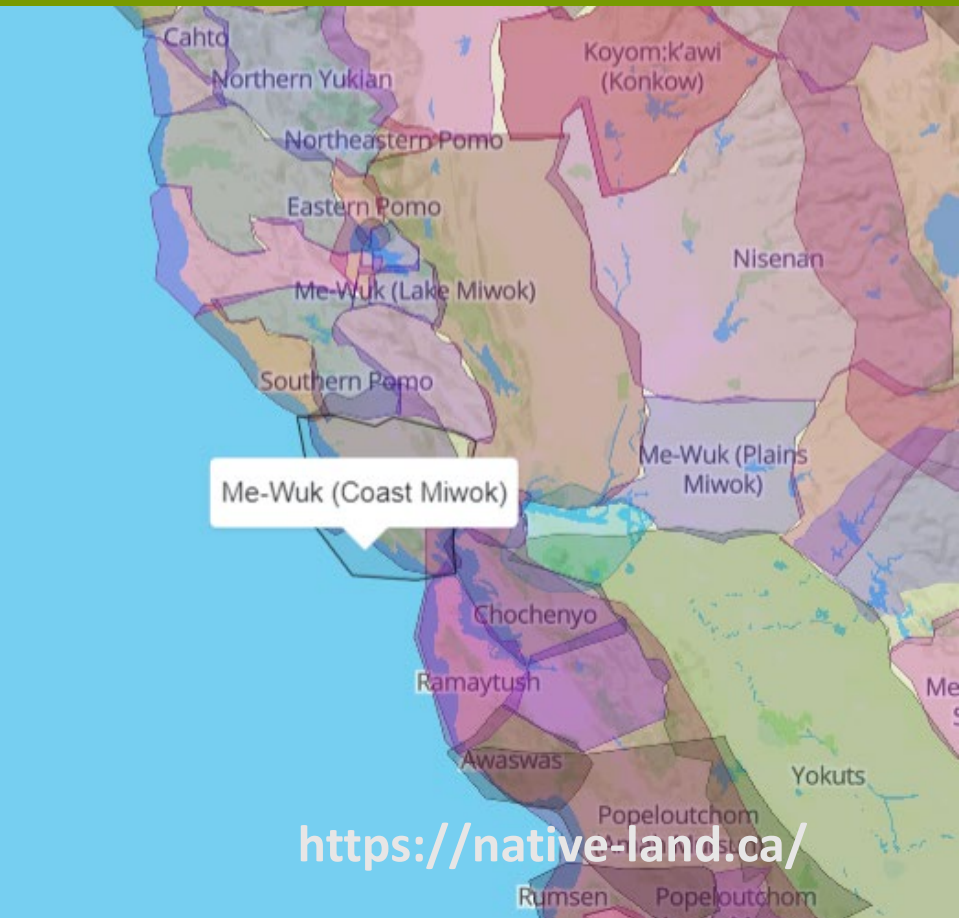
All things to all people

Opportunities to deliver on the promise of 30x30 and “nature-based solutions”

California Native Plant Society

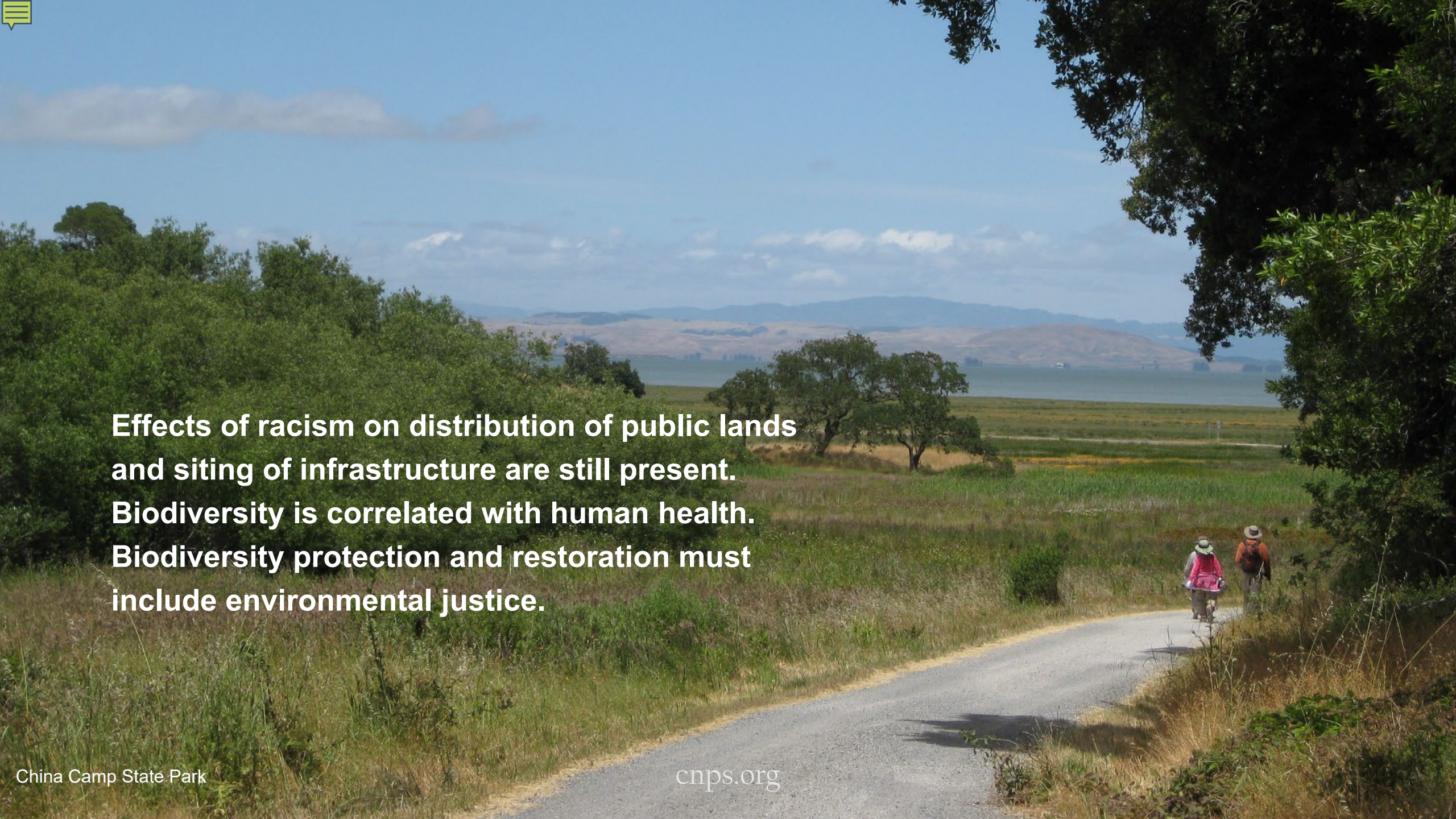
THE LAND INCLUDING MOUNT TAMALPAIS IS COAST MIWOK. I AM SPEAKING TO YOU FROM CHOCHENYO OHLONE LANDS.

HTTPS://GRATONRANCHERIA.COM/



CALIFORNIA WAS FOUNDED ON THE ERADICATION OF DIVERSITY IN THE SERVICE OF GREED

- 1848 CA to US as spoils of Mexican-American War
- California's 1850 Act for the Government and Protection of Indians
  - Criminalized loitering and vagrancy
  - Allowed for forced servitude, kidnapping, mass capture and sale of children after killing their parents
  - 14th Amendment nullified much of the law in 1866
- From 1851-2 the federal government negotiated 18 treaties with 139 tribes in California
  - 7.5-8.5 million acres set aside in reservations
  - California senators stalled treaties in secret
  - 1905 began Rancheria creation, 61 totaling 7,500 acres
  - Tribal populations plummeted 85% btwn 1850-1890


Effects of racism on distribution of public lands and siting of infrastructure are still present.
Biodiversity is correlated with human health.
Biodiversity protection and restoration must include environmental justice.
China Camp State Park
cnps.org

BIODIVERSITY IS THE VARIETY OF LIFE AT ALL SCALES, RANGING FROM GENES TO SPECIES TO WHOLE ECOSYSTEMS

CALIFORNIA BIODIVERSITY ROADMAP, 2018

OUR PATH TODAY

The Decade of Biodiversity
- Aichi Targets
- State Biodiversity Initiative
- Biodiversity Roadmap
- October 2020 Executive Order

Understand-Protect-Manage
- Maps as baseline information
- Prioritizing sites and species
- Integrating monitoring and management

Access is only one part of equity
- Meaningful engagement
- Reciprocal learning

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use

Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building

How many of you have heard of the Paris Agreement?

How many of you have heard of the Aichi Targets?

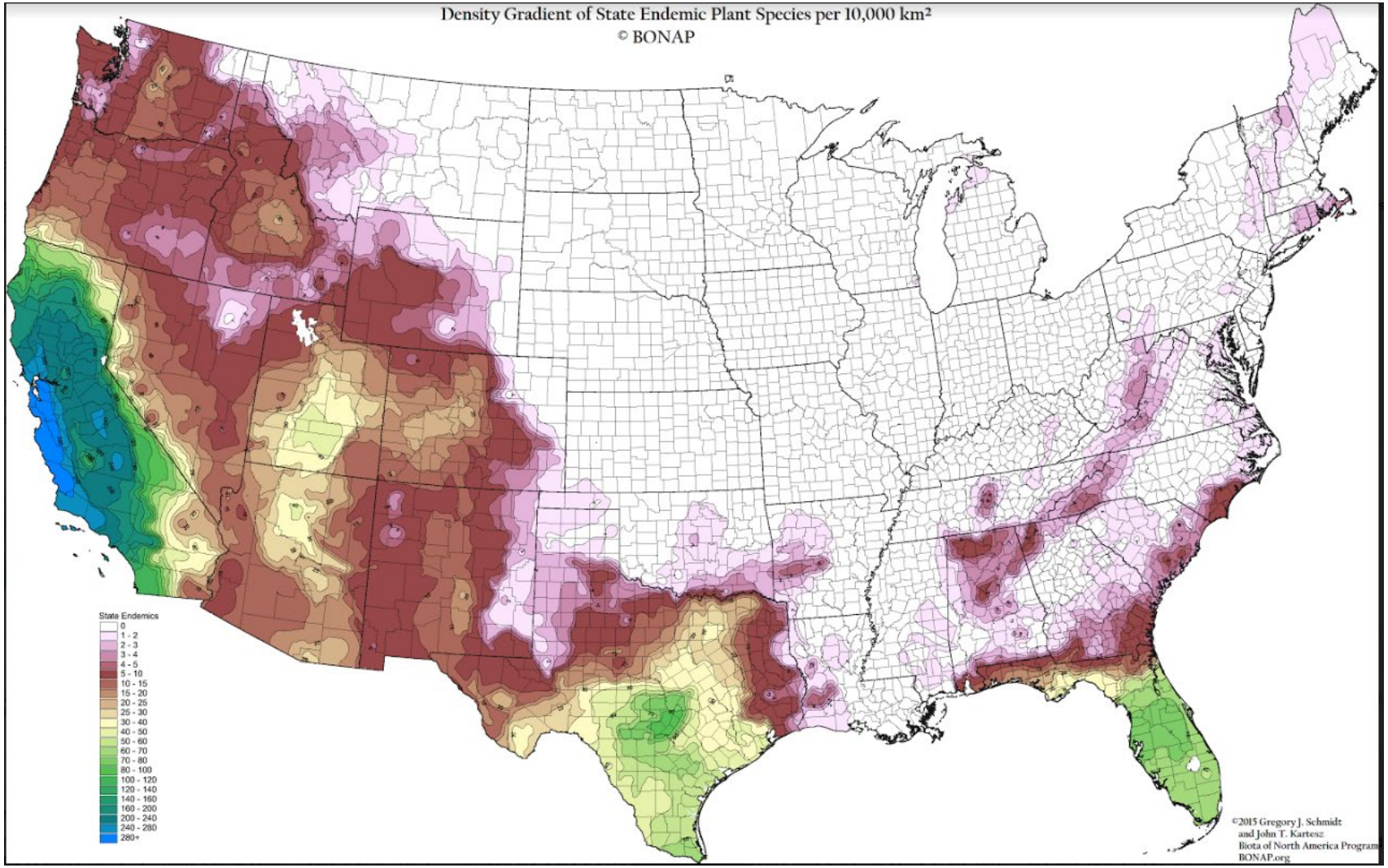
Mt Diablo from Mt Tamalpais


MAYBE GLOBAL TARGETS ARE TOO BIG?
Antelope Poppy Reserve
cnps.org

CALIFORNIA IS A GLOBAL BIODIVERSITY HOTSPOT

California has more biodiversity than any other state in the US.

Over 1,300 plant species grow here and nowhere else in the world.



Reflecting pool

CALIFORNIA BIODIVERSITY INITIATIVE AND ROADMAP

A Charter to Secure the Future of California's Native Biodiversity

In 2017, Governor Brown assembled a team of California biodiversity experts to draft a charter on native plant biodiversity conservation

Charter Adopted, Executive Department, State of California: September 2018

Executive Order B-54-18

September 7, 2018 Governor Brown signed an executive order to establish the California Biodiversity Initiative

Directs Secretaries of Agriculture and Natural Resources to work together

- Promote deeper understanding of threats
- Protect native vegetation
- Manage and restore natural and working lands and waters
- Explore financing to achieve these goals

Directs state agencies to work together and in partnership to achieve goals

Declares September 7th as California Biodiversity Day

californiabiodiversityinitiative.org


Fragrant fritillary on Nicasio Ridge

A FOCUS ON MULTIPLE BENEFITS AND WORKING LANDS

Executive Order N-82-20

October 7, 2020 Governor Newsom signed an executive order to combat the **climate and** biodiversity crises

1. Directs California Natural Resources Agency to work with Department of Food and Agriculture, Cal. EPA and other agencies to establish the California Biodiversity Collaborative with stakeholders, analyze efforts and engage others
2. Conserve at least 30% of California's land and coastal waters by 2030, with a strategy by February 1, 2022
3. California Natural Resources Agency directed to prioritize multi-benefits projects, streamline approvals for projects, collaborate with researchers and tribal partners, and participate in regional, national, and international efforts
4. Department of Food and Agriculture directed to coordinate on reinvigorating pollinator populations, control invasive species, and enhance soil health
5. State agencies shall identify and implement actions to accelerate natural removal of carbon and build climate resilience

6.-8. Develop a Natural and Working Lands Climate Smart Strategy and incorporate this into agency Scoping Plan processes

https://www.gov.ca.gov/wp-content/uploads/2020/10/10.07.2020-EO-N-82-20-.pdf

Sargent cypress along San Geronimo Ridge

cnps.org

Establish the California Biodiversity Initiative Working Group

Cross-agency working group co-chaired by California Departments of Food and Agriculture and Fish and Wildlife

Institutionalize and Maintain Support for the California Landscape Conservation Cooperative

Ensure continuity of the California Landscape Conservation Cooperative

AREA 1: HELP GOVERNMENT COORDINATE ON BIODIVERSITY GOALS

Prioritize Actions Around Biodiversity and Align Landscape-scale Planning with Biodiversity Goals

Align large-scale planning with biodiversity goals; manage working lands for co-benefits

Update Relevant Strategic Plans to Include Biodiversity Goals

Plans such as the Wildlife Conservation Board's Strategic Plan should align with biodiversity goals when updated

Establish the California Biodiversity Collaborative

California Natural Resources Agency work with Department of Food and Agriculture, Cal. EPA and others to establish the CA Biodiversity Collaborative

Write Natural and Working Lands Climate Smart Strategy

CNRA and others shall develop a Natural and Working Lands Climate Smart Strategy that serves as a framework to advances the State's carbon neutrality goal and builds climate resilience. (By Oct 2021)

AREA 1: HELP GOVERNMENT COORDINATE ON CLIMATE AND BIODIVERSITY GOALS

Prioritize Actions Around Climate and Align Landscape-scale Planning with Climate Goals

Align large-scale planning with climate goals; manage working lands for co-benefits

Update Scoping Plan to Include NWL CSS

California Air Resources Board shall consider the Natural and Working Lands Climate Smart Strategy and science-based data to update the target for the natural and working lands sector for the State's carbon neutrality goal.

AREA 2: IMPROVE OUR UNDERSTANDING OF CALIFORNIA'S BIODIVERSITY

Oak tree inosculation

DEVELOP PRIORITIES FOR MONITORING

Update Natural Heritage Ranks
Identify Important Plant Areas

MAKE DATA AND TOOLS TRANSPARENT AND READILY AVAILABLE

State agencies work together to publish clearinghouses for monitoring data
State agencies develop a network of monitoring sites
Advance community science efforts

Monitoring at Pine Mountain

Oak tree inosculation

AREA 2: IMPROVE OUR UNDERSTANDING OF CALIFORNIA'S BIODIVERSITY

ESTABLISH A BASELINE

Collect existing data on biodiversity and management

Analyze and project impact of climate change and other stressors

COMMUNICATE ABOUT EFFORTS

Expand the communication and use of information, indicators and tools to monitor, track and protect California's biodiversity and natural resources

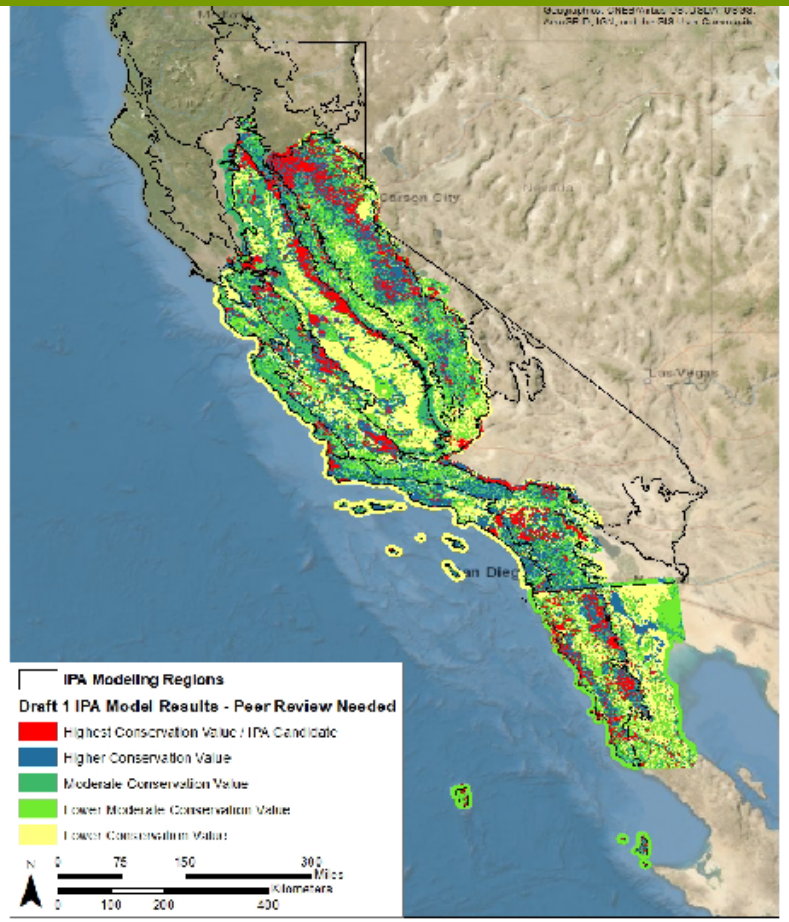
Engage stakeholders across California's diverse communities

Monitoring at Pine Mountain

Sargent cypress along San Geronimo Ridge

cnps.org

PROTECTING IMPORTANT PLANT AREAS



Draft IPA Model Results. All draft regions require additional webinars to engage regional experts for peer-review, reiteration, completion of threats analysis, and final comment and reiteration prior to publication. Baja California will be the first region completed by the end of 2020.

PLANT DATA NOT FULLY INTEGRATED

Many priority protection programs don't incorporate plants into planning

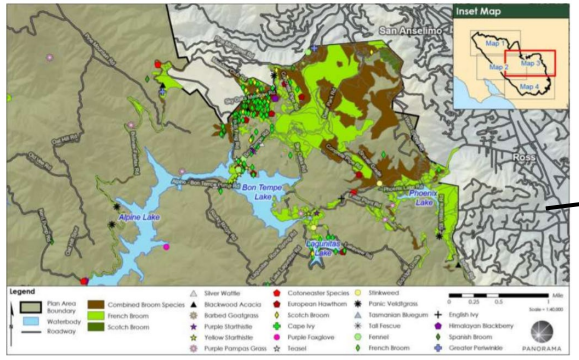
Important Plant Area program of CNPS combines input of multiple types:

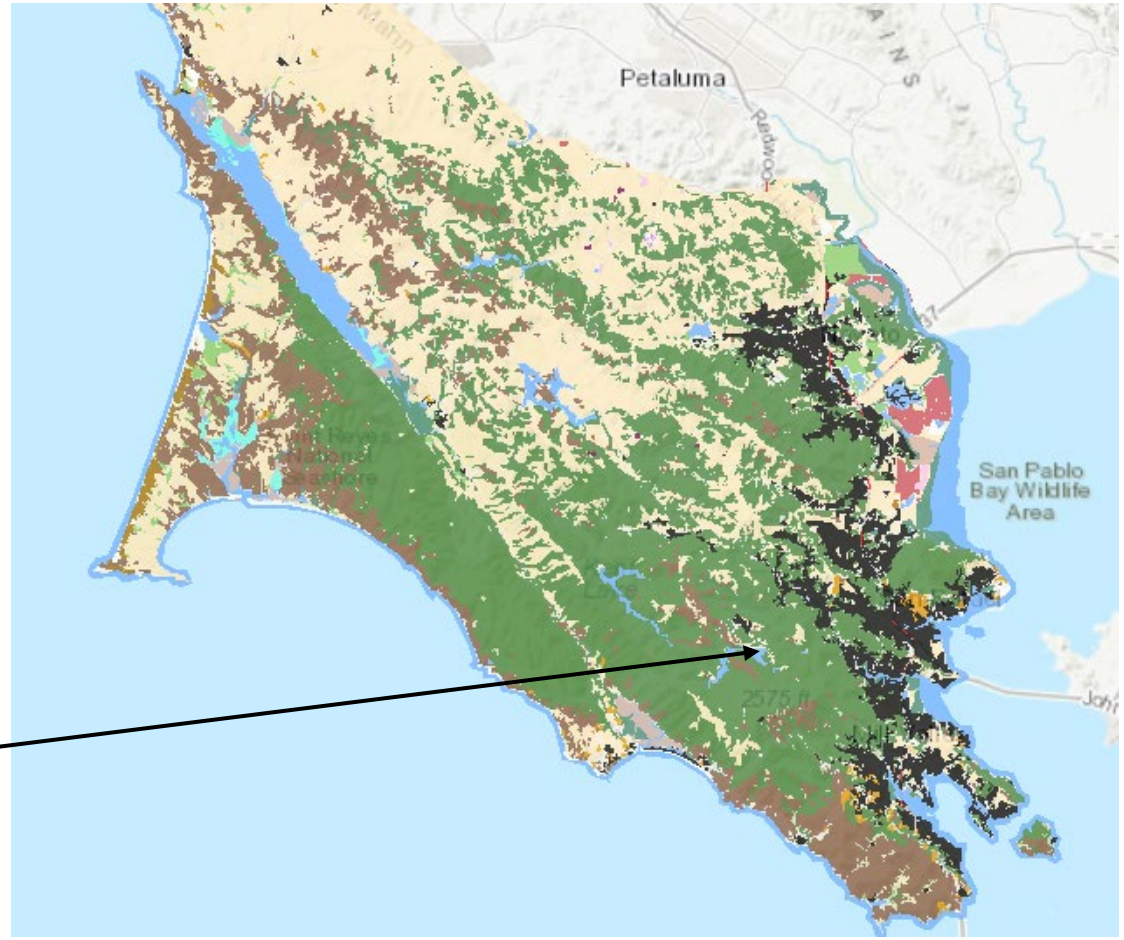
- Rare plant species
- Rare vegetation types
- Significant vegetation types (wetlands, e.g.)
- Botanically significant areas (areas of high species richness, culturally significant plants)

2022 target release date; CNPS working on Threats and Opportunities analysis and Cal-IPC working on climate change vulnerabilities for 50 listed native plant species and sensitive species hotspots in central coastal CA based current invasive species stressors and future climate change scenarios

WHAT'S WHERE?

- ✓ Fine-scale vegetation maps: Help identify connectivity and landscape-scale patterns; about half the state has been mapped
- ✓ Rare species and communities locations: Know what habitats need protection; CDFW needs to update CNDDB and rare spp and veg
- ✓ Areas most vulnerable to climate stress: Wetlands, near-shore, alpine, range-edge plants
- ✓ Invasive species: Widespread stressors and incipient problems

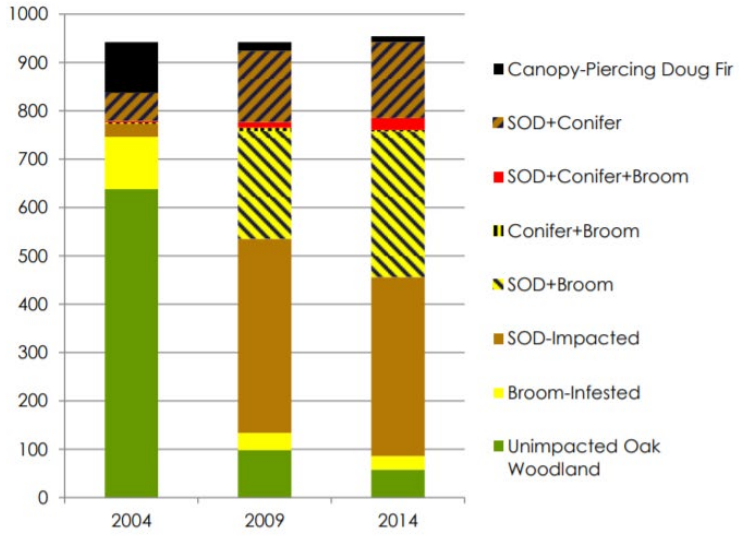




OVERLAY FOR A MORE COMPLETE PICTURE

- ✓ What areas have multiple stressors?
- ✓ Where can management alleviate these?

Oak woodlands—mostly coast live oak—are being impacted by SOD, broom, and conifer encroachment



- ✓ With invasive plant management a top concern, and resources limited, how can we be most effective?
  - ➢ Prevention and early detection
  - ➢ Working together against weeds
  - ➢ Prioritizing sites and species
  - ➢ Monitoring and communicating

Species Lost, Found, and on the Edge of Gone on Mt. Tamalpais

WILLIAMS, A.[1], YOUNG, A.[2], GOSLINER, T.[2], KLEIN, J.[1], WHELAN, S.[1]

[1]Marin Municipal Water District, 220 Nellen Avenue, Corte Madera, CA 94925

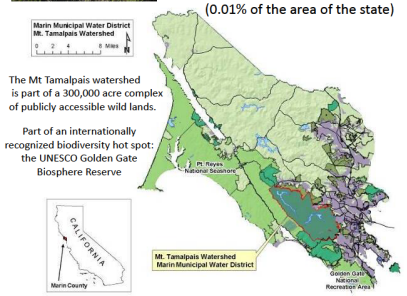
[2]California Academy of Sciences, 55 Music Concourse Drive, Golden Gate Park, San Francisco, CA 94118

INTRODUCTION

Mt. Tamalpais in Marin County is a well-botanized site with a legacy of over 3700 specimens collected since the 1840's. The Marin Municipal Water District (MMWD) has stewarded most of the land in the Mt. Tamalpais Watershed over the past 100 years. To mark its centennial, MMWD partnered with the California Academy of Sciences on a series of bioblitzes to document the flora of the Mt. Tamalpais Watershed using teams of citizen science volunteers and professionals. The project was partially funded through a year-long planning grant from the S.D. Bechtel, Jr. Foundation to answer real research questions about California biodiversity. The project has continued through 2016, now as "safari" hunts, as more plants remain to be found.

More than 50% of Marin's flora is found in the watershed (only 12% of the area of Marin County)

15% of California's flora is found on watershed lands (0.01% of the area of the state)



THE GOALS

Document current state of flora on Mt. Tamalpais.
Fill taxonomic gaps in collections.
Establish benchmark for exploring shifts in the flora.
Increase local expertise and engagement.

THE METHODS

Volunteers with botanical or photography skills were recruited and trained in specimen collection and pressing, data recording, and photodocumentation.

Organizers formed teams based on interests, skills, and experience of members. After a morning refresher on methods, teams gathered their tools and packets and head to their site.

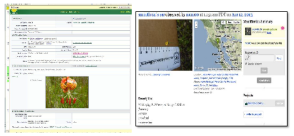
Uncollected reproductive plants were **photographed and collected**; others just photographed.

The team spends about **4 hours in the field**, then returns to base.

Back at base, plants are transferred from field presses to plant presses, arranged and given better ID if needed.

As we searched for fewer, more cryptic or rare species, we switched to roving "safari" mode with fewer people.

Dwarf pearlwort (*Sagina apetala*) tops out at 3 inches tall, and wasn't found until 2016.



We used both **Calflora and iNaturalist** in different years to turn photos into georeferenced observations with notes on abundance and habitat.

Comparison to historic data

- Searched Consortium of California Herbaria[3] records for "Tamalpais"
- Adjusted records as able to Jepson II nomenclature, combined some non-recognized taxa (822 taxa to 737 taxa)
- Assigned taxa to native, non-native, or unknown status

"Likely Extirpated" list

- Reviewed 1970 "Marin Flora" for taxa noted on MMWD lands but not on MMWD species list
- Reconciled names as able to Jepson II nomenclature and dropped synonyms
- Reviewed additional sources (Calflora, CCH, iNaturalist) and local experts

The "Locally Rare" list includes natives with fewer than 3 known populations.

[3]Data provided by the participants of the Consortium of California Herbaria (ucjeps.berkeley.edu/consortium/)

Pairing Old and New Methods
Herbarium specimen collection is a centuries-old technique to document plant occurrences. New methods such as geotagged digital photography circumvent the old problem of poor location data which plague older specimens.

THE RESULTS

Bioblitz Totals:
2394 observations

- Of 837 taxa
- Representing 114 plant families
- 1417 specimens
- Representing 826 taxa

- Between 60 and 70 plant taxa appear to have been extirpated from MMWD lands
- We are "adding" non-native species to our list at twice the rate of natives
- An additional 210 species appear to have three or fewer populations

Pre-2012 collections
- 130/3735 specimens (3%) and
- 73/737 taxa (10%) non-native

Blitz collections
- 369/1344 specimens (27%),
- 220/792 taxa (28%) non-native

Early medick (*Medicago praecox*) is a typical new weed.

Reason	Taxa Added	Taxa Dropped	Unsubstantiated Taxa
Observation	115		
Mistaken id	1		
Name change	14	16	
Unrecognized hybrid		2	
No records from area		9	
Prospective rare species		7	
Prospective nonnative species		1	
Presumed extirpated		2	
Records	17		5
			95
Grand Total	147	37	100

70 of 115 "true" adds from surveys are non-native.
100 of 1021 taxa remain unsubstantiated.

Lifeform	Rare	Moisture-dependent	Fire-follower	None of the Above
Annual	6	10	5	12
Fern		3		
Perennial	6	18	1	5
Shrub, Tree	1	1	1	4
Grand Total	13	32	8	21
% of Total	19%	48%	12%	31%

Likely Extirpated taxa skewed to wet and open sites; 1/5 were already rare. Locally rare species appear similar in habitat and lifeform.

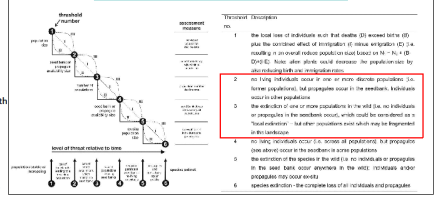
Lifeform	Open areas	Rock outcrops	Chaparral	Chaparral, riparian	Wetlands	Grasslands	Woodlands	Forest gaps	Forests	Grand Total	% of Total
Annual	3		7		6	14	1			31	46%
Fern					2				1	3	4%
Perennial	1	1	1		13	5		2	2	25	37%
Shrub, Tree			3	1				2	2	8	12%
Grand Total	4	1	11	1	21	19	1	4	5	67	100%
% of Total	6%	1%	16%	1%	31%	28%	1%	6%	7%		

THE DISCUSSION

Creating Useful Benchmarks
Many studies, including this one, are using herbarium specimens as a way of looking back, to compare present-day data on phenology or distribution. This project highlights some of the historic lack in location specificity and taxonomic breadth that plague such comparisons, and offers a true benchmark against which future change may be measured.

The **first Tamalpais collection** of Canada goldenrod (*Solidago elongata*); only the sixth specimen for Marin.

Alien plant invasions and native plant extinctions: a six-threshold framework
Paul O. Downey and David M. Richardson, in AoB Plants 2016
http://aobpla.oxfordjournals.org/content/8/plw047.full



Implications of Extirpation
The below-posited framework of extinction thresholds shows extirpation as halfway to extinction. While proposed as a way to look at rare species, it is cautionary for our extirpated and locally rare plants.

Enchanter's nightshade (*Circaea alpina* ssp. *pacifica*) ©2013 Debra L. Cook
Plants abound less than 1km NW of MMWD lands but the last Tamalpais record is from 1939.

West and North
Many of the extirpated species have healthy populations remaining to the north and west, suggesting climate change may already be affecting our flora.

Annual checkerbloom (*Sidalcea calycosa* ssp. *calycosa*) is locally rare: found in a single wet meadow, it also shows up in CNDDB as rare ssp. *rhizomata*, a lump/split error.

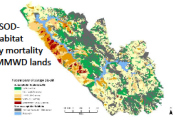
Likely List Issues
The historic lack in specimen location specificity and taxonomic breadth, coupled with limited record access and potential misidentifications reduce confidence in the "Likely Extirpated" species list. "Locally Rare" species may be under-mapped, but concerted efforts will be made to find and document them.

Hotspots of Rarity: Extirpated and locally rare species cluster in a few species-rich sites

Gairdner's yampah (*Perideridea gairdneri* ssp. *gairdneri*) is one of 16 rare or locally rare plants found at one diverse site.

Involving Citizen Scientists
Over the course of 30 events, we involved over 200 volunteers in nearly 3,500 hours of plant species documentation. Through thoughtful team formation—pairing expert with novice, repeat with newcomer; assigning tasks and tapping into existing skills—everyone was able to learn, teach, and produce useful information.

Axes of Extirpation
Habitat preferences of extirpated and locally rare species suggest possible causes:
Climate change, invasive plants, loss of fire, and forest micro-climates and structure altered by disease (Sudden Oak Death)

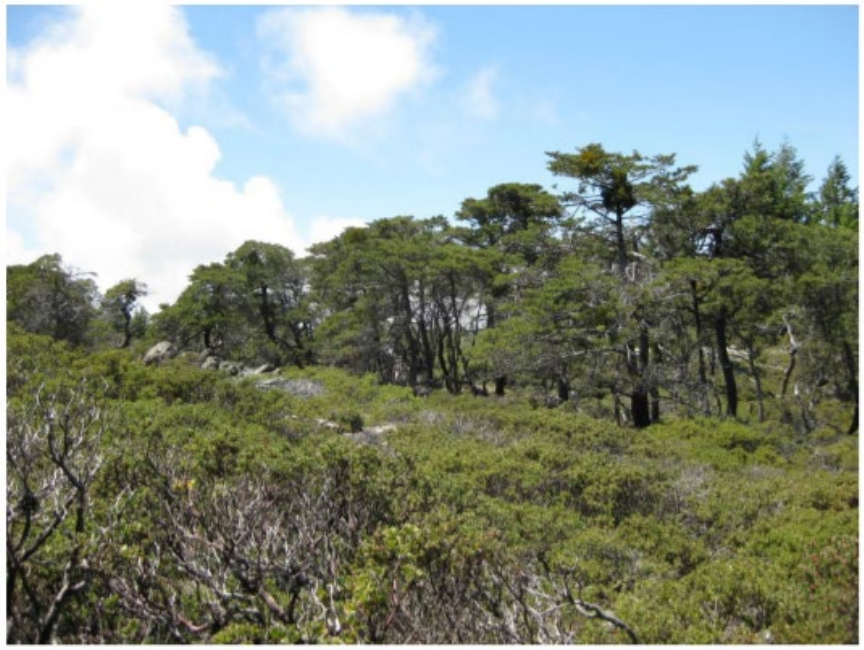


Pacific dogwood (*Cornus nuttallii*) Photo by Albert Everett Wieslander and the Marian Koshland Bioscience and Natural Resources Library, U.C. Berkeley, www.lib.berkeley.edu/BIOS/vtm/ from Laurel Dell on MMWD lands. Possibly planted in the late 1800's, now dead without offspring. The site has been altered by Douglas-fir invasion, weeds, and Sudden Oak Death.

ACKNOWLEDGEMENTS: Many thanks to the S.D. Bechtel, Jr. Foundation for initial funding, and to superstar volunteers Clint Kellner, Doreen Smith, Frederic Leist, Paul DaSilva, Mary Ellen Hannibal, Marguerite Murphy, Peter Suri, Sharon Tsui, Carol Haggerty, Robert Brostrom, Elizabeth Brusati, and Robin Truitt, and thanks to all our volunteers from the field to the herbarium to the computer!

IMPROVE OUR UNDERSTANDING OF BIODIVERSITY

- Community science project with California Academy of Sciences
- Multi-year survey of plants, supported by herbarium specimens, photos, public database records
- Allows for exploration of range shifts, locally rare species



MARIN MUNICIPAL WATER DISTRICT
RARE PLANT INVENTORY UPDATE

MAY 1, 2019
ADDENDUM JULY 8, 2019

ANDREA WILLIAMS, VEGETATION ECOLOGIST
MARIN MUNICIPAL WATER DISTRICT
awilliams@marinwater.org

MICHELLE O'HERRON, COMMUNICATIONS CONSULTANT
O'HERRON & COMPANY
michelle@oherron.co

IMPROVE OUR UNDERSTANDING OF BIODIVERSITY

- Detail current understanding of the situation
- Revisit historic populations and map new ones
- Assess distribution of populations and levels of risk
- Integrate locally rare species
- Discuss current and potential threats
- Acknowledge data gaps
- Track search areas and negative data
- Make non-sensitive data available and submit to CNDDB

EXTIRPATION AND EXTINCTION: LOCAL AND STATE DRIVERS

EXTIRPATION=LOCAL EXTINCTION

- Approximately 70 plants extirpated from Tam
  - Mostly annuals
  - Meadow/wet site species ›50%
  - Some fire followers
- Approximately 22 plants extinct in CA
  - 10 perennials, 8 annuals, 4 shrubs
  - Marsh meadow/wet site species ›50%
  - Direct land conversion (agriculture, urban) 50%
  - Indirect conversion (habitat loss, grazing) ~25%
- Extinction in plants is complicated
  - Plants hide in time and space
  - Seed banks, irregular emergence

UNDERSTAND—PROTECT—MANAGE

- ✓ Fine-scale vegetation maps: Time series 2004-2009-2014
- ✓ Rare species and communities locations: Updated rare plant inventory, plant inventory; hotspots of biodiversity
- ✓ Areas most vulnerable to climate stress: Wetlands, near-shore, serpentine barren, maritime chaparral, range-edge plants/veg
- ✓ Invasive species: Widespread stressors and incipient problems
- ✓ https://weedmap.cal-ipc.org/weedmapper/
- ✓ https://www.onetam.org/peak-health

- ➢ Analyze to find multiple stressors
- ➢ Direct resources to high-value sites (wet meadows, oak woodlands, serpentine)
- ➢ Direct resources to high-risk sites (trail-heads, staging areas, construction zones, fuel breaks)
- ➢ Target widespread species in high-value and high-risk sites; target incipient problems everywhere
- ➢ Communicate out effort AND effect: acres treated, amount spent, change in target population
- ➢ Work regionally and locally

Measuring the Health of Mt. Tam

Maintaining a healthy, vibrant, and diverse Mt. Tam begins with understanding how key ecological resources are faring, and how we can better care for this iconic and beloved place.

One Tam partners and Bay Area scientists have come together to try to answer the question: **How healthy are Mt. Tam's natural resources?**

Peak Health Report

UNDERSTAND—PROTECT—MANAGE

- ✓ What are the iconic species or habitats?
- ✓ What are vegetation types indicating climate, pest or pathogen, or disturbance-related stressors?
- ✓ Rare species and plant communities locations: Which of these can tell you about land health?
- ✓ How is your management being monitored for effectiveness?
- ✓ How is the surrounding community involved in understanding, monitoring, and influencing biodiversity?
- ✓ Involve local people in monitoring
- ✓ Use available data and recovery thresholds from mandated monitoring of listed species
- ✓ Integrate information and serve in multiple formats and depths (data to dashboard)
- ✓ Use adaptive management monitoring, compliance monitoring, and target species mapping to fully inform decision-making
- ✓ Communicate out effort AND effect: acres treated, amount spent, change in target population

WHAT DOES IT MEAN TO MEANINGFULLY ENGAGE?

Access to Nature is only one Piece

Having quality natural areas accessible to community members is the first piece of equity, not the only one.

Early Detection and Rapid Response

Orange County CNPS members record and report emergent invasive plants:
https://www.occnps.org/invasives/emergent-invasive-plant-management-program.html

Input on Goals and Objectives

Involving stakeholders in restoration goals and objectives can help educate community members on local biodiversity and ensure expectations are clear and shared.

Habitat Restoration and Stewardship

San Diego CNPS members restore at least 75 acres each year:
https://www.cnpssd.org/habitat-restoration

Reciprocal Learning

Local people have local knowledge; they may have spent time in areas you haven't, or noticed things you didn't. You may be able to offer training or make specific asks of the local people.

Locally Significant Plants and Places

East Bay CNPS compiles information on locally rare and unusual plants and on botanically important plant areas:
https://ebcnps.org/ebrare-plant-database/
https://ebcnps.org/guidebook-to-botanical-priority-protection-areas/

Resilient forest plot, Bolinas Ridge

MULTIPLE BENEFITS AND WORKING LANDS

GRAZING AND CARBON FARMING ARE TOOLS

Making sure biodiversity benefits are included in success criteria

Identify areas where diversity will not be damaged

Monitor for success—carbon storage, water infiltration, native plant increases

Cattle ranch with broom in Marin County

MILLIONS OF DOLLARS ARE PROPOSED FOR FUEL REDUCTION AND HABITAT RESTORATION

Making sure biodiversity benefits are included in success criteria

Identify support needed for pre-project surveys

Why not use pre-project surveys to fill gaps in knowledge?

Cattle ranch, Nicasio Ridge

AREA 4: MANAGE LANDS AND WATERS TO ACHIEVE BIODIVERSITY GOALS

ASSESS AND SECURE THE SUCCESS OF CONSERVATION EASEMENTS

Evaluate success of current easements in protecting biodiversity

Consider new easement opportunities and alignments

MAINTAINING AND ENHANCING THE LONG-TERM BENEFITS OF WORKING LANDSCAPES

Keep working lands working—prevent land conversion

Maximize biodiversity benefits

Identify support needed for working landscapes

Oak woodland in Marin County

AREA 5: RESTORE AND PROTECT LANDS AND WATERS TO ACHIEVE BIODIVERSITY GOALS

Accelerate the Pace of Restoration

Develop effective guidelines for restoration

Evaluate standard practices

Recommend actions

Evaluate and Capitalize on Opportunities to Utilize Fallowed Agricultural Lands for Pollinator Habitat

Analyze fallow lands for potential use as pollinator habitat

Work with Tribes to Use Traditional Ecological Knowledge to Support Management and Restoration Activities

Establish a collaborative to support integration of tribal partners in restoration and management activities

Evaluate and Improve Mitigation Actions to Better Achieve Conservation Outcomes

Develop spatial database of lands protected or restored via mitigation

Accelerate and Streamline Prevention, Detection and Management of Invasive Species and Pests

Expand programs to prevent, detect and manage invasive species and pests

Develop California-specific assessments

Evaluate & improve weed management

Evaluate State Protected Areas with Priorities

Compare conservation priorities against protected lands


Acres treated is not a measure of success;
it is only a measure of effort.
You cannot manage what you do not know.
Balance risk of action against risk of inaction.
cnps.org

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- Meaningful engagement
- Reciprocal learning

protecting

CALIFORNIA'S NATIVE FLORA SINCE 1965