



CalIPC Symposium 2020
Session 12: Early Detection & Rapid Response
A Panel Event
October 30, 2020, 1:00-2:30pm



Outline of Today's EDRR Panel Session

2:00pm Welcome, Topic Overview,
& Panelist Introductions

2:10pm EDRR Case Studies from
Across California

3:00pm Panelist Q&A

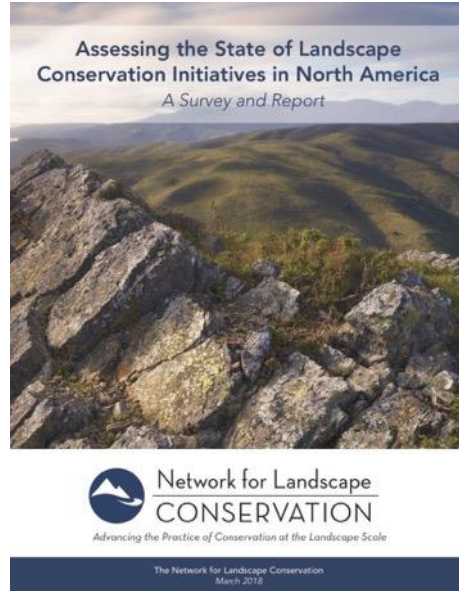
3:25pm Parting Remarks & Links to
Resources



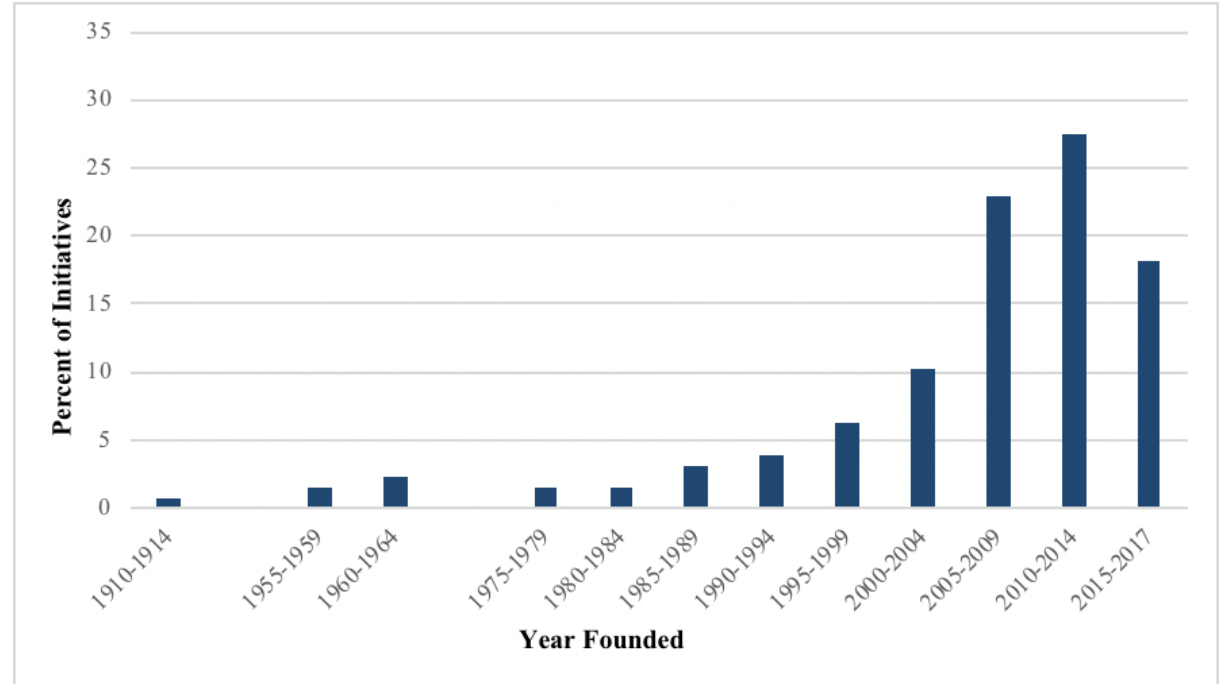
Santa Lucia Preserve in Monterey County

Photo by Jenna Allred

The Rapid Growth of Landscape Stewardship & Conservation



Summary report and more information available on www.landscapeconservation.org





- 1 Orange Coast Collaborative
- 2 Redwoods Rising
- 3 Santa Cruz Mountains Stewardship Network
- 4 Tahoe Regional Planning Agency
- 5 One Tam
- 6 Central Valley Landscape Conservation Project
- 7 Dinkey Collaborative
- 8 Eastern Mojave Conservation Collaborative
- 9 Inter-Island Regional Collaborative
- 10 Klamath Watershed Partnership
- 11 North Coast Oak Woodland Conservation Project
- 12 Mayacamas to Berryessa Coast Ranges Partnership
- 13 One Watershed - Russian River Confluence
- 14 Rivers & Lands Conservancy
- 15 Santa Monica Mountains Collaborative
- 16 Sonoma County Vital Lands Initiative
- 17 Southern Sierra Leadership Forum
- 18 Tahoe-Central Sierra Initiative
- 19 Greater Upper Truckee River Watershed Partnership
- 20 Lake Tahoe West Restoration Partnership
- 21 Trinity County Collaborative
- 22 Western Klamath Restoration Partnership
- 23 Smith River National Recreation Area Collaborative
- 24 Burney-Hat Creek Community Forest and Watershed Group
- 25 South Fork American River Cohesive Strategy
- 26 Amador Calaveras Consensus Group
- 27 Yosemite Stanislaus Solutions
- 28 Forest First



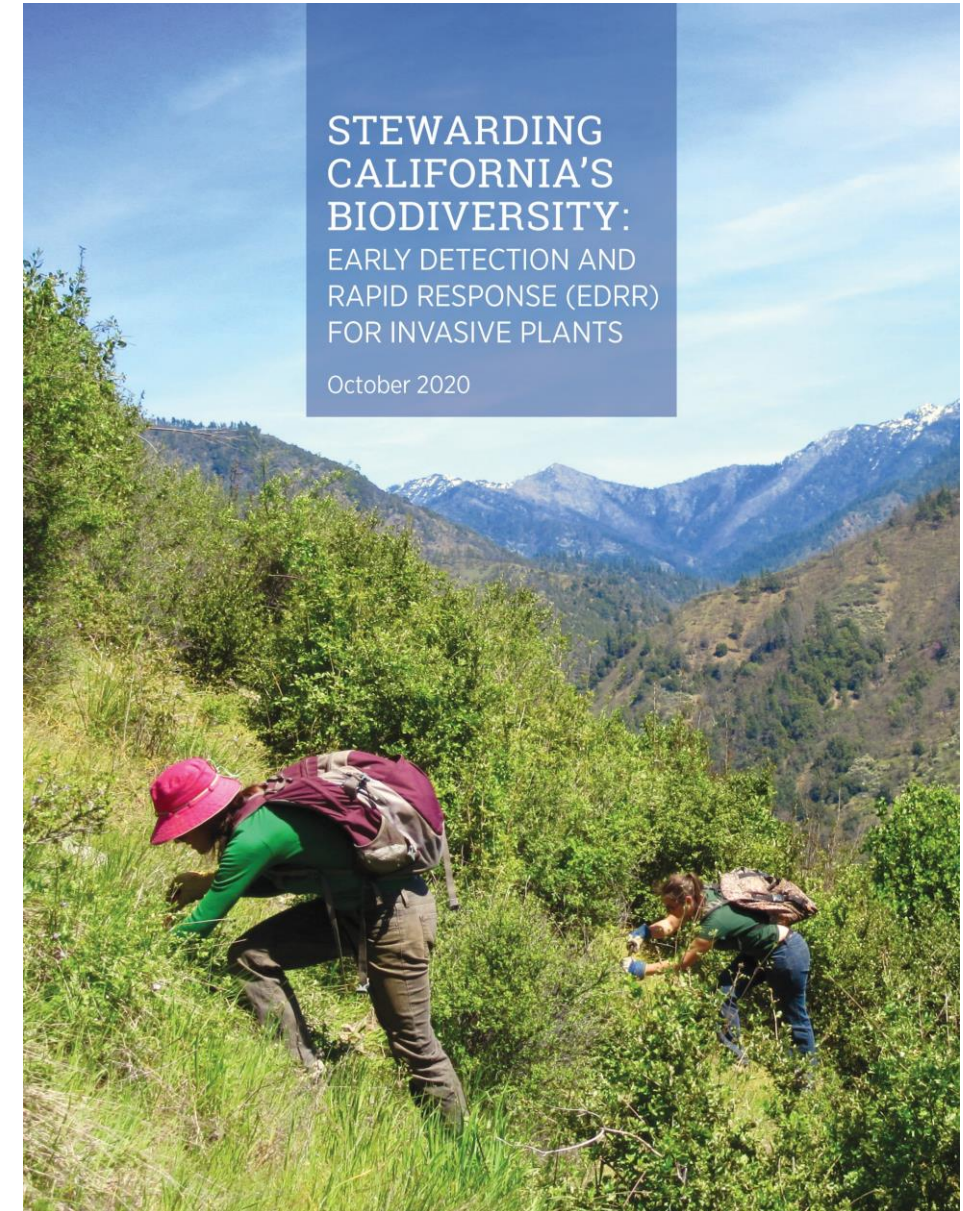


The **California Landscape Stewardship Network** is a diverse range of partnerships that advances **collaborative, cross-boundary approaches** to statewide challenges & opportunities through:

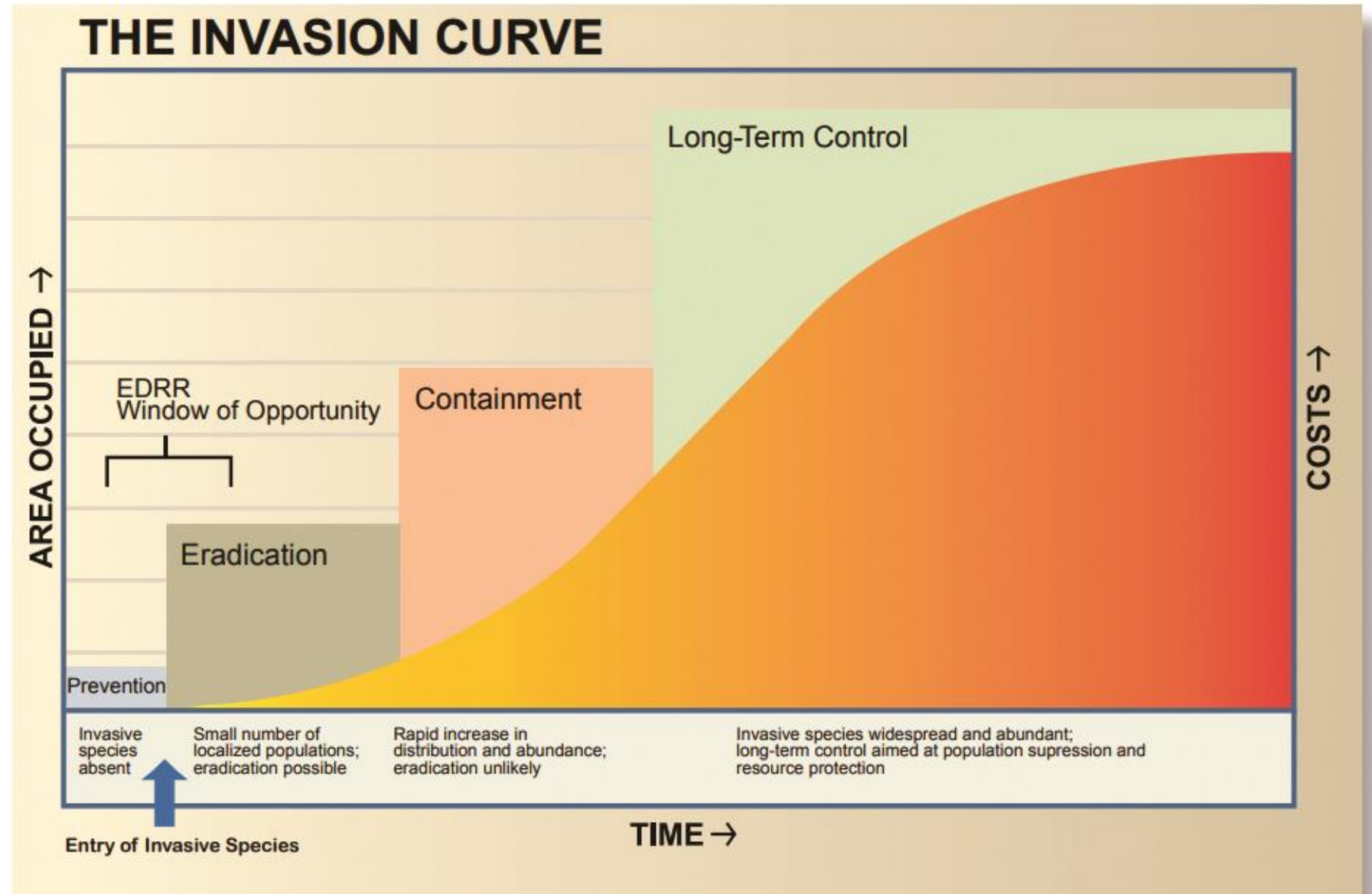
- **Fostering peer exchange** that catalyzes relationship-building and information-sharing
- **Developing systems and solutions** to encourage
 - More efficient permitting and compliance
 - Innovative policy & funding to support landscape stewardship
 - Seamless data sharing
- **Building the movement** to convey the value and impact of landscape-scale stewardship, and increase capacity to work collaboratively at the landscape scale

KEY RECOMMENDATIONS

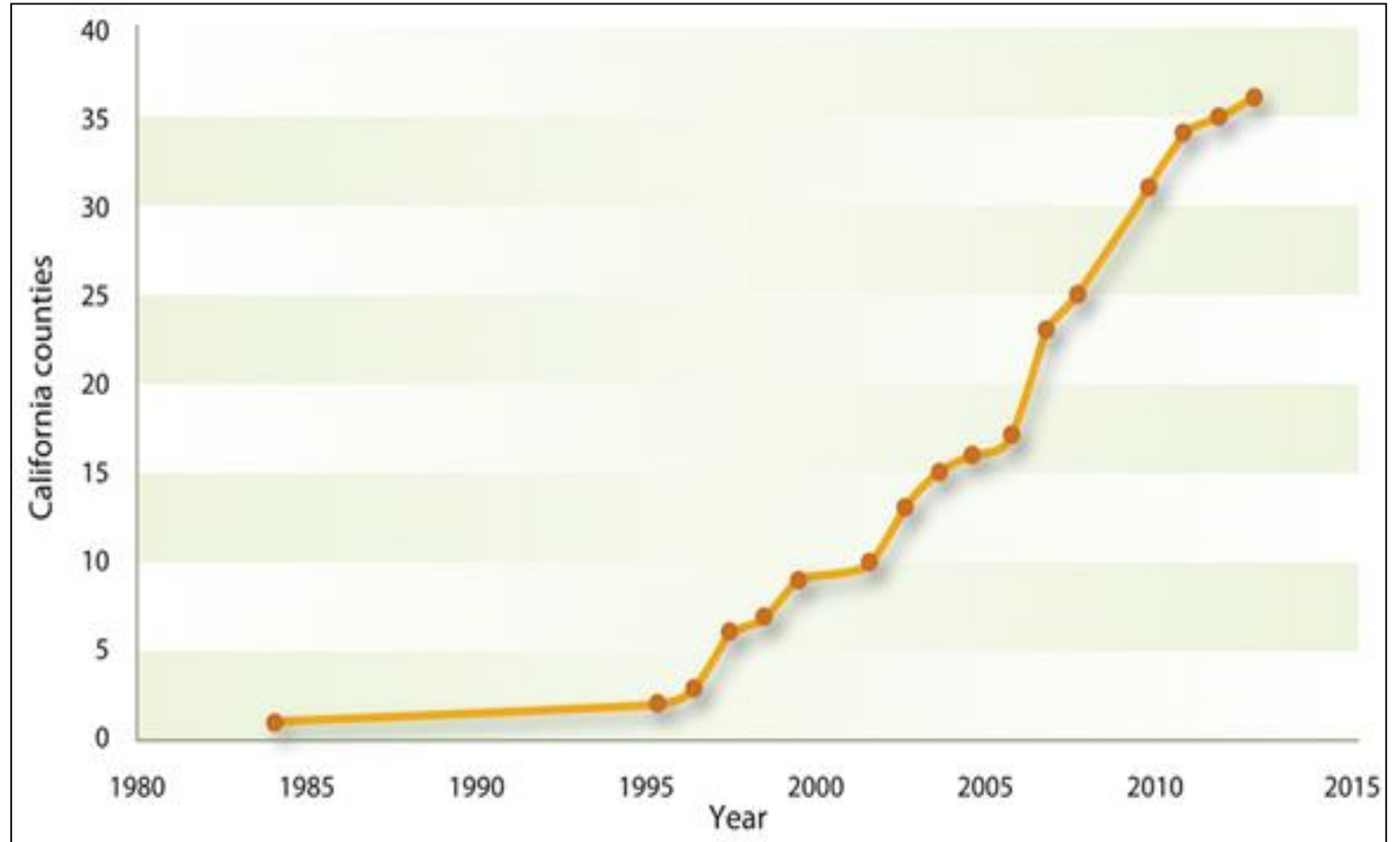
1. Fund invasive plant EDRR through the California Department of Food and Agriculture's (CDFA's) statewide Weed Management Areas (WMA) program.
2. Build invasive plant expertise and capacity at the California Department of Fish and Wildlife (CDFW) and integrate it into collaborative management efforts.
3. Enhance bond funding for invasive plant EDRR.



EDRR AS AN ESSENTIAL STEWARDSHIP TOOL



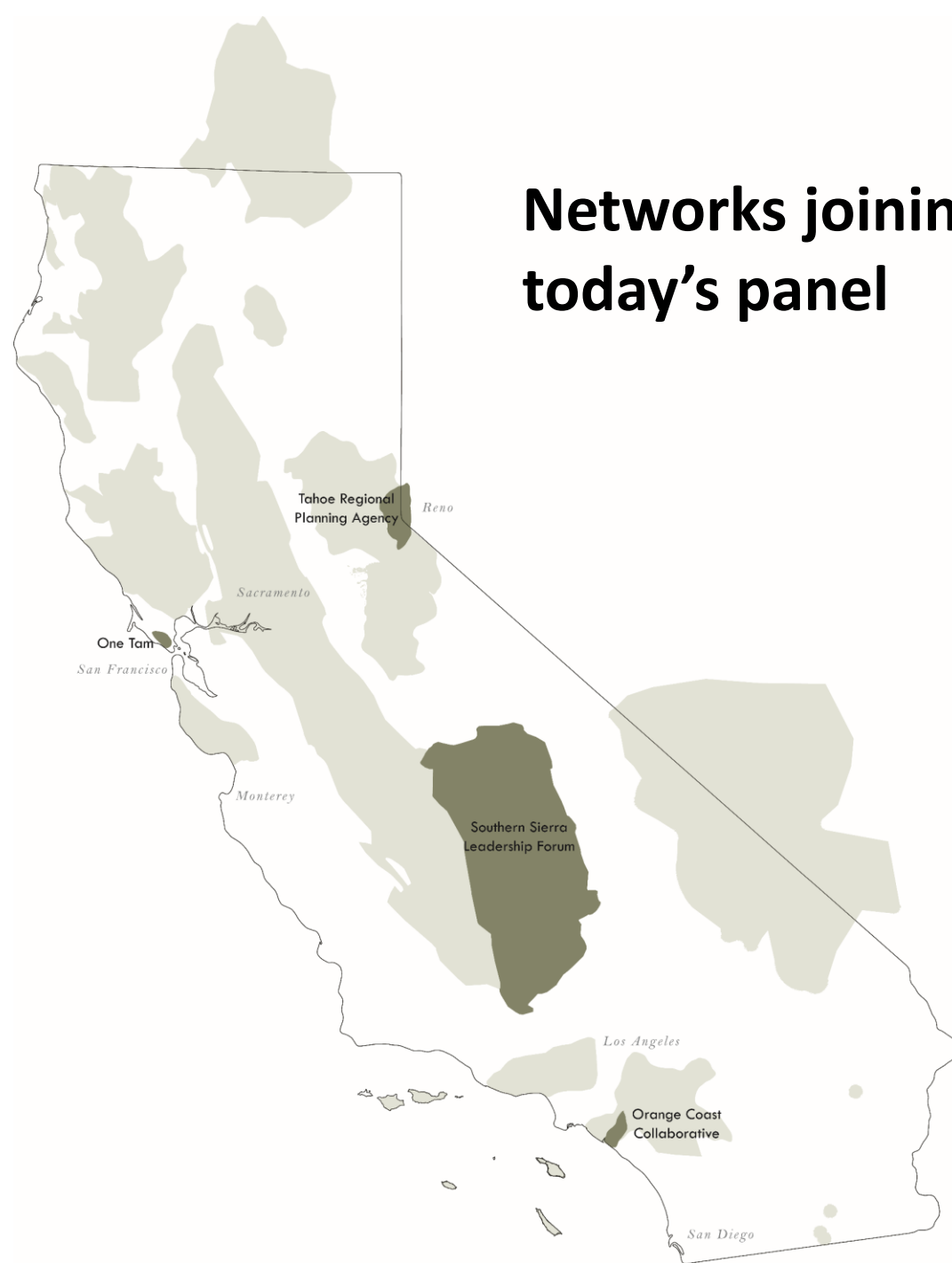
One that got away 25 years ago...



Stinkwort (*Dittrichia graveolens*) was first found in Santa Clara County in the 1980s. Since then, it has spread to more than half of the counties in the state. (Graph from *California Agriculture* magazine, retrieved from <http://calag.ucanr.edu/Archive/?article=ca.v067n02p110>).



Networks joining us for today's panel





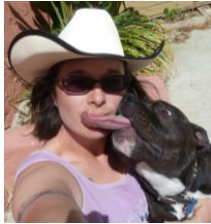
Sharon Farrell, Panel Moderator



Jesse Patterson

Eyes on the Lake:

Leveraging the power of community science to Keep Tahoe Blue



Rachel Kesel

One Tam: Multi-Jurisdictional EDRR



Christy Brigham

Precious Things Breaking in New Ways:

The Growing Importance of EDRR in an Era of Unprecedented, Rapid Environmental Change



Nathan Gregory

Partnership and Planning:

Coordinating EDRR Across the Nature Reserve of Orange County



Leah Gardner

California State Parks Exotic Plant Management and Development of an EDRR Program



Jesse Patterson,
*Eyes on the Lake: Leveraging
the Power of Citizen Science
to Keep Tahoe Blue*



Eyes on the Lake:

Leveraging the power of citizen science to Keep Tahoe Blue

Jesse Patterson
Chief Strategy Officer







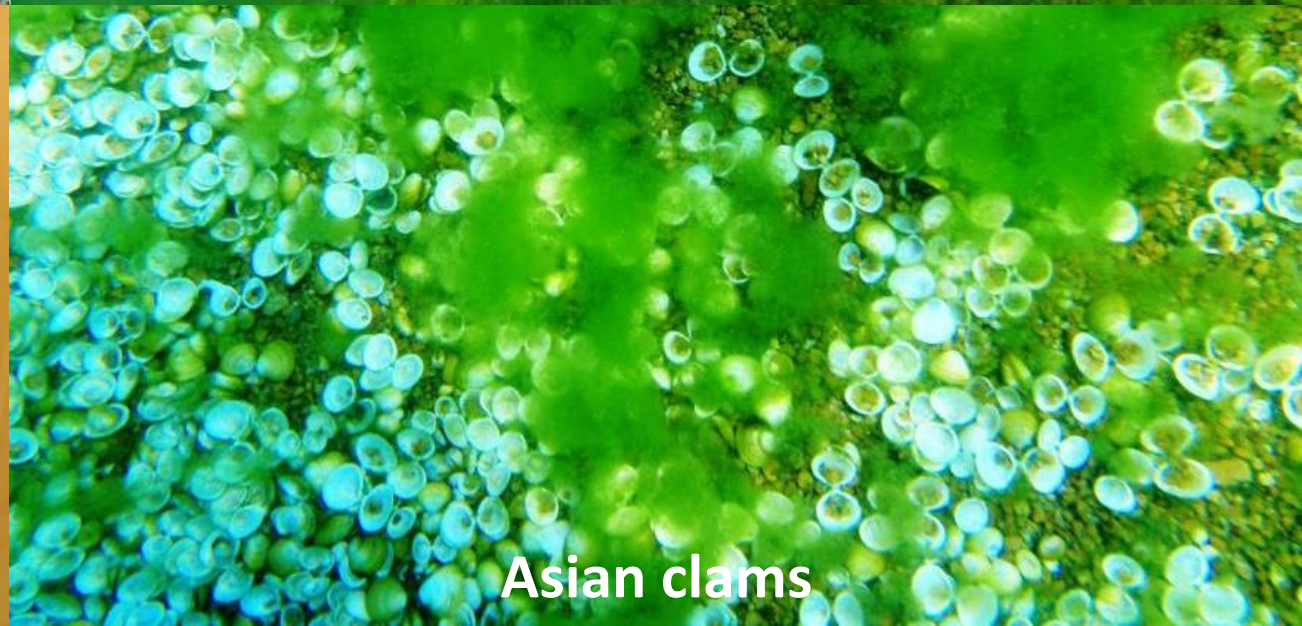
Eurasian watermilfoil



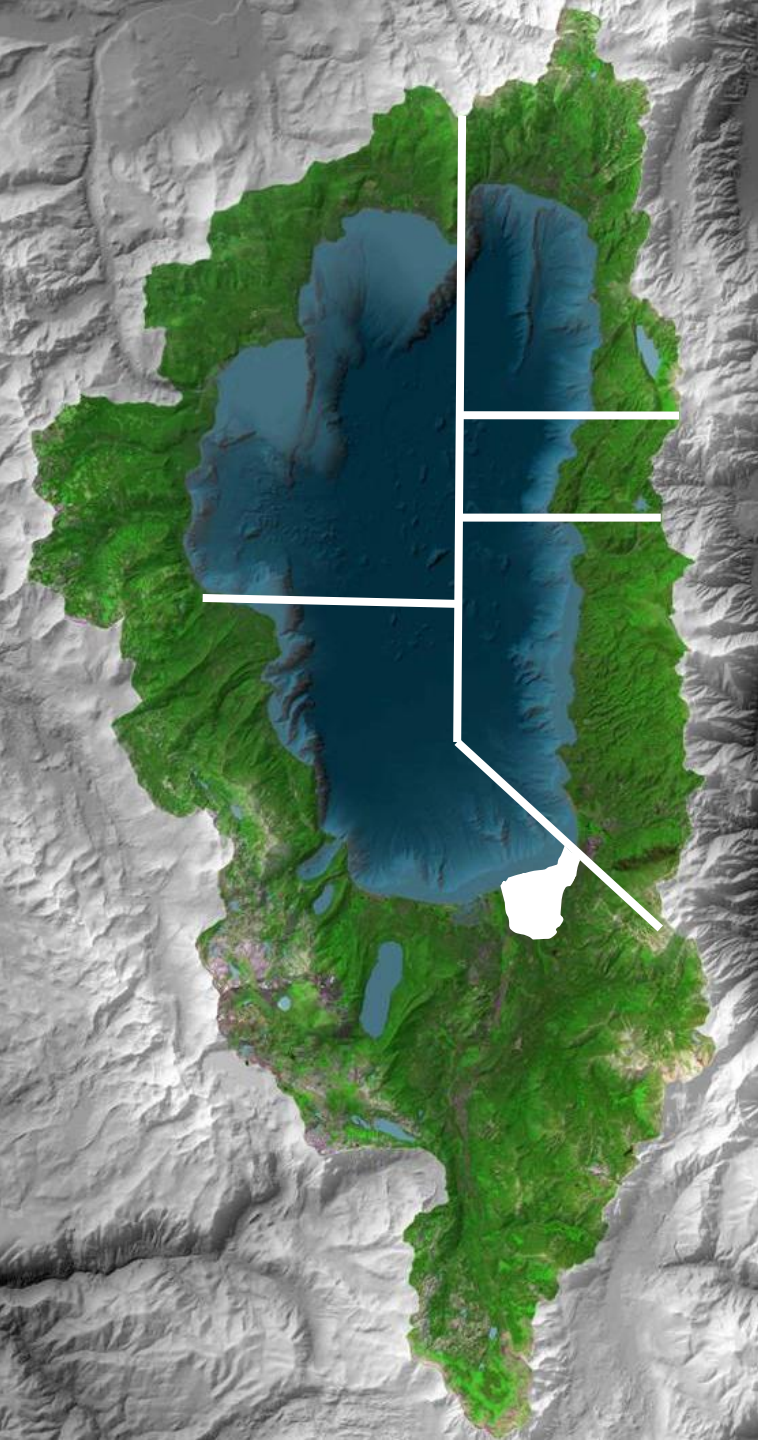
Curlyleaf pondweed



Goldfish



Asian clams



Lake Tahoe Region Aquatic Invasive Species Action Agenda 2021–2030

A report prepared by:



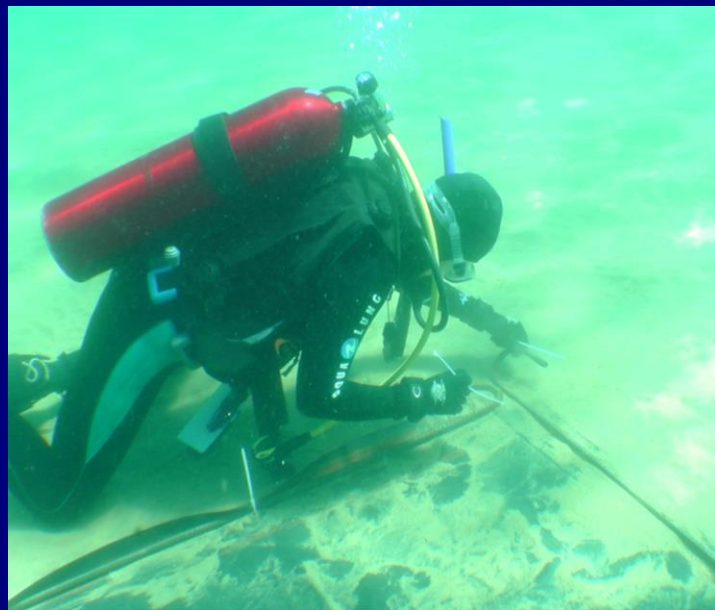
Lisa DeBruyckere of
Creative Resource Strategies, LLC

September 2019



Since 2010:

**\$26 million for aquatic invasive species
\$5.9 million from private sources (23%)**



Prevention

Control

Monitoring

“protect while you play”



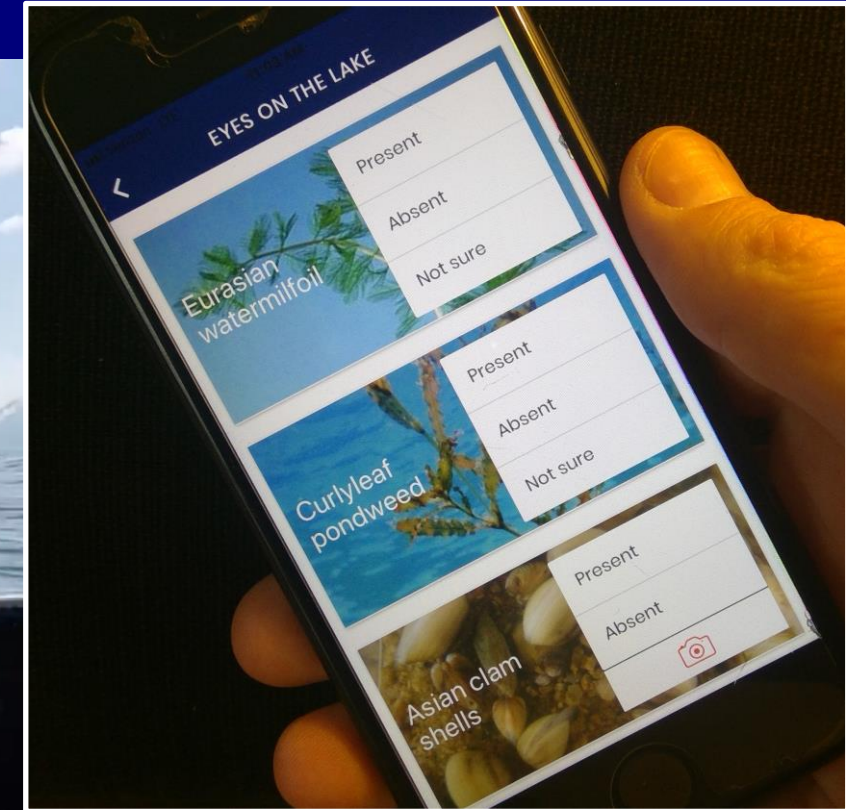
Eyes on the Lake: Training



Eyes on the Lake: Tool Kit



Eyes on the Lake: Access

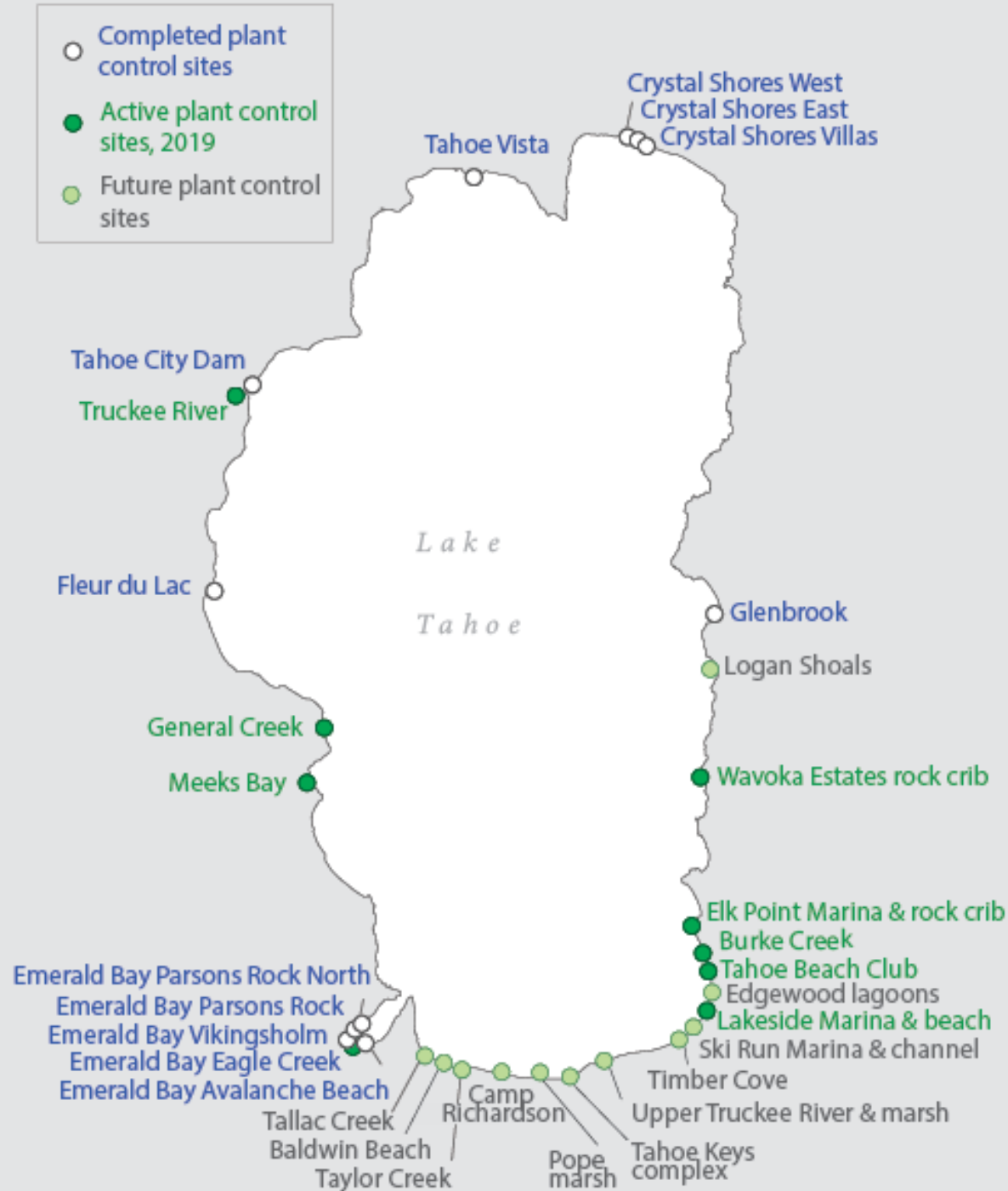
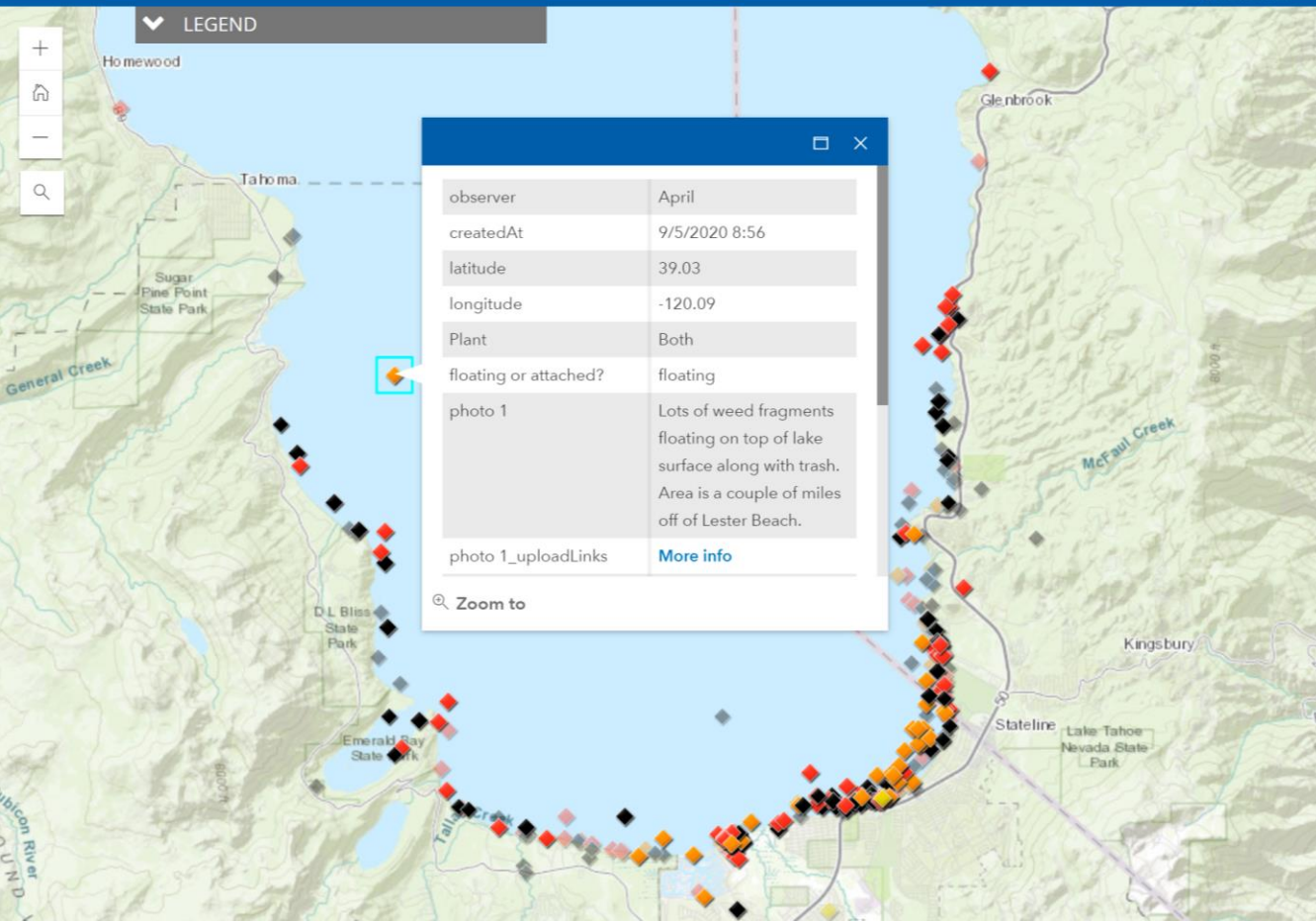




Mapping

Eyes on the Lake Observations 2020

Volunteer Observations for the Eyes on the Lake program in 2020.

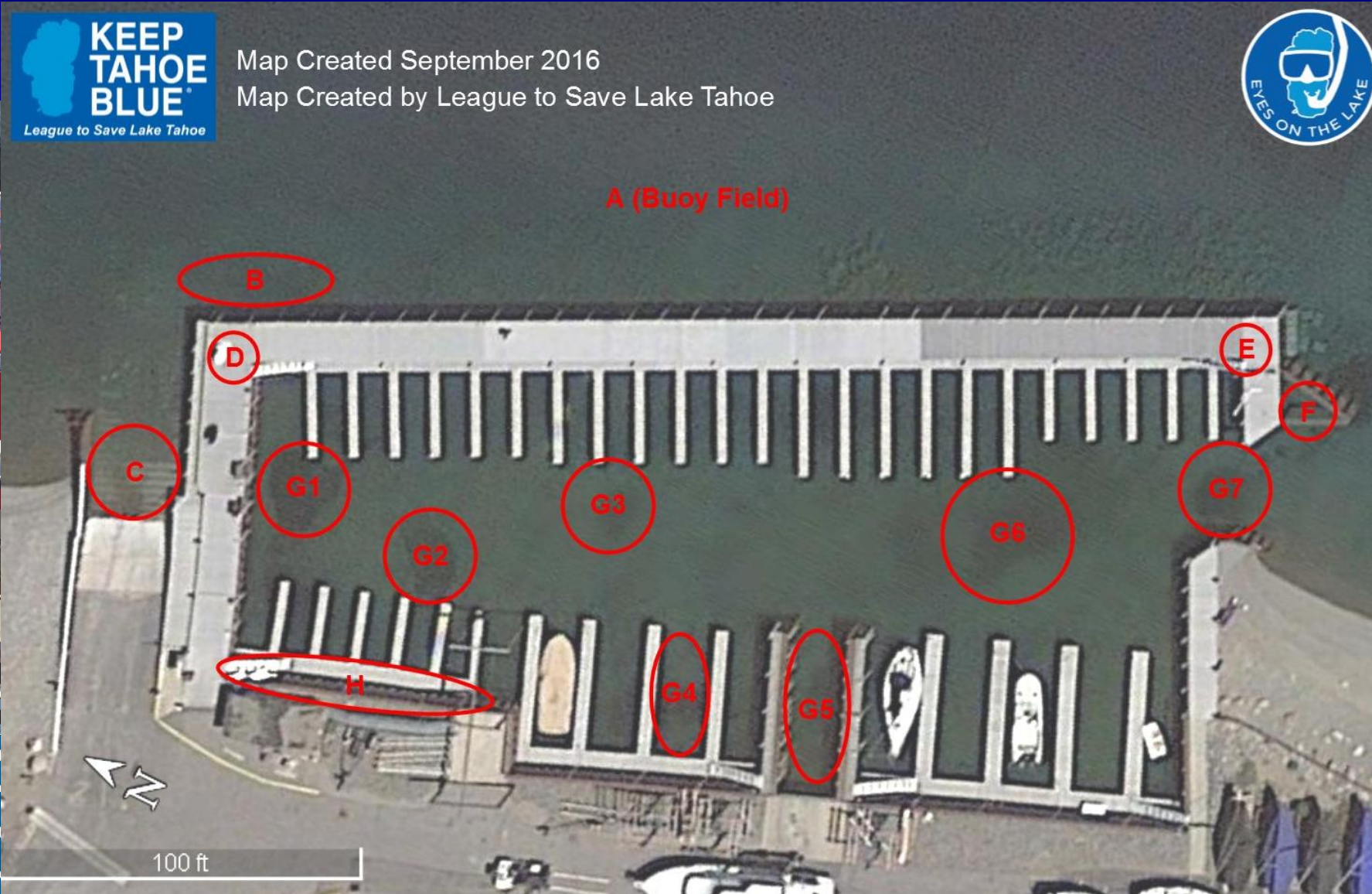


2013-2020 program stats

- 71 formal trainings
- 600 certified volunteers
- 1,470 surveys submitted
- 206 unique sites surveyed
- 14 marinas certified
- 11 marinas mapped
- 157 surveys on the Citizen Science app



Marina General Permit: NPDES



Map Created September 2016
Map Created by League to Save Lake Tahoe



Volunteer Surveys: Restoration





Lessons Learned

Any program raises awareness

Create tiers of involvement

Quality assurance / quality control

Integrate into existing efforts

Partner with businesses and orgs

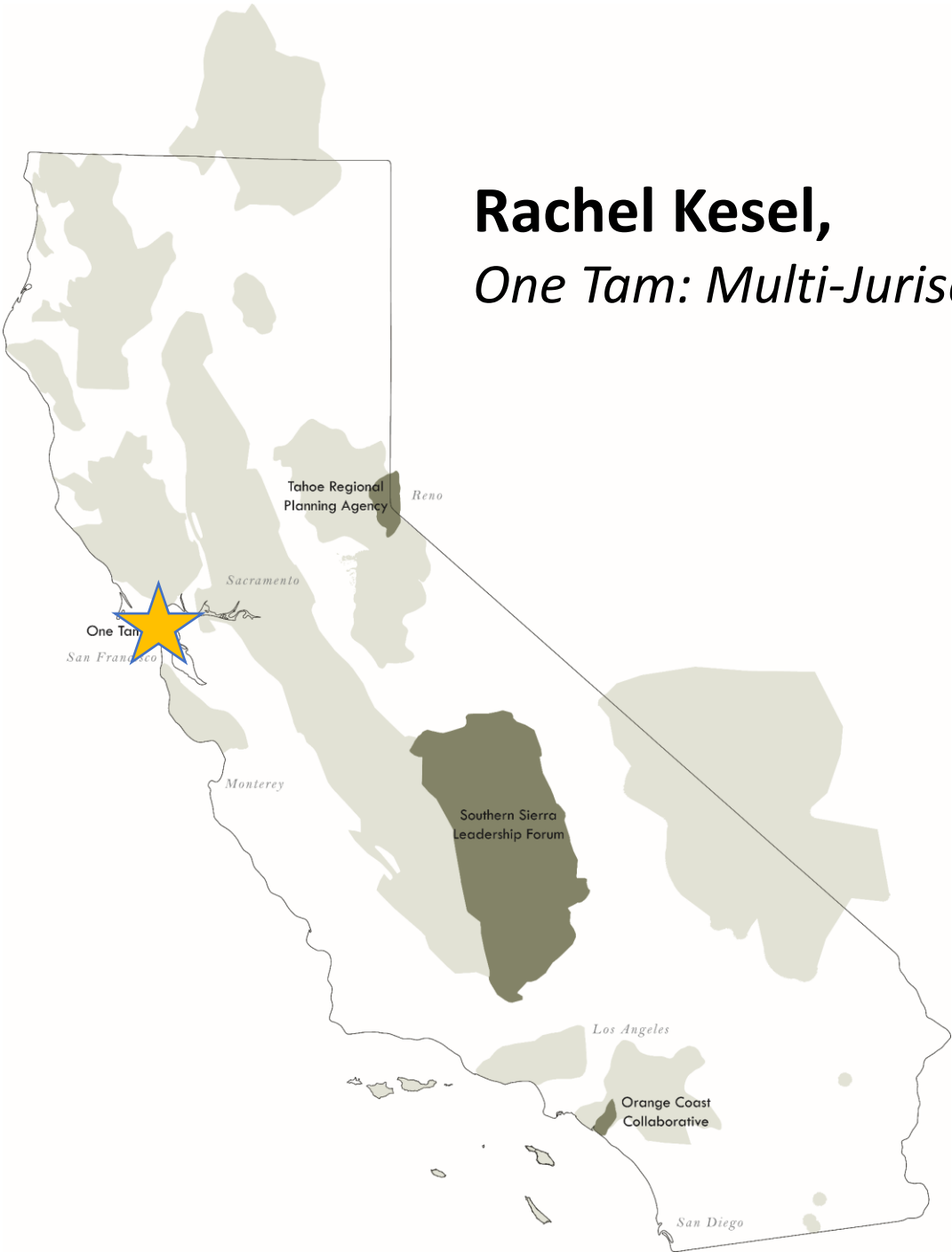
Technology is your friend

Thank You
keeptahoeblue.org
jesse@keeptahoeblue.org





Rachel Kesel,
One Tam: Multi-Jurisdictional EDRR



The background of the slide is a photograph of a mountain silhouette against a sunset sky. The sky is filled with horizontal bands of orange, yellow, and light blue. The mountain is dark and occupies the lower half of the frame.

ONE TAM

Multi-Jurisdictional EDRR

Rachel Kesel

10.30.20

Get Your CEUs

DPR Slides Look Like This!



Two partners had
existing EDRR teams
and protocols



Get Your CEUs

One Tam agencies knew that EDRR is an appropriate weed management strategy

when you have small patches of weeds that are new to an area.



[REDACTED]
National Park Service
U.S. Department of the Interior

Natural Resource Program Center



Early Detection of Invasive Plant Species in the San Francisco Bay Area Network

A Volunteer-Based Approach

Natural Resource Report NPS/SFAN/NRR—2009/136

Species List

Repeat Surveys

Use of Volunteers

Data Schema



Photo credit: Lieven Leroy

Get Your CEUs

One Tam prioritized weeds by looking at

scale of ecological impact, feasibility of control, and distribution of the species.



Testing protocol

Learning how much time to
leave for rapid response

Learning new weeds and their
propagule mobility



Photo credit: Lieven Leroy

Recent Analysis of EDRR data

Priority One species are < 1% of total weed
acres on Tam!

61 gross acres

8 net acres

- 6 species undetected
- 6 species 100% managed
- 3 species >95% managed

EARLY DETECTION
BEYOND BOUNDARIES



Rachel Kesel, Conservation Management Specialist

rkesel@onetam.org

David Greenberger, Assistant Conservation Management Specialist

dgreenberger@onetam.org

A Few EDRR Successes on Tam



A Few

ONE
TAM



Get Your CEUs

Stinkwort and purple starthistle are two species successfully managed by One Tam using EDRR



Are we meeting our goals?

Goal: Treat 100% of Priority One patches annually.

57% of Priority One acres are under management



Several Factors Impact Management

Riparian/wetland species

- Clematis vitalba
- Iris pseudocarus

Tough upland species

- Maytens boaria

Rights of Way



Revisiting goals

ONE
TAM



Lessons Learned

- Shared goals must be reiterated and revisited.
- A pilot season was beneficial.
- The protocol must remain flexible.
- Analyze data early to find flaws in dataset.
- Rapid Response requires contact with invasive plant material.
- Rapid Response requires reserving time in the schedule.



•THANK YOU!



Rachel Kesel
rkesel@onetam.org

Photo credit: Lieven Leroy

E
K



Christy Brigham,
*Precious Things Breaking in New
Ways: The Growing Importance of
EDRR in an Era of Unprecedented,
Rapid, Environmental Change*

Precious Things Breaking in New Ways:

The Growing Importance of EDRR in an Era of
Unprecedented, Rapid, Environmental Change

Cal-IPC

October 2020

Christy Brigham Ph.D.

Chief of Resources Management and Science

Sequoia and Kings Canyon National Parks

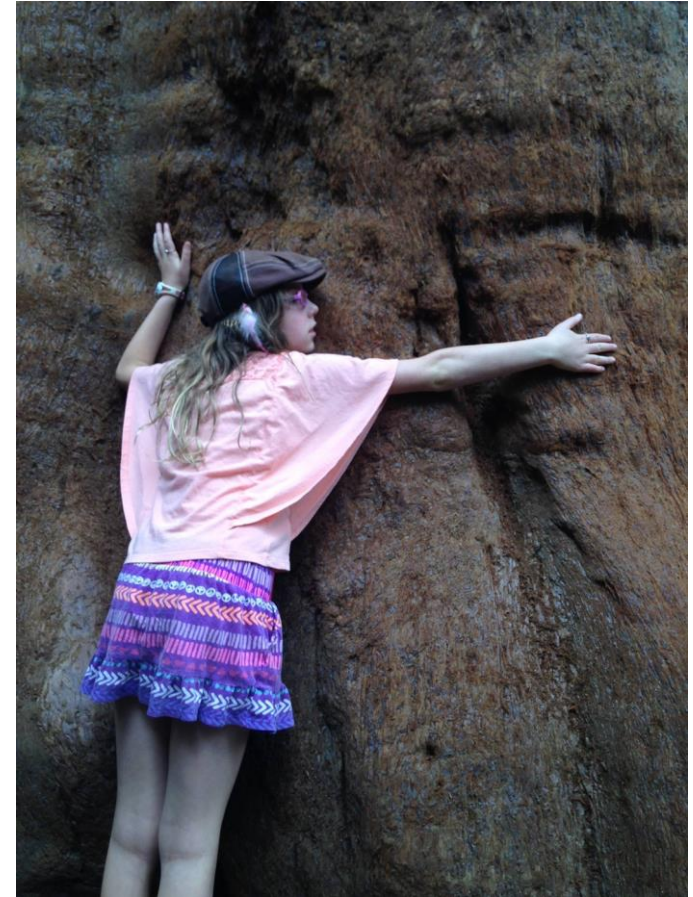
Roadmap

- Talk outline
 - Why now – context
 - The World As It Was
 - The Specific Problem
 - What We Did
 - Going Forward In the Upside Down

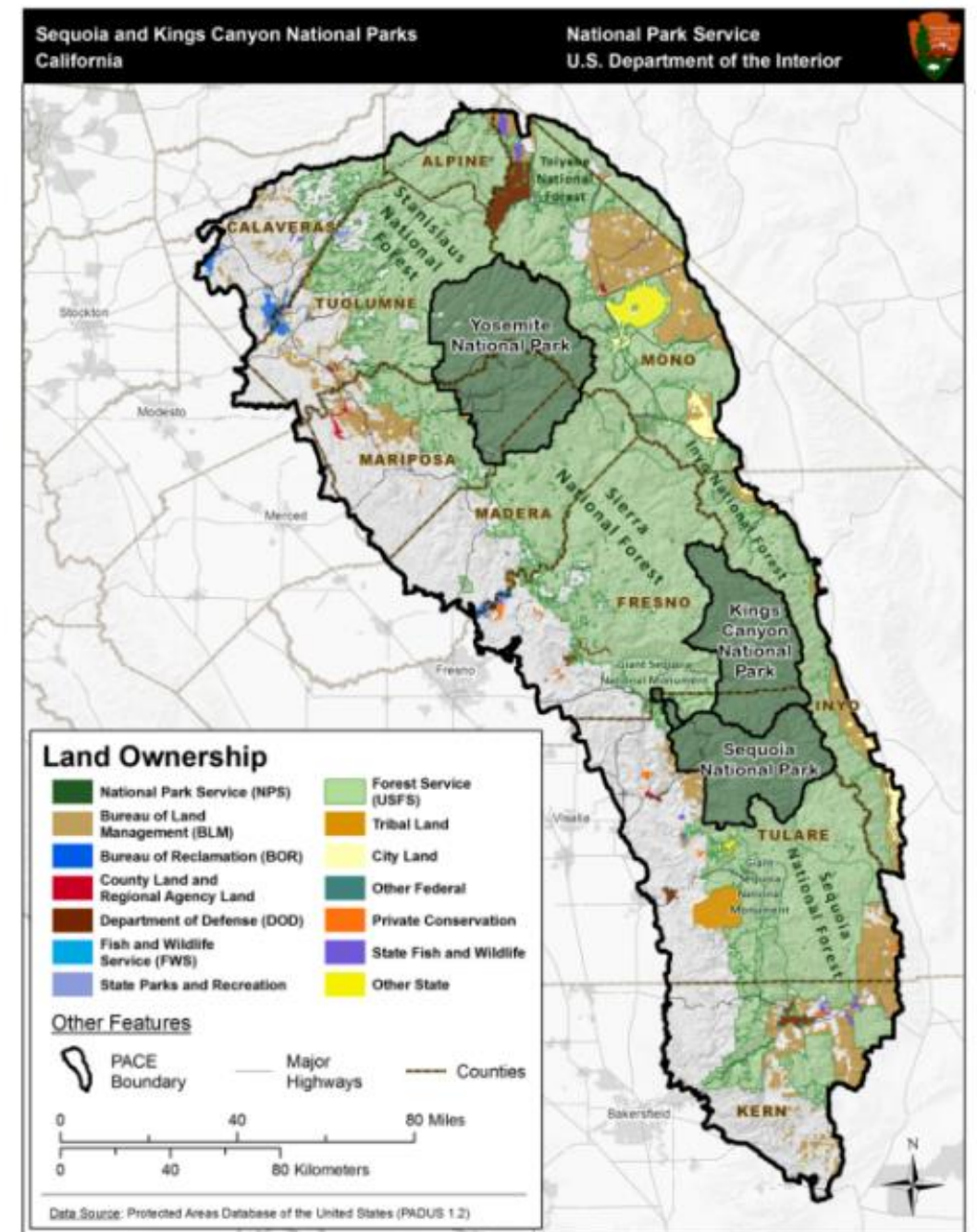
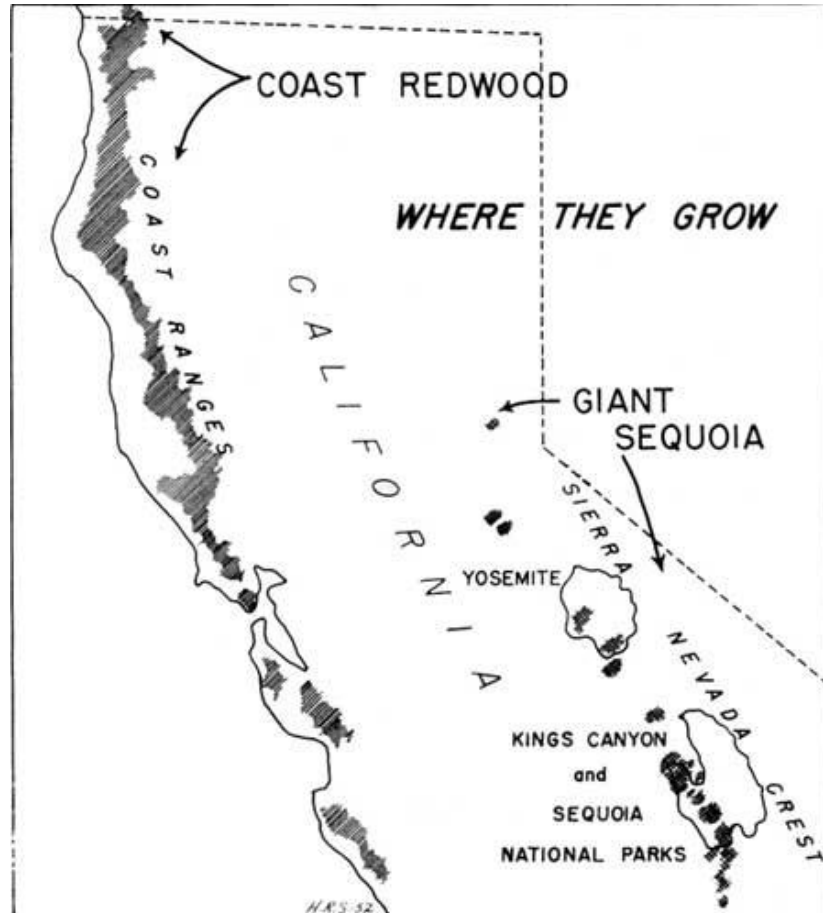


Why Do We Love Giant Sequoias? (Just so we're all on the same page)

- Really old (live to be over 3000 years old)
- Uncommon
- Most massive non-clonal organisms
- Sequester teragrams of carbon every year (in SEKI second only to red fir forests)
- Habitat for T and E species
- Charismatic megafauna / spoketrees



Sequoias Are Scattered Across a Large Landscape



Context

- We used to think
 - Monarchs aren't killed they just eventually fall over
 - Nothing attacks Giant Sequoia
 - Reintroduce fire and all is well
- Seeing impacts of climate-mediated drought and fire suppression we thought wouldn't see until 50 years from now



What Do You Need in the Upside Down?

EDRR



The Specific
Problem: Fire x
Drought x Beetles



Drought Mortality: Fire Damage x Drought x Beetle Interactions – What Did We See in 2016?



Scattered Standing Dead Defoliated Trees

- Half dozen scattered in different areas
- All in areas burned in prescribed fire or wildfire
- Started during drought but continued into 2016 and 2017 and into today
- Appeared to be in wet areas
- General hypothesis: high water table = shallow roots + fire damage + hotter drought = susceptibility to death by beetle



Questions and Why This is a BIG Problem

Questions

- Was this occurring other places?
- How many trees were killed in SEKI? Across the range?
- Were the beetles actually the cause of death?
- Under what conditions was this occurring?

Capital B.I.G. Problem

- Sequoias need fire
- We do a lot of prescribed burning
- We NEED to do more burning
- But what if fire damage is resulting in vulnerability to future beetle death?
- Takes 2000 years to grow a new one

Our Response: EDRR+

- Multi-scale ED:
 - Made flyer
 - Emailed flyer
 - Intensive subjective search in SEKI and YOSE
 - Stratified mortality survey in SEKI
- Rapid Response Research
 - Characterization of dead trees
 - Initiated physiological research
 - Initiated beetle research



Help track recently dead or dying giant sequoias.



Many giant sequoias exhibited symptoms of moisture stress during the hot drought of 2012 to 2016. In fall of 2014, significant dieback of foliage was observed in about half of >4000 sequoias surveyed in Sequoia and Kings Canyon Parks. We have been studying their drought response ever since as part of a project, Giant Sequoia Drought Response from Leaf to Landscape ([video](#)). We've only observed a very small number of giant sequoias that actually died during the drought, but in June of 2017 we found that recently dead sequoia trees had their inner bark riddled with beetle galleries suspected to be *Phloeosinus*, a genus that also attacks cedars (see photos). *Phloeosinus* in giant sequoias has been reported previously, but the trees were thought to be resistant to these attacks. We don't know for certain if *Phloeosinus* killed the recently observed drought-stressed trees, but the observations could indicate an "Achilles heel" for giant sequoia when they face even hotter droughts in the future.

Please help us collect more observations. We are looking for information on sequoias that recently died (still have dead foliage) or have recently "dead" branches. Submit the following:

- Location (UTM coordinates preferred)
- Photos and descriptions of tree: % dead foliage, fire scars, beetle galleries, landscape position, etc.
- Any green foliage?
- Fire scars around the trunk? If so, how far around?
- *Phloeosinus* beetle galleries on inner bark? Any live beetles?
- Upland or next to a stream or wetland?
- Diameter at breast height (DBH) and height (if possible).

Submit to: Koren Nydick
Sequoia & Kings Canyon
National Parks
koren_nydick@nps.gov
Tel: 559-565-4292



Phloeosinus beetle galleries on the inner bark of giant sequoia.

Photos by Nate Stephenson, U.S. Geological Survey and Tom Spaulding

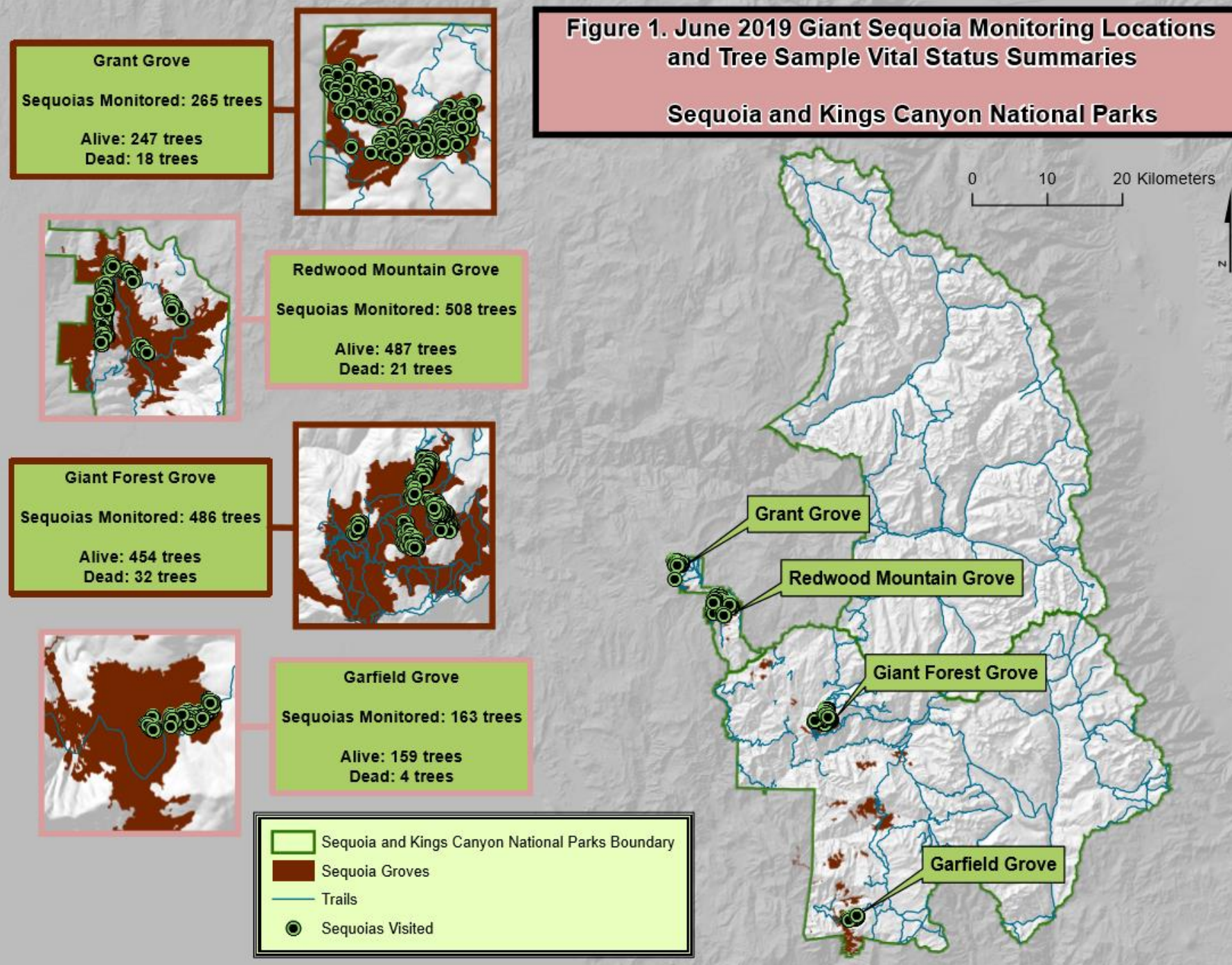


Early Detection Efforts

- Searched in known areas with recent burns
- Conducted our own stratified trail search in burned and unburned groves to measure mortality rates
- Tried to get nonprofit to coordinate outreach
- Emailed flyer to
 - regional USFS forest health experts
 - Sequoia managers
 - Researchers
 - Forest managers
 - Everyone we could think of

Figure 1. June 2019 Giant Sequoia Monitoring Locations and Tree Sample Vital Status Summaries

Sequoia and Kings Canyon National Parks



What Did We Learn?

- 33 known dead monarchs in SEKI in three groves (Giant Forest, Redwood Mountain, Grant Grove) (may be more out there)
- All in areas with fire in the last decade prior to drought – mortality continuing
- All with signs of severe fire damage
- Majority in very wet areas
- All with signs of beetle attack
- Similar trees on Sequoia N.F.
- Also dead trees in Yosemite
- Outside of these areas, mortality rate is at background (.1 to .2 % per year)
- Still working on a full map of dead sequoias for SEKI using LiDAR and multi-spectral imagery



Rapid Response Research

- Isotopic water studies
- Sap flow measurements
- Pre and post prescribed burn in two parks
- Testing fuel reduction treatments (raking)
- Beetle traps
- Beetle genetics



Things Are Changing Rapidly But You Don't Know Where or What is Coming (Demigorgons?)

- Can't afford to monitor everything
- Change could come from any direction
- Apocalyptic chickens coming home to roost all over the place
- Yes or No, "later" is off the table
- Need scale/scope to assess "problem" and prioritize
- EXPANDED EDRR IS PART OF THE SOLUTION



Image courtesy of Cornell Lab of Ornithology



Looking Forward: Sequoias

- 2020 Wildfire season (30% of total grove area just burned)
- Direct effects
- Indirect effects
- Need to learn (why, where, apply to remaining groves)
- Need to change management
- Change our vision of risk
- Landscape scale assessments
- Landscape scale prioritization

Conclusions

- Expanded view of EDRR is what we need in the Upside Down
- Build your network of contacts
- Engage your army of early detectors
- Stay strong – Bring your best science and your strongest strategy
- Our future depends on it
- Tell your story – we need community engagement





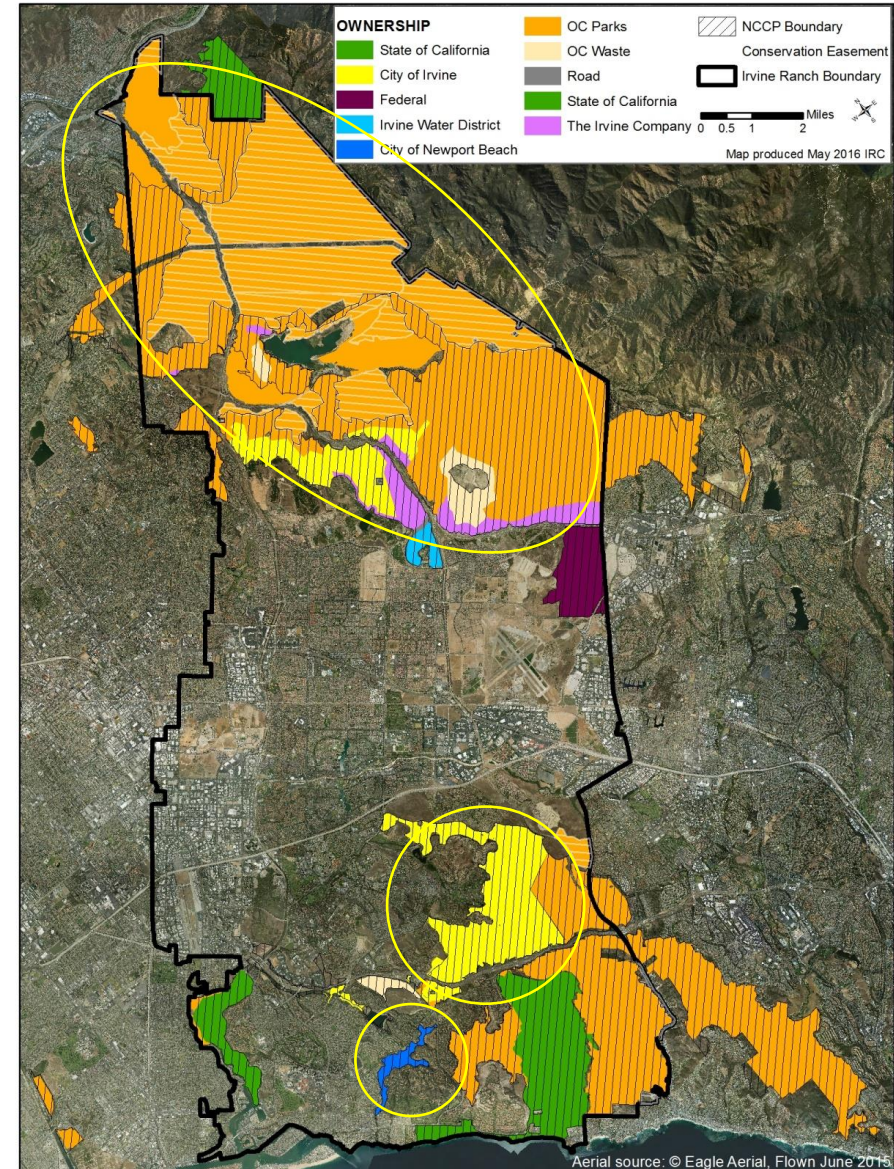
Nathan Gregory,
*Partnership and Planning:
Coordinating EDRR Across the
Nature Reserve of Orange County*



Regional Setting



Land Ownership and Management



Planning

Five-Year Invasive Plant Management Plan for the Central Reserve of the Nature Reserve of Orange County and Adjacent Lands



Report for the Natural Communities Coalition, 2019



www.calflora.net/recentfieldtrips/whitingranch09.html

Prepared by:

California Invasive Plant Council
- Doug Johnson, Executive Director
- Dana Morawitz, Conservation & GIS Program Manager
- Jutta Burger, Science Program Director

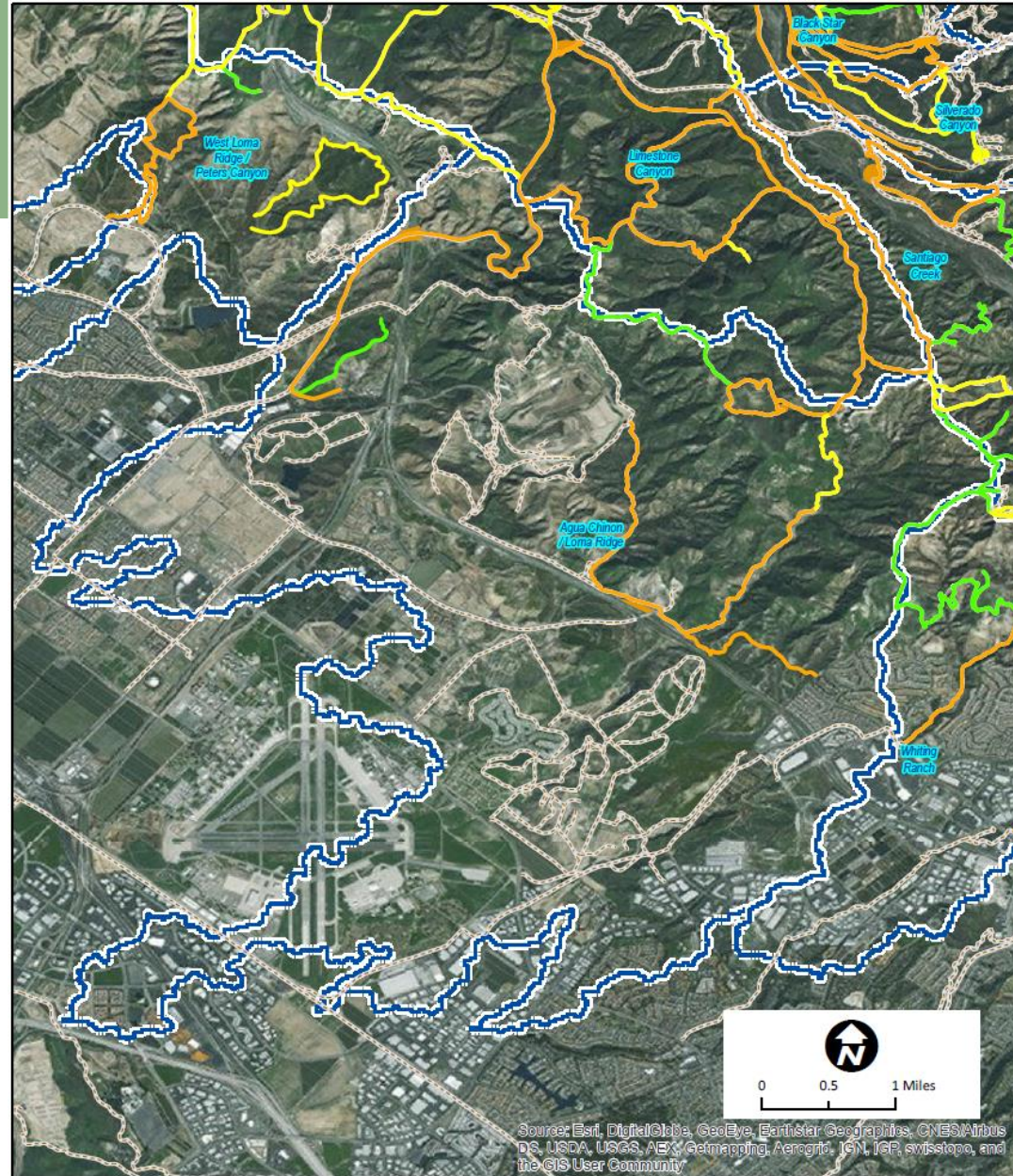
Partnering with:

Milan Mitrovich, Natural Communities Coalition
Core Management Team:
- Nathan Gregory, Irvine Ranch Conservancy
- Jennifer Naegele, Orange County Parks
- Lana Nguyen, California State Parks

Note: In addition to this report, see GIS geodatabase provided.

Prioritization

- Urban edge
- Popular trails
- Visitor facilities



LEGEND

EDRR Survey Priority

- | | |
|--------|----------------------|
| High | Survey every 1 year |
| Medium | Survey every 2 years |
| Low | Survey every 3 years |

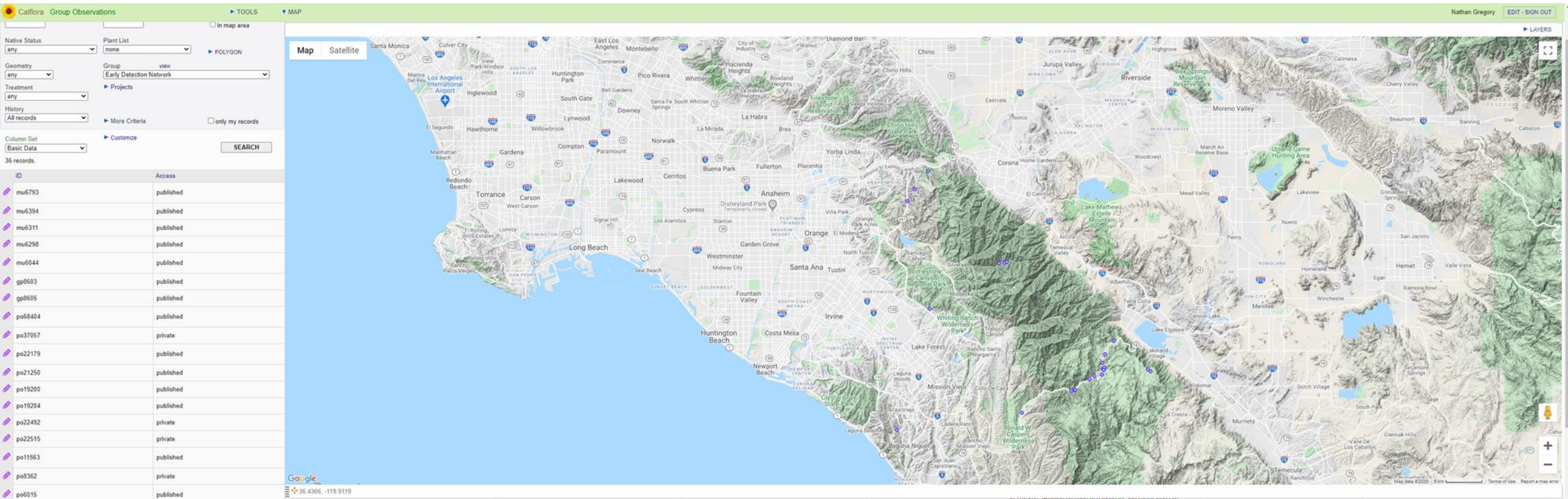
Other trails

- | |
|--|
| Invasive Plant |
| Management Units
(Subwatershed - Level 2) |

~DRAFT~

- | |
|--------------------------|
| NCC Central region |
| EDRR Routes |
| Agua Chinon / Loma Ridge |

Implementation



Challenges



- Capacity
 - Funding
 - Expertise
- Consistency
 - Baseline information
 - Priorities
 - Policy



© 2017 Ron Vanderhoff



Jutta Burger

Essential Elements



- 
- The background of the slide is a wide landscape photograph. On the right side, a large, light-colored rock formation sits atop a hill covered in green shrubs. In the center, a lone tree stands on a rocky outcrop. The background shows a deep valley with rolling green hills under a cloudy sky. A semi-transparent grey box on the left contains a bulleted list.
- Buy-in
 - Collaboration
 - Communication



Leah Gardner,
*California State Parks Exotic Plant
Management and Development
of an EDRR Program*

California State Parks Exotic Plant Management and Development of an EDRR Program

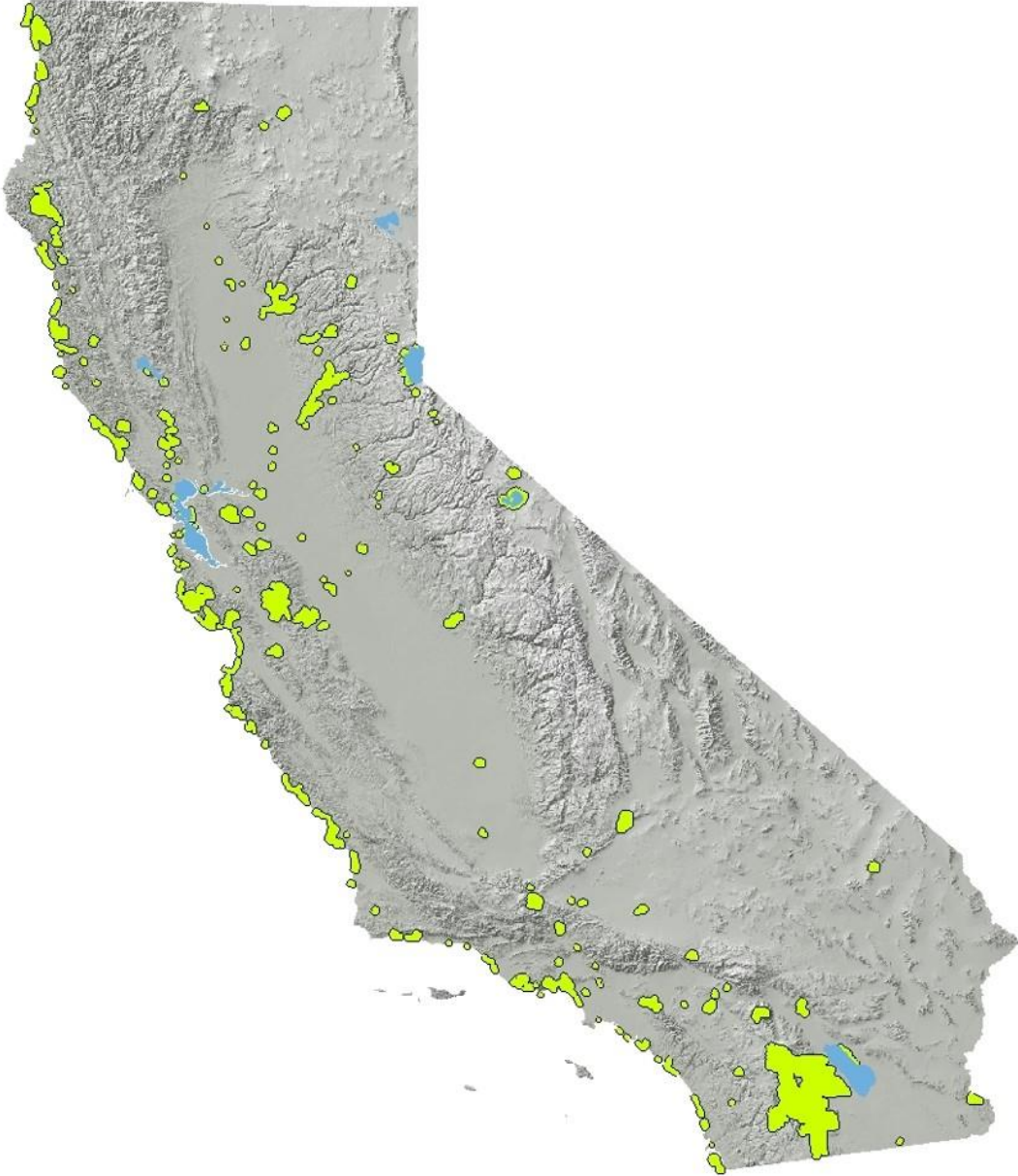


Leah Gardner
Senior Environmental Scientist (Specialist)
Botany and Vegetation Management
Leah.Gardner@parks.ca.gov



The State Park System

- 280 park units in 21 districts
- 1.5 million acres
- 339 miles of coastline
- 94% of land base is undeveloped
- Critical habitat nodes and linkages in networks of conserved lands





State Parks Mission

To provide for the health, inspiration and education of the people of California by helping to **preserve the state's extraordinary biological diversity**, protecting its most valued natural and cultural resources, and creating opportunities for high-quality outdoor recreation.



Directives from the Department Operations Manual (DOM) 2004

DOM 0310.7 Exotic Plant Control

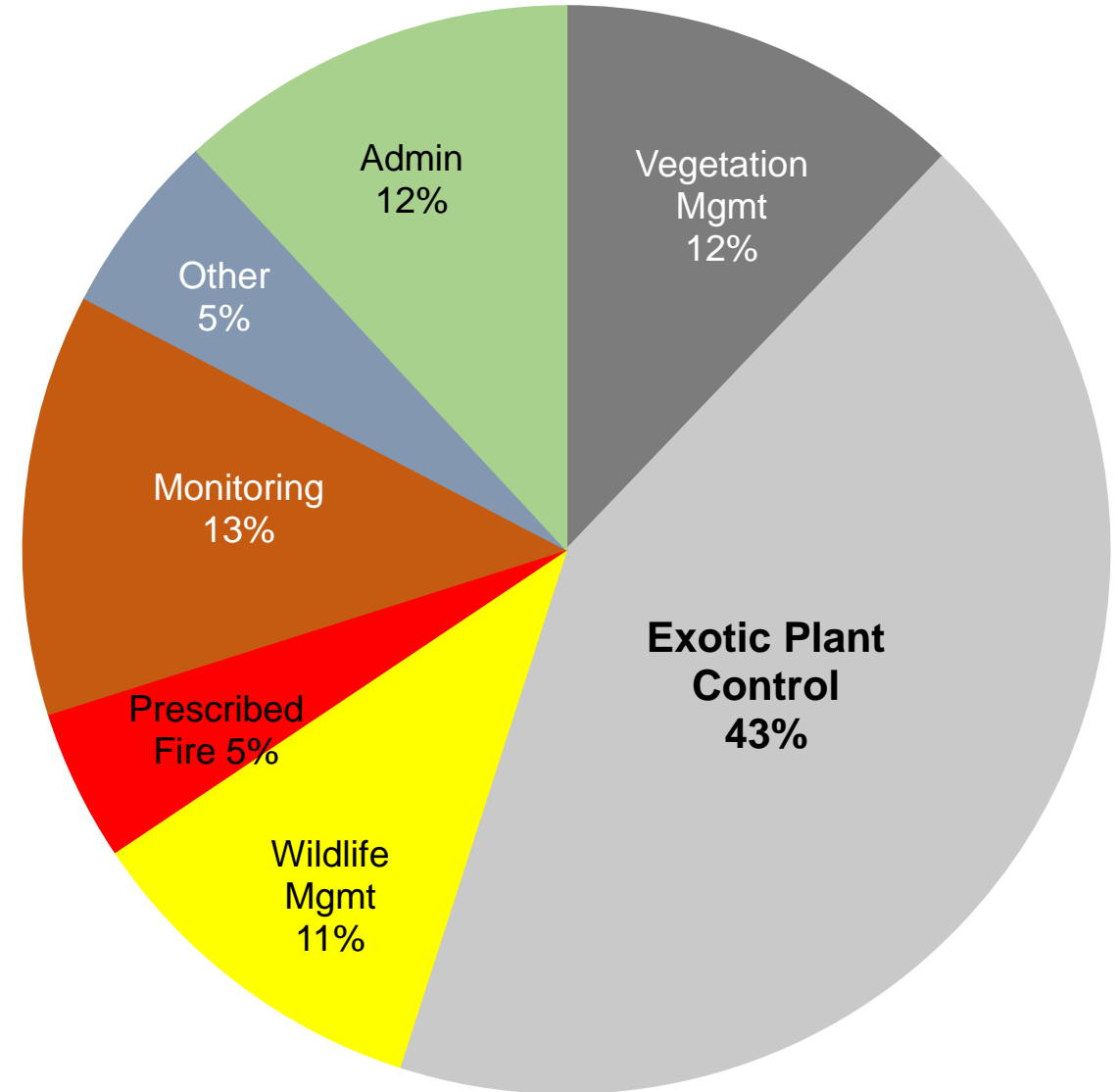
Controlling damaging exotic plant species is one of the Department's greatest challenges in fulfilling its mission to help preserve the natural resource values of the State Park System.

DOM 0310.7.2 Removal of Established Populations of Exotic Plants

The immediate removal of new invasions is the most effective method of controlling highly invasive species.



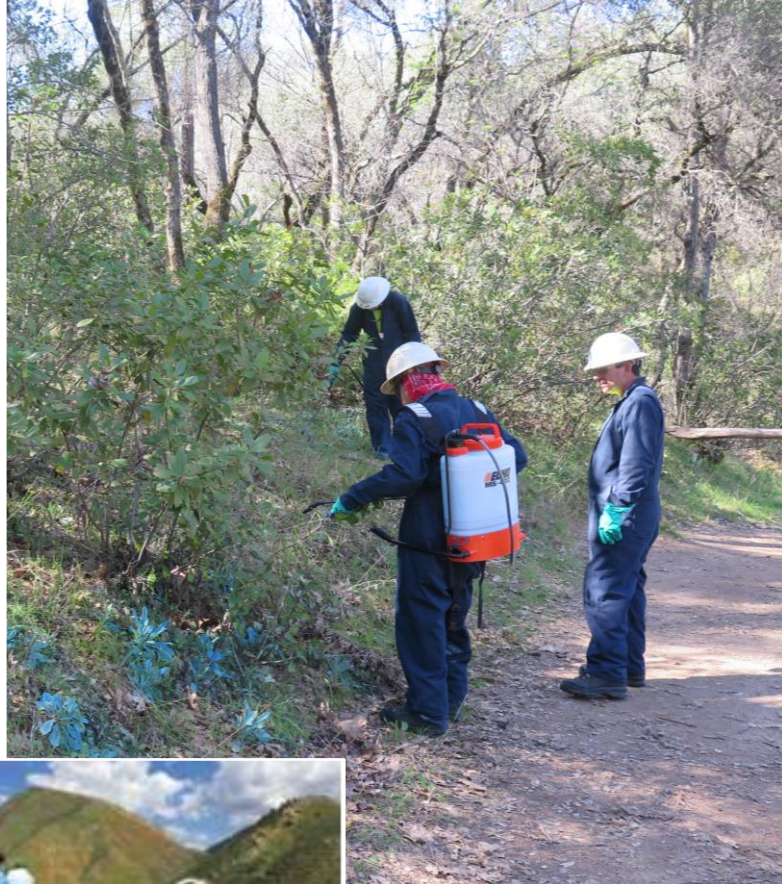
On-Going Maintenance Activities Natural Resources



Manual and Mechanical Treatments



Chemical Treatments



Prescribed Fire

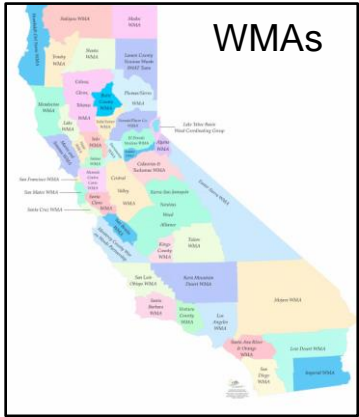
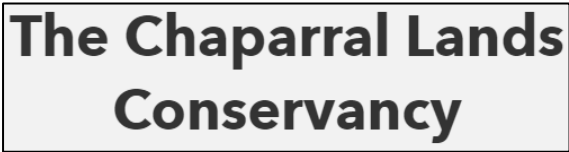
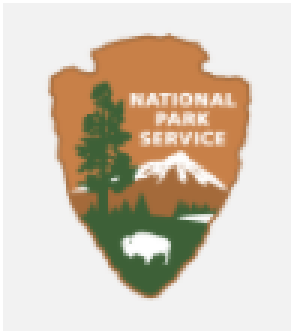




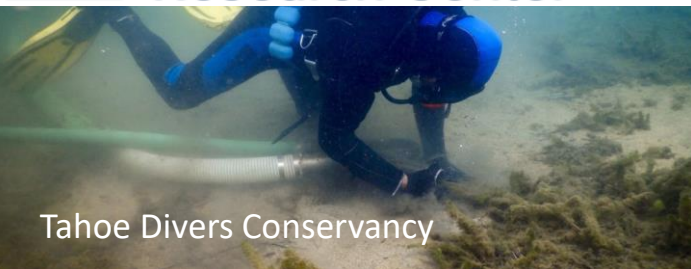
(with a few exceptions)



Regional Partnerships



Eradicating Eurasian milfoil at Emerald Bay SP



2010



2014

EDRR Pilot Program 2012-2015

- Started in 2012
- Santa Cruz and Orange Coast districts participated in the pilot
- Added Bay Area, North Coast Redwoods, San Diego Coast, Sierra, and Colorado Desert districts.

State Parks Early Detection and Rapid Response (EDRR) Handbook

Containing the Methods and History of a Pilot EDRR Project Conducted by NRD and District Staff from 2012 to 2015



Prepared by:

California State Parks
Natural Resources Division (NRD)
1416 Ninth Street, Room 923
Sacramento, CA 95814



List of Preparers

Ramona Robison and Nita ~~Barve~~ ^{Borve} - NRD
Tim Hyland and Daniella Schweizer - Santa Cruz District
Santa Cruz Resource Conservation District and California Invasive Plant Council –
Technical assistance and review

April 30, 2015

EDRR Program – Plans, Goals, & Vision

- Develop new handbook and training materials
- Roll out to additional districts beginning early next year
- Foster a parks culture that practices prevention and early detection as integral components of successful exotic plant management
- Continue promoting participation in regional partnerships for effective weed management - and other natural resource stewardship work - at a landscape scale

California State Parks
Early Detection and Rapid Response (EDRR) Handbook
for Invasive Species Management



Prepared by:

California State Parks
Natural Resources Division (NRD)
1416 Ninth Street, Room 923
Sacramento, CA 95814



Revised 2020
by Leah Gardiner, Rachel Kesel, and Nita Barve

EDRR for Weeds following Fire and Fire Suppression



Dozer line





Learn more about the CLSN:

calandscapestewardshipnetwork.org/

Learn more about EDRR in California:

[https://calandscapestewardshipnetwork.org/sites/default/files/2020-10/Stewarding Biodiversity Invasive Plant EDRR large.pdf](https://calandscapestewardshipnetwork.org/sites/default/files/2020-10/Stewarding%20Biodiversity%20Invasive%20Plant%20EDRR%20large.pdf)

Connect with us:

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DLandry@parksconservancy.org