

Lake Tahoe Shoreline Plan

AGENDA: Joint Fact Finding Committee

10:00-12:30, Wednesday, June 22, 2016

@ TRPA, 128 Market Street, Stateline, NV (775) 589-5274



Contact: Rebecca Cremeen, Tel: 775-589-5214 rcremeen@trpa.org

Call-In Information: 1 (408) 650-3123 | Access Code: 745-810-005

10:00	Introductions, Agenda Review
10:05	Follow Up on Action Items from Meeting 1 <i>Materials: (01) Meeting Summary, 4-28-2016</i> <i>(02) Revised Joint Fact Finding Questions</i>
10:15	Final Approach to Summer Data Gathering Rebecca Cremeen and Jennifer Cannon, TRPA <ul style="list-style-type: none">▪ Buoy Count with GPS▪ Noise Survey▪ Boat Use Survey▪ Scenic Survey▪ Other Issues + Any Final Concerns or Questions?
10:35	Fish Habitat and Access Facilities – Brandy McMahan, TRPA <ul style="list-style-type: none">▪ <i>Materials: See Fish Habitat Memo</i>▪ Confirm best available science to inform policy▪ If considering future policy, what is the best available science telling us? For piers? Buoys? Other access?
11:10	Break
11:20	Boating – Rebecca Cremeen, TRPA <ul style="list-style-type: none">▪ <i>Materials: See Boating Policy Memo with Literature Review</i>▪ Confirm best available science to inform policy on boating access (motorized and non-motorized)
12:00	Future Lake Levels <ul style="list-style-type: none">▪ <i>Materials: See Low Lake Levels Memo</i>▪ What studies should we consider to help make decisions on lake management?▪ JFF Recommendation for the Steering Committee (<i>discuss in August</i>): What lake level scenario and planning horizon should guide policy making and lake management decision-making?
12:25	Wrap Up and Next Steps

JOINT FACT FINDING COMMITTEE

Date	Topics
April 28	JFF Questions Resource Inventory 2016 Boating Season: Buoy Count; Noise Monitoring; and Boat Use/Surveys
June 22 (10:00-12:30)	Final Approach to Summer Data Gathering Fish Habitat and Access Facilities: identify best available science to inform policy Boating Impacts/Literature Review (Air, Noise, Water Quality) Future Lake Levels -- What studies should we consider to help make decisions on lake management?
August 3 Or Aug 8	<i>Boating Continued</i> Consider Adaptive Resource Management Approach What we can use from the Threshold Evaluation? What can we learn from Nearshore Science? CTC Shoreline Access Plan Presentation
August 24 (10-12:30 or 2-4:30) or 25 (2-4:30)	Future Lake Levels Scenarios – What lake level scenario and planning horizon should guide policy making / lake management decision making? Piers: Scenic Management and Fish Habitat Dredging (New/Beneficial Requirement – If TRPA were to adopt Federal and State non-degradation standards, how might that affect / would that be protective of lake clarity and water quality?)
Sept 13 or Sept 14 (preferred)	Follow Up to Buoy Count and Data Processing Scenarios: Future Lake Levels (Part 2)
Sept 30 9:30-12:30	Mitigation (sequencing)
Oct forthcoming	

SUMMARY: Joint Fact Finding Meeting

Held June 22, 2016

In Brief

The JFF discussed final data needs and approach to 2016 surveys which include boating use, buoy counts, scenic analysis and noise monitoring. Geoff Shadlow and Sudeep Chandra joined the Committee and provided input into the latest research on fish abundance, fish habitat mapping and climate change. The group discussed relevant research and studies related to boating impacts, and developing a web page to compile and share data relevant to policy development for the Shoreline Plan.

Action Items

Date	Responsible	Item
7/6	Geoff	Send Donner Lake Study to Rebecca
7/6	Dennis	Contact El Dorado County for buoy data
7/6	Dennis	Compile Tahoe Keepers data related to non-motorized boating and send to Rebecca
7/6	Jesse/Dennis	Coordinate with Tahoe Keys Property Owners Association to collect boat use data
7/6	Penny	Coordinate with Water Trails and staff to get non-motorized data
7/6	Dan	Send Fish Habitat Map and Study to Rebecca who will forward to group
7/6	Dennis	Send Tahoe Keepers Data to Rebecca
7/6	Brandy	Work with Seana to set up location on Shoreline website for data sharing
7/6	Sudeep	Send latest reports of fish population studies and boating impacts to Rebecca
7/6	Jan	Collect research related to boating trends and send to Rebecca
7/6	Rebecca	Coordinate with Jim Walsh and Marina Association to collect concessionaire boating data
7/6	Rebecca	Coordinate with Jesse to involve League in surveys
7/6	Rebecca/Adam	Finalize scenic photo inventory approach

Next Meeting: **August 3, 9:30-12:00**

Discussion Summary

Follow Up on Action Items from Meeting 1

Adam and Ken reported back on the emissions and noise data gathering approach. TRPA will update the emissions model with the appropriate fleet mix for Lake Tahoe. TRPA staff will repeat noise surveys this year using the same location and protocol as previous years.

Final Approach to Summer Data Gathering

Boat Use Survey-TRPA staff will repeat the 2014 boat use survey this summer which looks at occupancy of moorings at select sites around the lake.

AIS Data-TRPA will continue to collect key boating information from AIS stations: engine horsepower, type and boat mooring.

Concessions-Concessions information was collected by TRPA in 2014 and the group agreed that additional data could be collected this year from Marina concessions. Rebecca agreed to work with Jim Walsh and the Marina Association to collect additional data.

Buoy Survey-California State Lands will contract with Spatial Informatics Group (SIG) to conduct the buoy survey in California, which will include GPS mapping. TRPA will survey buoys on the Nevada side of the Lake with assistance from NDOW using the same protocol. Jesse emphasized the importance of collecting all buoy data including small buoys used for jet skis (personal watercraft). Jennifer Cannon is coordinating the protocol and will integrate this feedback.

Scenic-TRPA staff will be collecting photos for the scenic analysis. Some suggested the possibility of high resolution video to provide greater continuity in the analysis. Adam and Rebecca will identify methodology and the locations, which will be representative of different shoreline conditions and structures. Jesse and the League staff are interested in assisting TRPA with these as well as other surveys.

Fish Habitat and Access Facilities

The primary focus of this element will be to identify the best available science and its findings. TRPA is updating its Threshold Evaluation report which includes an updated fish habitat map prepared by SIG. The previous map constrained the entire parcel even if only a portion contained sensitive habitat. The planning team would like consensus from the JFF Committee as to whether or not to use this map for the Shoreline Plan as best available science.

Sudeep Chandra shared that the latest science does not show a direct relationship between habitat and fish abundance. Fish populations have been in decline since 1989 while habitat has remained largely intact. In scientific research, fish habitat is no longer a driver to indicate abundance although identifying variables to increase populations is challenging. Also, of note, building structures in Lake Tahoe has largely been static, and fish populations have decreased. A 2011 report cites a 58% decrease in fish spawning (even though habitat is stable). Regardless of the latest science that fish habitat is not a driver for

abundance; TRPA is required to evaluate environmental impacts to fish habitat, the established environmental threshold.

Of important note, Sudeep Chandra says that the fish studies of the 80s and 90s conducted for the purposes of shoreline planning are still accurate and can inform the shoreline plan.

The group will review the draft fish report, map and the latest studies on fish populations and agreed to revisit this issue at a future meeting.

Boating Impacts

TRPA staff have compiled a number of studies related to boating impacts and are looking to the Committee for additional resources to inform policy decisions. The group recommended incorporating findings from a number of studies related to water quality, AIS, and carrying capacity. Concessionaire data would be useful to track boating use and trends, and fueling locations. Jan recommended that we contact the Marina Association for help with this. The group agreed to forward any relevant research to Rebecca and Brandy who will compile the reports and place them in an accessible location on the Shoreline Plan or TRPA website for everyone to access. Some of the studies mentioned, include:

- Glen Miller, U of Nevada, fuel fossil residues from boating
- Tim Row, USGS, under contract with TRPA
- Geoff Schladow has a few studies on shallow water and sediments
- Whitman (2015) on invasive species (Dennis will share)
- Penny will investigate non-motorized boating data with the water trail
- Carrying capacity: BOR Walrus approach to managing boating density and Lake George in NY

Prior to the next meeting, the planning team will prepare a more refined set of joint fact finding questions related to the literature.

Future Lake Levels

The Shoreline Steering Committee is seeking a recommendation from the JFF Committee on implications of policy changes related to low lake level scenarios. The Committee recommended we plan for a range of elevations rather than a fixed low water level. The Bureau of Reclamation's Truckee Basin Study contains useful information on this topic. Geoff recommended another report from UC Davis which he will share with the group. The Committee decided to revisit this topic at the next JFF meeting.

Participants

Lahontan RWQCB: Mary Fiore-Wagner

CTC: Penny Stewart

California State Lands: Jason Ramos

League to Save Lake Tahoe: Jesse Patterson

Tahoe Lakefront Owners' Association: Jan Brisco

TRPA: Kenneth Kasman, Brandy McMahan, Jennifer Cannon, Dennis Zablagó, Dan Segan

Consultants

Adam Lewandowski, Ascent Environmental

TRPA JFF Coordinator Rebecca Cremeen

Facilitator Gina Bartlett, Consensus Building Institute, gina@cbuilding.org | 415-271-0049

Key Questions for Joint Fact Finding

Updated 6/6/2016



RECREATIONAL ACCESS

- How do people use the lake?
- Where do people access the lake?
- Where is demand concentrated?
- What are the different types of recreational use on the lake and at the shoreline?
- What user conflicts, if any, occur between recreational and other users?
- What modes of transportation are used to access the lake?
- How can environmental thresholds be used to evaluate and monitor the impacts of access?
- What information do we have regarding the economic benefits of lake access?
- What information do we have regarding environmental impacts of recreational use?

Parking

- What is parking capacity? (car parking or trailer parking)
- Is there enough parking to meet demand?

Marinas

- Are there enough marinas to meet demand?
- What type of access (motorized/non-motorized) is provided at the different marinas?
- Which marinas provide both public and private access to the lake?

Watercraft

- What are the estimates of the number of boats and the amount of boating activity on the lake?
- How many boat launches exist?
- How is fueling accomplished?
- Where are fueling stations located and is there a need for more?
- Does the lake need more boat ramps?
- Should we reevaluate the speed limits in Emerald Bay related to pollutants?
- What information do we have regarding the environmental impacts of boating (e.g. water quality, air quality, noise, etc.)?

SHORELINE STRUCTURES

- What is the inventory, including location, of existing structures (piers, buoys, slips, marinas, boat lifts, etc.)?
- How are piers and buoys related to recreational use?
- What has been approved and by whom?
- How many are public, quasi-public, and private?
- How do we evaluate the effects of extending existing piers and boat launches?
- What information do we have regarding the environmental impacts of shoreline structures?

SHOREZONE USES

- What are the considerations for dredging? Beach replenishment?

CLIMATE CHANGE AND LOW LAKE LEVEL ADAPTION

- What assumptions and scenarios should we use regarding lake level?
- What are some climate change adaptation strategies related to low lake levels?
- What information do we have regarding the environmental impacts of climate change and changing lake levels (e.g. flora, fauna, temperature, etc.)?

PUBLIC HEALTH AND SAFETY

- How is public health and safety access distributed across the lake?
- Are emergency response needs being met and if not, what factors affect public health and safety access?

AQUATIC INVASIVE SPECIES

- Do we have evidence that there has been a change in AIS abundance and geographic distribution?

2016 BOATING SEASON DATA NEEDS

Noise Monitoring: Do we need to conduct noise monitoring and does the JFF Committee agree with the proposed TRPA approach?

Buoy Inventory: Should a buoy count (permitted and unpermitted) be conducted in 2016 and what is the most efficient and accurate method for data collection (aerial Imagery, TRPA Boat Crew Count, other agency Boat Crew Count, other)?

Boat Surveys: Can we rely on the 2014 Boat Survey information or do we need to repeat another one and if so, what changes should be made?

Low Lake Level Imagery/Mapping: Do we need an aerial photo of the Lake at 6,223 (low Lake elevation) and what other elevations do we need to map?

Pier Maps: Do we need to update our existing pier map to show complete polygons?

AIS Inspection Form: Do we need to update the AIS Inspection form to collect additional information on boating?

SHORELINE PLANNING PROCESS QUESTIONS

TRPA Regional Plan and Code of Ordinances

- What is working under the existing Code that should be retained and what is not working?
- What goals and policies of the Regional Plan Shorezone/Shoreline Sub-element should be retained, amended or added?
- Are there any other goals or policies in other Elements of the Regional Plan that we need to review/amend?
- What worked and what did not work under the 2008 Code?
- What version of the Code should we start with (existing or existing with 2008 Code amendments inserted)?

EIS/Baseline Conditions

- In addition to Lake Tahoe, do we need to consider other Lakes in the Tahoe Basin (Fallen Leaf Lake and Cascade Lake)?
- What buoy baseline should we use for both regulatory and EIS purposes?
- If the Shoreline Plan and Code developed through the collaborative planning process is going to be the preferred Alternative in the EIS, what other Alternatives should be considered?

Mitigation Funds and Program

- How should we use the remaining funding collected under the 2008 Shorezone Ordinance for implementation, enforcement, and monitoring?
- Are we going to need to develop and implement a new Blue Boating Program to mitigate the impacts of boating? If we do, what worked well and what did not work well from the last time.

2016 Threshold Evaluation Report

Does the JFF Committee agree that the studies developed for the 2015 Threshold Evaluation Report should be used to inform the Shoreline Strategic Initiative (Noise, Tahoe Yellow Cress, Shoreline Scenic Assessment, Fish Habitat Report & Map, etc.)? If yes, what additional information do we need to collect that is not included in the Threshold Report?



Lake Tahoe Shoreline Plan

Policy Topic: Fish Habitat

06.15.2016

Brief Description

The intent of this discussion is to identify the best available science to guide policy discussions on shoreline structures and placement. TRPA has a new habitat map to inform thinking. This memo summarizes existing information for joint fact finding consideration.

Policy Issues for Consideration

The Shoreline Steering Committee is still developing policy issues for consideration

Pier Construction

Buoy Placement

New Fish Habitat Map

New fish habitat map might be an issue because it “appears” to have less fish habitat designated because it is more refined and accurate than the 1984 Fish Habitat Map.

Key Questions for Joint Fact-Finding

1. Are the existing Fish Habitat and Spawning Studies sufficient for reconsidering the standards set forth in the TRPA Code of Ordinances for new piers and other structures?
2. Are there other measures (others than those identified in the *Draft EIS – July 2005*) that should be considered for mitigating future impacts to fisheries?
3. Should the 2015 “Use of Remotely Sensed Imagery to Map and Quantify the Extent and Distribution of Lake Tahoe’s Nearshore Substrates and Fish Habitats” Report be used to inform the Shoreline Planning Initiative?

Existing Data, Information & Science

- Existing Fish Studies
- 2008 Shorezone Ordinance EIS

- Use of Remotely Sensed Imagery to Map and Quantify the Extent and Distribution of Lake Tahoe's Nearshore Substrates and Fish Habitats Report (2015)

Fish Habitat and Spawning Studies

The TRPA Regional Plan Shorezone Subelement, Policy SZ 1.9, requires TRPA to “regulate the placement of new piers, buoys, and other structures in the nearshore and foreshore to avoid degradation of fish habitats, creation of navigation hazards, interference with littoral drift, interference with the attainment of scenic thresholds, and other relevant concerns.” It requires TRPA to “conduct studies, as necessary, to determine potential impacts to fish habitats and apply the results of those studies and previous studies on shoreline erosion and shorezone scenic quality in determining the number of, location of, and standards of construction for facilities in the nearshore and foreshore.”

The TRPA Code of Ordinances, Section 84.4.1: *Fish Habitat and Spawning Study*, required (in 1987) that TRPA prepare a study assessing the impacts resulting from the construction and use of structures, including mooring buoys, on fish habitat and spawning areas in Lake Tahoe and the mouths of its tributaries. It also required the study evaluate and recommend methods for restoring fish habitat. The Code called for TRPA to reconsider the standards set forth for piers, for boat ramps, for mooring buoys, and for floating docks and platforms in response to the studies. In response, the following studies were prepared:

Final Report: Littoral Structures and Its Effects on the Fish Community of Lake Tahoe, Earl R. Byron and Brant Allen, Institute of Ecology, Division of Environmental Studies, UC Davis, and Wayne Wurtsbaugh and Karen Kuzis, Department of Fisheries and Wildlife, Utah State University, Logan, November 16, 1989

Significant Findings: This study found there are important fisheries considerations to be taken into account in regulating the season of construction, location, and type of shorezone structures to be constructed in Lake Tahoe and that poling piers and solid bulkhead structures showed no statistically significant effects on littoral fish densities during the course of the study. Rock crib structures, however, showed a significant positive effect on fish densities and were associated with much greater numbers of fish. **Note:** TRPA does not allow new rock crib structures because they interfere with littoral drift.

Lake Tahoe Fish Community Structure Investigations: Phase III Report by David Beauchamp and Wayne Wurtsbaugh Department of Fisheries and Wildlife/Ecology Center, Utah State University, Logan, Utah, and Brant Allen, Phaedra Budy, Robert Richards, John Reuter, Institute of Ecology Division of Environmental Studies, UC Davis, California, June 1991

Significant Findings: This study found that piers (pile and rock crib) either had neutral or positive effects on densities of littoral zone fishes, depending on their configuration. It found that pile piers had no significant effect on densities of any of the fish species or on the species composition and, in some cases, that the density of fish species was significantly higher near rock-crib piers. The type of substrate underlying piers was a more important determinant of fish density than the piers themselves, with more complex substrates containing more fish. Boat traffic in marinas and near piers caused fish schools to retreat to cover, but they usually returned to normal activity patterns within 30 seconds.

The Effect of Shorezone Structures and Associated Activities on the Spawning Success of Native Minnows, by Brant C. Allen and Dr. John Reuter, Tahoe Research Group, UC Davis, October 1996

Significant Findings: This study found that there should be a non-degradation policy that would prohibit the construction of new structures where existing gravel substrate would be rendered unusable by spawning fish. Open pile piers which allow the transport of fish under the structure would be allowed, as it was observed that fish do spawn under these structures if gravel exists. The area of gravel replaced by the pier piles should be mitigated in equal or greater function and value when compared to the lost habitat. Careful consideration should also be given to existing rock crib pier restoration projects because these structures are important to fishes living in the shorezone. This is due to the complex habitat that they provide.

Fisheries Non-Degradation Protection Measures

In response to these studies, previous environmental analysis on shoreline development identified a number of resource management measures that could be implemented to both avoid and mitigate impacts to fisheries. Some of the measures identified include:

- 1) Restoration best management practices (BMPs) for fish habitat and native riparian vegetation
- 2) Restoration and/or reclamation of spawning habitat at a 1.5:1 ratio

- 3) Mitigation fee program to offset Regional impacts on fisheries resources through use to implement the Environmental Improvement Program (EIP) fisheries improvement projects
- 4) Prohibition on construction in spawning habitat from May 1 to October 1
- 5) Restriction on boat beaching in spawning habitat from May 1 to October 1
- 6) Prohibition on expansion of existing boat ramps in spawning habitat
- 7) Coordination of property owners with TRPA and Lahontan Regional Water Quality Control Board (LRWQCB) staff regarding dredging and water quality requirements, including substrate analysis before dredging, approval of dredging methods and equipment, and design/construction of turbidity barriers
- 8) Prohibition on construction of floating piers that float along their full length (i.e.,
- 9) connecting the backshore and lakeward)
- 10) Preference for dynamic over static shoreline protection methods
- 11) Exotic weed management plan for boat launching facilities and marinas

Source: Lake Tahoe Shorezone Ordinance Amendments Supplemental Draft EIS – July 2005 (www.trpa.org/programs/shorezone)

2015 Fish Habitat Report and Map

In 2015, TRPA commissioned Spatial Informatics Group (SIG) to prepare the “Use of Remotely Sensed Imagery to Map and Quantify the Extent and Distribution of Lake Tahoe’s Nearshore Substrates and Fish Habitats” Report (“2015 Fish Habitat Report”) to inform the 2015 Threshold Evaluation Report, which will be released in September 2016 for public review. The Draft 2015 Fish Habitat Report is currently being reviewed by the Nearshore Agency Working Group, which consists of staff from the U.S. Environmental Protection Agency (EPA), Lahontan Regional Water Quality Control Board (Lahontan RWQCB), Nevada Division of Environmental Protection (NDEP), and TRPA, and the California Department of Fish and Wildlife (CDFW) and Nevada Division of Wildlife (NDOW).

TRPA’s existing Prime Fish Habitat Map, adopted on May 19, 1984, reflects “Spawning Habitat” and “Feeding and/or Escape Cover Habitat” on a parcel level, which means that if a small portion of fish habitat was found the entire parcel frontage that intersects the shoreline is reflected as fish habitat. The benefits associated with the 2015 Fish Habitat Map is that it has a higher degree of accuracy in that it is not overly generalized, more accurate and refined in actually outlining small fish habitat areas and has been developed based on the

best available information and science. Furthermore, to ensure an even greater degree of accuracy, SIG is updating the draft map to include confidence estimates, which will provide estimates of how likely the mapped fish habitat type represents the actual conditions in the Lake.

Existing Codes

The requirements for preparing a study assessing the impacts resulting from the construction and use of structures on fish habitat and the code provisions that need to be reconsidered are in Chapter 84: *Development Standards Lakeward of High Water* of the TRPA Code of Ordinances, which has been attached for reference.



Lake Tahoe Shoreline Plan

Policy Topic: Boating Impacts

06.14.2016

Brief Description

The Joint Fact Finding (JFF) Committee is being asked to provide input on best available science and research to make informed policy recommendations and to conduct a defensible analysis of the environmental impacts of boating use on Lake Tahoe. The following describes current scientific resources available to inform the 2016 Shoreline Plan, including: findings from the 2016 Draft Threshold Evaluation Report, potential environmental impacts from boating identified in the 2008 Shorezone Environmental Impact Statement (EIS), and known literature on the topic of boating impacts.

Policy Issues for Consideration

The Shoreline Steering Committee is developing policy issues on June 23, 2016.

Key Questions for Joint Fact-Finding

What is the best available information for evaluating the environmental impacts of boating and boating related activities on Lake Tahoe?

Are there additional studies that need to be added to the below literature review and taken into consideration?

What are the environmental impacts of boating use on Lake Tahoe?

Existing Data, Information & Science

Draft Threshold Evaluation Report Findings

TRPA is currently updating its Threshold Evaluation Report, which is required every four years as a component of the Regional Plan. The Public Review Draft Report is scheduled to be released in September 2016. A summary of the initial findings in the draft report related to boating activities and threshold attainment are below.

Fisheries/Fish Habitat

The 2016 Evaluation and new mapping effort found no detectable change in the area of fish habitat and to fisheries from 2002 conditions.

Water Quality

The 2016 Evaluation found little change in the indicators related to water quality. Clarity in the nearshore environment is in attainment, although certain researchers believe that standards should be higher. A paper published in 2013 by Alexander and Wigart shows a link between nearshore turbidity and boating at Lake Tahoe, however the findings have not generally been accepted by the scientific community.

Aquatic Invasive Species

Under the current Aquatic Invasive Species (AIS) program, TRPA tracks inspections, decontamination and launches from marinas. This data is compiled and tracked using the Environmental Improvement Program (EIP) tracker program. Additionally, non-motorized boats can register under the voluntary "Tahoe Keeper" program, where the public is trained to clean, drain and dry boats to prevent the spread of AIS. The 2016 Threshold Evaluation found no detectable trends in the amount of algae and periphyton and no new AIS have been detected on the lake. However, there are no tracking or prevention programs in place to control the spread of AIS around the lake by watercraft.

Noise

The last watercraft noise shoreline study was completed in 2013. The study monitored a total of 9 sites over 180 days. Only 12 noise exceedances by boats were recorded. As the impacts related to noise were not considered significant, the key recommendation from the 2013 report was to continue enforcement of the 600' "no wake zone". The Threshold Evaluation found that the indicators for the overall noise threshold in the Basin has not changed since 2011 conditions. TRPA plans on conducting a similar study during the 2016 boating season that will include ambient as well as single event noise monitoring.

Air Quality

Air quality impacts from boating are estimated using emissions modeling. This is typically conducted by using a standard "fleet mix" and an estimate of the number of boats on the lake. For the Shoreline Plan, some TRPA staff members have recommended using emissions models adjusted to include a fleet mix that is more representative of Lake Tahoe, which does not include 2 stroke engines.

2008 Shorezone EIS

The 2008 Shorezone EIS identified a number of potential environmental impacts associated with boating and boating related activities on Lake Tahoe. Under the

preferred alternative, the Final EIS found that these impacts could be mitigated to a level that is less than significant given best management practices and a number of mitigation and monitoring programs. The potential impacts identified in the 2008 plan are outlined in the table below:

Potential Environmental Impacts Identified in 2008 Shorezone Plan FEIS

WATER QUALITY
Increased Discharges of Nutrients from Dredging Activities
Increased Discharge of Petroleum Products from Operation of Motorized Watercraft and Fueling Activities.
Degradation of Water Quality from Increased Emissions and Atmospheric Deposition of NOX.
Increased Discharges of Sediments from an Increase in Motorized Watercraft Launches.
Increased Water Quality Degradation from Increases in Backshore Access-Related Impervious Coverage and Disturbance.
SCENIC RESOURCES
Degradation of Nonattainment Shoreline Units.
Increase in Visible Mass and Degradation of Scenic Quality in Visually Sensitive Scenic Units.
Increase in Visual Mass from Buoys in Shoreline Travel Units.
Degradation of Attainment Status for Roadway Units and Recreation Areas.
RECREATION
Reduced Lateral Shorezone Pedestrian Access from New Shorezone Structures.
Create Obstacles to Nearshore Navigation from Construction of New Piers or Extension of Existing Piers.
Degradation of the Recreational Experience from Increased Motorized Boating Noise.
Create Barriers to Top-Line Fishing Areas from Construction of New Piers or Expansion of Existing Piers and Placement of New Buoys.
Attainment of Summer Day-Use Persons-at-One-Time Allocations.
AIR QUALITY/TRANSPORTATION
Increased NOX Emissions from Motorized Watercraft.
Increased Reactive Organic Gas Emissions from Motorized Watercraft
Increased CO Emissions from Motorized Watercraft
NOISE
Increases in Noise Levels from Increased Motorized Boating
Increased Noise from Vehicle Traffic Accessing Public Facilities.
VEGETATION
Destruction or Loss of Riparian Plant Communities.
Loss of Threatened, Endangered, or Sensitive Plant Species or Uncommon Plant Communities in the Tahoe Region.
Loss of Unique Deepwater Plant Communities.
Introduction and Spread of Invasive Non-native Aquatic Plants.

SOIL CONSERVATION
Loss of Sensitive Environmental Zones and Increased Erosion
Increase in Land Coverage from New Access Paths or Structures.
Continued and Additional Disruption to Littoral Drift Processes Along the Shorezone
Inadequate Delineation of Unstable Backshore Areas.
Addition of Shoreline Protective Structures and Retaining Walls.
WILDLIFE
Loss of Riparian Habitat
Disturbance of Bald Eagle, Osprey, and Wintering Bald Eagle Disturbance Zones and Waterfowl Management Zones.
Increased Snag Removal
Introduction of Non-native Aquatic Weeds
ARCHAEOLOGICAL, HISTORICAL, AND CULTURAL RESOURCES
Loss of Any Known or Unknown Historic, Cultural, or Archaeological Sites from Modifications to Existing Structures.
Disturbance, Demolition, or Removal of Any Known Resource from a Site.
Disturbance, Demolition, or Removal of Any Unknown or Unearthed Resource from a Site.
PUBLIC HEALTH AND SAFETY
Increased Boating Use and Accidents

Boating Impacts Literature Review

A number of studies have been conducted regarding boating use on various water bodies and on Lake Tahoe. A summary of the studies is provided below.

Boating/Watercraft Use Surveys

Lake Oroville Boating Use Study (2004)

Recreation Study to support Federal Energy Regulatory Commission (FERC) relicensing and recreation planning. Based on adequacy of facilities to serve recreational needs and determine if capacity limits for boating were being exceeded. Surveyed boaters' perceptions of other boaters (social capacity). Ecological capacity was focused on shoreline erosion and sensitive shoreline vegetation. (refer to other studies for the FERC relicensing). Also looked at bald eagle territory disturbance. Conclusions did not identify major concerns, although cautioned against increasing capacity at certain high use areas.

Hagler Bailey Watercraft Use Study Lakes of Tahoe (1999)- Lake Tahoe

Study designed to measure watercraft use. Provided a baseline measure of recreational boating use and boater attitudes prior to implementation of the ban on two-stroke motors. Primary objectives were to measure watercraft and

fuel usage, collect data on public opinion and to measure characteristics of the boating population.

2012 Northeast Recreational Boater Survey: A Socioeconomic and Spatial Characterization of Recreational Boating in Coastal and Ocean Waters of the Northeast United States (2012)

A partnership among industry, government, and nongovernmental organizations conducted a survey of marine recreational boaters from Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut and New York during the 2012 boating season.

TRPA Survey of Boaters at Lake Tahoe-Franz (2002)

The primary purpose of the survey was to respond to the court in terms of litigation relative to the marina at Tahoe Keys. Specific areas of inquiry included but were not limited to: type of watercraft, number of days watercraft used, fuel types, types of motor, number of days, place of residence.

2007-2009 California Boater Survey-CA Coastal Commission, CA Dept of Boating & Waterways, Santa Monica Bay Restoration Foundation, Keep the Delta Clean Program (2011)

A statewide examination of boating habits, environmental awareness and overall outreach and education program evaluation. By providing a snapshot of recreational boaters and boating behaviors in the State of California, the study's findings allow the project partners to develop more effective and accurate boater outreach and education. The findings will also assist in developing new public education materials and targeting strategies to reduce potential sources of boat pollution. Lastly, this study will provide useful information for all boater education and boat-related pollution programs.

Recreational Boat Traffic Surveys of Broward County, Florida-Mote Marine Laboratory (2005)

The goal of the project was to characterize boating patterns in Broward County, Florida and provide information leading to the completion of the Broward County Boat Facility Siting Plan and Manatee Protection Plan (MPP).

Boating Clean and Green Survey-Public Research Institute, San Francisco State University

The purpose of this study was to provide information about boater practices that would be useful to the Boating Clean and Green Campaign in its efforts to: (1) develop and implement public education programs aimed at the reduction of oil and fuel related water pollution stemming from boat use; and (2) to assist local agencies and marinas in implementing programs to reduce boat-generated pollution, including the installation of pollution control services.

National Boating Usage Study Preliminary Survey Report-National Marine Safety Committee -Australia (2009)

The National Marine Safety Committee commissioned the National Recreational Boating Usage Study to collect information about recreational boating that can be used to provide an evidence base upon which to develop better marine safety policies and education programs. The study began recruiting in June 2008 and recruited recreational boaters from across Australia. Approximately 3800 individuals registered to take part in the study which includes a survey questionnaire and an online trip diary. This report presents the data collected from the preliminary survey. In total 2818 individuals completed the survey.

Carrying Capacity

Lake Ripley Watercraft Census & Recreational Carrying Capacity Analysis (2003) -Lake Ripley Management District -WI

The purpose of this study is to 1) quantify lake usage during the 2003 boating season, 2) develop a formula for estimating recreational carrying capacity under varying user conditions, and 3) evaluate Lake Ripley's carrying capacity status with respect to existing lake-use data. The study found that boating densities were between 141% and 171% of Lake Ripley's carrying capacity. This analysis suggests a high probability of user conflict and environmental degradation on Lake Ripley as a result of overcrowding on busy, mid-summer weekends and holidays.

Boating Carrying Capacity Review (Pinecrest Lake, CA):

The purpose of the review was to provide background data to help determine an appropriate number of moorings at Pinecrest Lake during development of the Pinecrest Lake Shoreline Management Plan.

Deep Creek Lake Boating and Commercial Use Carrying Capacity Study- Maryland Department of Natural Resources (2004)

This study was specifically conducted to determine: current/existing recreational boating lake uses; potential/projected future recreational boating uses; optimal recreational boating use carrying capacities, the ability of the lake to accommodate existing and future demands; and management options for controlling growth if boating commercial uses at the lake meet or exceed carrying capacity.

Techniques for Estimating Boating Carrying Capacity: A Literature Review (2005)- Catwba-Wateree Relicensing Coalition-North Carolina

This document will examine a variety of literature on recreational carrying capacity. Emphasis is placed on boating density methodology and other factors pertinent to lake carrying capacity estimation. The boating carrying capacity studies that were reviewed contained the following categories of analysis: use characteristics, usable lake area, boating density, lake use rate, and boaters' perceptions of crowding.

Economics

2012 Recreational Boating Economic Study-National Marine Manufacturers Association/Recreational Marine Research Center at Michigan State University

Provides overview of the total annual economic value of recreational boating including the number of recreational boating industry businesses, total jobs, and annual recreational boating industry businesses.

Statewide Minimum Shoreland Zoning-An Economic Analysis-Wisconsin Department of Natural Resources (2012)

The Analysis measured the environmental benefits of shoreland zoning changes related to coverage of impervious surfaces in the shoreland and increased vegetation protection measures. The analysis measured the environmental benefits by predicting impacts on phosphorus runoff and water clarity and monetizing the value of increased employment that comes from clearer water.

Water Quality

Lake Tahoe Motorized Watercraft Report-An Integration of Water Quality, Watercraft Use and Ecotoxicology Issues (1998) TRPA/UC Davis

A synthesis of the results of the Hagler Bailly watercraft survey, water quality monitoring for fuel constituents, and emissions studies conducted in 1997 & 1998.

Investigation of Near Shore Turbidity at Lake Tahoe (2002) Lahontan/DRI

This study found the highest turbidity values in the nearshore adjacent to Tahoe Keys and other areas off South Lake Tahoe and Tahoe City. The study found a strong correlation between elevated turbidity near the shore and development on the shore.

Bioassessment of Tahoe Keys Marina, South Lake Tahoe, CA -California Department of Fish and Game (2004)

In July, 2000, CDFG was contracted by the Tahoe Keys Property Owner's Association to initiate an assessment of the biological condition in Tahoe Keys Marina as part of the NPDES permit requirements. The assessment was designed to measure water column chemistry and the benthic macroinvertebrate (BMI) communities at four areas within the Marina every two years. This report presents results from the BMI and water chemistry samples collected on July 22, 2004.

Effect of Motorized watercraft on summer nearshore turbidity at Lake Tahoe, California-Nevada -Alexander, Wigart (2013)

The Lake Tahoe clarity trend is dominated by a consistent long-term decline attributed to the influx of nutrients and fine inorganic particles. The South Lake Tahoe nearshore clarity can be affected by factors such as wind waves, streamflow, boating, and urban stormwater, and the turbidity in the nearshore is greater during the summer than during the winter. In this study we measured the summer nearshore turbidity from 2 piers in South Lake Tahoe and found the summer nearshore transparency to be influenced by wind, boating, and lake currents, but not streamflow or urban stormwater. During summer 2012 the average daily increase in turbidity of Lake Tahoe's southern nearshore was 1.19 NTU following high intensity boating and 0.10 NTU following low intensity boating. Wave action and turbulence from boating in Lake Tahoe's shallow nearshore are likely to suspend sediment and release nutrients; however, there are no restrictions for boat operation in Lake Tahoe's shallow nearshore.

Sedimentation of the Littoral Zone in Lake Tahoe-Osborne-USC (1985)

The assessment of the littoral zone of Lake Tahoe was conducted to determine the cumulative effects of structures constructed in the shorezone.

Fisheries

The Effect of Shorezone Structures and Associated Activities on the Spawning Success of Native Minnows-UC Davis (1996)

Recommended a non-degradation policy to gravel substrates in the shorezone as eggs can be disturbed from beaching boats and development of shorezone structures. Noted the importance of rock cribs for fish habitat. Found that spawning was not disturbed even during extremely busy conditions (Independence Day).

Lake Tahoe Fish Community Structure Investigations: Phase III Report-Utah State University, UC Davis (1991)

Shorezone Spawning in Lake Tahoe: The Effect of Shorezone Structures and Associated Activities on the Spawning Success of Native Minnows (1996)

Final Report: Littoral Structure and Its Effects on the Fish Community of Lake Tahoe (1989)

Air Quality

Nevada Air Quality Trend Report 2000-2010-Nevada Division of Environmental Protection

This Trend Report presents ambient air quality data collected by the State of Nevada and the California Air Resources Board. The primary purpose of NAPCP's ambient monitoring network is to determine current and projected concentrations of ambient air pollutants within the state, ensure current resource management strategies are working properly, and to develop new measures by which the ambient air quality standards will continue to be attained.

Keeping Tahoe Blue through Atmospheric Assessment: Aircraft and Boat Measurements of Air Quality and Metereology near and on Lake Tahoe-CARB/UC Davis (2004)

During the summer and fall of 2002, aircraft measurements of meteorological and air quality variables were obtained over the western Sierra Nevada and the Lake Tahoe Basin. During the winter of 2003, similar measurements were made close to the lake's surface using a small research vessel on the lake. The primary

objective of these field efforts was to document the concentrations of nitrogen-containing species as well as other pollutants in the air over and upwind of the lake, as these species can deposit into the lake and act as nutrients that accelerate eutrophication. Based on a preliminary analysis of our data it appears that concentrations of nitrogen in the air above Lake Tahoe are affected by a number of sources, including in-basin emissions, local and distant forest fires, regional background pollution, and transport of pollutants from the Central Valley.

Noise

“Drowning in Noise” Noise Costs of Jet Skis in America- Noise Pollution Clearinghouse (2000)

This study uses a quantitative model that estimates the monetary value of the “disamenity” (lost enjoyment) that jet ski noise introduces into beach environments in America. Our results, expressed in dollars, are what beachgoers would pay to rid lake, bay, river and ocean beaches of jet ski noise — if there were an entity that would take their money and turn off the noise. We present two types of estimates: the “annoyance” cost of jet ski noise itself, and the effectiveness of possible strategies to reduce this cost.

Scenic

1993 Lake Tahoe Basin Scenic Resource Evaluation-TRPA

Thirty-seven recreation areas are included in this study. These include parks, beaches, picnic areas, and campgrounds. Also included are the public areas of the five alpine ski resorts in the basin. The bicycle portion of the study includes Class I and II bicycle paths that are separated from the major roadways, or Class II bicycle ways with clearly marked rights-of-way. These recreation areas are operated by various city, county, state, and federal agencies. They were selected primarily from the "Inventory of Recreation Resources in the Lake Tahoe Basin" conducted by the South Lake Tahoe Recreation Department and the Eldorado County C.E.T.A. All areas selected are either publicly owned and operated or publicly owned and operated by private concerns. The exceptions are the ski areas, most of which are generally privately owned and operated.

Miscellaneous

The Effects of Motorized Watercraft on Aquatic Ecosystems (2000)

Boats may interact with the aquatic environment by a variety of mechanisms, including emissions and exhaust, propeller contact, turbulence from the propulsion system, waves produced by movement, noise, and movement itself. In turn, each of these impacting mechanisms may have multiple effects on the aquatic ecosystem. Sediment resuspension, water pollution, disturbance of fish and wildlife, destruction of aquatic plants, and shoreline erosion are the major areas of concern and will be addressed in the following pages. Impacts of boats that primarily affect human use of lakes, such as crowding, safety, air quality, and noise will not be addressed specifically.

Lake Tahoe Nearshore Evaluation and Monitoring Framework-Desert Research Institute, UNR, UC Davis (2013)

Changes in nearshore conditions at Lake Tahoe have become evident to both visitors and residents of the Tahoe Basin, with increasing stakeholder interest in managing the factors that have contributed to apparent deterioration of the nearshore environment. This has led to joint implementation of a Nearshore Science Team (NeST) and the Nearshore Agency Working Group (NAWG), which together have contributed to a synthesis review of nearshore information and the development of a monitoring and evaluation plan that will track changes in nearshore conditions. A conceptual model is presented that conveys our contemporary understanding of the factors and activities that affect desired nearshore qualities. Results from review and analysis of historical data are provided, as well as an assessment on the adequacy of existing nearshore standards and associated indicators. The resulting nearshore monitoring framework will be used to guide development of an integrated effort that tracks the status and trends associated with nearshore conditions.

Overview of the Recreational Boating Industry's Aquatic Stewardship through Technology, Innovation and Education-National Marine Manufacturers Association

This study will provide an overview of the recreational boating industry's contributions to aquatic stewardship and environmental responsibility. It provides a thorough analysis of the boating industry's efforts to promote responsible recreation through the promotion of education and outreach programs, the development and marketing of new, environmentally friendly products and the cooperative efforts of the industry to work in conjunction with state and federal government to institute policies that protect the environment.



Lake Tahoe Shoreline Plan

**Policy Topic: Planning for Future Lake
Levels**

06.15.2016

Brief Description

As part of the Shoreline Plan, the Shoreline Steering Committee has begun discussing low Lake level adaptation strategies for a number of issues, but specifically buoy relocations, new dredging, and pier extensions. The Steering Committee has realized that it needs to identify a Lake level (or range) to develop Policy to manage the shoreline, based on the best available information and science. The Joint Fact Finding (JFF) Committee is being requested to identify the best available science for this purpose and ultimately to make a recommendation on the Lake level or range that the Shoreline Steering Committee should consider for the Shoreline Plan.

Policy Considerations

The Committee is being asked to consider the information and provide direction on the Lake level that should be used to inform future policy decisions and the EIS, as well as the projected timeframe for the plan. It should be noted that plans are typically developed for 20 years.

Key Questions for Joint Fact-Finding

For June 2016: What studies should we consider to help make decisions on lake management?

Discuss in August: What lake level scenario and planning horizon should guide policy making and lake management decision-making?

What is the best available information and science with regards to future Lake Tahoe levels to inform Policy decisions and the EIS?

What Lake level elevation should we plan for?

What should be our planning timeframe?

Should any existing Code provisions be amended (pierhead line, buoy line, etc.) to adapt to future Lake levels?

Existing Data, Information & Science

- Tahoe Environmental Research Center, UC Davis
- Desert Research Institute, UNR
- Truckee Basin Study Climate Projections/Scenarios: BLM
- Water for the Seasons Project Scenarios (Spring 2016)

- Federal Water Master Lake Level Projections for 2016/17
- Historical Water levels from USGS
- Lake Tahoe Bathymetry from USGS

Truckee River Basin Study

www.usbr.gov/watersmart/bsp/docs/finalreport/truckee/tbsbasinstudy.pdf

The Truckee River Basin Study has some of the most recent climate change scenarios for informing Policy decisions and the Environmental Impact Statement (EIS). The Study finds that rising temperatures will increase evaporative losses and reduce the proportion of winter precipitation that accumulates as snow. Below is a chart from the Study on projected future water surface elevations at Lake Tahoe (2011-2091). It needs to be noted that the operational maximum Lake level elevation is 6,229.1 feet and the natural rim is 6,223 feet.

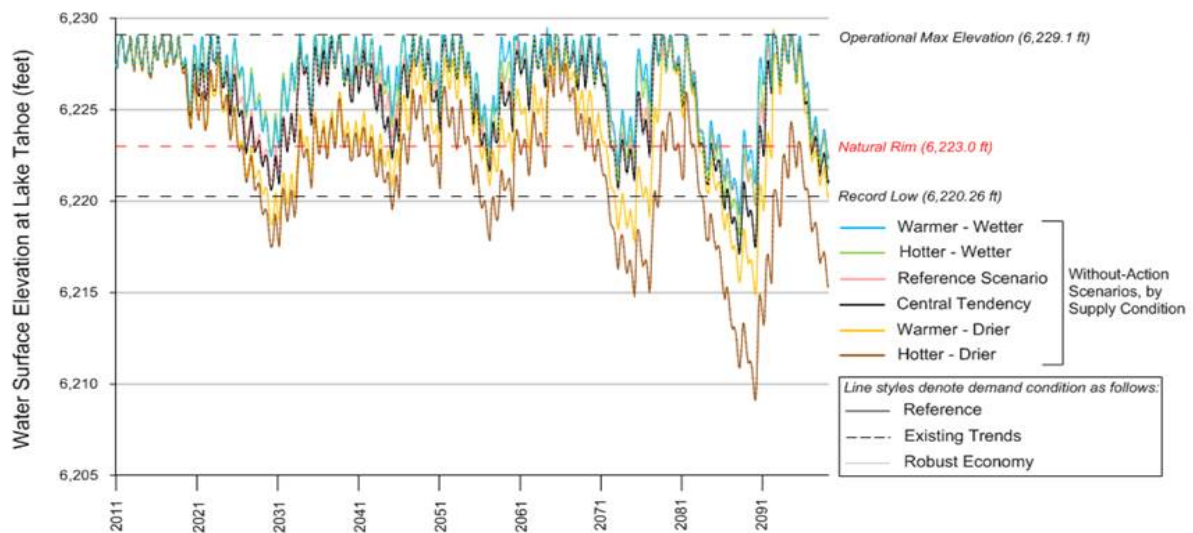


Figure 6-4. Projected Future Water Surface Elevations at Lake Tahoe

Source: Truckee River Basin Study, www.usbr.gov/watersmart/bsp/docs/finalreport/truckee/tbsbasinstudy.pdf

Lake Tahoe Bathymetry from USGS

The 1998 Lake Tahoe Bathymetry from USGS (tahoe.usgs.gov/bath.html) shows the terrain of the lake floor. This information is helpful for determining which areas will be most impacted from low Lake levels, such as Tahoe City which is located on a shelf. There has been some discussion regarding updating this information for multiple planning efforts, such as Shoreline, Aquatic Invasive Species, and Nearshore.

Existing Codes

The following TRPA Code of Ordinances provisions should be considered when discussing future Lake levels and adaption strategies:

For Lake Tahoe, the low water elevation is **6,223 feet**, Lake Tahoe Datum (Ch. 90)

For Lake Tahoe, the high water elevation is **6,229.1 feet**, Lake Tahoe Datum (Ch. 90)

Single-use piers cannot extent beyond a lake bottom elevation of **6,219** feet, or beyond the pierhead line, whichever is more limiting (Section 84.5.1.D).

Pier decks cannot extend above an elevation of **6,232** feet, Lake Tahoe Datum. Boat lifts, pilings, and handrails and other similar safety devices, cannot extend more than four feet above the pier deck. Pier decks may extend up to elevation **6,234** feet in limited situations where TRPA finds that the additional height is necessary for safety reasons or that local wave characteristics represent a real threat to the integrity of the structure (Section 84.5.2.B).

Boat ramps cannot extend lakeward beyond an elevation of **6,219** feet, Lake Tahoe Datum, and cannot exceed 75 feet in length as measured from the high water line except for marine railways, which may be permitted additional length (Section 84.6.1)

Mooring buoys cannot be located any further lakeward than necessary to provide for safe mooring, but not to exceed **350 feet lakeward of the high water line** (Section 84.7.1.C).

Floating docks and platforms cannot extend beyond a lake bottom elevation **6,219** feet, Lake Tahoe Datum, or beyond the pierhead line, whichever is more limiting (Section 84.8.1.C).

Where it is found that low lake levels prevent or significantly reduce access to open water recreation and that dredging cannot be permitted, temporary structures that extend beyond lake bottom elevation 6,219 feet or the pier headline may be permitted to facilitate lake access. This code provision does not apply to single-use piers (Section 84.15.4).

The creation of a wake or speeds in excess of five MPH by motorized watercraft within **600 feet of the waterline** Lake Tahoe is prohibited (Section 84.17.1).