

# TRPA Governing Board

*May 22, 2024*

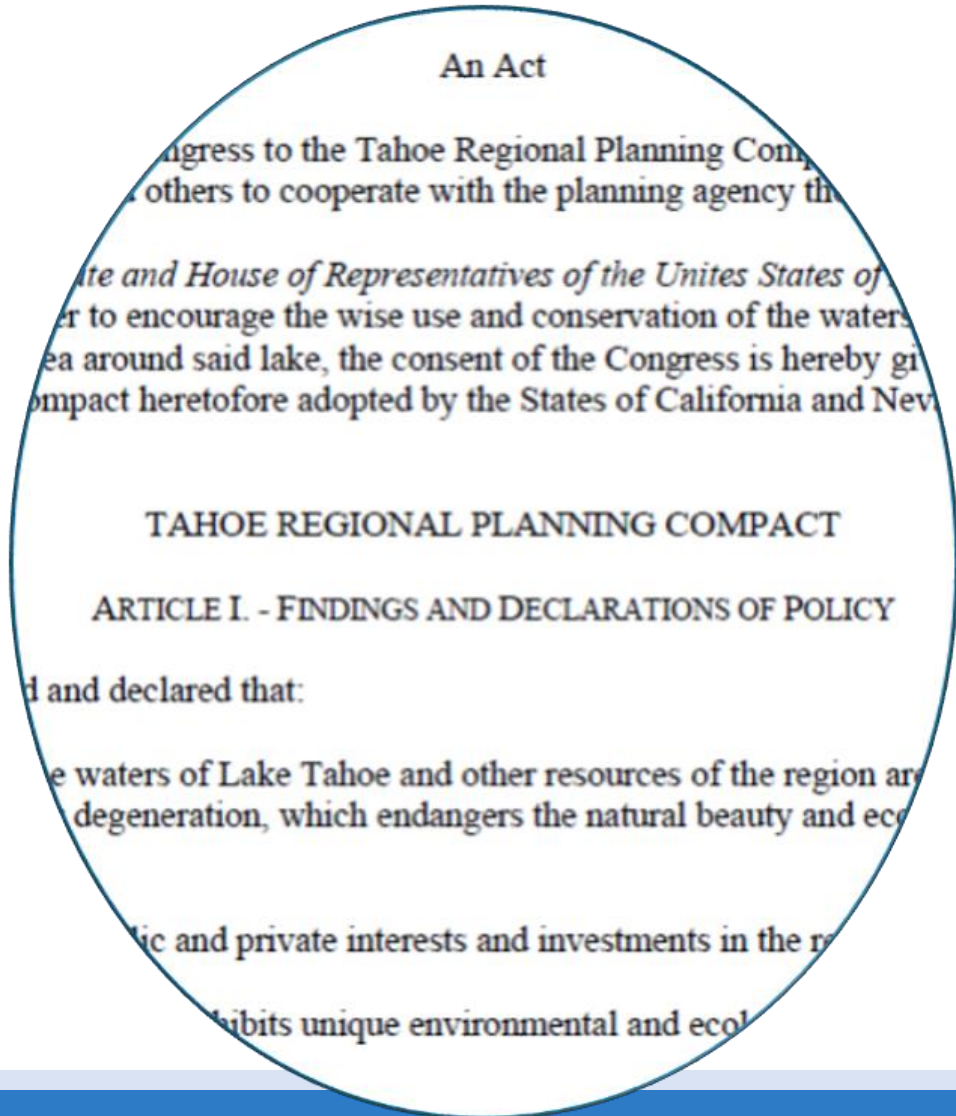
## AGENDA ITEM IX.A

# Proposed revisions to environmental threshold carrying capacities (threshold standards)

**Dan Segan**

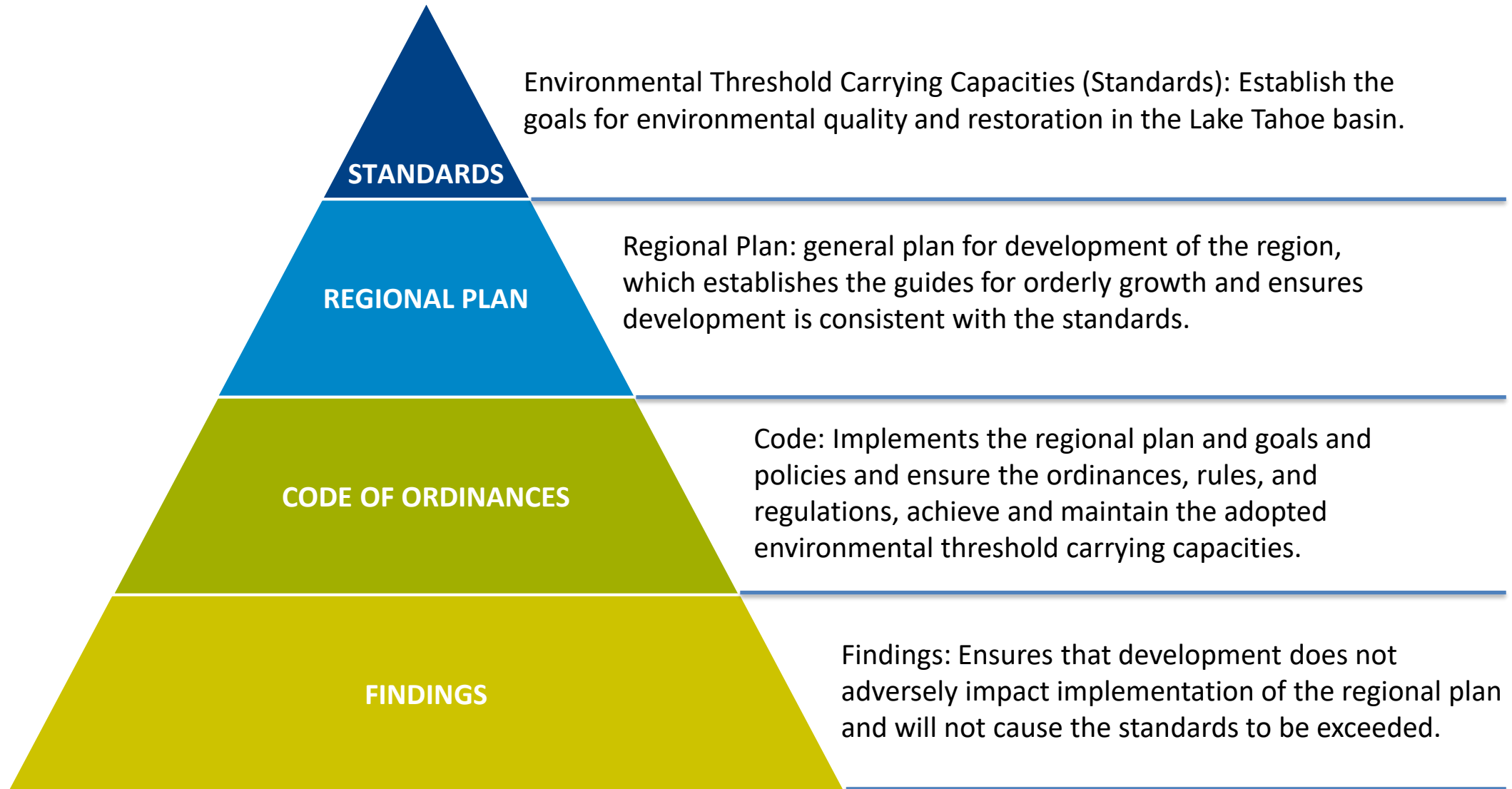
Chief Science and Policy Advisor  
775-589-5233, [dsegan@trpa.gov](mailto:dsegan@trpa.gov)

# Threshold Standards



Article (II) (i) “***Environmental threshold carrying capacity***” means an environmental standard necessary to maintain a significant scenic, recreational, educational, scientific or natural value of the region or to maintain public health and safety within the region. Such standards shall include but not be limited to standards for air quality, water quality, soil conservation, vegetation preservation and noise.

# Threshold Standards



# Lake Tahoe Restoration Act

MAN-

made

0,000

VII of the Compact, and State law, as applicable.

“(b) PRIORITY LIST.—

“(1) DEADLINE.—Not later than March 15 of the year after the date of enactment of the Water Resources Development Act of 2016, the Chair, in consultation with the Secretary, the Administrator, the Directors, the Planning Agency, the States of California and Nevada, the Federal Partnership, the Washoe Tribe, the Lake Tahoe Federal Advisory

Committee, and the Tahoe successor organization) shall prioritize Environmental Impact Statements for the Lake Tahoe Basin in categories described in subsection

“(2) CRITERIA.—The List shall be based on the following criteria:

“(A) The 4-year study evaluation.

“(B) The ability to measure progress or success of the program.

“(C) The potential to significantly contribute to the achievement and maintenance of the environmental threshold carrying capacities identified in Article II of the Compact.

“(D) The ability of a program to provide multiple benefits.

“(E) The ability of a program to leverage non-Federal contributions.

“(F) Stakeholder support for the program.

“(C) The potential to significantly contribute to the achievement and maintenance of the environmental threshold carrying capacities identified in Article II of the Compact.

shall be made available to the Secretary to carry out, including by making grants, the following programs:

“(i) Programs identified as part of the Lake Tahoe Basin Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy 10-Year Plan.

“(ii) Competitive grants for fuels work to be awarded by the Secretary to commu-

adopted national wildland implement the applicable portion of the plan described in clause

ass programs, including treatments.

a Fire Restoration under the authority of the Secretary.

the Tribe programs on tribal lands within the Lake Tahoe Basin.

(vi) Development of an updated Lake Tahoe Basin multijurisdictional fuel

“(D) The ability of a program to provide

on the Priority List.

“(c) RESTRICTION.—The Administrator shall use not

more than 3 percent of the funds provided under sub-

## Natural Resource Evaluation Systems: Assessment of Best Practices for the Tahoe Regional Planning Agency

Tahoe Science Advisory Council Technical Report | October 2017



A product of the Tahoe Science Advisory Council prepared by:

Alan Heyvaert – *Desert Research Institute; TSAC co-chair*  
Christopher Knopp – *Desert Research Institute consultant*  
Ed Parvin – *U.S. Geological Survey*  
Casey Schmidt – *Desert Research Institute*

**TSAC**

TSAC WO-004, ver. 8-d

### Structuring Data to Facilitate Management of Threshold Standards

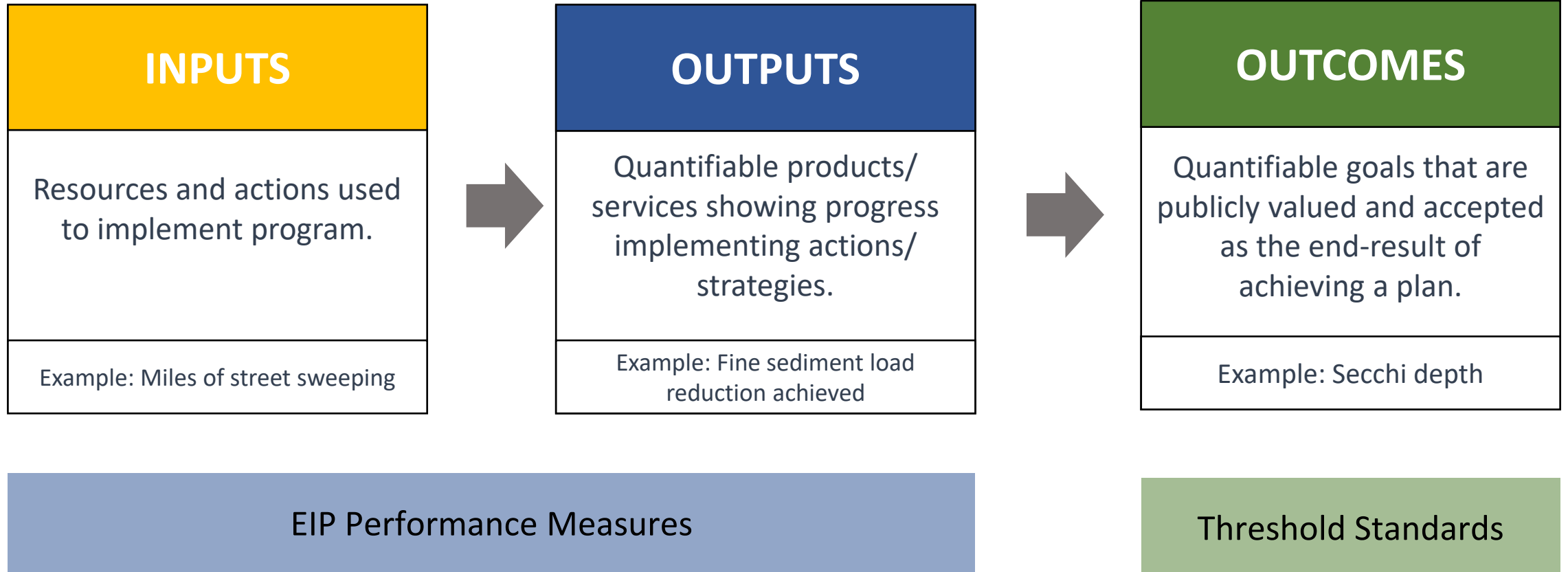
#### Executive Summary

In a previous study the Tahoe Science Advisory Council (TSAC) reviewed natural resource management systems from around the country and documented their findings in terms of best practices for establishing environmental management goals and for evaluating progress towards those goals (TSAC, 2017). The Council identified four core principles and eight programmatic characteristics that were considered essential for effective natural resource evaluation and management. This document builds on that earlier work by providing guidance on three essential elements needed for structuring information to inform threshold standard development and outcome tracking. These essential elements include 1) the development of a conceptual framework to communicate broad-scale socio-ecological system goals and interactions across threshold categories, 2) elucidation of system functions and causal linkages through conceptual models, and 3) tracking progress toward specified outcomes through indicators selected from causal networks or result chains.

The conceptual framework recommended for Tahoe Basin thresholds management is derived from decades of environmental resource management research based on Pressure-State-Response (PSR) relationships. This has been expanded over time to better represent complex social-ecological systems, where the driving forces from social, demographic and economic developments produce activities that create pressures on environmental states and yield changes or impacts on ecosystem services that ultimately require management responses (DAPSIR: Driver-Activity-Pressure-State-Impact-Response). This basic conceptualization has been used extensively for different types of problems around the world. It has proven to be a flexible and useful framework that can be tailored to the specific requirements of each system. It serves as the foundation for communicating and deliberating on complex environmental issues and for collaborative consideration of potential management responses.

The conceptual model represents our understanding of system function, based on those factors represented within the conceptual framework. It condenses a universe of potentially relevant environmental factors and interactions into a set of diagrams and associated narratives that identify and organize the key attributes of these complex systems into a simplified representation of system structure and dynamics. It shows where management responses can provide benefits by maintaining or restoring desired features or ecosystem services (as benefits humans obtain from properly functioning ecosystems). The conceptual model also indicates where assumptions or uncertainties are present that may require additional investigation, often conducted within an adaptive management system to inform future decisions.

# Framework



# Best Practice



## Specific

The standard establishes a specific numeric target, and benchmark/baseline values are documented where necessary.



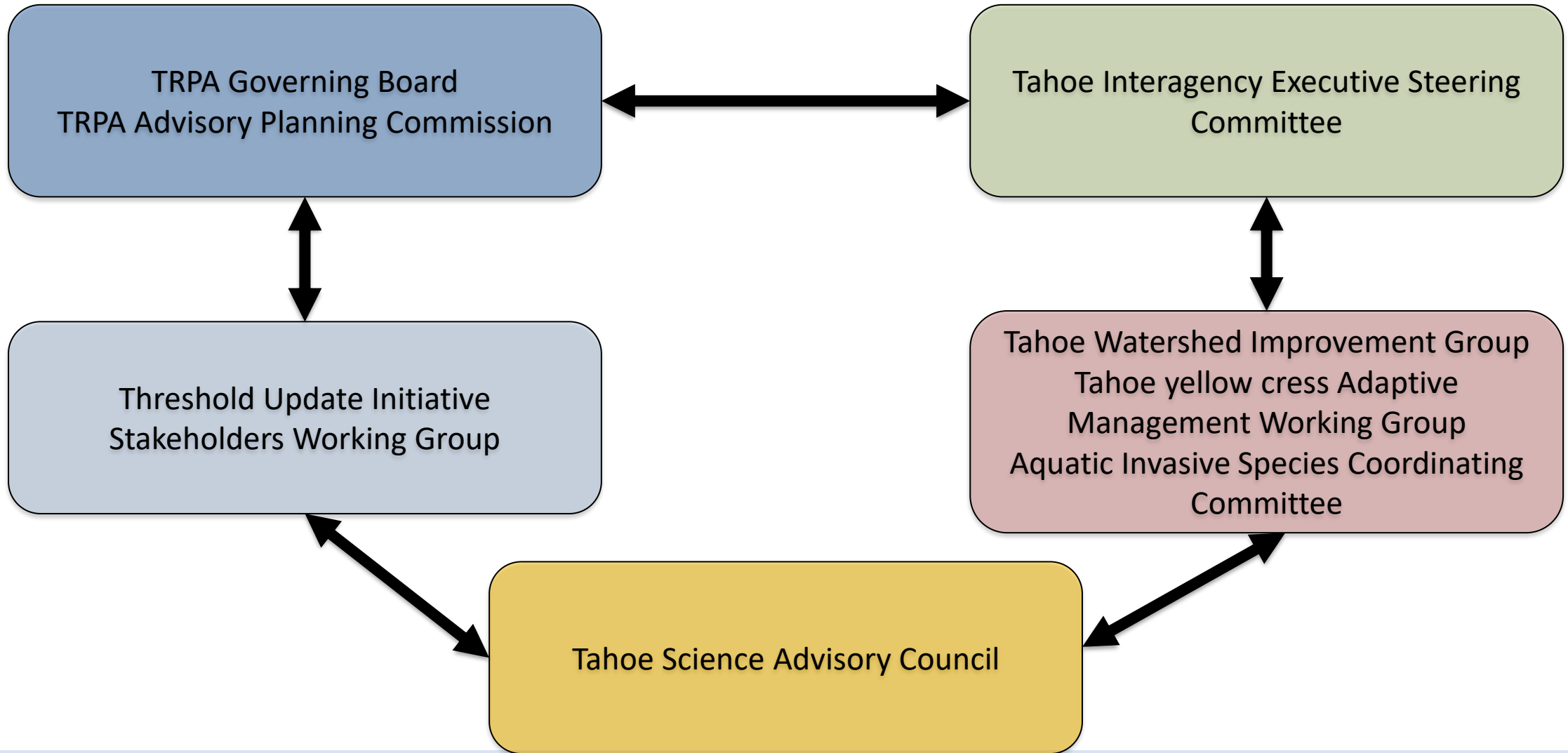
## Measurable

The standard has clearly defined indicator(s) that link to the standard, and there are practical ways to objectively and accurately measure progress towards attainment.



## Outcome-based

Standards establish a desired condition for an environmental end state. Standards do not establish a means to achieve the desired outcome.





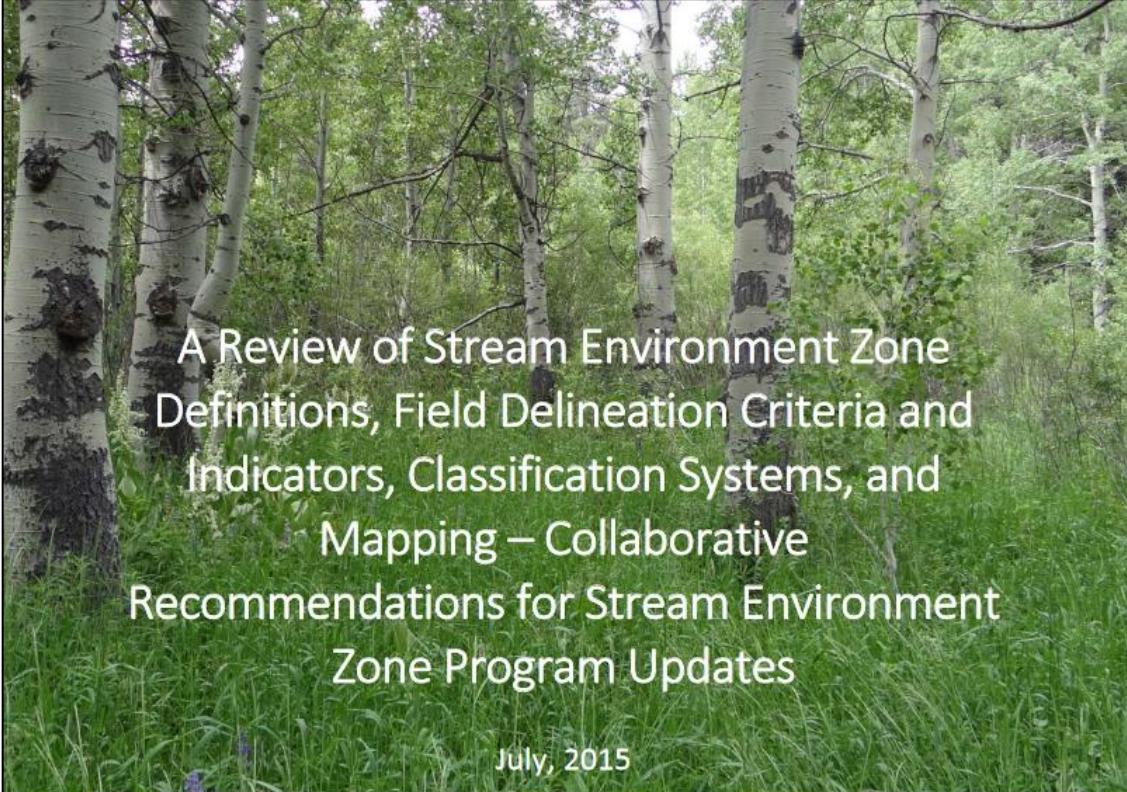
# **Stream Environment Zone (SEZ)**

# What is an SEZ?

## TRPA Code

### Stream Environment Zone

- Generally an area that owes its biological and physical characteristics to the presence of surface or ground water.



A Review of Stream Environment Zone Definitions, Field Delineation Criteria and Indicators, Classification Systems, and Mapping – Collaborative Recommendations for Stream Environment Zone Program Updates

July, 2015

Prepared By  
**Spatial Informatics Group**

Ken Roby<sup>1</sup>, Jarlath O’Neil-Dunne<sup>1,2</sup>, Shane Romsos<sup>1,3</sup>, William Loftis<sup>4</sup>, Sean MacFaden<sup>1,2</sup>, David Saah<sup>1</sup>, and Jason Moghaddas<sup>1</sup>

<sup>1</sup> Spatial Informatics Group  
3248 Northampton Court  
Pleasanton, California 94588  
<http://www.sig-gis.com/>

<sup>2</sup> University of Vermont - Spatial Analysis Laboratory  
Rubenstein School of Environment and Natural Resources

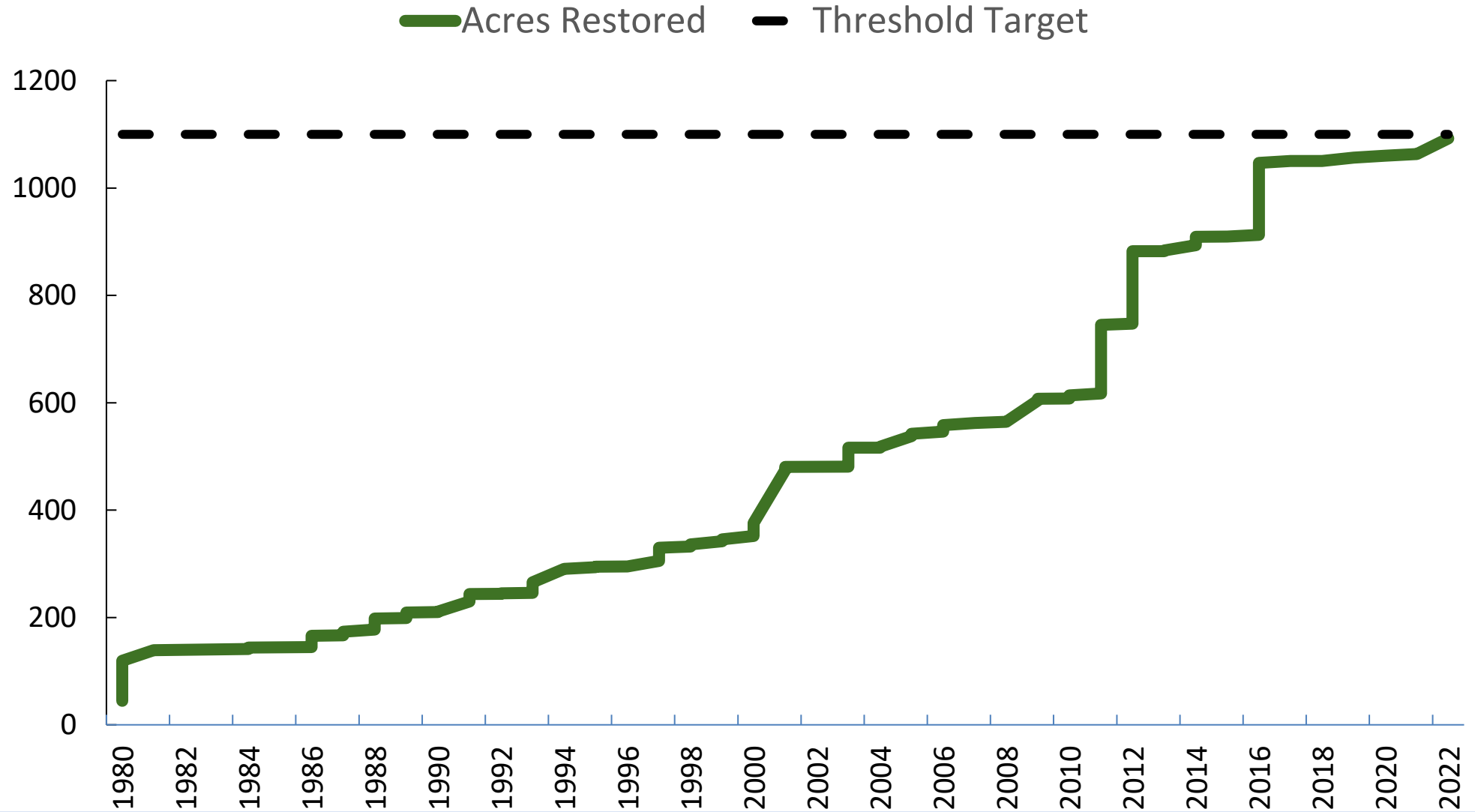
<sup>3</sup> For questions or information on this report, contact:  
Spatial Informatics Group  
1048 Ski Run Blvd.  
South Lake Tahoe, CA  
[sromsos@sig-gis.com](mailto:sromsos@sig-gis.com)

<sup>4</sup> USDA - Natural Resource Conservation Service  
NRCS-EPA Liaison Office

# Current SEZ Standards

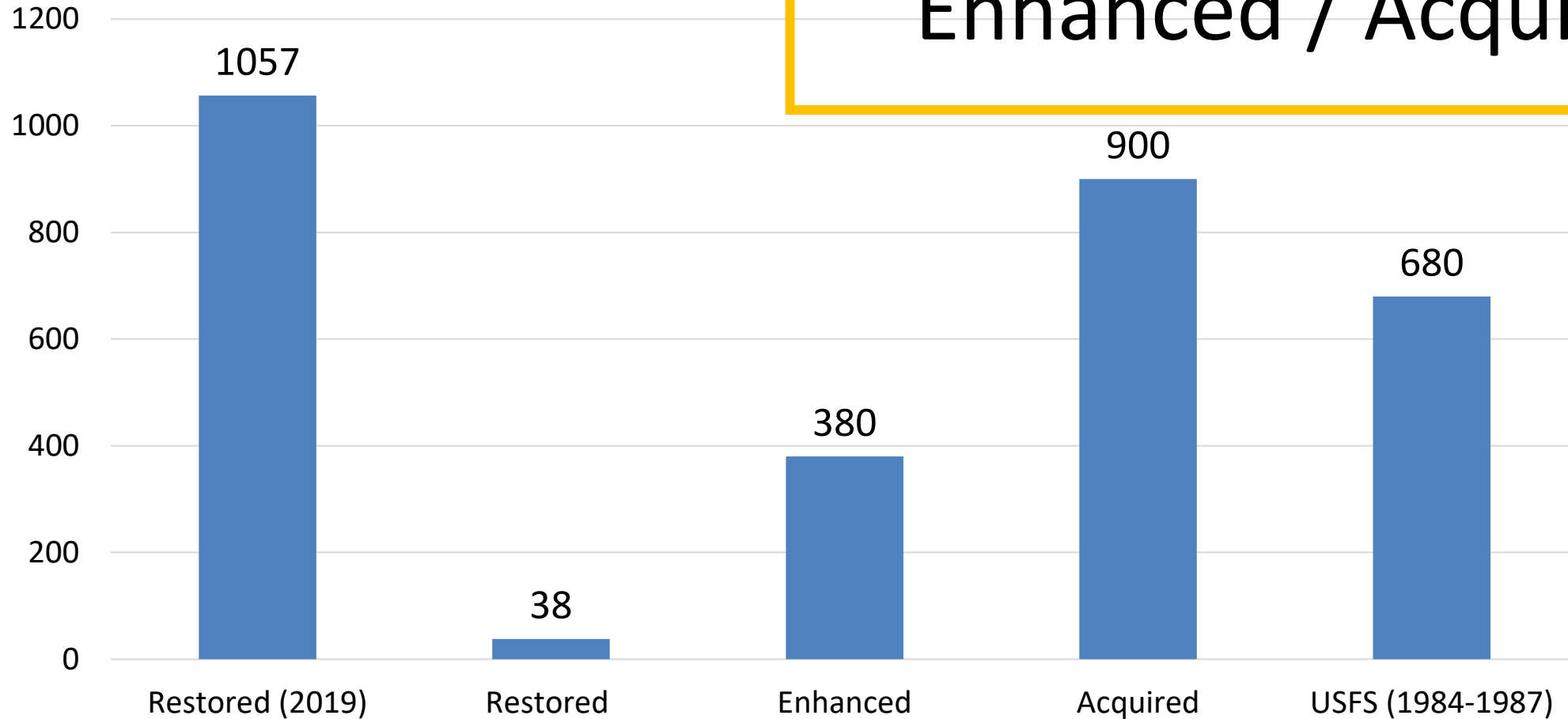
- 1. Preserve existing naturally functioning SEZ lands in their natural hydrologic condition*
- 2. Restore 25% of the SEZ lands that have been identified as disturbed, developed or subdivided*
- 3. Restore all disturbed SEZ lands in undeveloped, un-subdivided lands*
- 4. Attain a 5% total increase in the area of naturally functioning SEZ lands*

# SEZ Restoration



# Full accounting

3055 Acres Restored /  
Enhanced / Acquired





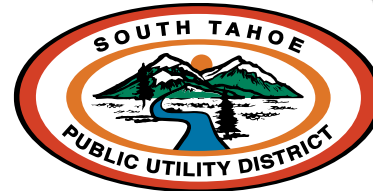
**TAHOE**  
RESOURCE CONSERVATION DISTRICT



Nevada Division of  
**STATE LANDS**



CITY OF  
**SOUTH LAKE TAHOE**



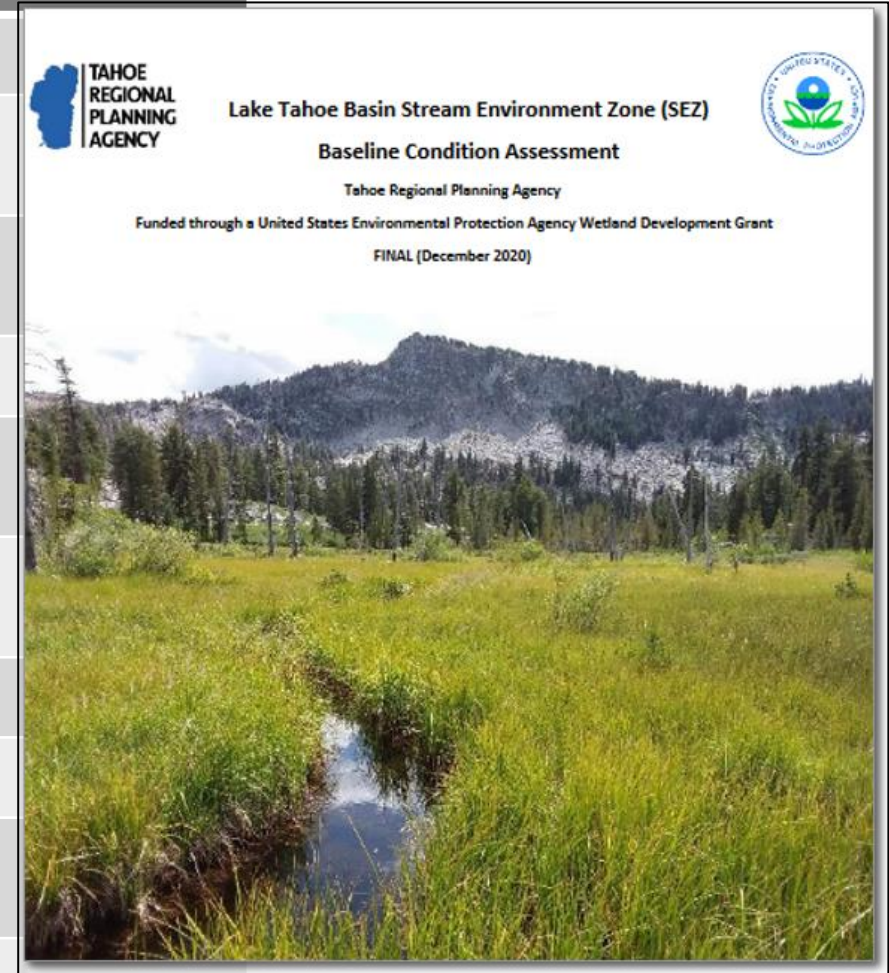
# Peer Review

*“In summary, the present approach to evaluating the condition and the improvement in SEZ’s is an overly blunt instrument with no apparent scientific basis beyond “more is better.” The science has truly advanced in the last 40+ years”*

– 2015 Peer Reviewer

# Condition Index

Indicator	Description	Value	Score
Headcuts	Number of headcuts	0	12
Vegetation Vigor	Vegetation "greenness"	Trending drier	3
Conifer Encroachment	Percent of pixels encroached	98	3
Channel Incision	Bank height ratio	2.23	3
Ditches and Gullies	Percent ditches / gullies	37	6
Channel Stability	Percent unstable banks	23	6
Habitat Fragmentation	Percent developed	86	3
Biotic Integrity	CSCI score	0.85	9
Invasive Plants	Number of invasive plants	1	9
Fish passage	Number of barriers	2	3
<b>Total</b>			<b>57 / 120 = 47.5% (D)</b>





# SEZ Baseline

## The Stream Environment Zones of Lake Tahoe



Use this application to visualize **CURRENT CONDITIONS** of stream monitoring attributes, **EXPLORE** monitoring data such as stream **TRACK** where

SEZ Area: Site A		SEZ Type: Meadow, Non-Channelled	
Year: 2014	SEZ quality: 67	Acres: 10	SEZ condition index: 670
Year: 2018	SEZ quality: 75	Acres: 10.5	SEZ condition index: 788
<b>SEZ index change: 118</b>			

# Target setting

Partner 1		Post Restoration Score		
		100%	91%	88%
# Projects	103			
Acres Treated	2,748			
Regional Score		1,004,256	886,283	871,270

Partner 2		Post Restoration Score		
		100%	91%	88%
# Projects	269			
Acres Treated	6,238			
Regional Score		1,106,376	1,065,837	1,031,517

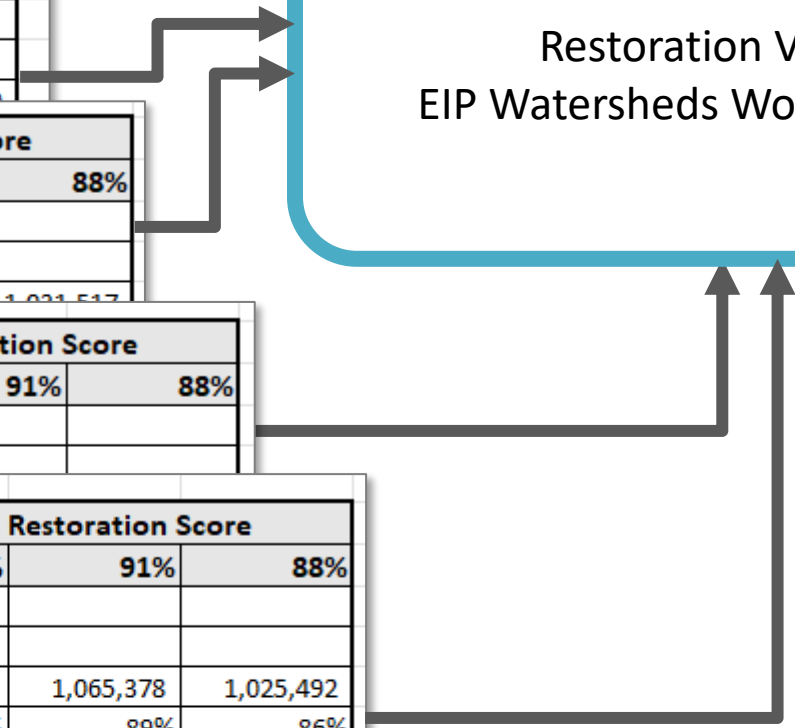
  

Partner 3		Post Restoration Score		
		100%	91%	88%
# Projects	309			
Acres Treated	6,206			

Partner 4		Post Restoration Score		
		100%	91%	88%
# Projects	349			
Acres Treated	7,252			
Regional Score		1,112,517	1,065,378	1,025,492
Regional % of Possible Score		93%	89%	86%
Regional % of Possible Score (no SEZ re-establishment)		104%	99%	96%
Regional % increase		18%	13%	9%
Score improvement		173,480	126,341	86,455
Total gap closed		68%	50%	34%
Gap closed (no SEZ re-establishment)		129%	94%	64%

Restoration Vision:  
EIP Watersheds Working Group



# Proposed Standard

- Enhance the quality and function of meadows and wetlands from 79% to a minimum of 88% of the regional possible SEZ condition index score.

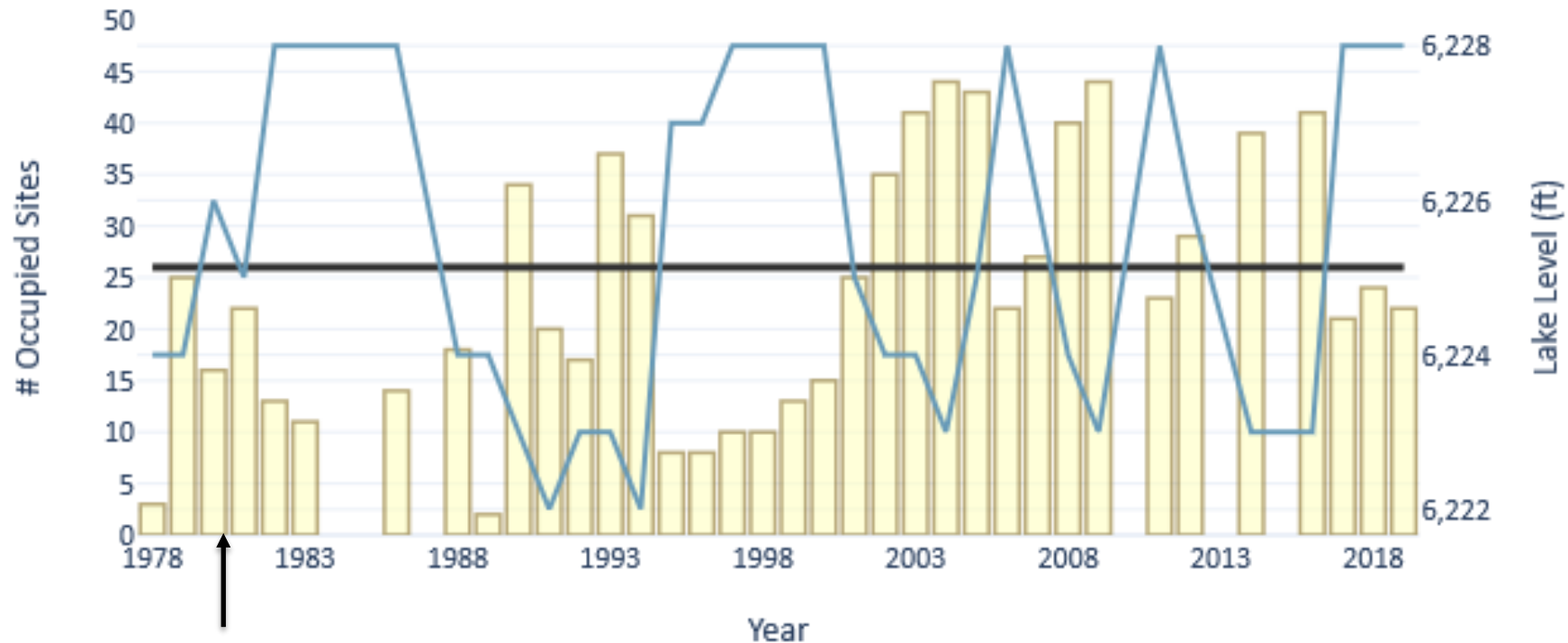
# **Tahoe Yellow Cress (*Rorippa subumbellata*)**

# Tahoe Yellow Cress



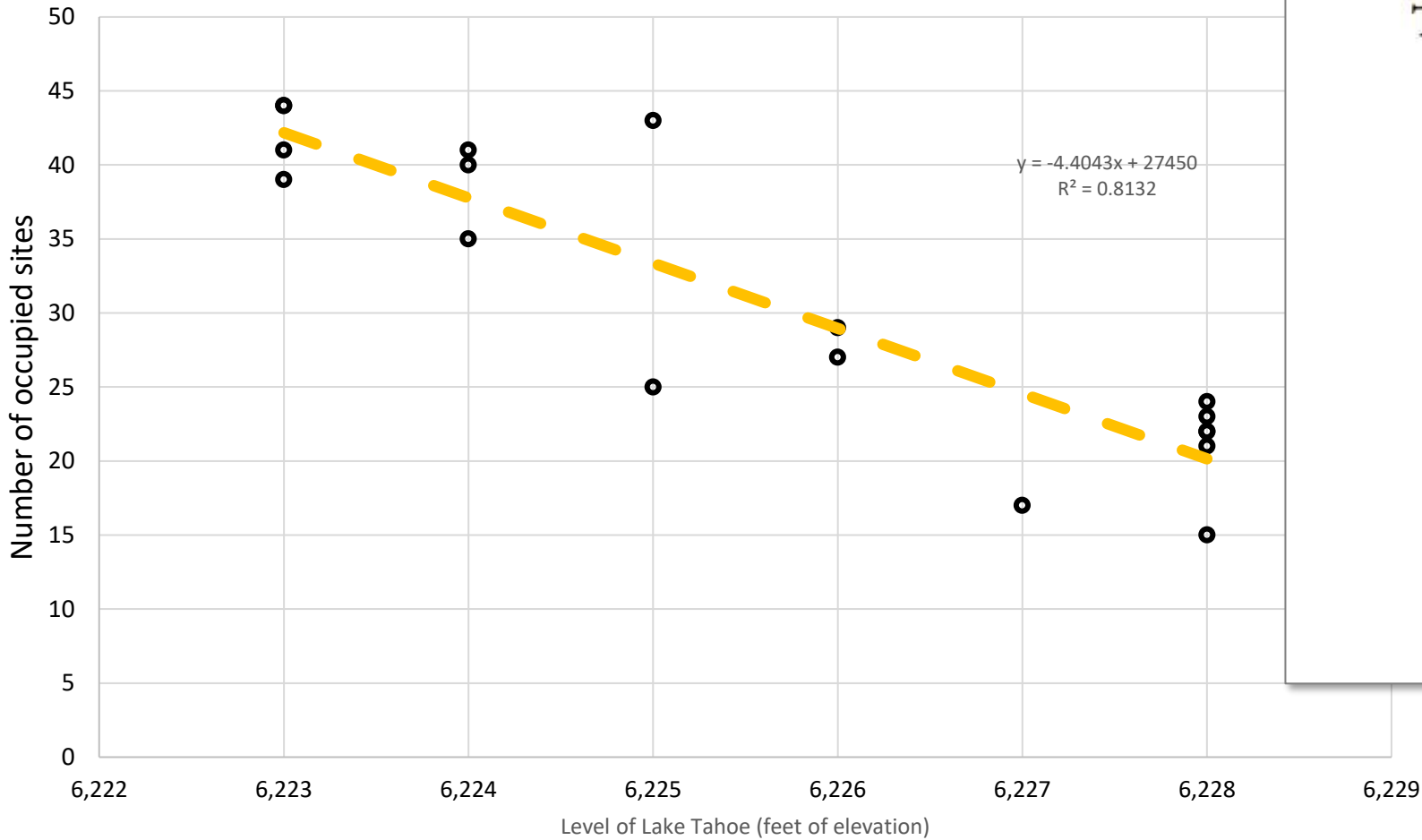
# Influence of Lake Level

Tahoe Yellow Cress



26 site goal was first three years of survey data from approximately 34 sites during 1979-1981

# Lake Level



## CONSERVATION STRATEGY FOR

TAHOE  
(

### Conservation Strategy for Tahoe yellow cress (*Rorippa subumbellata*)



Prepared by  
Alison E. Stanton  
and the  
Tahoe yellow cress  
Adaptive Management Working Group  
and  
Executive Committee

For the  
USDA Forest Service Pacific Southwest Research Station  
Domestic Grant  
13-DG-11272170-010

# Tahoe Yellow Cress

Proposed: Maintain at least the number of occupied *Rorippa subumbellata* survey sites for each lake level as established in the Table below:

Lake Level (feet of elevation)	Occupied survey sites
Low (<6,225)	35
Transition (6,225- 6,227)	26
High (>6,227)	20



# **Aquatic Invasive Species**

# AIS Program

## Prevention



## Control



# AIS Control Standards

WQ9) Reduce the abundance of known aquatic invasive species.

WQ10) Reduce the distribution of known aquatic invasive species.

WQ11) Abate harmful ecological impacts resulting from aquatic invasive species.

WQ12) Abate harmful economic impacts resulting from aquatic invasive species.

WQ13) Abate harmful social impacts resulting from aquatic invasive species.

WQ14) Abate harmful public health impacts resulting from aquatic invasive species.

# Water Quality Review

TSAC WO-012 report; June 2020

## Implementation of a System Structuring Approach for Water Quality Threshold Standards

**From:** Tahoe Science Advisory Council (TSAC)  
 TSAC subcommittee authors: Dr. Alan Heyvaert and Dr. Ramon Naranjo  
 TRPA collaboration co-author: Dan Segan

### Executive Summary

The Tahoe Science Advisory Council (Council) has been working with the Tahoe Regional Planning Agency (TRPA) to develop specific recommendations for threshold standards and associated performance measures to ensure they formally link to appropriate metrics for the Environmental Improvement Program (EIP) and for thresholds progress reporting. This report summarizes progress toward that goal through diverse efforts over the last few years, including an updated set of recommendations for implementation of a system structuring approach, focused here on water quality threshold standards to serve as a model for similar reviews in other threshold categories. System structure in this context represents general organization of threshold standards and the reporting framework that supports decision-making on actions to promote standards attainment and maintenance.

Recommendations for structuring the threshold standards system comprise three key elements: first, to articulate program goals in clear language that communicates a collective purpose to a general audience; second, each goal statement should be supported by one or more specific objectives that explicitly define success, which are the threshold standards; third, objectives should be supported by result chains that link management actions (strategies and individual tactics) to objectives and clearly identify how implementation will be tracked and how the effectiveness of management actions will be evaluated.

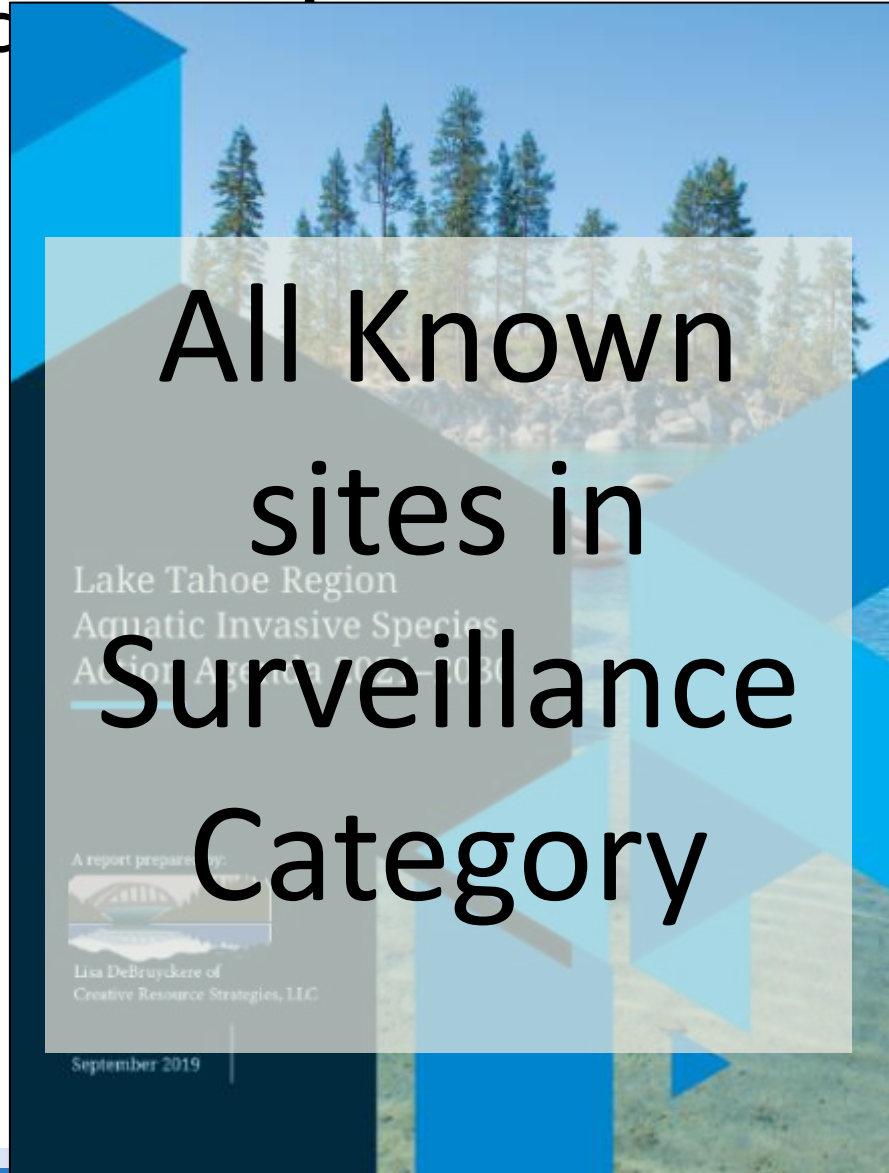
Expanding on these key features, recommendations for structuring threshold standards include:

- 1) Ensuring that each threshold standard fits under a broad aspirational goal statement for its threshold category;
- 2) Clarifying that threshold standards are framed as objectives, and that each objective conforms to SMART criteria (specific, measurable, attainable, relevant and time-framed);
- 3) Where current threshold standards articulate a goal instead of an objective, a specific objective should be defined as the threshold standard for that goal;
- 4) Continue to reduce or eliminate sources of overlap between standards;

Table 2. Role identification for WQ threshold standards. All are TRPA threshold standards at present, with VEC added as an existing state standard. N/A indicates a role was not identified within the system structure. See Appendix A for narrative definitions associated with each threshold standard.

ID No.	Reporting Category	Name of Standard	Role
State Standard	Deep Water (Pelagic) Lake Tahoe	Vertical Extinction Coefficient (VEC)	Objective
WQ-01	Deep Water (Pelagic) Lake Tahoe	Secchi Disk	Objective
WQ-02	Deep Water (Pelagic) Lake Tahoe	Phytoplankton Primary Productivity	Objective
WQ-03	Nearshore (Littoral) Lake Tahoe	Nearshore Turbidity (Stream Influence)	Objective
WQ-04	Nearshore (Littoral) Lake Tahoe	Nearshore Turbidity (No Stream Influence)	Objective
WQ-05	Nearshore (Littoral) Lake Tahoe	Nearshore Phytoplankton Primary Productivity	Objective
WQ-06	Nearshore (Littoral) Lake Tahoe	Nearshore Periphyton Biomass	Objective
WQ-07	Nearshore (Littoral) Lake Tahoe	Nearshore Attached Algae	Goal
WQ-08	Aquatic Invasive Species (AIS)	Aquatic Invasive Species Prevention	Goal
WQ-09	Aquatic Invasive Species (AIS)	Aquatic Invasive Species Abundance	Goal
WQ-10	Aquatic Invasive Species (AIS)	Aquatic Invasive Species Distribution	Goal
WQ-11	Aquatic Invasive Species (AIS)	Aquatic Invasive Species Ecological Impacts	Goal
WQ-12	Aquatic Invasive Species (AIS)	Aquatic Invasive Species Social Impacts	Goal
WQ-13	Aquatic Invasive Species (AIS)	Aquatic Invasive Species Economic Impacts	Goal
WQ-14	Aquatic Invasive Species (AIS)	Aquatic Invasive Species Public Health Impacts	Goal
WQ-15	Tributaries	Nitrogen Concentration (Tributaries)	Strategy
WQ-16	Tributaries	Phosphorus Concentration (Tributaries)	Strategy
WQ-17	Tributaries	Iron Concentration (Tributaries)	Strategy
WQ-18	Tributaries	Suspended Sediment Concentration (Tributaries)	Strategy
WQ-19	Surface Runoff	Nitrogen Concentration (Surface Runoff)	Strategy
WQ-20	Surface Runoff	Phosphorus Concentration (Surface Runoff)	Strategy
WQ-21	Surface Runoff	Iron Concentration (Surface Runoff)	Strategy
WQ-22	Surface Runoff	Suspended Sediment Concentration (Surface Runoff)	Strategy
WQ-23	Groundwater	Surface Discharge – Total Nitrogen	N/A

# Proposed Threshold Standards

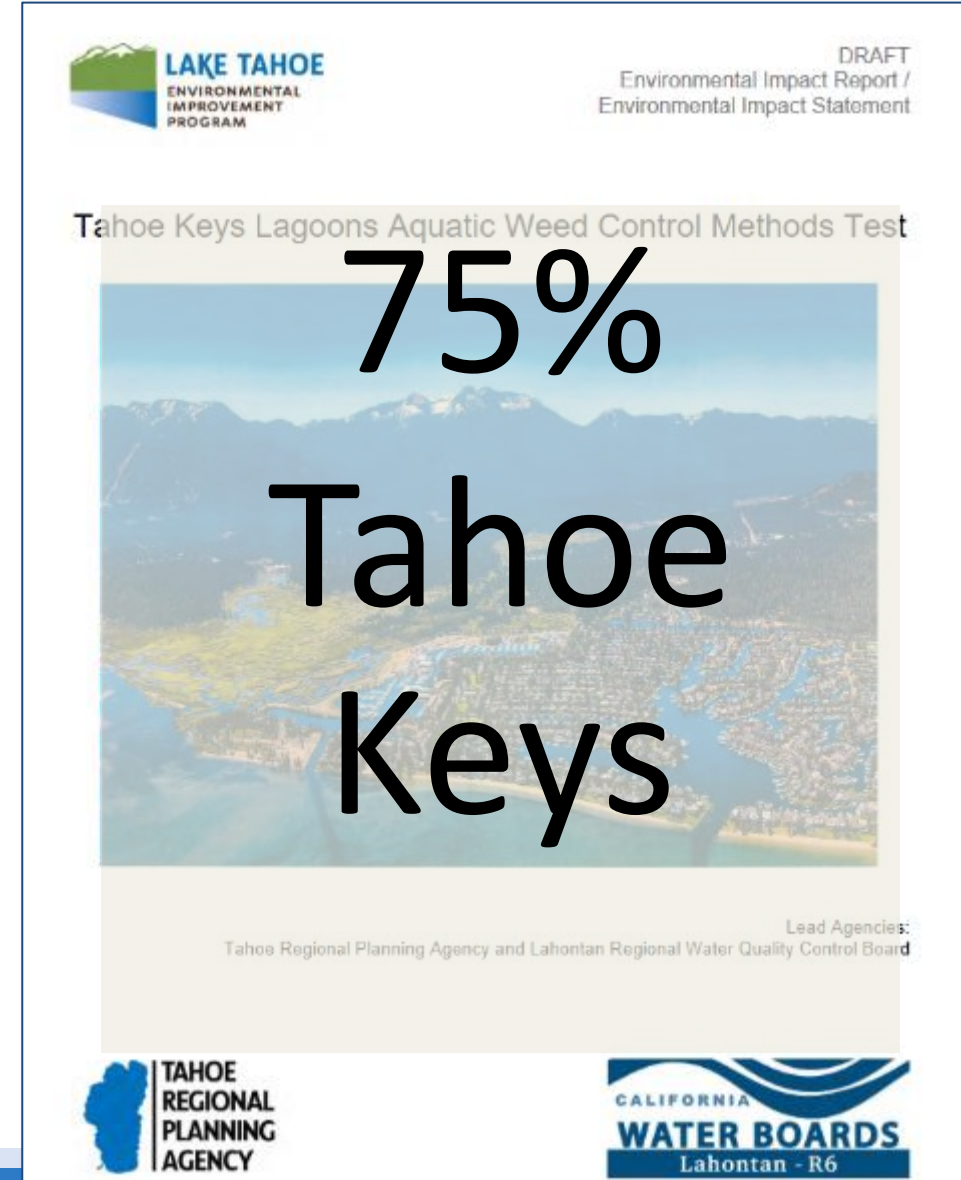


**All Known sites in Surveillance Category**

Lake Tahoe Region  
Aquatic Invasive Species  
Action Agenda 2022-2030

A report prepared by:  
Lisa DeBruyckere of  
Creative Resource Strategies, LLC

September 2019



LAKE TAHOE  
ENVIRONMENTAL  
IMPROVEMENT  
PROGRAM

DRAFT  
Environmental Impact Report /  
Environmental Impact Statement

Tahoe Keys Lagoons Aquatic Weed Control Methods Test

**75%  
Tahoe  
Keys**

Lead Agencies:  
Tahoe Regional Planning Agency and Lahontan Regional Water Quality Control Board

TAHOE  
REGIONAL  
PLANNING  
AGENCY

CALIFORNIA  
WATER BOARDS  
Lahontan - R6

# AIS proposed standards

1. No active aquatic invasive plant infestations in Lake Tahoe, adjacent wetlands, and tributaries, not including the Tahoe Keys.
2. Reduce average aquatic invasive plant abundance in the Tahoe Keys by a minimum of 75% from the 2020 baseline year

# Required Motions

1. A motion to approve the required findings (Attachment B) including a finding of no significant effect.
2. A motion to recommend adoption of Ordinance 2024-\_\_\_, amending Ordinance 2019-02 (Attachment A), updates to the threshold standards for 1) Stream Environment Zone (SEZ) restoration, 2) Aquatic Invasive Species control, and 3) Tahoe Yellow Cress conservation.