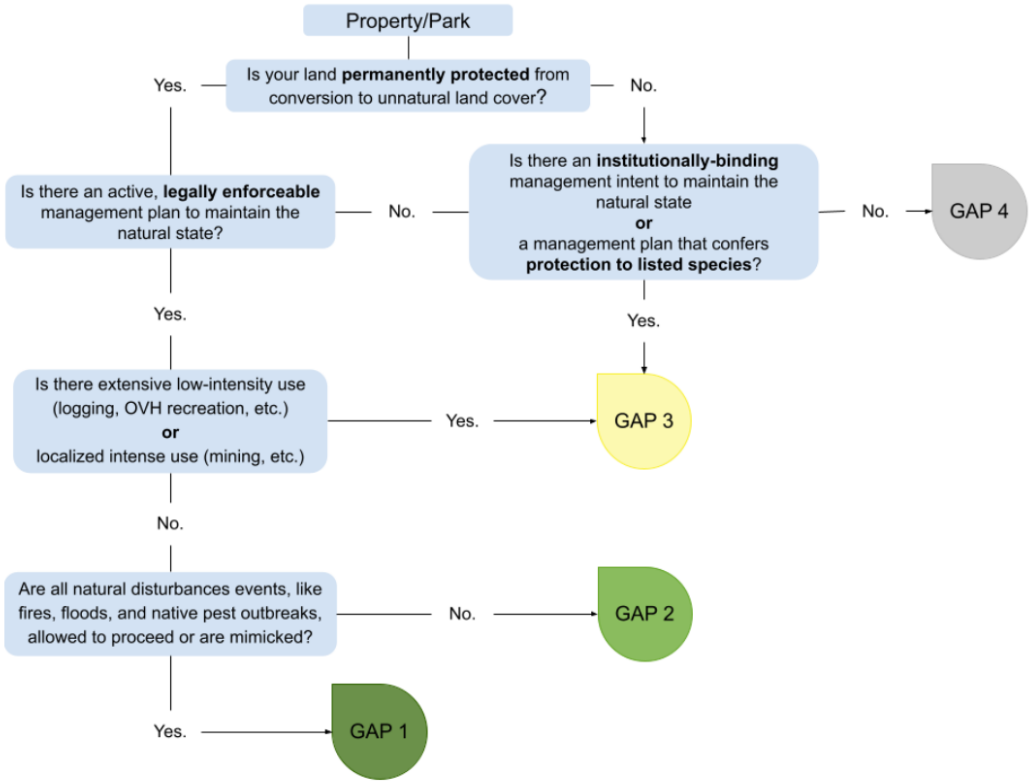


FIGURE 2. FLOW CHART OF QUESTIONS FROM THE 30X30 TOOLKIT FOR CALIFORNIA (GREENINFO NETWORK (N.D.))

To advance and track progress on the three Key Objectives, the California 30x30 Initiative launched CA Nature (CNRA, 2026a)—a suite of interactive mapping and visualization tools to advance 30x30. These applications allow for an in-depth look at the current 30x30 Conservation Areas to aid in planning conservation action. However, they do not allow for comparison of biodiversity across all remaining natural areas (both within and outside of the 30x30 Conservation Areas) and are limited in assessment of some critical aspects of biodiversity, such as species richness, freshwater resources, and connectivity.

The analysis presented here is designed to enhance CA Nature by introducing additional metrics and analytics that support the first Key Objective (i.e. protect and restore biodiversity) and elucidate where biodiversity is and is not currently legally protected, providing insight for planning for future protected areas that support biodiversity and effectively meet 30x30 targets. The analysis incorporates datasets supported by CA Nature with additional metrics and additional datasets. Our goal is to support conservation partners in developing effective strategies to protect California's diverse ecosystems and species.

Where Do We Stand in 2026?

The year 2026 enters the second half of the decade-long effort to achieve 30x30 objectives. With the remaining years until 2030, it is critical to take stock and ensure there is still time to implement effective conservation and management strategies. According to the most recent progress report from September 2026 (CNRA, 2026b), 27.1% of California's lands currently meet the criteria for durable conservation, meaning these areas are protected and managed in perpetuity—for biodiversity. This represents an increase of roughly 3.5 million acres since the launch of this effort in 2022. However, almost 3 million acres of land still need to be conserved to meet the 30% target.

The remaining years until 2030 are critical for achieving California's 30x30 conservation goals. Assessing how effectively current 30x30 Conservation Areas are protecting biodiversity is essential to shaping future priorities and guiding strategic investments. As a leader in climate action and environmental stewardship, California's 30x30 initiative has the potential to exemplify a proactive, science-driven approach to conservation. This report seeks to:

evaluate how well 30x30 Conservation Areas represent the state's biodiversity, identify existing gaps, and highlight opportunities to achieve the terrestrial component of the goal of protecting 30% of California's lands and coastal waters by 2030.

Biodiversity Assessment

This report presents a comprehensive biodiversity assessment of California's 30x30 conserved lands, other conserved or public lands, and non-conserved lands. We examined vegetation types, species richness and rarity, connectivity features, freshwater resources, climate-relevant features, and other biodiversity-critical elements both within the 30x30 Conservation Areas and across other public and private lands. Specifically, we:

- Describe the characteristics and composition of the current 30x30 Conservation Area network; and
- Assess representation of habitats and other ecological features (hereafter habitats/features) within the 30x30 Conservation Area network and outline conservation strategies to address identified gaps.

To conduct this assessment, a working group was convened under the umbrella of the California Biodiversity Network (CBN). CBN is a coalition of experts from government, non-profit organizations, and academia dedicated to conserving California's rich and threatened natural heritage. CBN played a central role in launching and supporting the 30x30 Initiative and has provided technical and ecological expertise throughout its implementation. Early on, CBN identified key research needs and data gaps (outlined in Appendix D of Pathways to 30x30) to support effective conservation planning.

CBN assembled a dedicated working group to carry out this biodiversity assessment. Data analysis was led by a core team at The Nature Conservancy (TNC) and writing was contributed by members of CBN, TNC, and the California Natural Resources Agency (CNRA).

Throughout the process, the working group collaboratively developed key questions, and reviewed and agreed upon data sources, analytical methods, evaluation criteria, and interpretation of results. Draft findings and interpretations were presented and discussed during group meetings, ensuring that the final report reflects a consensus-based, scientifically grounded understanding of the current state of biodiversity conservation under California's 30x30 Initiative. This report contains results for a subset of data (Table 2) that was initially proposed and evaluated during the 2024-2025 working group sessions. Additional data evaluated during these sessions, but not evaluated for the 2025 or 2026 30x30 Conservation Areas data releases and associated reports are listed in Appendix A.

This collaborative, cross-sector approach helped ensure that the assessment is both technically robust and aligned with the broader goals of California's conservation community.

Conservation Need and Opportunity Framework

To evaluate the adequacy of protection for different features, we developed a conservation need and opportunity framework and applied it consistently to all biodiversity-relevant habitats and features.

To determine conservation need (Figure 3), we compared the statewide level of conservation for each habitat/feature to the percentage of California's land that is currently in 30x30 Conservation Areas (27.1%).

- Habitats/Features with greater than or equal to 27.1% of their extent in 30x30 Conservation Areas are considered on par with or above statewide conservation levels (hereafter, "on par"). For these, habitats/features additional conservation should focus on areas that also achieve additional goals such as:
    - Improving representation within specific ecoregions or watersheds
    - Protecting rare or endemic fine-filter species within those habitats/features
    - Enhancing connectivity
    - Protecting landscapes more likely resilient to climate change
    - Improving equitable access for disadvantaged communities
    - Prioritizing cultural values
- Habitats/Features with 20% to <27.1% of their extent in 30x30 Conservation Areas are considered slightly under-represented and would benefit from additional conservation to reach or surpass statewide coverage levels.

- Habitats/Features with <20% of their extent in 30x30 Conservation Areas are considered under-represented and in higher need of conservation action.

In some cases, simply reaching statewide conservation levels is not sufficient. We identify rare or highly impacted features—those that comprise ≤3% of the state (e.g., coastal migration space), have been historically converted (e.g., wetlands), or support critical ecosystem functions (e.g., key connectivity linkages, groundwater dependent ecosystems)—as "Key Features." For these we recommend protecting all remaining examples wherever feasible.

We excluded non-typological, value-based features—such as top ranked biodiversity and species richness—from the representation framework thresholds because these datasets include only the highest portion of continuous data (e.g., the top quintile). In a network designed to protect the most biologically rich places, these high-value areas should, by definition, be disproportionately represented.

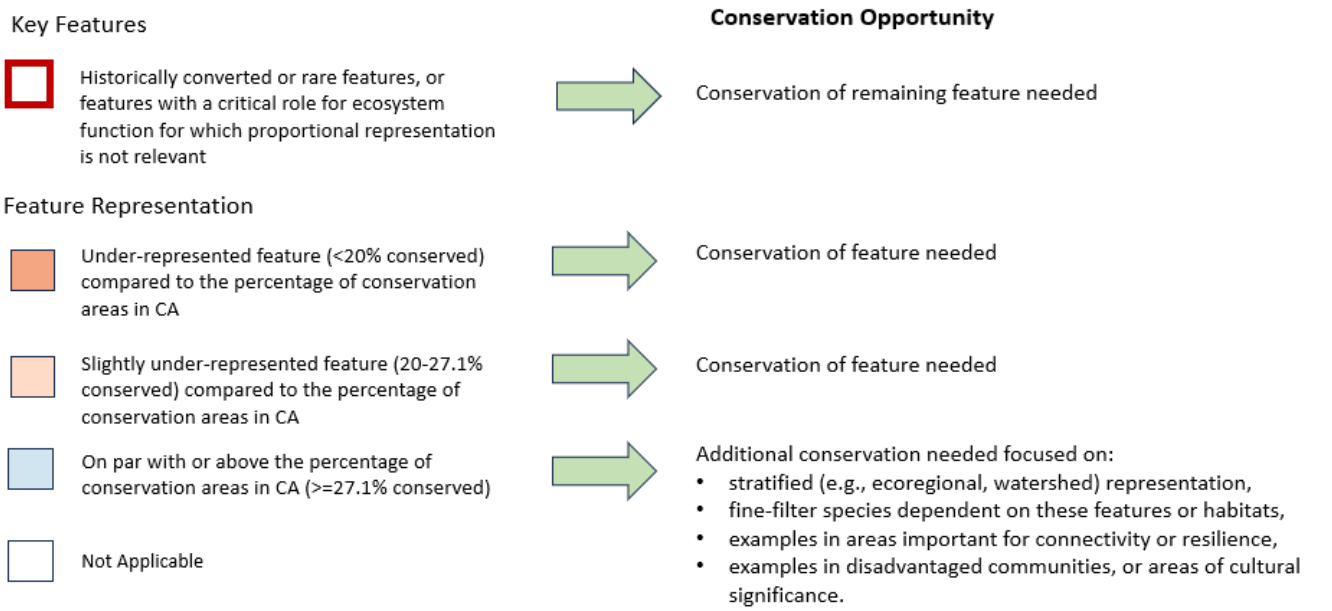


FIGURE 3. FEATURE REPRESENTATION AND CONSERVATION OPPORTUNITY FRAMEWORK.

In addition to assessing conservation need, we identified conservation opportunity pathways for each habitat/feature (Figure 4). For some habitats/features, most remaining opportunities lie on other conserved or public lands (outside the 30x30 Conservation Areas), suggesting a focus on improving management on those lands or increasing durability. For others, remaining opportunities occur primarily on non-conserved lands, pointing to the need for new acquisitions or conservation easements on private lands. These opportunities are determined by the proportion of the remaining habitat/feature on GAP 3 or 4 lands versus the proportion remaining on non-conserved lands. The yellow portion of the Proportional Pathway Opportunities pie chart (Figure 4) shows the portion of the remaining habitat's (i.e., outside of 30x30 lands) area that could be conserved through acquisition of easements or purchase of land for protection. The green portion of the pie chart (Figure 4) indicates the portion of the remaining habitat's area that could be conserved through improved or more durable management practices.

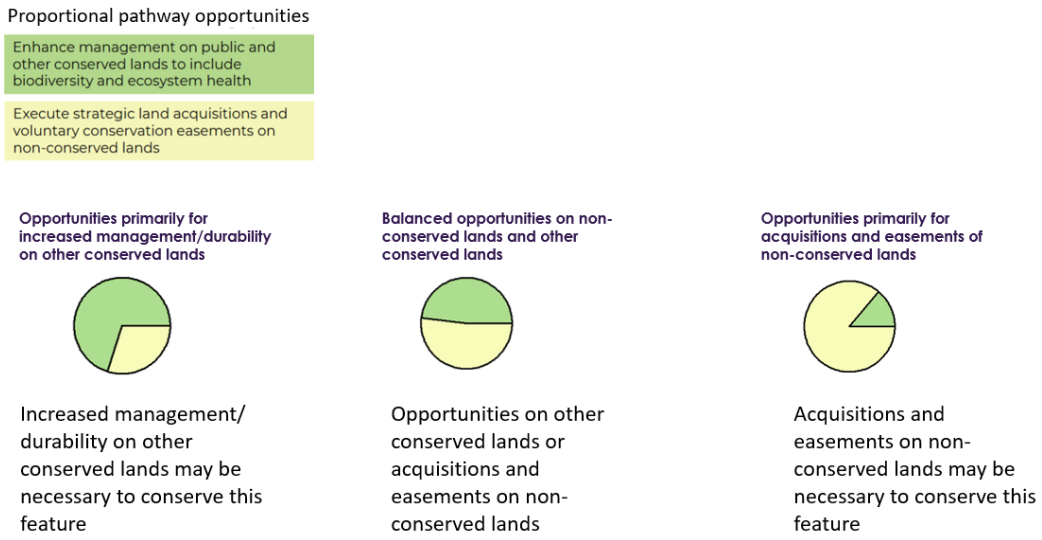


FIGURE 4. PROPORTIONAL PATHWAY OPPORTUNITIES.

Methods

We evaluated habitats and other ecological features (hereafter, habitats/features) within three categories of land status:

- 30x30 Conservation Areas (GAP 1 and GAP 2)
- Other conservation areas and other public lands or lands with unknown status (GAP 3 and GAP 4)
- Non-conserved lands

In this analysis, a conservation area *unit* (hereafter, unit) refers to a single polygon in the 30x30 Conservation Area dataset (CNRA, 2026c, Figure 5). Each unit contains a percentage of its area assigned to each of the four GAP status codes (Figure 1). Lands with GAP 1 or GAP 2 status are considered "30x30 Conservation Areas," while GAP 3 and GAP 4 lands are categorized as "other conservation areas or public lands." Land within California that falls outside any Conservation Area unit regardless of GAP status, is considered "non-conserved." Because a unit may contain multiple GAP statuses, only a portion of a given unit may qualify as a "30x30 Conservation Area" with the remainder of the unit classified as "other conservation areas or public lands." For example, if 45% of a 100-acre unit is GAP 1 or 2, only 45 acres is counted as part of the 30x30 Conservation Area's network, with the remaining area classified as other conservation lands. A key challenge is that the percentages of each GAP Status are not spatially explicit within the unit. In other words, we do not know where within the unit the GAP 1 or GAP 2 acres are located.

Calculations of habitat and feature composition, representation, and gaps within the 30x30 Conservation Area network are based on the intersection of each habitat/feature with 30x30 Conservation Areas. Because GAP status is not spatially allocated within a unit, estimating these metrics requires assumptions about how much of each habitat/feature falls within each GAP category (Appendix B: Figure S1). As a result, all quantitative measures of composition, representation, and gaps are estimates. For each habitat or feature, we report a primary estimate based on the proportion of GAP 1 and GAP 2 lands within each unit—hereafter "proportional estimate." To reflect uncertainty inherent in this approach, we also provide lower and upper estimates to indicate the range of uncertainty around this estimate.

To calculate the primary proportional estimate, we first multiplied the proportion of each unit classified as a 30x30 Conservation Area by the acreage of the habitat/feature within that unit. For example, if 90% of a unit is GAP 1 or GAP 2, then the acreage of each habitat/feature extent in that unit is multiplied by 0.9 to estimate how much of the habitat/feature is potentially within the 30x30 Conservation Areas. We then summed these proportional habitat/feature acreages across all units containing that habitat/feature to calculate overall representation within the 30x30 Conservation Area network.

To characterize uncertainty around this proportional estimate, we calculated both lower and upper estimates for each habitat/feature. For the lower estimate, we restricted the analysis to only units in which at least 80% of their area qualified as a 30x30 Conservation Area (i.e., GAP 1 and GAP 2). For each of these units, we assumed that as much of the habitat/feature under consideration as possible was within the 30x30 portion of the unit. Thus, the estimated amount of habitat/feature within a single unit was the minimum of: the total acreage of the habitat/feature in the unit and the total acreage of the 30x30 Conservation Area lands within the unit. We then summed these values across all units meeting the ≥80% GAP 1 and GAP 2 threshold. For the upper estimate, we applied the same calculation but expanded the subset to include all units with at least 20% of their area in 30x30 Conservation Areas (i.e., GAP 1 or GAP 2).

To illustrate how these different approaches affect habitat/feature coverage, Table 1 presents a simple explanation using oak woodland across three 100-acre units (A, B, and C). Each unit contains 50 acres of oak woodland but differs in the proportion of land qualifying as 30x30 Conservation Areas. Across the three-unit network, the proportional method yields an estimated 70 acres of total oak woodland within 30x30 Conservation Areas, with a lower estimate of 50 acres and an upper estimate of 90 acres.

Table 1. The lower, proportional, and upper estimates of hypothetical representation of oak woodland across a network of conservation areas consisting of three units (A, B, and C)

Units	**GAP status of three 100 ac properties, each with 50 acres of oak woodland**	**30x30 Oak woodland habitat coverage Lower estimate (at least 80% GAP 1, 2)**	**30x30 Oak woodland habitat coverage Proportional estimate**	**30x30 Oak woodland habitat coverage Upper estimate (at least 20% GAP 1, 2)**
Unit A	90% GAP 1, 2 (90 ac of 30x30 conservation areas)	50 ac oak woodland	45 ac oak woodland	50 ac oak woodland
Unit B	40% GAP 1,2 (40 ac of 30x30 conservation areas)	0 ac oak woodland	20 ac oak woodland	40 ac oak woodland
Unit C	10% GAP 1,2 (10 ac of 30x30 conservation areas)	0 ac oak woodland	5 ac oak woodland	0 ac oak woodland
Total across units:	140 ac total 30x30 conservation areas	50 ac oak woodland	70 ac oak woodland	90 ac oak woodland

We chose to include these three estimates (i.e., proportional, lower, and upper) for each feature/habitat based on the results of a sensitivity analysis comparing six different approaches (Appendix B), including the minimum possible and maximum potential values, for each major habitat type as defined in the FVEG dataset (CALFIRE, 2024). This sensitivity analysis showed that multiplying the proportion of GAP 1 or 2 areas in a unit by the habitat/feature acreage provides a moderate estimate within the broader set of possible outcomes (Appendix B).

The 2026 Conservation Areas data (CNRA, 2026c) has 24,016ac of tribal lands that are included as 30x30 Conservation Areas but are not available spatially due to the sensitive nature of spatial data for tribal lands and associated privacy protections. We included these lands in the calculations of the total acreage and percent of California in 30x30 Conservation Areas, but did not include these 24,016ac in estimates of habitat/feature representation or network composition because the spatial location is necessary for calculating habitat/feature coverage.

Habitats and Features

CBN working group identified datasets important to characterize California's biodiversity. When possible, datasets were chosen to be consistent with CA Nature and to include new research with statewide data published after the

launch of CA Nature. Table 2 and Appendix A: Table S1 together show the feature data, metrics, and data sources agreed upon by the working group that best represent the state's biodiversity for this analysis. This full suite of recommended data was analyzed for the 2024 Conservation Area release. For 2025 and subsequent analyses, the data was limited to the subset of data (Table 2) shared in the report "California's 30 x 30 Initiative at its Midpoint: A Biodiversity Assessment Snapshot of the State's Conservation Areas" based on statewide consistency and interpretability.

Table 2. Feature and habitat data and sources.

Topic	Feature	Source
Ecoregion	30x30 Ecoregions	CNRA (n.d.)
Habitat	13 class major habitat types (CWHR13)	CAL FIRE (2024)
	60+ class habitat types (CWHR)	CAL FIRE (2024)
ACE Biodiversity	ACE Biodiversity (Rank 5; top 20% native richness, top 5% rare richness, and endemic richness by taxa)	CDFW (2018)
Additional biodiversity: species richness	Plant richness (top 20%)	Kling et al. (2019)
	Rarity-weighted endemic plant richness (top 20%)	Kling et al. (2019)
Connectivity	Present-day connectivity (all categories)	Cameron et al. (2022)
	Climate migration routes	Schloss et al. (2022)
	Regional connectivity linkages	Beier et al. (2006)
Freshwater Resources	Freshwater species richness	Howard et al. (2015)
	Wetlands (freshwater emergent wetland, freshwater forested/shrub wetland, or estuarine and marine wetland)	National Wetland Inventory, US Fish and Wildlife Service (2019)
	Groundwater dependent ecosystems	Klausmeyer et al. (2018)
	Streams by order	USGS NHD (2020)
Climate-related risks and/or disturbance	Historic Fire Perimeters	CAL FIRE (2025)
	Flood hazard zones	First Street Foundation (2020)
	Sea-level rise	NOAA (n.d.)
	Mid-century habitat climate exposure	CWHR-based per Thorne et al. (2016)

Most datasets represented discrete habitat types (e.g., wetlands, streams, oak woodland) or categorical conditions (e.g., channelized connectivity). For continuous or ranked datasets, such as ACE Top Ranked Biodiversity and ACE

species richness (including richness of all native species, endemic richness, and rare richness), we converted the continuous data into discrete features by applying thresholds (e.g., highest rank, the top 20% or top 5%).

We summarized each habitat/feature in terms of area (acres), length (miles), or counts for the lower, proportional, and upper estimates. We then calculated:

- Network Composition: The percentage of the 30x30 Conservation Areas network composed of each habitat/feature, and
- Representation and Gaps: The percentage of each habitat/feature's statewide extent occurring within each land status category. These two calculations are described in detail below.

Network Characteristics

To characterize the composition of the current 30x30 Conservation Areas Network we calculated percentages based on the percent of the network composed of each feature as follows:

$$\%\ of\ network\ =\ \frac{area\ of\ feature\ within\ 30x30\ Conservation\ Areas}{total\ area\ of\ the\ 30x30\ Conservation\ Areas} \times 100$$

Network composition provides a quick snapshot of the state's 30x30 Conservation Areas.

Representation and Gaps

To better understand the representation of habitats and other features within the 30x30 Conservation Areas network, we calculated the percentage of habitats/features contained within the network as follows:

$$\%\ of\ feature\ =\ \frac{area\ of\ feature\ within\ a\ network}{total\ area\ of\ the\ feature\ statewide} \times 100$$

With this simple calculation, we were able to assess how effectively diverse habitats and ecological features are represented within the 30x30 Conservation Areas network. This evaluation identifies gaps in habitat and feature representation, highlighting areas that require further conservation efforts. Additionally, we examined the presence of these habitats/features across other conservation areas and public lands (GAP 3 and GAP4), and non-conserved lands. Based on these insights, we identified proportional conservation pathway opportunities to address these gaps and enhance habitat protection and representation across the state.

Progress

To quantify year-over-year progress towards biodiversity conservation goals, we calculated the change in representation for each habitat/feature by subtracting its 2025 representation percentage from its 2026 value. We then compared this change in percent representation to two benchmarks: 1) the statewide increase in the percentage of land within 30x30 Conservation Areas, and 2) the 2025 conservation need identified for each habitat/feature (Schloss et al. 2026). For this calculation, the 2025 representation percentages were recalculated using an updated base land area that excluded Marine Protected Area overlap, to match the base layer used for the 2026 representation calculations and therefore may differ from the percentages reported in the 2025 Biodiversity Assessment (Schloss et al. 2026).

Results

First, we describe the characteristics and composition of the current 30x30 Conservation Areas network, then we share the results of the representation, gap, and opportunity pathway analysis through the Conservation Need and Opportunity Framework (Figures 3 & 4) for habitats, species-rich areas, connectivity, and freshwater resources.

Land Characterization

In alignment with CA Nature, our assessment shows that 27.1% of California is currently within 30x30 Conservation Areas. Another 24.8% is classified as other conserved lands, public lands, or lands with unknown status (GAP 3 or GAP 4). The remaining 48.1% is non-conserved land.

FIGURE 5. MAP OF CONSERVATION STATUS WITHIN EACH ECOREGION IN CALIFORNIA SHOWING PROPORTION OF LAND WITHIN 30X30 CONSERVATION AREAS VS. OTHER CONSERVED LANDS AND/OR OTHER PUBLIC LANDS ALONG WITH NON-CONSERVED LANDS.

Network Composition

The largest portion of 30x30 conserved lands is made up of the Mojave Desert ecoregion (27%), followed by the Sierra Nevada (17.4%), Southern California Mountains and Valleys (9.3%), Southeastern Great Basin (7.2%), and Sonoran Desert (5.2%). As of 2026, the Klamath Mountains now also compose 5.2% of the 30x30 conserved lands. All other ecoregions each comprise less than 5% of the network (Figure 6).

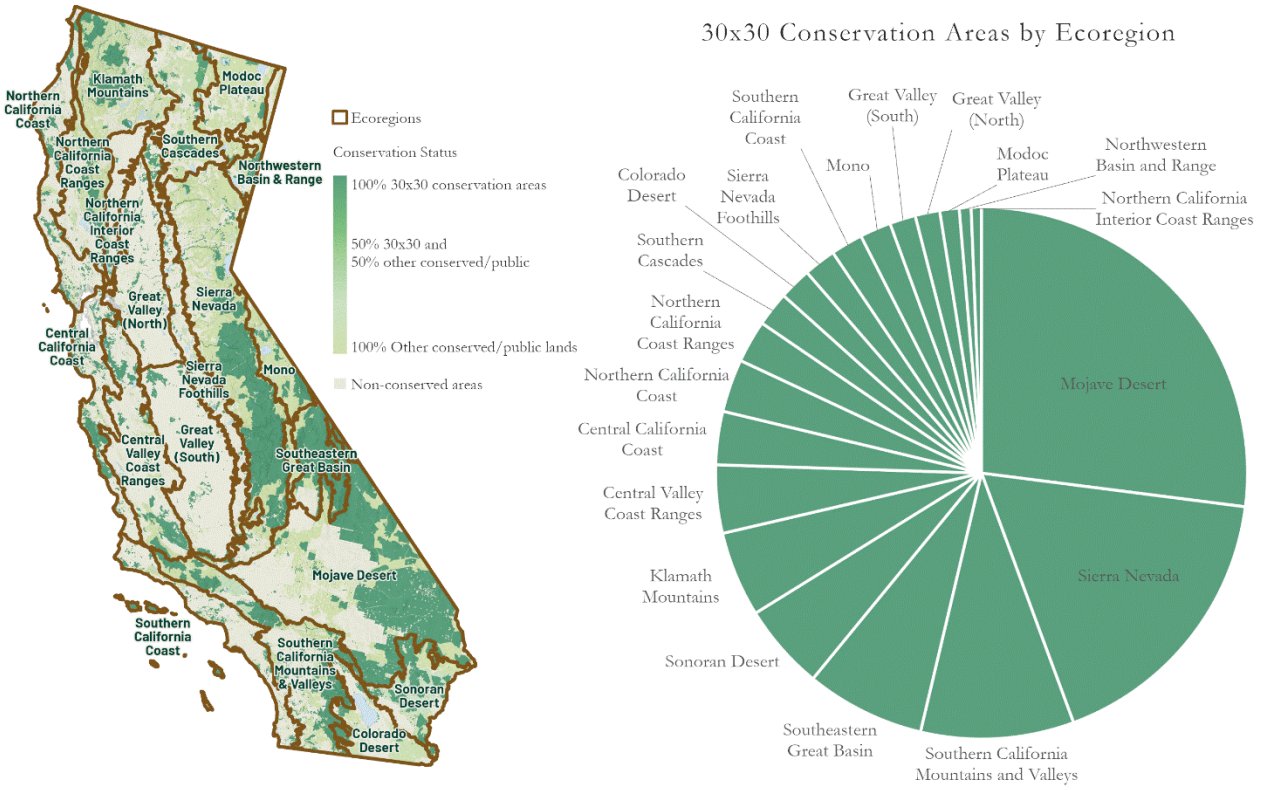


FIGURE 6. A) MAP OF CALIFORNIA ECOREGIONS B) PIE CHART OF PROPORTIONAL ECOREGIONAL COMPOSITION OF THE NETWORK OF 30X30 CONSERVATION AREAS.

Given that the Mojave Desert makes up the largest proportion of 30x30 Conservation Areas, it follows that desert shrub (e.g., desert scrub, desert wash, alkali desert scrub) habitat makes up 37.6% of 30x30 Conservation Areas (Figure 7). Conifer forest (16.4%), and shrub (e.g., chaparral, coastal scrub, bitterbrush, sagebrush) (14.4%) are also more widespread habitats in the 30x30 network of conservation areas. Together, these three broad habitat groups constitute more than two-thirds of the total area within California's 30x30 Conservation Areas network.

Sand dunes in Death Valley National Park © Greg Survant/TNC Photo Contest 2022

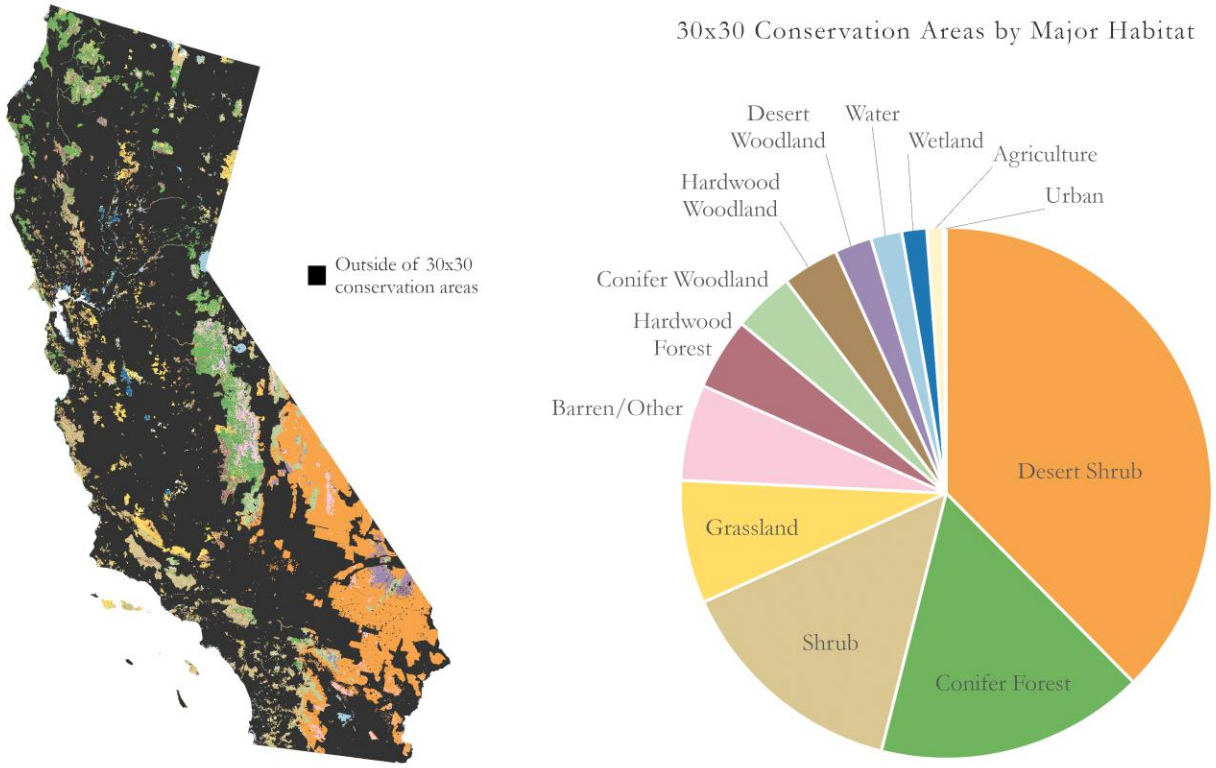


FIGURE 7. A) MAP OF MAJOR HABITATS WITHIN 30X30 CONSERVATION AREAS B) PIE CHART OF PROPORTIONAL HABITAT COMPOSITION OF THE NETWORK OF 30X30 CONSERVATION AREAS.

Climate and disturbance pressures are already reshaping the network. Roughly one-third (32%) of the network has natural vegetation that is projected to be stressed by mid-century climate change. About 0.5% of the network is at risk from sea-level rise, and 13% has burned in wildfires in the past decade. Though fire is both natural and beneficial to some systems, recent fire events have burned with higher severity, intensity, or frequency, which can be associated with ecological transitions (Miller et al., 2009; Williams et al. 2023).

Representation and Gaps

We assessed how habitats and other ecological features are distributed across 30x30 Conservation Areas, other conserved or other public/unknown status lands, and non-conserved lands. This lens highlights where future public and private conservation actions can most effectively advance 30x30 biodiversity outcomes to build a more representative, resilient, and connected network.

Tables 3-12 and Figures 8-15 present detailed results for habitat, species richness, connectivity, and freshwater resources. Together, they show that every ecoregion and habitat type in California contains opportunities to build a more a representative, resilient, and connected network of biodiverse lands. Details for each metric and feature are provided below.

These tables report the percentage of habitats/features within the 30x30 Conservation Areas network, the type and magnitude of conservation needed to improve its representation, and the proportional opportunities for either acquisition in fee or easements on non-conserved lands, as well as increasing durability or adjusting management objectives on other conserved or public lands. Accompanying maps illustrate the distribution of each habitat/feature across GAP status categories.

Habitat

Some terrestrial habitats are well represented within 30×30 Conservation Areas, while others are substantially under-represented (Figure 8, Table 3). Desert habitats, for example, are conserved above statewide conservation levels (48% of the desert shrub and 57% of the desert woodland are in 30x30 Conservation Areas). Additional conservation of desert habitats can focus on finer-scale desert habitats, ecoregional representation, rare species, or important areas for connectivity, climate resilience, or equitable access. In contrast, grasslands and hardwood woodland are poorly represented. Because most of the remaining extent of these habitats are on non-conserved lands (indicated by the yellow portion of the Proportional Pathway Opportunities pie chart, Table 3), these habitats are strong candidates for new acquisitions or conservation easements. Other under-represented habitats, such as conifer and hardwood forests, are more widely distributed across GAP 3 and GAP 4 lands (indicated by the green portion of the Proportional Pathway Opportunity pie chart, Table 3), which include public lands with limited or unclear conservation mandates, or conservation objectives that do not include management for biodiversity. On those lands, conservation opportunities include improving management to prioritize biodiversity and increasing the durability of protection, for example by retiring extractive uses or focusing management on activities that sustain and/or promote native biodiversity.

The oak woodlands and grasslands of the Tehachapi Mountains © Simon Williams/TNC

*Table 3. Representation levels, the conservation need, pathways, and opportunities to advance conservation of major terrestrial habitats, and progress on representation since 2025. Proportional pathway opportunities include improving management or increasing durability on other public lands or conserved areas (green) or acquisition or easements on non-conserved lands (yellow). Arrows indicate the magnitude and direction (up=gain; down=loss) of change in representation since 2025. *Additional goals can include stratified representation (e.g., ecoregion, watershed), protection of fine-filter species, connectivity corridors, climate resilient landscapes, areas of cultural significance, or access for disadvantaged communities.*

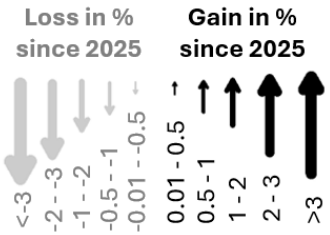
Feature	% of feature in 30x30 Conservation Areas	Proportional Pathway Opportunity	Gain since 2025	Conservation Opportunity
Hardwood Woodland	15 % 15 - 15.6 %		↑	Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Grassland	18 % 17.6 - 17.9 %		↑	Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Hardwood Forest	23 % 22.1 - 22.6 %		↑	Conservation of feature needed: slightly under-represented compared to the percentage of 30x30 Conservation Areas in CA
Conifer Forest	26 % 25.1 - 25.2 %		↑	Conservation of feature needed: slightly under-represented compared to the percentage of 30x30 Conservation Areas in CA
Shrub	30 % 28.5 - 29.6 %		↑	On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Conifer Woodland	33 % 33.3 - 33.4 %		↑	On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Desert Shrub	48 % 46.7 - 47.9 %		↓	On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Desert Woodland	57 % 57.1 - 57.5 %		↑	On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*

Feature Representation

- Under-represented feature (<20% conserved) compared to the percentage of conservation areas in CA
- Slightly under-represented feature (20-27.1% conserved) compared to the percentage of conservation areas in CA
- On par with or above the percentage of conservation areas in CA (>=27.1% conserved)

Proportional pathway opportunities

- Enhance management on public and other conserved lands to include biodiversity and ecosystem health
- Execute strategic land acquisitions and voluntary conservation easements on non-conserved lands



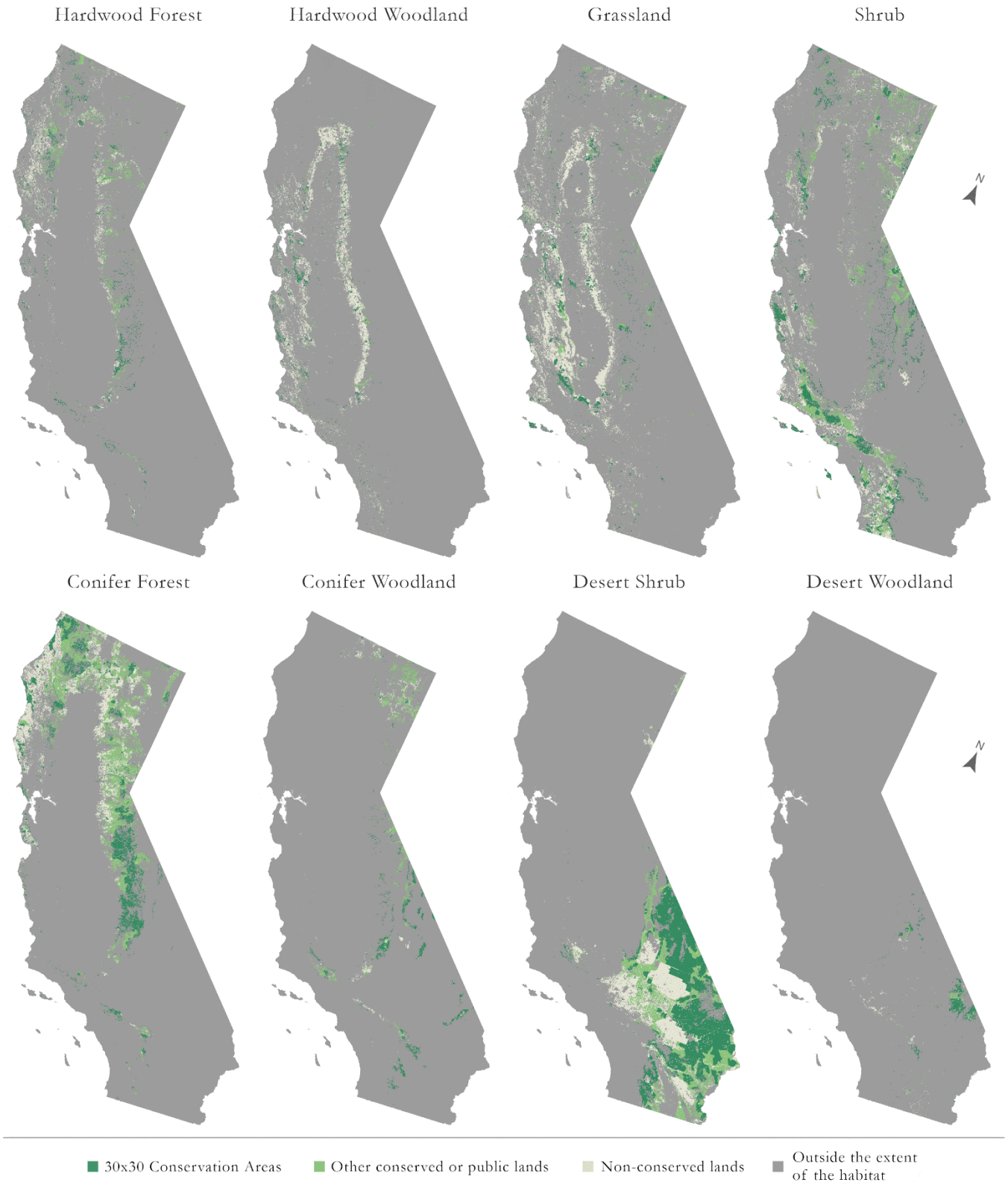


FIGURE 8. THE EXTENT OF MAJOR TERRESTRIAL HABITATS COLORED BY CONSERVATION STATUS: 30X30 CONSERVATION AREAS, OTHER CONSERVED OR PUBLIC LANDS, AND NON-CONSERVED LANDS. MAPPED CONSERVATION STATUS WITHIN CONSERVATION AREAS IS DETERMINED BY MAJORITY CONSERVATION STATUS. GRAY AREAS ARE OUTSIDE THE EXTENT OF THE HABITAT.

Roughly half of the finer-resolution natural terrestrial habitat associations are underrepresented relative to statewide conservation levels. Eastside pine is the most under-represented with only 7.3% of its extent conserved within 30x30 Conservation Areas, followed by blue-oak foothill pine, ponderosa pine, blue oak woodland, and valley oak woodland, with only between 10–12.5% (Tables 4 and 5). For eastside pine, the primary pathway is improving management and durability on existing conserved and public lands, whereas for ponderosa pine, the opportunity is split between management changes on conserved lands and new conservation on non-conserved lands (Table 4). Blue oak–foothill pine, blue oak woodland, and valley oak woodland all have more opportunity for additional conservation on non-conserved lands (Table 5). There is a lot of variability in representation across finer-resolution conifer habitats, with subalpine conifer having some of the highest representation of all habitats and eastside pine the lowest (Table 4). There is less variability across finer-resolution hardwood habitats with 6 of 8 hardwood habitats under-represented to some degree (Table 5).

Although broader habitat classifications of desert and shrub are on par with or above state levels, several finer habitat classifications of these broader types are under-represented and in need of additional protection statewide, including desert riparian, alkali desert scrub, bitterbrush, low sage, and sagebrush (Tables 6 and 7). This highlights the importance of including finer habitat classifications in the analysis and points to the need for focused additional protection within broader habitats that are on par with state levels. The opportunities for additional protection for these under-represented shrublands are primarily through increasing the durability or management on other conserved or public lands, whereas the opportunities for conserving these under-represented desert habitats are more evenly distributed between management improvement and acquisitions/easements.

Las Piletas Ranch Preserve on the Central Coast © Ethan Inlander

*Table 4. Representation levels, the conservation need, pathways, and opportunities to advance conservation of finer-resolution conifer forest and woodland habitats, and progress on representation since 2025. Proportional pathway opportunities include improving management or increasing durability on other public lands or conserved areas (green) or acquisition or easements on non-conserved lands (yellow). Arrows indicate the magnitude and direction (up=gain; down=loss) of change in representation since 2025. *Additional goals can include stratified representation (e.g., ecoregion, watershed), or within these habitats, protection of fine-filter species, connectivity corridors, climate resilient landscapes, areas of cultural significance, or access for disadvantaged communities.*

Feature	% of feature in 30x30 Conservation Areas	Proportional Pathway Opportunity	Gain since 2025	Conservation Opportunity
Eastside Pine	7.3 % 5.8 - 5.9 %			Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Ponderosa Pine	10.8 % 10.2 - 10.2 %			Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Juniper	17.5 % 17.3 - 17.4 %			Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Montane Hardwood-Conifer	17.9 % 17.5 - 17.7 %			Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Douglas Fir	19.6 % 18.9 - 18.9 %			Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Sierran Mixed Conifer	20.9 % 20.6 - 20.7 %			Conservation of feature needed: slightly under-represented compared to the percentage of 30x30 Conservation Areas in CA
Klamath Mixed Conifer	22.7 % 21.4 - 21.5 %			Conservation of feature needed: slightly under-represented compared to the percentage of 30x30 Conservation Areas in CA
Redwood	25.1 % 25.2 - 25.2 %			Conservation of feature needed: slightly under-represented compared to the percentage of 30x30 Conservation Areas in CA
White Fir	26.6 % 25.5 - 25.5 %			Conservation of feature needed: slightly under-represented compared to the percentage of 30x30 Conservation Areas in CA
Closed-Cone Pine-Cypress	32.1 % 31.3 - 31.8 %			On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Jeffrey Pine	37.1 % 36.9 - 37 %			On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Red Fir	48.4 % 47.4 - 47.4 %			On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Pinyon-Juniper	52.7 % 52.7 - 52.8 %			On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Lodgepole Pine	70.6 % 70.5 - 70.5 %			On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Subalpine Conifer	86 % 85.8 - 85.8 %			On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*

*Table 5. Representation levels, the conservation need, pathways, and opportunities to advance conservation of finer-resolution hardwood woodland and forest habitats, and progress on representation since 2025. Proportional pathway opportunities include improving management or increasing durability on other public lands or conserved areas (green) or acquisition or easements on non-conserved lands (yellow). Arrows indicate the magnitude and direction (up=gain; down=loss) of change in representation since 2025. *Additional goals can include stratified representation (e.g., ecoregion, watershed), or within these habitats, protection of fine-filter species, connectivity corridors, climate resilient landscapes, areas of cultural significance, or access for disadvantaged communities.*

Feature	% of feature in 30x30 Conservation Areas	Proportional Pathway Opportunity	Gain since 2025	Conservation Opportunity
Blue Oak-Foothill Pine	10.4 % 10.3 - 10.8 %			Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Blue Oak Woodland	11.3 % 11.1 - 11.6 %			Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Valley Oak Woodland	12.5 % 12.2 - 12.8 %			Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Montane Hardwood	21.3 % 20.9 - 21.3 %			Conservation of feature needed: slightly under-represented compared to the percentage of 30x30 Conservation Areas in CA
Valley Foothill Riparian	22.7 % 22.3 - 23.3 %			Conservation of feature needed: slightly under-represented compared to the percentage of 30x30 Conservation Areas in CA
Coastal Oak Woodland	25.5 % 25.2 - 26.2 %			Conservation of feature needed: slightly under-represented compared to the percentage of 30x30 Conservation Areas in CA
Aspen	29.9 % 29.9 - 29.9 %			On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Montane Riparian	44.3 % 43.8 - 44.5 %			On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*

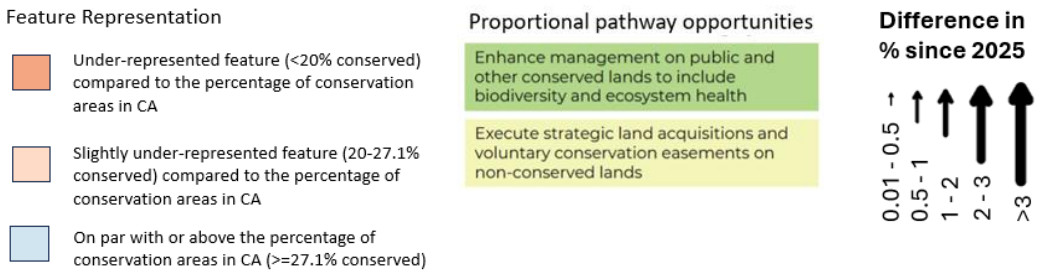


*Table 6. Representation levels, the conservation need, pathways, and opportunities to advance conservation of finer-resolution shrub and grassland habitats, and progress on representation since 2025. Proportional pathway opportunities include improving management or increasing durability on other public lands or conserved areas (green) or acquisition or easements on non-conserved lands (yellow). Arrows indicate the magnitude and direction (up=gain; down=loss) of change in representation since 2025. *Additional goals can include stratified representation (e.g., ecoregion, watershed), or within these habitats, protection of fine-filter species, connectivity corridors, climate resilient landscapes, areas of cultural significance, or access for disadvantaged communities.*

Feature	% of feature in 30x30 Conservation Areas	Proportional Pathway Opportunity	Gain since 2025	Conservation Opportunity
Bitterbrush	14.3 % 13.7 - 13.8 %		↑	Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Annual Grassland	17 % 16.8 - 17.1 %		↑	Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Low Sage	18.1 % 18.2 - 18.2 %		↑	Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Sagebrush	23.5 % 23.2 - 23.4 %		↑	Conservation of feature needed: slightly under-represented compared to the percentage of 30x30 Conservation Areas in CA
Chamise-Redshank Chaparral	28 % 26.5 - 30.8 %		↑	On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Coastal Scrub	30.7 % 30.1 - 32 %		↑	On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Mixed Chaparral	32.9 % 31.2 - 33.6 %		↑	On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Montane Chaparral	32.9 % 32.1 - 32.2 %		↑	On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Perennial Grassland	34.1 % 34 - 34 %		↑	On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Alpine-Dwarf Shrub	80.1 % 80.1 - 80.1 %		↑	On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*

Feature Representation

- Under-represented feature (<20% conserved) compared to the percentage of conservation areas in CA
- Slightly under-represented feature (20-27.1% conserved) compared to the percentage of conservation areas in CA
- On par with or above the percentage of conservation areas in CA (>=27.1% conserved)

Proportional pathway opportunities

- Enhance management on public and other conserved lands to include biodiversity and ecosystem health
- Execute strategic land acquisitions and voluntary conservation easements on non-conserved lands

Difference in % since 2025

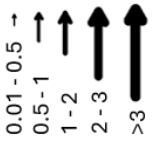
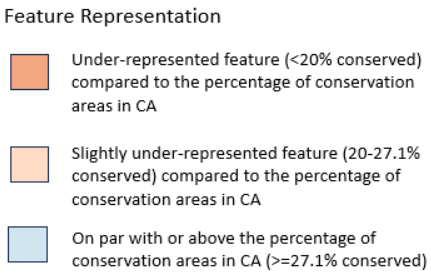
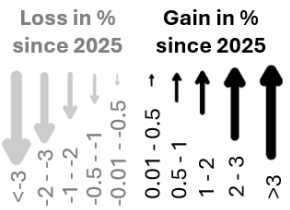


*Table 7. Representation levels, the conservation need, pathways, and opportunities to advance conservation of finer-resolution desert habitats, and progress on representation since 2025. Proportional pathway opportunities include improving management or increasing durability on other public lands or conserved areas (green) or acquisition or easements on non-conserved lands (yellow). Arrows indicate the magnitude and direction (up=gain; down=loss) of change in representation since 2025. *Additional goals can include stratified representation (e.g., ecoregion, watershed), or within these habitats, protection of fine-filter species, connectivity corridors, climate resilient landscapes, areas of cultural significance, or access for disadvantaged communities.*

Feature	% of feature in 30x30 Conservation Areas	Proportional Pathway Opportunity	Gain since 2025	Conservation Opportunity
Desert Riparian	19.2 % 16.8 - 19 %			Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Alkali Desert Scrub	19.9 % 19.6 - 20.3 %			Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Desert Succulent Shrub	35.8 % 35.2 - 36.9 %			On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Desert Scrub	50.1 % 48.7 - 50.1 %			On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Palm Oasis	50.3 % 48.1 - 49.4 %			On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Desert Wash	63 % 60.5 - 66.8 %			On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Joshua Tree	63.7 % 63.7 - 63.7 %			On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*





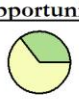
Independence Lake in the heart of the Sierra Nevada © Simon Williams/TNC

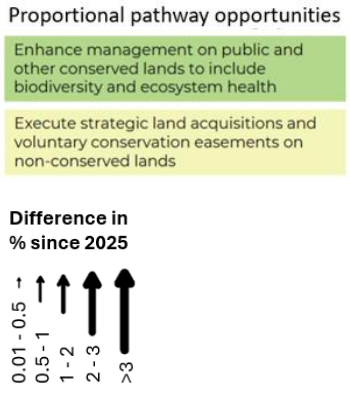
Richness

Biodiversity rank and richness data (CDFW, 2018, Kling et al., 2019) are derived from continuous surfaces, so we evaluated top-ranked or top richness areas (top 20% for overall species richness and endemic plant richness, and top 5% for rare and endemic vertebrate richness). In a conservation network that effectively protects biodiversity, all, or most of the areas with the highest-ranked and most species-rich areas should be distributed within the conservation areas. Our results indicate that this is not yet the case: the top-ranked areas for overall biodiversity and rare biodiversity— both statewide and within ecoregions—are below statewide conservation percentages (Table 8, Figure 9).

Although plant richness, endemic plant rarity-weighted richness, and reptile richness are on par or above statewide conservation levels (Tables 9 and 10, Figures 10-14), this still indicates that less than half of the most species-rich areas are currently within the 30x30 Conservation Areas network. Representation is particularly low for birds (all and rare), amphibians, endemic reptiles, and endemic mammals, whose remaining high-richness areas lie largely on non-conserved lands, again suggesting a need for acquisitions or easements to ensure the most species-rich areas for these taxa are conserved (Table 9, Figures 10-13). In contrast, many of the remaining opportunities to conserve the richest areas for plants and mammals occur on public or other conserved lands, where improved management and more durable protection could substantially improve outcomes.

Table 8. Representation levels, the proportional pathway opportunities to advance conservation of the top ranked biodiversity priorities, and progress on representation since 2025. For these threshold-derived features, comparison to California levels of conservation is not applicable, and conservation should target all of the most species-rich areas. Arrows indicate the magnitude and direction (up=gain; down=loss) of change in coverage since 2025.

Feature	% of feature in 30x30 Conservation Areas	Proportional Pathway Opportunity	Gain since 2025
Top Ranked Biodversity Statewide	24 % 23 - 23.8 %		
Top Ranked Biodversity per Ecoregion	24 % 23.6 - 24.7 %		
Top Ranked Rare Biodversity Statewide	26 % 25.1 - 26.1 %		
Top Ranked Rare Biodversity per Ecoregion	26 % 25.7 - 27 %		



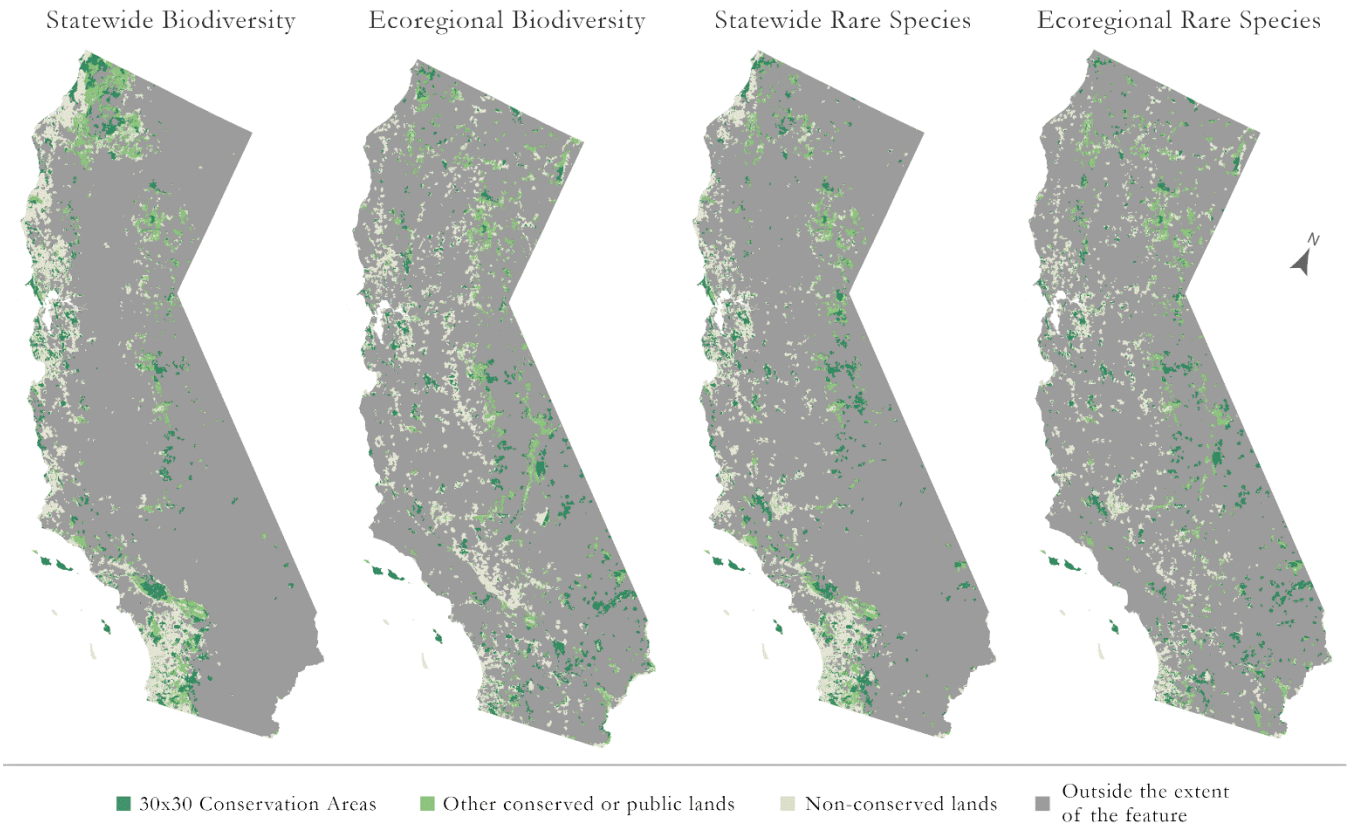


FIGURE 9. THE EXTENT OF TOP RANKED BIODIVERSITY (ACE RANK 5) STATEWIDE AND PER ECOREGION AND THE TOP RANKED RARE BIODIVERSITY (ACE RANK 5) STATEWIDE AND PER ECOREGION COLORED BY CONSERVATION STATUS: 30X30 CONSERVATION AREAS, OTHER CONSERVED OR PUBLIC LANDS, AND NON-CONSERVED LANDS. MAPPED CONSERVATION STATUS WITHIN CONSERVATION AREAS IS DETERMINED BY MAJORITY CONSERVATION STATUS. GRAY AREAS ARE OUTSIDE THE EXTENT OF THE FEATURE.

A Santa Cruz Island fox peers out through the grass © Ian Shive

Table 9. Representation levels, proportional pathway opportunities to advance conservation of the most species rich (top 20%) areas for vertebrate taxa and most species rich (top 5%) for rare and endemic subsets of each taxon, and progress on representation since 2025. For these threshold-derived features, comparison to California levels of conservation is not applicable, and conservation should target all of the most species-rich areas. Arrows indicate the magnitude and direction (up=gain; down=loss) of change in coverage since 2025.

Feature	% of feature in 30x30 Conservation Areas	Proportional Pathway Opportunity	Gain since 2025
Reptile Richness	41 % 39.3 - 40.8 %		
Amphibian Richness	22 % 21.7 - 22.4 %		
Mammal Richness	24 % 22.9 - 23 %		
Bird Richness	13 % 13.1 - 13.4 %		
Rare Reptile Richness	25 % 23.9 - 25.8 %		
Rare Amphibian Richness	29 % 28.1 - 28.8 %		
Rare Mammal Richness	25 % 24.2 - 25.4 %		
Rare Bird Richness	18 % 17.5 - 18.5 %		
Endemic Reptile Richness	22 % 20.8 - 22.8 %		
Endemic Amphibian Richness	30 % 29.5 - 30.3 %		
Endemic Mammal Richness	22 % 21.6 - 22.2 %		
Endemic Bird Richness	26 % 25.2 - 27.5 %		

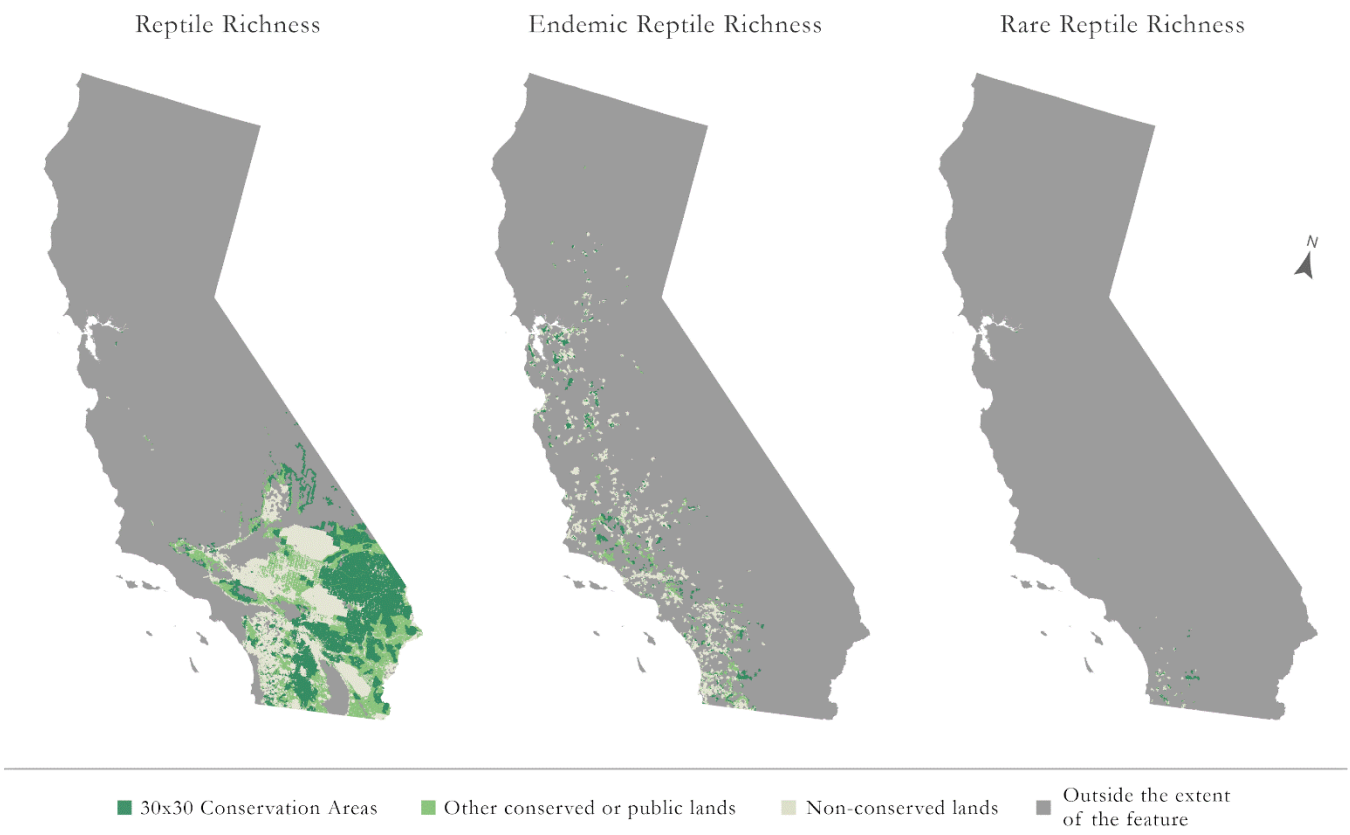


FIGURE 10. THE EXTENT OF THE MOST SPECIES-RICH AREAS FOR ALL NATIVE REPTILES (TOP 20% MOST RICH), ENDEMIC REPTILES (TOP 5% MOST RICH), AND RARE REPTILES (TOP 5% MOST RICH) COLORED BY CONSERVATION STATUS: 30X30 CONSERVATION AREAS, OTHER CONSERVED OR PUBLIC LANDS, AND NON-CONSERVED LANDS. MAPPED CONSERVATION STATUS WITHIN CONSERVATION AREAS IS DETERMINED BY MAJORITY CONSERVATION STATUS. GRAY AREAS ARE OUTSIDE THE EXTENT OF THE FEATURE.

California whip snake at Gray Davis Dye Creek Preserve in CA © Alan D. St. John

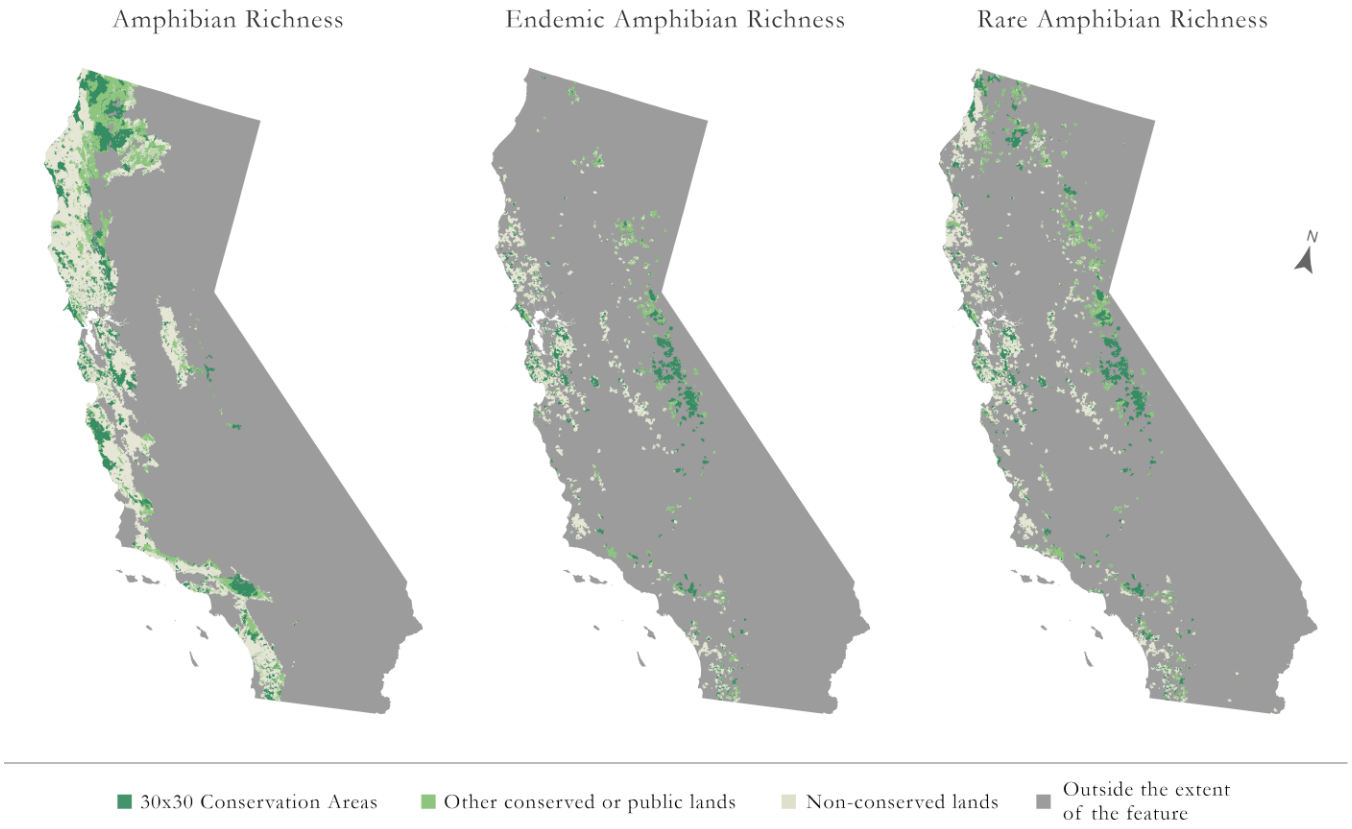


FIGURE 11. THE EXTENT OF THE MOST SPECIES-RICH AREAS FOR ALL NATIVE AMPHIBIANS (TOP 20% MOST RICH), ENDEMIC AMPHIBIANS (TOP 5% MOST RICH), AND RARE AMPHIBIANS (TOP 5% MOST RICH) COLORED BY CONSERVATION STATUS: 30X30 CONSERVATION AREAS, OTHER CONSERVED OR PUBLIC LANDS, AND NON-CONSERVED LANDS. MAPPED CONSERVATION STATUS WITHIN CONSERVATION AREAS IS DETERMINED BY MAJORITY CONSERVATION STATUS. GRAY AREAS ARE OUTSIDE THE EXTENT OF THE FEATURE.

Juvenile Giant Pacific Salamander in Angelo Coast Range Reserve © Ian Shive

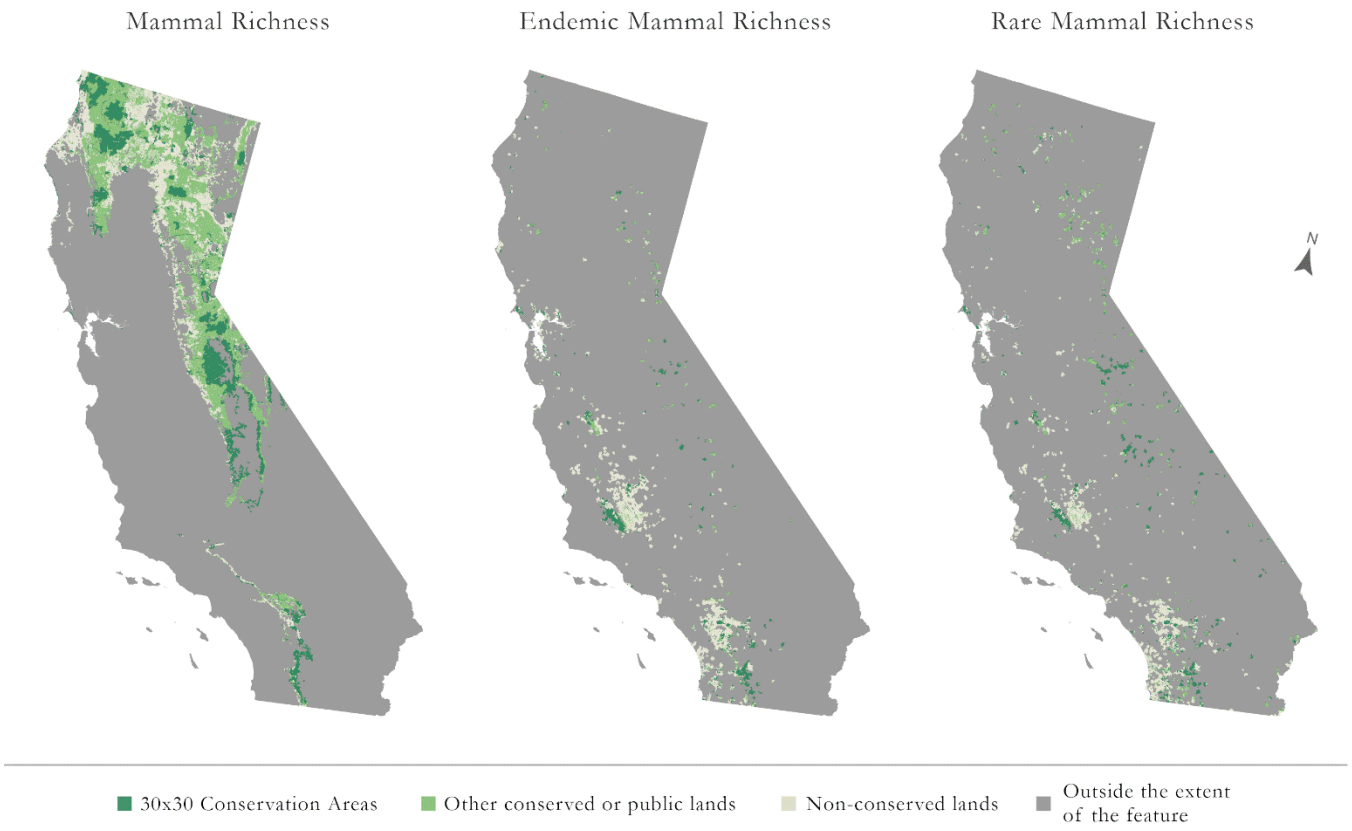


FIGURE 12. THE EXTENT OF THE MOST SPECIES-RICH AREAS FOR ALL NATIVE MAMMALS (TOP 20% MOST RICH), ENDEMIC MAMMALS (TOP 5% MOST RICH), AND RARE MAMMALS (TOP 5% MOST RICH) COLORED BY CONSERVATION STATUS: 30X30 CONSERVATION AREAS, OTHER CONSERVED OR PUBLIC LANDS, AND NON-CONSERVED LANDS. MAPPED CONSERVATION STATUS WITHIN CONSERVATION AREAS IS DETERMINED BY MAJORITY CONSERVATION STATUS. GRAY AREAS ARE OUTSIDE THE EXTENT OF THE FEATURE.

A badger emerges from its den, CA ©Jeffrey Rich

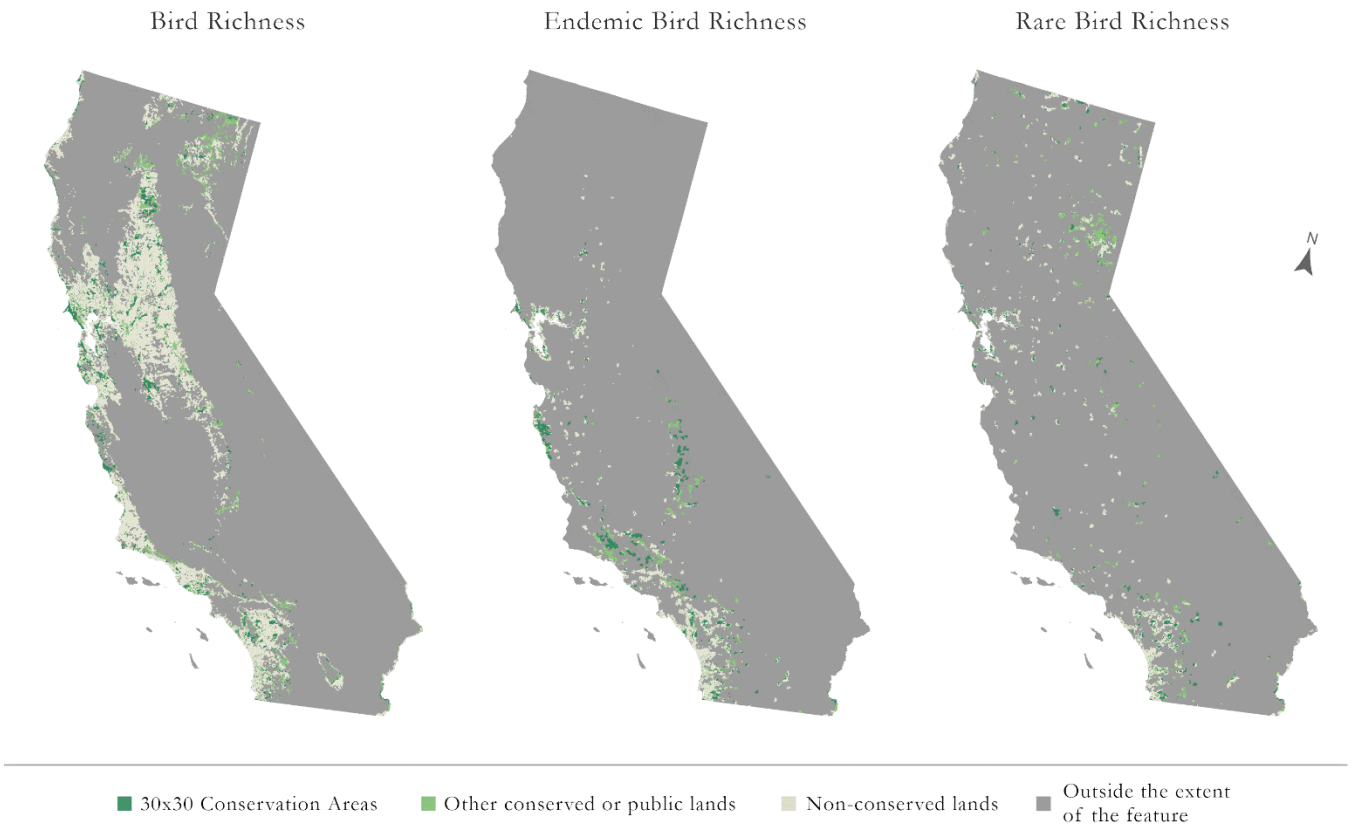


FIGURE 13. THE EXTENT OF THE MOST SPECIES-RICH AREAS FOR ALL NATIVE BIRDS (TOP 20% MOST RICH), ENDEMIC BIRDS (TOP 5% MOST RICH), AND RARE BIRDS (TOP 5% MOST RICH) COLORED BY CONSERVATION STATUS: 30X30 CONSERVATION AREAS, OTHER CONSERVED OR PUBLIC LANDS, AND NON-CONSERVED LANDS. MAPPED CONSERVATION STATUS WITHIN CONSERVATION AREAS IS DETERMINED BY MAJORITY CONSERVATION STATUS. GRAY AREAS ARE OUTSIDE THE EXTENT OF THE FEATURE

An island scrub jay on Santa Cruz Island, CA © Morgan Heim Day's Edge Production

Table 10. Representation levels, proportional pathway opportunities to advance conservation of the most species rich (top 20%) areas for plants and rarity-weighted endemic plants, and progress on representation since 2025. For these threshold-derived features, comparison to California levels of conservation is not applicable, and conservation should target all of the most species-rich areas. Arrows indicate the magnitude and direction (up=gain; down=loss) of change in coverage since 2025.

Feature	% of feature in 30x30 Conservation Areas	Proportional Pathway Opportunity	Gain since 2025
Plant Richness	42 % 41.5 - 42.2 %		↑
Endemic Plant Rarity Weighted Richness	36 % 35.1 - 35.9 %		↑

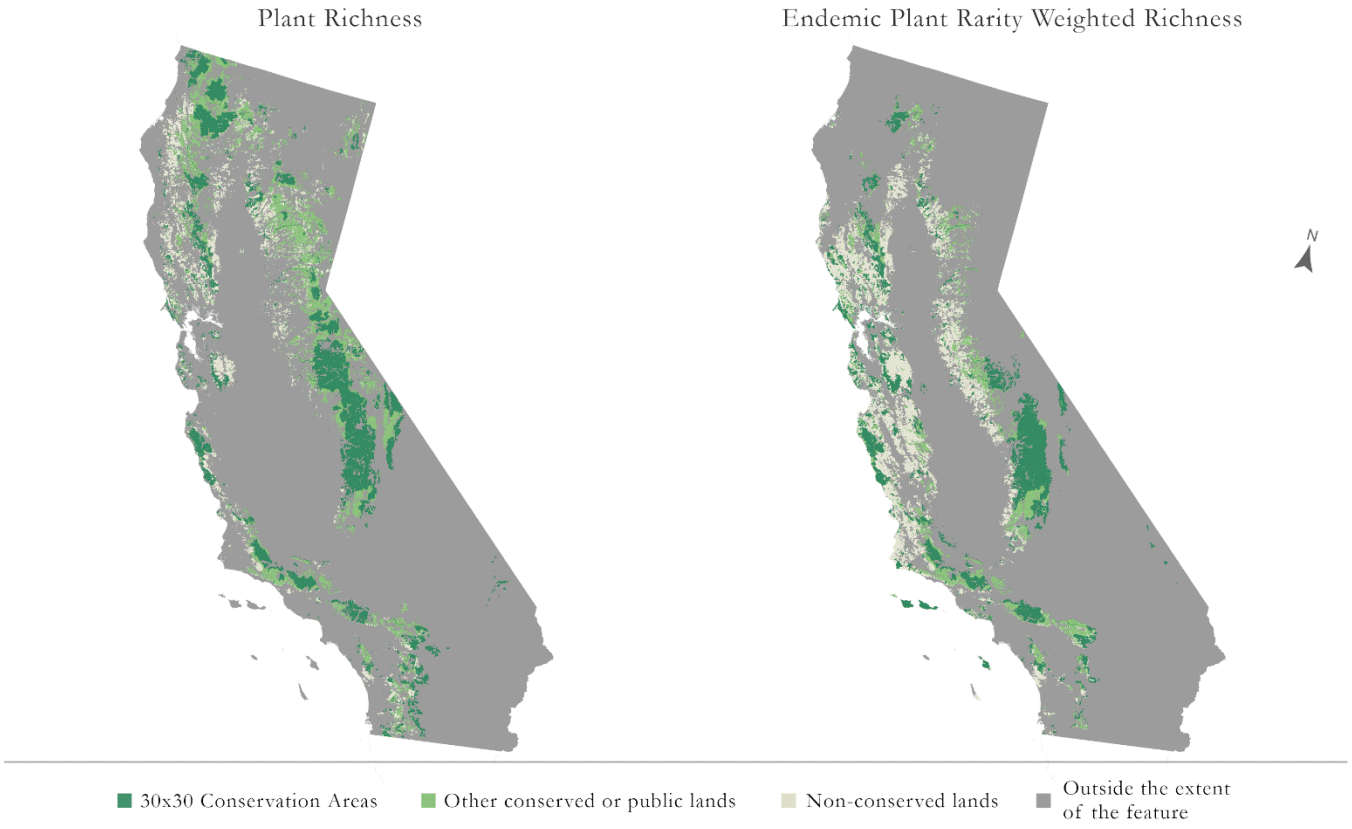
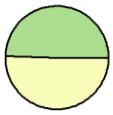


FIGURE 14. THE EXTENT OF THE MOST SPECIES RICH (TOP 20%) AREAS FOR ALL PLANTS AND RARITY-WEIGHTED ENDEMIC PLANTS COLORED BY CONSERVATION STATUS: 30X30 CONSERVATION AREAS, OTHER CONSERVED OR PUBLIC LANDS, AND NON-CONSERVED LANDS. MAPPED CONSERVATION STATUS WITHIN CONSERVATION AREAS IS DETERMINED BY MAJORITY CONSERVATION STATUS. GRAY AREAS ARE OUTSIDE THE EXTENT OF THE FEATURE.

Connectivity and Resilience

Channelized connectivity features (Cameron et al., 2022) are conserved at levels below overall statewide conservation coverage. Key regional linkages (e.g., those identified in the South Coast Missing Linkages project; Beier et al., 2006) are conserved at levels above statewide levels of representation (Table 11, Figure 15). However, preservation of the entire linkage is critical for maintaining ecosystem function, making conservation of all of the remaining linkage extents and channelized connectivity a high priority. Some channelized and regional linkages could be secured through improved management and enhanced durability of GAP 3 and 4 lands, but the majority of these linkage areas occur on non-conserved lands that will require acquisitions or easements. Intensified connectivity is somewhat under-represented, whereas diffuse connectivity and climate linkages occur at levels above overall 30×30 coverage.

*Table 11. Representation levels, the conservation need, pathways, and opportunities to advance conservation of habitat connectivity, and progress on representation since 2025. Proportional pathway opportunities include improving management or increasing durability on other public lands or conserved areas (green) or acquisition and easements on non-conserved lands (yellow). Arrows indicate the magnitude and direction (up=gain; down=loss) of change in representation since 2025. *Additional goals can include stratified representation (e.g., ecoregion, watershed), protection of fine-filter species, climate resilient landscapes, areas of cultural significance, or access for disadvantaged communities.*

Feature	% of feature in 30x30 Conservation Areas	Proportional Pathway Opportunity	Gain since 2025	Conservation Opportunity
Channelized Connectivity	25 % 24.7 - 26.2 %			Conservation of remaining feature needed: rare or historically degraded feature that plays a critical role for ecosystem function
Intensified Connectivity	23 % 22.5 - 23.7 %			Conservation of feature needed: slightly under-represented compared to the percentage of 30x30 Conservation Areas in CA
Diffuse Connectivity	38 % 36.7 - 37.4 %			On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
Climate Linkage	43 % 42.2 - 43.6 %			On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
South Coast Missing Linkages	29 % 27.8 - 30.8 %			Conservation of remaining feature needed: rare or historically degraded feature that plays a critical role for ecosystem function

Feature Representation

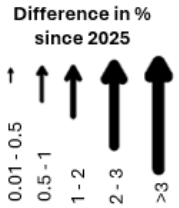
- Under-represented feature (<20% conserved) compared to the percentage of conservation areas in CA
- Slightly under-represented feature (20-27.1% conserved) compared to the percentage of conservation areas in CA
- On par with or above the percentage of conservation areas in CA (>=27.1% conserved)

Key Features

- Historically converted or rare features, or features with a critical role for ecosystem function for which proportional representation is not relevant

Proportional pathway opportunities

- Enhance management on public and other conserved lands to include biodiversity and ecosystem health
- Execute strategic land acquisitions and voluntary conservation easements on non-conserved lands



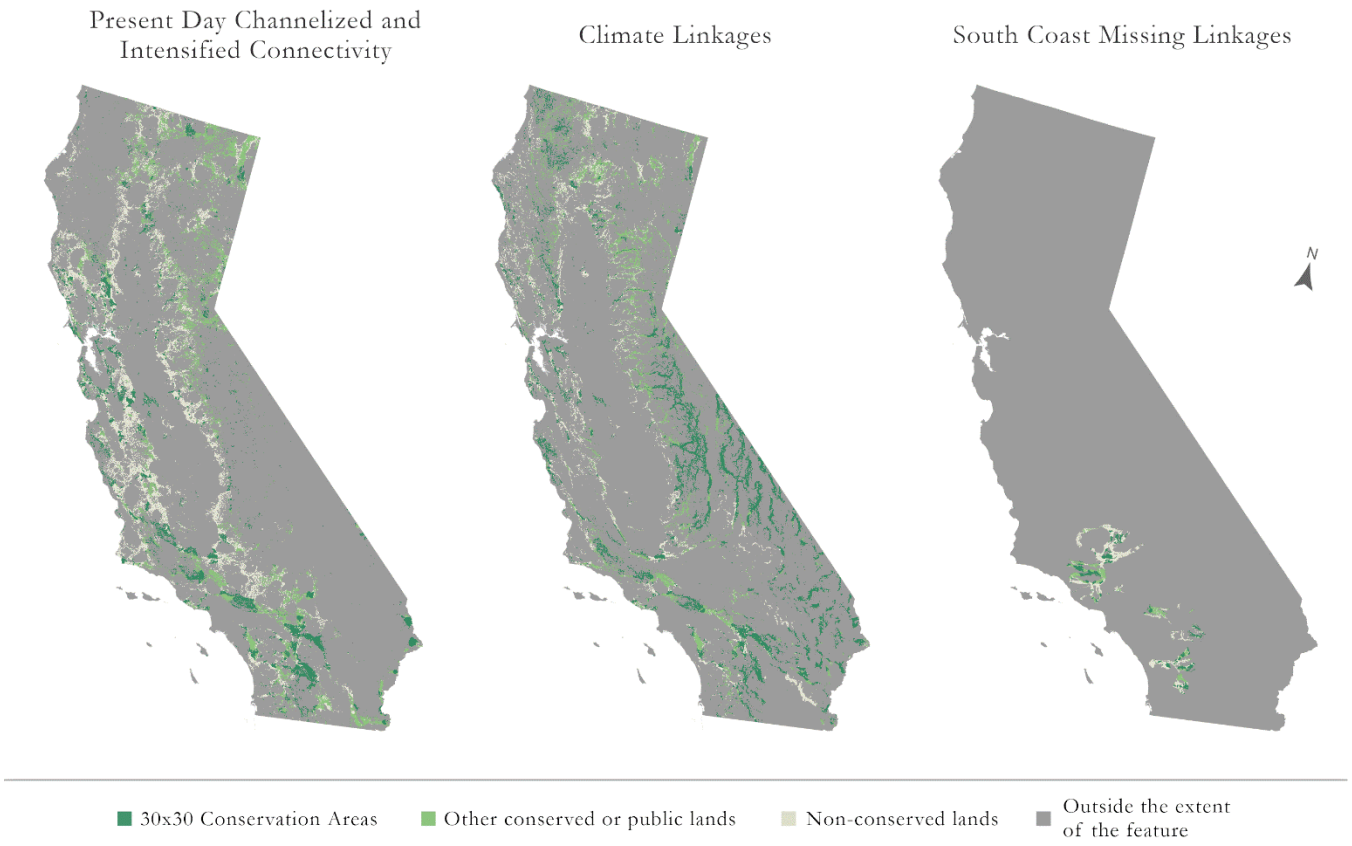
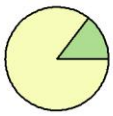
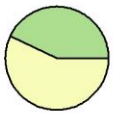


FIGURE 15. THE EXTENT OF IMPORTANT CONNECTIVITY AREAS FOR WILDLIFE MOVEMENT COLORED BY CONSERVATION STATUS: 30X30 CONSERVATION AREAS, OTHER CONSERVED OR PUBLIC LANDS, AND NON-CONSERVED LANDS. DIFFUSE WELL-CONNECTED HABITATS ARE NOT MAPPED HERE. MAPPED CONSERVATION STATUS WITHIN CONSERVATION AREAS IS DETERMINED BY MAJORITY CONSERVATION STATUS. GRAY AREAS ARE OUTSIDE THE EXTENT OF THE FEATURE.

Freshwater Resources

Freshwater habitats emerge as both relatively well represented and highly vulnerable. For example, 34-36% of remaining wetlands and groundwater-dependent ecosystems are in 30×30 Conservation Areas, but their historical loss, restricted distribution, and crucial role in ecosystem function make them "Key Features" and underscore the need to conserve the remaining extent of these habitats (Table 12, Figure 16). Major rivers (23%) and mid-sized streams (26%) are slightly under-represented relative to overall conservation coverage, while headwater streams (28%) are slightly above statewide levels. Conservation of rivers and streams and their surrounding riparian areas will be especially important to allow species to respond and adapt to climate change because they provide connectivity between habitats and across elevational gradients (Seavy et al., 2009). The 100-year floodplain (15%) is notably under-represented and is a clear opportunity for future conservation. Only 23% of the area of watersheds with the highest freshwater species richness are in 30×30 Conservation Areas, pointing to the need for targeted protections to ensure that conservation lands protect the most species-rich areas.

*Table 12. Representation levels, the conservation need, pathways, and opportunities to advance conservation of freshwater features, and progress on representation since 2025. Proportional pathway opportunities include improving management or increasing durability on other public lands or conserved areas (green) or acquisition and easements on non-conserved lands (yellow). Arrows indicate the magnitude and direction (up=gain; down=loss) of change in representation since 2025. *Additional goals can include stratified representation (e.g., ecoregion, watershed), protection of fine-filter species, connectivity corridors, climate resilient landscapes, areas of cultural significance, or access for disadvantaged communities.*

Feature	% of feature in 30x30 Conservation Areas	Proportional Pathway Opportunity	Gain since 2025	Conservation Opportunity
Remaining Wetlands	34 % 34.2 - 34.6 %		↑	Conservation of remaining feature needed: rare or historically degraded feature that plays a critical role for ecosystem function
Groundwater Dependent Ecosystems	36 % 35.5 - 37.3 %		↑	Conservation of remaining feature needed: rare or historically degraded feature that plays a critical role for ecosystem function
Rivers (order 6+)	23 % 22.8 - 23.3 %		↑	Conservation of feature needed: slightly under-represented compared to the percentage of 30x30 Conservation Areas in CA
Streams (3-5)	26 % 25.1 - 26.3 %		↑	Conservation of feature needed: slightly under-represented compared to the percentage of 30x30 Conservation Areas in CA
Headwaters (order 1-2)	28 % 27.5 - 29.1 %		↑	On par with the percentage of 30x30 Conservation Areas in CA. Conservation of feature should focus on additional goals*
100yr Floodplain	15 % 15 - 15.4 %		↑	Conservation of feature needed: under-represented compared to the percentage of 30x30 Conservation Areas in CA
Watersheds with top 20% freshwater species richness	23 % 22.8 - 23.4 %		↑	Representation of feature not applicable - additional conservation needed for most species rich areas

Feature Representation

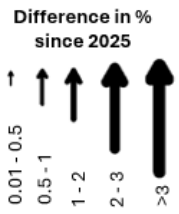
- Under-represented feature (<20% conserved) compared to the percentage of conservation areas in CA
- Slightly under-represented feature (20-27.1% conserved) compared to the percentage of conservation areas in CA
- On par with or above the percentage of conservation areas in CA (>=27.1% conserved)
- Not Applicable

Key Features

- Historically converted or rare features, or features with a critical role for ecosystem function for which proportional representation is not relevant

Proportional pathway opportunities

- Enhance management on public and other conserved lands to include biodiversity and ecosystem health
- Execute strategic land acquisitions and voluntary conservation easements on non-conserved lands



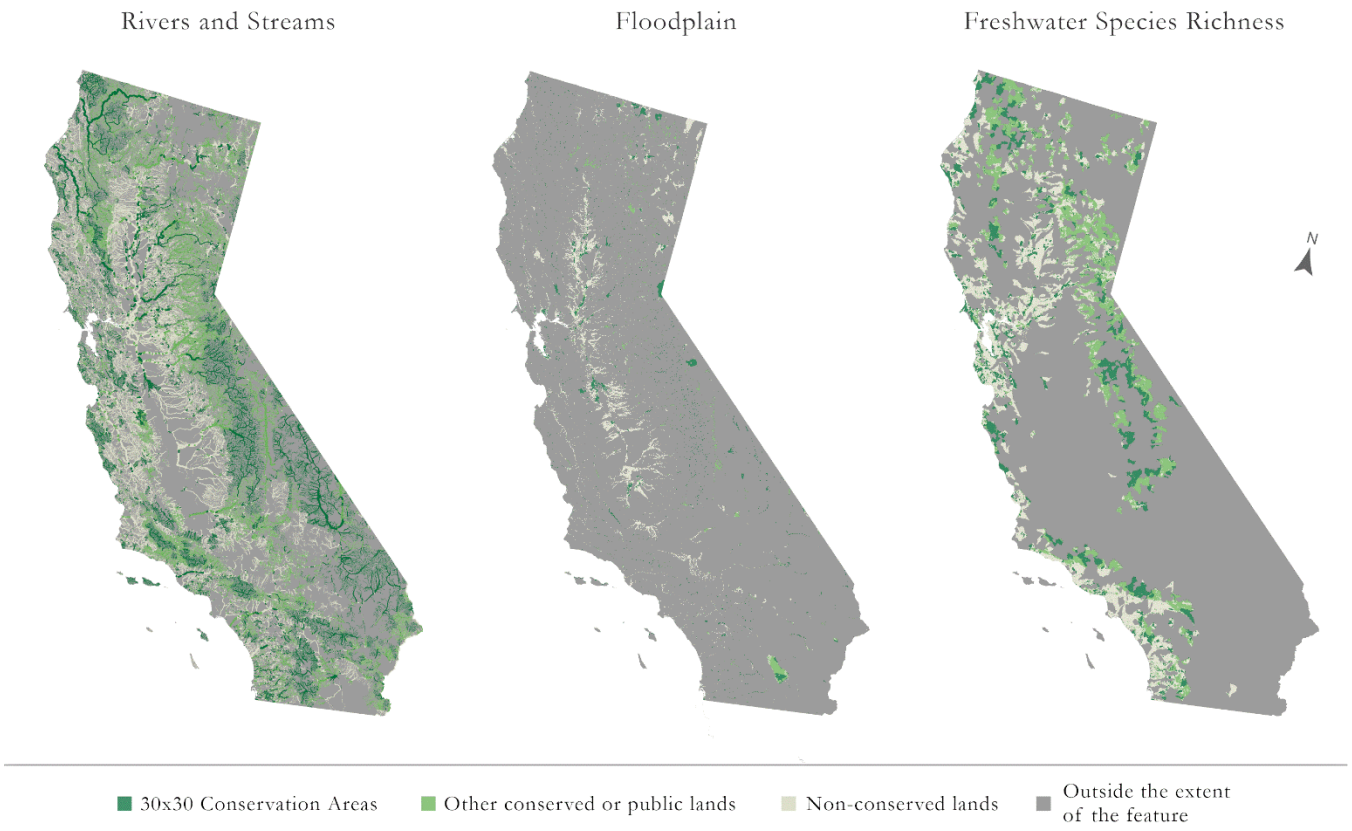


FIGURE 16. THE EXTENT OF FRESHWATER FEATURES COLORED BY CONSERVATION STATUS: 30X30 CONSERVATION AREAS, OTHER CONSERVED OR PUBLIC LANDS, AND NON-CONSERVED LANDS. MAPPED CONSERVATION STATUS WITHIN CONSERVATION AREAS IS DETERMINED BY MAJORITY CONSERVATION STATUS. GRAY AREAS ARE OUTSIDE THE EXTENT OF THE FEATURE. WETLANDS AND GROUNDWATER DEPENDENT ECOSYSTEMS ARE NOT DISPLAYED.

Chinook salmon on the North Coast ©Jeffrey Rich

Uncertainty of Estimates

Although the true coverage of any habitat or feature cannot be known—because GAP status is not spatially explicit—just two of the habitats showed differences among the lower, proportional, or upper estimates that crossed key framework thresholds (i.e., 20%, 27.1%). For these two habitats, the conservation need would be 'slightly under-represented' for the lower estimate for Chamise-Redshank Chapparal and the upper estimate for Alkali Desert Scrub.

Progress since 2025

The overall percentage of land in 30x30 Conservation Areas increased by a difference of 1% - from 26.1% to 27.1%. If conservation actions were primarily directed toward the most-species rich areas, key biodiversity features, and under-represented habitats, we would expect the year-over-year difference for these habitats/features to exceed 1%. From 2025 to 2026, these focal features and habitats (i.e., under-represented habitat, species rich areas, key features) showed representation inter-annual differences greater than 1% (Figure 17), indicating that conservation efforts over the past year were focused in areas with the highest conservation need.

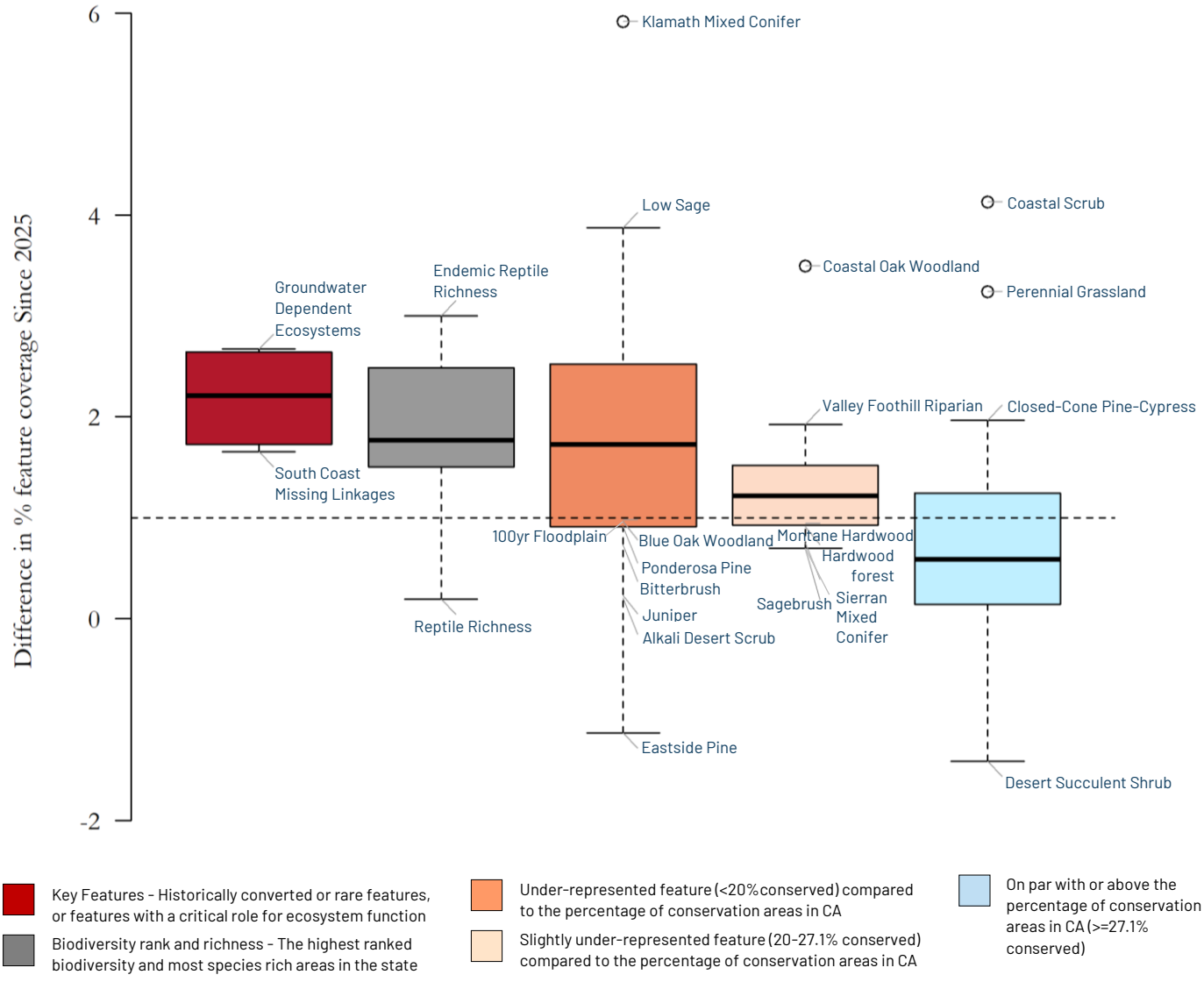


FIGURE 17. BOXPLOTS OF THE DIFFERENCE IN THE PERCENTAGE OF HABITAT/FEATURE REPRESENTATION IN 30X30 CONSERVATION AREAS SINCE 2025 FOR EACH CONSERVATION FRAMEWORK CATEGORY (E.G., KEY FEATURES, UNDER-REPRESENTED HABITATS ETC). BOXES INDICATE THE INTERQUARTILE RANGE, SOLID LINES INDICATE THE MEDIAN, WHISKERS EXTEND TO THE LOWEST AND HIGHEST VALUE WITHIN 1.5 TIMES THE INTERQUARTILE RANGE, POINTS INDICATE VALUES BEYOND THIS RANGE. VALUES ABOVE THE HORIZONTAL LINE AT 1% (I.E., THE DIFFERENCE IN TOTAL 30X30 COVERAGE STATEWIDE BETWEEN 2025 AND 2026) INDICATE A GAIN IN PERCENT HABITAT/FEATURE REPRESENTATION THAT EXCEEDED THE OVERALL DIFFERENCE IN PERCENT COVERAGE STATEWIDE. HABITATS/FEATURES WITH VALUES AT OR BEYOND EACH WHISKER AND UNDER-REPRESENTED HABITATS WITH CHANGE IN REPRESENTATION LESS THAN 1% ARE LABELED.

Some of these under-represented habitats and key features had gains in percent coverage that far exceeded the statewide increase in 30x30 coverage (i.e., a difference of 1%). Klamath Mixed Conifer (+5.9% since 2025) and Low Sage (+3.9% since 2025) had the largest improvements for terrestrial habitats (Figure 17). Other Key Features and under-represented habitats, such as channelized connectivity areas, groundwater-dependent ecosystems, desert riparian, douglas fir, and montane hardwood-conifer, showed progress of almost 3%, nearly tripling the inter-annual difference in percent coverage statewide. South Coast Missing Linkages, valley oak woodland, annual grassland, and remaining wetlands all improved, each with increases greater than a 1% difference. In contrast, several under-represented habitats and features made less progress or saw negative changes in representation, including alkali desert scrub, bitterbrush, blue oak woodland, eastside pine, ponderosa pine, and floodplains. Although all under-represented habitats and key features require continued conservation attention, these lower-progress habitats may warrant additional focus in the coming year.

Discussion

This assessment highlights both progress and persistent challenges in meeting California's 30x30 objectives. Ecoregional and habitat imbalances in the current network along with low protection levels for Key Features and the most species-rich areas underscore the importance of targeted conservation. Habitats such as hardwood woodlands and grasslands are markedly under-represented and primarily occur on non-conserved lands, emphasizing the need for strategic acquisitions and easements. Conifer and hardwood forests are only slightly under-represented, with more balanced opportunities for both management-based conservation on existing conserved lands and new protection on non-conserved lands.

While the Mojave Desert and Sierra Nevada together comprise nearly half of the network, many ecoregions contribute less than 10%, revealing gaps in representation that must be addressed to ensure biodiversity is conserved across the state and that access to nature is equitably distributed.

Maximizing 30x30 for Biodiversity

California has a long history of land protection. Only recently, however, have conservation decisions been guided by explicit biodiversity priorities and principles such as representation, species richness and rarity, connectivity, and resilience. Progress since 2025 indicates that conservation actions have been directed toward biodiversity priorities, thereby improving representation of these important habitats and ecological features within the 30x30 Conservation Areas network. Ensuring that the 30×30 Conservation Area network effectively addresses biodiversity decline will require a continued focus on:

- The most species-rich and highest-ranked biodiversity hotspots,
- Rare and functionally critical habitats, and
- Under-represented habitats and ecoregions.

The findings here can help prioritize where additional conservation will most effectively advance 30×30. For habitats with low representation within the 30×30 Conservation Areas—such as grasslands, blue oak woodland, valley oak woodland, and blue oak–foothill pine—increasing conservation to meet or exceed statewide levels is a clear objective. These habitats often occur on private lands, with additional conservation opportunities primarily for acquisitions and easements, or a need to identify how best to engage landowners in long-term conservation efforts. Where representation is already relatively high, as in many desert habitats, new investments in these habitats may best focus on fine-scale habitat classes like alkali desert scrub, fine-filter targets such as rare and endemic species, improving ecoregional representation, strengthening connectivity and climate resilience, protecting cultural significance, and advancing equitable access for disadvantaged communities.

Climate Change

Climate change increases the urgency of conservation and can help us further refine where investments will be most meaningful for biodiversity. Projections that nearly one-third of the network's vegetation will face climate stress (based on CWHR-level habitat exposure, methods from Thorne et al. 2016), combined with recent wildfire activity, highlight the need for a conservation strategy that is explicitly climate-aware. Fire remains a natural and often

beneficial process, but increasingly severe fires and shortened return intervals can drive ecosystem transitions (Williams et al. 2023). Building resilience into the 30×30 network will need additional focus on:

- Ensuring representation of habitats within and across ecoregions and watersheds,
- Maintaining redundancy across climatic gradients,
- Prioritizing areas projected to remain climatically stable, or with habitats projected to be stable, or that contain high microclimatic diversity, and
- Creating a connected network of conservation areas that allows for movement.

However, even if protected areas are planned with a lens toward climate resilience, effects of climate change do not respect borders and can impact ecosystems both inside and outside of protected areas. Management can be an effective tool to enhance the ability for protected areas to conserve biodiversity in a changing climate. For example, in the case of wildfire, it is increasingly evident that wise forest management is critical to reduce the likelihood of high severity fire. This highlights the importance of coupling protection with stewardship, consistent with the priority pathways of California's 30x30 strategy (CNRA, 2022) and aligned with state's nature-based solutions climate targets (CNRA, 2024).

Moving The Needle Toward 30%

This analysis focuses on three of the ten pathways identified by the state to meet 30×30 goals: executing strategic land acquisitions, increasing voluntary conservation easements, and enhancing conservation of existing public lands and coastal waters. These are the pathways that directly move the needle toward the 30% goal. In this report, we treat each of those three pathway opportunities as equally viable and compare opportunities based solely on the proportion of the habitat/feature occurring within areas suited to each pathway. In practice, however, these pathways differ substantially in feasibility, scale, cost, and implementation challenges. Progress toward 30x30 has in the first half decade, come largely from increasing durability on other conserved lands – particularly through federal actions, such as designations. Yet the extent to which this pathway can continue to deliver the acreage needed to meet the 30% commitment remains uncertain. Relying primarily on acquisitions and easements would require unprecedented annual rates of protection of non-conserved lands. Accelerating progress on these lands will require aligning state conservation funding with durable management (GAP 1 or 2), along with clear expectations for submitting boundary and GAP-status data so that conservation investments translate into measurable gains.

Caveats

In this analysis we focused on three of the strategies outlined in the pathways document, but there are additional strategies—such as restoration, stewardship, and policy changes that do not directly contribute to the "30% by area" accounting. Although these are not evaluated here, they are essential for ensuring that California's ecosystems are thriving and resilient.

Biodiversity data are inherently incomplete and evolving. Ongoing sampling and monitoring are needed to improve our understanding of species distributions and ecosystem condition. Future work could include the identification of data gaps needed to be filled to complete a more comprehensive biodiversity analysis. Frontiers in eDNA, community science data collection, Sentinel Site Network biodiversity, and sampling have the potential to fill in many needed gaps in California's data on biodiversity. We encourage ongoing data submissions to the ACE datasets that drive many planning decisions in California.

The Conservation Areas dataset used in this analysis relies on GAP status codes at the unit level but does not spatially map GAP categories within units that contain multiple statuses resulting in uncertainty in representation estimates. Although the range of possible estimates is somewhat low for most features, it still comparable to – or larger than – the annual increases in 30x30 Conservation Area acreage. Without spatially explicit GAP data, we cannot test or improve the accuracy of these estimates.

Conclusion

The expansion of 30×30 Conservation Areas has added roughly 3.5 million acres since 2022 through acquisitions and easements on non-conserved land, improved management, and durability on other conserved or public lands, and through an expansive data collection effort on Conservation Area boundaries and GAP status codes. Just under 3

million more acres are needed to reach the 2030 goal. Progress over the past year was focused on under-represented ecosystems, species-rich areas, and key biodiversity features. Continued emphasis on landscapes such as grasslands, oak woodlands, wetlands, floodplains, and connectivity corridors—should remain a high priority, many of which occur largely on non-conserved lands. Additionally, engaging landowners through incentive programs, voluntary easements, and collaborative conservation models will be critical in the years ahead.

Past the halfway mark to 2030, California has made meaningful strides toward its 30x30 conservation goals, yet substantial challenges remain. The state's diverse landscapes call for a balanced approach that strengthens existing protections, expands conservation in under-represented regions and habitats, and explicitly incorporates climate resilience and equity. Looking ahead, success will depend on strategically securing new lands for durable protection, improving management on existing conserved and public lands, and addressing representation gaps for vulnerable habitats and key biodiversity features. If these next steps are implemented thoughtfully and at scale and with complementary strategies, California's 30x30 initiative can help build an interconnected, well-managed conservation network capable of sustaining the state's extraordinary biodiversity in a rapidly changing world.

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Appendix A: Data

Table S1. Data assessed in 2024 assessment and not included in this report.

Climate Zones	**10 Climate Zones**	**Acres; % of network; % of feature**	**Ackerly Lab n.d.**
Biodiversity: unique communities, species, abundance, and richness	Abundance for 26 bird species	% of species that are underrepresented (measured as % abundance in network)	Veloz et al. 2015
	19 Fungi Communities (eDNA derived)	% of communities that are under-represented	CALeDNA 2024
	19 Invertebrate Communities (eDNA derived)	% of communities that are under-represented	CALeDNA 2024
	19 Prokaryote Communities (eDNA derived)	% of communities that are under-represented	CALeDNA 2024
Connectivity and Resilience	Resilient Connected Network - all categories	Acres; % of feature % of network	Anderson et al. 2023
Freshwater Resources	Fish passage barriers	Count; % of feature	CDFW 2023
NBS and Agriculture	SAGBI (rated good+)	Acres % of feature	O'Green et al. 2015
	Drinking water source watersheds	Acres; % of feature	Klausmeyer and Fitzgerald 2012
	Farmland (prime, unique, statewide, or local importance)	Acres; % of feature	DOC FMMP 2018
	Lands suitable for grazing	Acres; % of feature	DOC FMMP 2018
	Carbon Storage	Acres in top 20%; % of feature; % of network	Sleeter et al. 2019
Progress Data - new protection	Protected areas	% of newly protected acres that are within 0.1 mi of 2022 conserved lands (any GAP status)	CNRA 2022
	Risk of conversion	% of newly protected acres that are in area with modeled land conversion	Integrated Climate and Land Use Scenarios (ICLUS), SSP2 Scenario, Version 2 U.S. Environmental Protection Agency 2016

	DAC	% of newly protected acres that are in DAC	California Office of Environmental Health Hazard Assessment (OEHHA), California Environmental Protection Agency, CalEnviroScreen 4.0. 2021
	Priority Populations (all)	% of newly protected acres that are in Priority Populations	CARB 2022
	Low-income communities	% of newly protected acres that are in Low-income communities	CARB 2022
	Parks for all - park need (ac/k)	% of newly protected acres that are in areas with identified park need	California Department of Parks and Recreation Community Engagement Division, Office of Grants and Local Services 2021
	Parks for all - park need (no park 0.5 mi)	% of newly protected acres that are in areas with identified park need	California Department of Parks and Recreation Community Engagement Division, Office of Grants and Local Services 2021

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A flock of dunlin in the Sacramento Valley © Drew Kelly

Appendix B: Sensitivity Analysis

Sensitivity of Results to Analytical Assumptions

Conservation Area units (hereafter, units) can have multiple GAP statuses associated as non-spatially explicit percentages of the unit's area. Therefore, in some cases only a portion of a unit will count as a 30x30 Conservation Area rather than the whole unit. Further, the location within the unit of each GAP Status is unknown. Each of these statuses may have different management implications, allowed uses, and levels of protection for resources. Without spatial information on where 30x30 Conservation Areas are within units that have multiple gap statuses, there will be some degree of uncertainty regarding the level of protection represented by the GAP Status, imprecisely located, afforded to the feature and habitat representation which is more clearly known.

In previous Conservation Areas data releases (2022, 2023, 2024), the data contained a "reGAP" field which assigned a single GAP status to the entire unit based on an 80% 30x30 Conservation Area threshold. If at least 80% of the unit was either GAP status 1 or 2, then the entire unit was assigned that GAP status. The entire unit was mapped as a 30x30 Conservation area, all acreage within the unit was counted toward the 30x30 Conservation Area network, and all features and habitats within that unit were considered conserved within these 30x30 lands for assessing representation and gaps.

This method resulted in both over- and under-estimates of lands that count towards 30x30. First, for units with between 80% and 99.9% GAP 1 or GAP 2 lands, this method overestimated the area by including all land area within the unit, even those areas that did not have the durability or management of GAP 1 or 2 lands. On the other hand, it undercounted lands that were less than 80% in GAP 1 or GAP 2 lands because it excluded all lands in those units even the portions that had the durability and management of GAP 1 or 2 lands. This 80% threshold and associated assumptions propagated through the habitat and feature composition and representation estimates.

The approach CNRA took to counting 30x30 Conservation Areas in 2025 was more precise for counting total acres. This approach did not use any threshold for inclusion of units, and instead, used the acreages of GAP 1 and GAP 2 lands within any unit, regardless of the proportional contribution of those acres to the unit. While the overall acreage count was more precise, it highlighted the ambiguity in feature and habitat composition and representation because the proportional GAP status is not spatially allocated and therefore, it cannot be known how much of any given habitat/feature is covered by the 30x30 conservation areas (Illustrated in Figure S1).

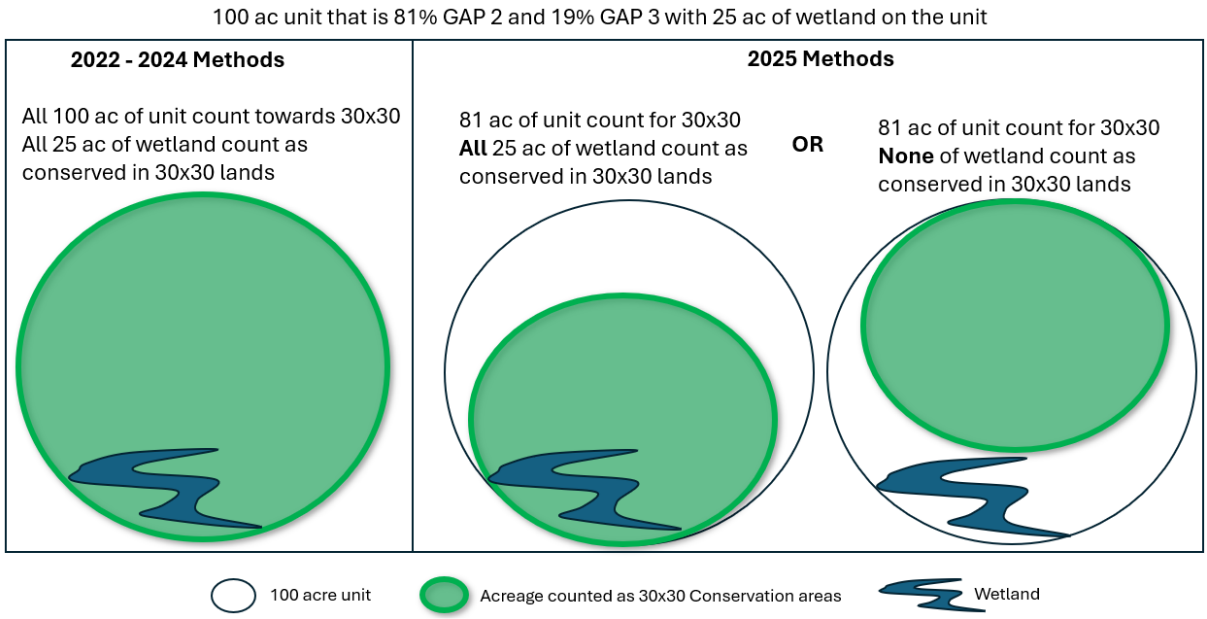
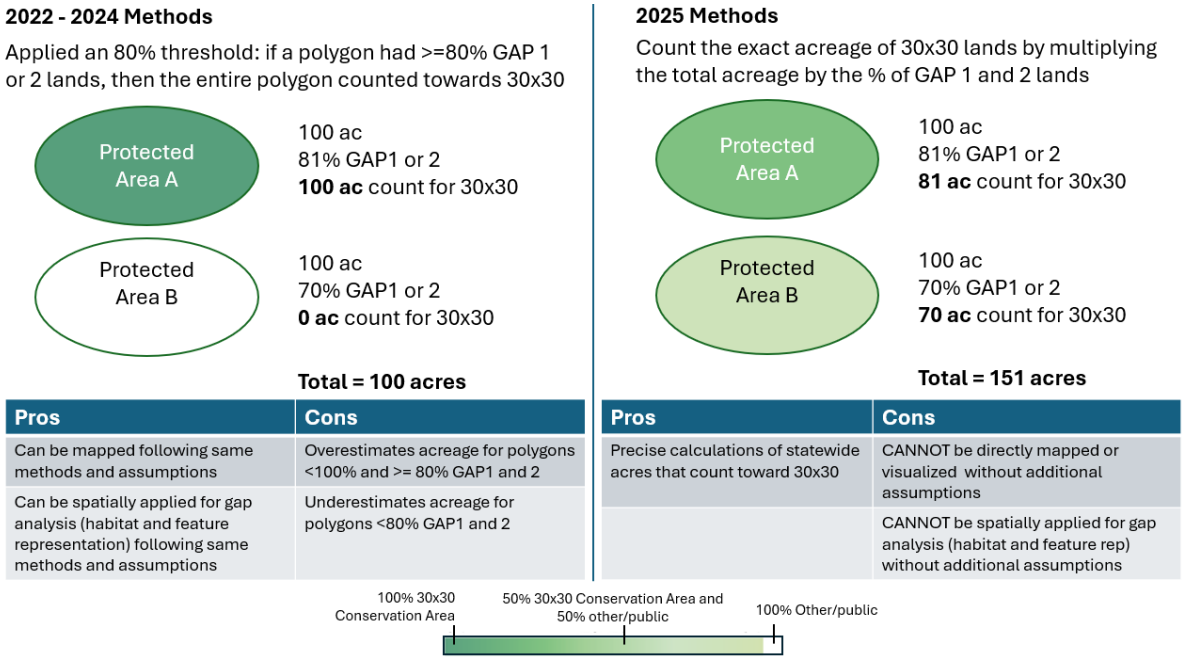


FIGURE S1. ILLUSTRATION OF THE CHALLENGE TO CALCULATING HABITAT/FEATURE REPRESENTATION THAT RESULTED FROM CHANGES TO THE APPROACH FOR CALCULATING 30X30 CONSERVATION AREA ACREAGE IN 2025. WITHOUT SPATIALLY DEFINED GAP STATUS CODES IT IS UNKNOWN IF ALL, NONE, OR SOME OF THE FEATURE IS COVERED BY 30X30 CONSERVATION AREAS.

To estimate habitat/feature composition and representation in a network of 30x30 Conservation Areas using CNRA's new approach (starting in 2025), it is necessary to make assumptions as to whether any and how much of any habitat/feature is covered by 30x30 Conservation Areas in units that have multiple GAP statuses. Figure S2 compares the assumptions and resulting estimates from the previous methodology (2022-2024) and the current methodology (2025) and describes pros and cons of each method.



Pros	Cons
Can be mapped following same methods and assumptions	Overestimates acreage for polygons <100% and >= 80% GAP1 and 2
Can be spatially applied for gap analysis (habitat and feature representation) following same methods and assumptions	Underestimates acreage for polygons <80% GAP1 and 2

Pros	Cons
Precise calculations of statewide acres that count toward 30x30	CANNOT be directly mapped or visualized without additional assumptions
	CANNOT be spatially applied for gap analysis (habitat and feature rep) without additional assumptions

FIGURE S2. COMPARISON OF THE 2022-2024 METHODS FOR CALCULATING 30X30 CONSERVATION AREA ACREAGE TO THE NEW APPROACH IN 2025.

To determine the impact of potential assumptions and develop a consistent and transparent methodology for estimating feature and habitat network composition and representation, we conducted a sensitivity analysis of different methods for estimating feature/habitat coverage by 30x30 Conservation Areas. We convened a small working group of CBN, TNC, DOC, and CNRA to develop and apply the sensitivity analysis methodology and review the results. The results of the sensitivity analyses were used to determine a method for calculating feature and habitat representation and gaps and network composition. These metrics will be used for CNRA's Biodiversity Explorer and the CBN Biodiversity Assessment 2025 report and subsequent reports.

Scenarios

Scenario 1: Minimum estimate: protected areas, and features within them, will only be counted and included as 30x30 lands if they are 99% in either GAP 1 or GAP2 lands. This results in a minimum estimate of network composition and feature and habitat representation. We used 99% to ignore edge effects/accounting errors.

Scenario 2: Lower estimate (80% cutoff): count the maximum possible acreage for all protected areas that are at least 80% in GAP 1 or GAP2. Maximum possible acreage means the total acreage of the feature unless it exceeds the acreage of the total acreage of GAP1 and GAP2 lands in that protected area, then the total acreage of GAP 1 or GAP 2 lands in that protected area would be used as the acreage for that feature within that protected area. None of the feature would be included if the protected area were less than 80% in GAP 1 or GAP2.

Scenario 3 Upper estimate (20% cutoff): count the maximum possible acreage for all protected areas that are at least 20% in GAP 1 or GAP2. Maximum possible acreage means the total acreage of the feature unless it exceeds the

acreage of the total acreage of GAP1 and GAP2 lands in that protected area, then the total acreage of GAP 1 or GAP 2 lands in that protected area would be used as the acreage for that feature within that protected area. None of the feature would be included if the protected areas were less than 20% in GAP 1 or GAP2.

Scenario 4: Maximum estimate: all protected areas with greater than 1% within GAP 1 or GAP 2 lands will be counted as included in 30x30 lands up to the maximum acreage, that is GAP 1 or GAP 2. For example, if a protected area is 100 ac and is 60% protected and has 50ac of oak woodland, we would assume all 50ac are protected. But if the same property were 30% protected, we would count only 30ac of the oak woodland as that would be the maximum amount if all the oak woodland were in GAP 1 or GAP2 lands.

Scenario 5: Proportional: all units are included and feature representation is multiplied by the proportion of lands in GAP 1 or GAP 2 combined. If there are 100 ac of wetland and 75% of the 10,000-ac conservation area is GAP 1 or 2, we will assume that 75 ac of wetlands are protected.

Scenario 6: Mapped. Use the reGAP field which CNRA uses to map 30x30 Conservation Areas and count the entire area of all habitats and features within the polygons that are mapped as GAP 1 or GAP 2. reGAP is set based on the GAP status with the largest percentage of the unit and is intended primarily for cartographic use.

For each scenario, first, the subset of units included in the scenario is identified based on thresholds or rules (e.g., >99%, >80%, >20%, >1%, or reGAP equal to 1 or 2). Every scenario except the proportional scenario is based on a subset of conservation area units. The proportional scenario uses the full set of conservation area units. Next, within each unit in the subset, the potential acreage of the habitat/feature covered by 30x30 Conservation Areas is calculated. Last, the estimated habitat/feature acreage for each unit is summed for all relevant units.

For the minimum, lower, upper, and maximum scenarios, for each habitat/feature within each included unit, we calculate the maximum potential habitat/feature included. This value is calculated as the minimum of either the total habitat/feature acreage or the total acreage of GAP 1 and GAP 2 lands combined. Total habitat/feature coverage for a single habitat/feature (e.g., oak woodlands) cannot therefore exceed the combined acreage of GAP 1 and GAP 2 lands for that unit. However, because we are using the full potential acreage for each habitat/feature, the combined habitat/feature acreage (e.g., conifer forests and oak woodlands) could exceed the combined acreage of GAP 1 and GAP 2 lands. For example, a 100-ac unit that is 25% within GAP 1 or 2 lands, has 50 ac of oak woodland and 50 ac of conifer forest. The maximum amount of the 50ac of oak woodland that could count toward 30x30 Conservation areas is 25 ac (i.e., the minimum of the habitat acreage and the 30x30 acreage). The maximum amount of the 50 ac of conifer forest that could count toward 30x30 Conservation areas is 25 ac. We allow each habitat to count the maximum potential coverage (25 ac) even though the total across both habitats is double the total 30x30 Conservation Area lands for that unit.

For the proportional estimate, within each unit, first we multiplied the proportion of a unit that is considered a 30x30 Conservation Area by the acreage of the habitat/feature within that unit to get the estimate of the habitat/feature acreage within the 30x30 lands for that unit. For example, if a unit had 75% of its area managed as 30x30 Conservation Areas (i.e., GAP 1 or GAP 2), the acreage of each habitat/feature extent within the unit would be multiplied by 0.75 to estimate the amount of each habitat/feature potentially within the 30x30 Conservation Area portion of that unit.

For the mapped estimate, we summed all habitat/feature acreage within the subset of units and did not use GAP status proportions once the subset of 30x30 Conservation areas was determined (i.e., using the reGAP field which was determined by the majority area in a GAP status code).

Table S1 compares the six scenarios including comparison of which units are included, method for calculating habitat/feature coverage, and for an example network consisting of two units, A and B, the total estimated oak woodland covered by 30x30 Conservation Areas within each unit and for the network to illustrate the implications of assumptions on habitat/feature coverage estimates.

Table S1. Sensitivity analysis scenarios and a comparison of which units are included in each scenario, method for calculating habitat/feature coverage, and the total estimated oak woodland covered by 30x30 Conservation Areas in a hypothetical network of two conservation area units.

Scenarios	Polygons Included	Acreage Counted	Example A 100 ac property 50 ac of oak woodland 85% protected	Example B 100 ac property 50 ac of oak woodland 25% protected	Total Oak woodland from examples
Scenario 1: **Minimum Estimate**	>99% in GAP 1 or 2	Total acreage of feature in subset	0 ac	0 ac	0 ac
Scenario 2: Lower estimate	>80% in GAP 1 or 2	Minimum of: -Total acreage of feature OR -Total acreage of GAP1&2 lands	50 ac oak woodland	0 ac	50 ac
Scenario 3: **Upper estimate**	>20% in GAP 1 or 2	Minimum of: -Total acreage of feature OR -Total acreage of GAP1&2 lands	50 ac oak woodland	25 ac oak woodland	75 ac
Scenario 4: **Maximum Estimate**	>1% in GAP 1 or 2	Minimum of: -Total acreage of feature OR -Total acreage of GAP1&2 lands	50 ac oak woodland	25 ac oak woodland	75 ac
Scenario 5: Proportional estimate	All polygons	Total feature acreage is discounted by the total % in GAP1&2 lands	42.5 ac oak woodland	12.5 ac oak woodland	55 ac
Scenario 6: Mapped lands	Polygons mapped in CA Nature Conservation Areas explorer	Total acreage of feature in subset	50 ac oak woodland	0 ac oak woodland	50 ac

For each scenario, we calculated the total units included, the total acreage of 30x30 conservation lands, the difference between the scenario acreage total and the official 2025 30x30 Conservation Areas acreage (i.e.,26,471,461ac), and the total acres of each FVEG CWHR13 habitat (CAL FIRE, 2024) estimated within the 30x30 Conservation Area network. We estimated the maximum range in uncertainty as the difference between the minimum and maximum scenarios and determined how the proportional scenario compared both to the other scenarios and to 2024 results.

Analysis Results

Each approach includes a different subset of units in the analysis, and the number of units varies from 14,624 in the minimum estimate to 18,372 (all polygons) in the proportional estimate. The overall acreage estimate of 30x30 Conservation Areas is also somewhat variable with approach (Table S2), with the minimum scenario under-estimating overall acreage of 30x30 Conservation Areas by nearly 1.2 million acres and the maximum scenario over-estimating overall acreage by more than 700 thousand acres.

Table S2. Sensitivity analysis scenarios and a comparison of the number of conservation units that are included in each scenario and their overall acreage.

Scenarios	Polygons Included	Total Polygons Included	Total Acreage of included polygons	Total acreage difference from 2025 Conservation Area acreage
Scenario 1: Minimum Estimate	>99% in GAP 1 or 2	14, 624	25,293,048	Underestimate by 1,178,413
Scenario 2: Lower estimate	>80% in GAP 1 or 2	16,993	26,326,624	Underestimate by 144,837
Scenario 3: Upper estimate	>20% in GAP 1 or 2	17,532	26,796,856	Overestimate by 325,395
Scenario 4: Maximum Estimate	>1% in GAP 1 or 2	18,017	27,192,007	Overestimate by 720,546
Scenario 5: Proportional	All polygons	18,372	26,471,461	NA
Scenario 6: Mapped lands	Polygons mapped in CA Nature Conservation Areas explorer	17,301	26,387,676	Underestimate by 83,785

The range in scenario estimates (i.e., the maximum scenario estimate minus the minimum scenario estimate) for 5 of the 13 land cover/ habitat types was less than 0.9%, which was the interannual change in percent of 30x30

Conservation Areas between 2024 and 2025 (Table S3). For context, the interannual change in % of each landcover type or habitat in 30x30 Conservation Areas was less than or equal to 0.9% for all habitat types except desert shrub and barren/other. The narrower ranges between scenarios for these 5 habitat/landcover types indicate more certainty in estimates for conifer woodland, desert shrub, desert woodland, urban, and agriculture. For conifer forest and woodland and barren/other, the range in estimates is slightly greater (1%-1.6%) than the interannual difference of 0.9%, for grassland, wetland, and shrub the range was more than double the interannual difference, and for hardwood woodland and water, the range was more than 3 times the interannual difference, indicating more potential uncertainty in representation estimates for these habitat/landcover types.

The biodiversity assessment framework uses representation cutoffs to determine if a habitat/feature is under-represented (<20% in 30x30 Conservation areas), slightly under-represented (in 2025, 20-26.1% in 30x30 Conservation Areas), or on par (in 2025, >=26.1% in 30x30 Conservation Areas). Shrub, which is sensitive to assumptions in the approach, is slightly under-represented in the minimum estimate, but is on par with state conservation levels in every other scenario. Similarly, water is under-represented in the minimum scenario but is only slightly under-represented in every other scenario. Because the minimum estimate was evaluated to determine the absolute minimum representation, but is unlikely to be a true estimate because it doesn't include any units with proportionally assigned GAP status (i.e., excludes >3,000 units that have 30x30 Conservation Areas), we conclude that the representation framework results for major habitats are robust to approach assumptions even though the absolute values and percentages cannot be known with certainty.

Table S3: Representation of landcover / habitat types (FVEG WHR13, CAL FIRE 2024) as percentages of each landcover / habitat statewide that is within 30x30 Conservation Areas as defined by the assumptions of each of the six scenarios.

	Scenario 1: Minimum Estimate (>99% GAP1or 2)	**Scenario 2: Lower estimate 80% (GAP1or 2) cutoff**	**Scenario 3: Upper estimate 20% (GAP1or 2) cutoff**	**Scenario 4: Maximum Estimate (>1% GAP1or 2)**	**Scenario 5: Proportional**	**Scenario 6: Mapped lands**	**Range in % from minimum to maximum estimates**
Conifer Forest	23.0	24.1	24.2	24.2	24.1	24.1	1.2
Hardwood Forest	20.4	21.5	21.9	22.0	21.6	21.5	1.6
Herbaceous	14.3	15.8	16.0	16.1	15.9	15.9	1.8
Shrub	25.4	27.0	28.0	28.0	27.8	27.2	2.6
Wetland	44.4	46.3	46.6	46.9	46.4	46.5	2.5
Barren/Other	50.9	51.7	51.7	51.9	51.7	51.7	1.0
Urban	0.5	0.7	0.8	0.8	0.7	0.7	0.3
Water	15.4	21.3	21.6	22.1	21.5	21.5	6.7

Agriculture	2.1	2.3	2.4	2.4	2.3	2.3	0.3
Hardwood Woodland	11.0	13.4	14.0	14.1	13.6	13.6	3.1
Conifer Woodland	33.2	33.2	33.3	33.3	33.3	33.3	0.1
Desert Shrub	47.9	48.2	48.3	48.3	48.2	48.3	0.4
Desert Woodland	56.3	56.6	56.6	56.8	56.6	56.6	0.5

We hypothesized that the proportional scenario would be the most appropriate to include as the primary estimate in the Biodiversity Assessment and the CA Nature Explorer. For nearly all land cover types / habitats, the proportional scenario estimate was between the lower (80% threshold) and upper (20% threshold) estimates (Table S3). For shrub, the proportional scenario estimate was between the upper estimate and the maximum scenario. For all habitat types, proportional estimates were closer to the maximum estimate than the minimum estimate (Table S4). However, we believe that this does not indicate that all estimates are more likely overestimates, but rather that the minimum is further from the true coverage value due to the exclusion of so many partial polygons.

The Proportional Scenario estimates an increase in coverage between 2024 and 2025 for all habitat and land cover types except for wetland, water, and desert woodland (Table S4). Not only did the methods change between 2024 and 2025, but some polygon geographies also changed as a result of data improvements and changes to data sources. Observationally, those changes were likely the reason for these decreases.

Table S4: Representation of landcover / habitat types (FVEG WHR13, CAL FIRE 2024) as percentages of each landcover / habitat statewide that is within 30x30 Conservation Areas as defined by the proportional approach and the difference between that estimate and the minimum and maximum estimates for 2025, and the representation values for 2024.

	Proportional Scenario % in 30x30 Conservation Areas	**Proportional scenario difference from: Scenario 1:** **Minimum Estimate**	**Proportional scenario difference from: Scenario 4:** **Maximum Estimate**	**Proportional estimate difference from 2024 representation levels**
Conifer Forest	24.1	1.1	0.1	0.9
Hardwood Forest	21.6	1.2	0.4	0.6
Herbaceous	15.9	1.6	0.2	0.9
Shrub	27.8	2.4	0.2	0.4
Wetland	46.4	2.0	0.5	-0.5
Barren/Other	51.7	0.8	0.2	2.9
Urban	0.7	0.3	0.1	0.0
Water	21.5	6.1	0.4	-0.1

Agriculture	2.3	0.2	0.1	0.1
Hardwood Woodland	13.6	2.5	0.5	0.9
Conifer Woodland	33.3	0.1	0	0.2
Desert Shrub	48.2	0.3	0.1	1.7
Desert Woodland	56.6	0.2	0.2	-0.5