



Lake Tahoe Shoreline Plan

02 Policy Topic: Boating Facilities

V9

Last Updated 03.14.2017

Brief Description

Boating facilities may be defined as developments and uses that support boat access to the water (including moorage), such as piers and slips, buoy fields, launch facilities, and ramps. Boating facilities may be comprised of a combination of structures (e.g. fixed-pile piers, floating docks, elevated gangways, boat launches, marine rails, etc.) used to facilitate boat access to the water and subsequent boat moorage. Moorage facilities may be utilized temporarily for transient moorage or may include longer term moorage during the entire boating season.

The following is an overview of topic areas associated with boating facilities necessary to inform policy considerations. These include multi-use structures, buoys and buoy fields, ramps, temporary structures, boat storage, and associated uses.

Per the 2008 inventory, there are 768 piers located along the shoreline of Lake Tahoe, approximately 43 piers of which are available for public use. Multi-use overwater structures, not including marinas, include joint- or community-use piers intended for use by more than one residence or a large number of people. Multi-use structures also include those designated to a single owner with multiple lakefront parcels with a deed restriction against further overwater structure development.

In addition to pier structures, boats may be moored to individual buoys or be located in a designated buoy field. The 2008 inventory (count completed in 2002), found 4,454 buoys on Lake Tahoe. This includes both permitted and unpermitted buoys. Between 2008 and 2010, the TRPA processed 3,431 permits, with an additional 981 buoy permits pending consideration when the court-ordered injunction on permitting went into place. In 2016, per direction from the Steering Committee and Joint Fact Finding Committee, TRPA, in association with the State agencies, conducted a new buoy count inventory. This new inventory counted 4,886 buoys.

Demand for boat access to Lake Tahoe often exceeds availability. This demand results in pressure during the boating season on marinas for boat moorage and launching, for new or expanded public boat launch facilities, additional need to permit buoys, and for potential future facilities such as fueling stations, pump out locations, public restrooms, and maintenance facilities. This demand also results in year-round pressure on marinas to provide more boat storage. The current inventory of boating facilities identifies 11 fueling stations, all but one of which are on the California side. Per the TRPA Compact, demand for additional

facilities would need to be addressed while also meeting resource protection standards.

Action Items

Action Item	Date	Name
Provide input on boating use assumptions for environmental review	Nov 2016- Feb 2017	JFF Committee
Provide input on boating study of impacts for environmental review	Done Fall 2016	JFF Committee
Review studies and assess boating impacts	Done 8/3/2016	JFF Committee
Identify Issues	Done June 2016	Steering Committee

Statement of Intent

This memo provides a summary of relevant issues identified during scoping of the Shoreline Plan with the intent of providing context and background in support of the overall planning effort. The Shoreline Steering Committee's discussion of these issues has been ongoing since early 2016.

Policy Issues to Consider in the Shoreline Plan

Water Quality

A central question surrounding many policy issues under consideration is whether or not boat use negatively impacts water and air quality. There is a perception by many that boat use, specifically gas-powered motors, has a negative correlation to water and air quality. Understanding the direct and cumulative impacts from boat use may influence policy decisions in the Shoreline Plan. The

environmental document will analyze the impacts of recommended policies in the Shoreline Plan. As noted in the Scope memo, The Shoreline Plan will focus on structures (marinas, piers, buoys, and boat ramps) to support water-dependent recreation within the shoreline and effective resource management to ensure threshold attainment.

Multi-use Structures

As noted in the stakeholder interviews, it is not clear how much pressure there is for new private overwater structures. Some respondents noted that with no new permits being issued for many years, there will undoubtedly be pressure to rebuild or build new pier structures. In light of potential direct and indirect impacts to lake water quality and clarity from increased boat use as well as scenic impacts from new overwater structures, consideration may be given to further emphasis of private multi-use structures over single-use structures.

Buoys

Permitting

Similar to the demand discussed above for overwater moorage structures, buoys are also likely to be in future demand as more people desire to keep watercraft moored on the water during the boating season. Based on the stakeholder responses, applicants often do not have a clear understanding of how buoy permits are issued and what agencies are responsible for approval. There appears to be a strong desire for a simpler, streamlined permitting process which avoids needing permits from multiple jurisdictions.

Some existing buoys have received permits from agencies other than TRPA. Some parcels are known to have three buoys. In certain situations, some of these existing buoys may be considered grandfathered.

The demand for buoy access is also evident for non-littoral parcels which are part of homeowners associations (HOAs). Several HOAs have expressed concern regarding designating such buoy access within their buoy fields.

Location and Number

Applications for new buoys are likely in the future based on the perceived level of demand. Currently, TRPA code allows two buoys per residential parcel. Given the recent drought conditions and difficulty in boat access during low-lake conditions, siting new buoys and buoy fields may consider location in relation to

habitat areas, water depths, scenic protection and navigation. The total number of buoys is of concern as well as how such buoys are distributed to each parcel.

Temporary Structures in Lieu of Dredging

Dredging, whether it is for new or maintenance purposes, has the potential to negatively impact water quality, water clarity, substrate, and distribution of aquatic invasive species. Optional consideration may be given to allow use of temporary overwater structures (e.g. floats) to be located in deeper water and therefore promote safe moorage, specifically during low water years. This topic is discussed in the memo on Low Lake Level Adaption.

Boat Storage

Many marinas are utilizing upland dry dock boat storage as an additional storage option to in-water boat moorage. This option may reduce the immediate environmental impact associated with in-water boat moorage while also increasing boat storage capacity and associated revenues. However, increased use of dry-dock storage facilities may lead to potential significant upland and cumulative impacts associated with increased boat use on the lake, impacts to scenic views, and increased impervious land cover.

Associated Uses (fueling / pump outs / maintenance)

Uses associated and necessary for boat use include a variety of potentially impactful activities, including fueling of watercraft, disposal of waste products, and maintenance. These activities are commonly conducted at local marinas or other specifically designated boating facilities, where established best management practices are commonly employed to ensure protection standards are followed. There may be future pressure to add more such facilities along the shoreline to accommodate increased demand. Only one fueling station (Zephyr Cove Marina) is located along the Nevada side.

One steering committee member inquired about the inventory of existing facilities, wondering what services are provided at each facility, specifically pump out and maintenance locations. Mapping has been provided, but this information may not be widely known.

Some concessionaires are renting personal watercraft from public pier locations or road side access points and may be fueling the watercraft over the water

with portable fuel containers. Similarly, many owners of small motorized watercraft may also be filling their vessels via portable fuel containers on the beach front. Such activities likely result in minor fuel spills.

Construction Equipment Access

Contractors who need access to the water via ramps to load and offload barge equipment and building materials may be limited at times due to demand at public ramps and local marinas as well as low lake levels.

Mitigation

Increased boat use could result in negative effects on water clarity, water quality, and air quality in Lake Tahoe. Understanding effects from boat use is part of the Joint Fact Finding process. The likelihood that these negative effects would occur and the severity of the impacts will be evaluated in the Shoreline Plan EIS.

If negative impacts are directly or indirectly linked to boat use, mitigation could be considered to offset future boat use impacts.

Related Policy Issues

Aquatic Invasive Species

Under the current Aquatic Invasive Species (AIS) program, TRPA and partners track inspections, decontamination and launches from marinas. There are perceptions that lakeshore algae conditions are worsening. The current state of scientific knowledge regarding incidence, trends, and causation of algae and periphyton and any associations to boating or shoreline structures should be determined through the Joint Fact-Finding process.

Joint Fact-Finding

The Joint Fact Finding Committee has evaluated the questions listed below regarding boats on the Lake and assumptions tied to boating use. Draft memos and meeting summaries are available at ShorelinePlan.org under Joint Fact Finding Committee meeting materials.

Watercraft

- What is the estimated number of boats moored on the lake?
- What is the best available science regarding water and air quality impacts from boat use?
- What is the best available science regarding the association of watercraft or shoreline structures to the incidence, trends or causation of algae conditions in the nearshore?
- What is the best available science regarding shoreline erosion associated with boat wakes?
- What is the proportion of different types of boats/engines and other watercraft and the inclusion of this information in modeling of boat emissions?
- Where are boat launch facilities / ramps located? (Need to differentiate between boat launches and boat ramps.)
- What is the estimated number of boats launching on the lake?
- Where are fueling stations located?
- How is fueling accomplished for watercraft that do not use a designated fueling station?
- Have noise levels changed in recent years?

Boat use estimates provide the baseline for estimating emissions from boating. The boat use surveys were designed and implemented to provide estimates for boating activity on the lake during peak and non-peak times. Boat use was last assessed in Lake Tahoe during the 2014 boating season. The Joint Fact-Finding Committee recommended repeating the surveys again in 2016 to provide another data point to refine estimates of boating on the lake. The boat use surveys provide a snapshot of the time and proportion of boats off moorings during a day, to gain information on how long a boat's engine was run during the day. The Joint Fact-Finding Committee suggested outreach to marina owners to get more detailed estimates of engine runtime. Engine runtime more accurately captures hours of operation of each boat, and when added to the boat survey data can improve the estimate of boating emissions.

Extensive research, outreach and discussion at four meetings of the Joint Fact-Finding Committee has led to the substantial modification to the estimates of boating use on Lake Tahoe. The product of those discussions is reflected in the

memo (dated 1/17/2017) from Ascent Environmental entitled "Preliminary Approach for Estimating Watercraft Use and Emissions."

Shoreline noise monitoring was last collected in 2013. The Joint Fact-Finding Committee recommended that shoreline noise monitoring be collected again during the summer of 2016. TRPA conducted shorezone noise monitoring at nine sites, during the peak boating season in the summer of 2016.

Shoreline Structures

The Joint Fact Finding Committee has evaluated these questions. The inventory is available via ShorelinePlan.org GIS mapping information

- What is the inventory, including location, of existing structures (piers, buoys, slips, boat lifts, etc.)?
- 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, field surveys by boat crews, other)?
- How many buoys are within and outside of buoy fields?
- Which structures are public or quasi-public?
- What is the best available science regarding adding overwater structure (even if only temporary) versus dredging.

Buoys

The following existing inventory data has been previously collected on the Lake:

- 2002 buoy count – Buoy count conducted from the shoreline.
- 2005/2006 Buoy count – Buoy count conducted through boat based survey.
- 2008-2010 Permitting records - Buoy count based on permit applications received by TRPA.

It was also noted that prior to 2016, the spatial location (GIS) of existing buoys include buoys miss-mapped on land and in locations far from the lake.

The Joint Fact-Finding Committee recommended a complete inventory of buoys on Lake Tahoe be conducted during the summer of 2016 by boat survey with a high-resolution GPS unit. The use of remotely sensed imagery was ruled out due to difficulty in identifying buoys from the images, and potential confusion between whitecaps from waves and buoys.

Buoy legality cannot be easily assessed as part of the on the water survey count, because the stickers issued to identify legal buoys have worn off in most cases. Identification of the legal status of individual buoys requires additional consideration.

Piers

Prior to 2016, GIS layers for existing piers on the lake did not accurately reflect the footprint of the individual piers on the lake and thus were considered insufficient for planning purposes. The Joint Fact-Finding Committee recommended that TRPA delineate the boundary of piers on the Lake using of aerial imagery of the Lake.

The Tahoe Keys is an artificial lagoon system defined separately from Lake Tahoe. Because boats moored in the Tahoe Keys access and use the lake, a complete inventory of all boating structures in the Tahoe keys is necessary to inform estimates of the lake's boating activity.

Regulatory Boundaries and Bathymetry

There are a number of regulatory lines referenced in the TRPA code, including; No wake zone, pier headline, buoy line, high water line (6229.1), low water line, natural rim, littoral shoreline public and private ownership. The Joint Fact-Finding Committee recommends that where multiple spatial representations (GIS layers) exist for a line, mapping experts should work to identify the best layer to represent the lines in the planning process.

The Joint Fact-Finding Committee recommended improving the existing USGS Bathymetry of Lake Tahoe. If acquired for the Lake "green lidar" could improve the accuracy of the existing depth contours by 10-fold and the Joint Fact-Finding Committee suggested exploring the cost and options for acquisition. Funding for this work is currently being sought but is not available at this time.

A structure inventory and GIS delineations of several regulatory limit lines (pierhead line and bathymetric lake elevations) were recently completed and the results made available to the public through the TRPA hosted Shoreline Plan Map, <http://gis.trpa.org/ShorelineMap/>.

Existing Data, Information and Science

Boating Information Collected from AIS Inspection Stations

Boating information has been and will be collected from AIS inspection stations. This information includes boat and motor details, storage location and motor usage.

Boat Use Monitoring

In 2014, the TRPA Boat Crew inventoried boating related structures such as boat lifts, boat houses and buoys to determine occupancy rates. Additional surveys were also conducted by the TRPA Boat Crew in 2015 and 2016.

Overwater Structure Inventory

An inventory of overwater structures was last conducted in 2008 as part of the EIS. Updated information is not likely to be needed since few structures have been built during this recent time period.

Buoy Inventory

Last full count conducted in 2006. Both the California State Lands Commission and Nevada Division of Wildlife participated in a count for the 2016 boating season. The 2016 buoy count reports are available for both states by visiting ShorelinePlan.org under materials / studies.

Noise

The last watercraft noise study was completed in 2013. This study found that out of 180 days of observation at 9 different sites, 12 noise exceedances occurred. The conclusion at that time considered, in general, noise impacts as not significant and recommended continued enforcement of the 600-foot no-wake

zone. Concerns continue with individual boats generating excessive noise (e.g. cigarette boats and exhaust cutouts). The status of the Basin's overall noise threshold had not changed since 2011.

Annual Shorezone Program Report (2010)

As part of the Adaptive Management System, this Report was prepared to report on the implementation of the 2008 Shorezone Program. The Report found that the first year of Shorezone Program implementation provided key knowledge in the following areas:

- Boating use was 13 to 20 percent below the projections in the Shorezone EIS. This was contributed to the broad economic downturn.
- Modeling showed boat engine emissions were significantly less than projected.
- Water sampling data showed hydrocarbons and bacteria are well within performance standards.
- Noise monitoring data supported increased enforcement and the need for additional monitoring.

The Report also provided an overview of boat use assumptions and how boating water and air emissions were analyzed in the EIS.

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 Bailly 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)-
Catawba-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 Meteorology 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.

Existing Codes

TRPA's code Chapter 84: Development Standards Lakeward of High Water addresses piers, boat ramps, multi-use structures, buoys, and motorized watercraft.

Overwater Structures

Overwater structures include piers, floating docks, platforms and associated access ramps. These topics are covered under the following sections of Chapter 84, Development Standards Lakeward of High Water.

Section 84.5, Piers, includes location standards and limitations, dimensional requirements and construction material criteria.

Section 84.8, Floating Docks and Platforms, includes location standards and limitations, dimensional requirements and construction material criteria.

Boat Launches

The Regional Plan addresses boat launch facilities with the following policy:

SZ-1.14 PRIVATE MARINAS SHALL BE ENCOURAGED TO PROVIDE PUBLIC BOAT LAUNCHING FACILITIES.

Boating access to Lake Tahoe would be increased under this strategy by encouraging all marina facilities to provide public launching facilities, where practical, and by providing incentives for those facilities which improve or provide such services.

Section 84.6 Boat Ramps includes location standards and limitations, dimensional requirements and construction material criteria.

Buoys

- TRPA is not permitting additional buoys at this time (including existing buoys which have been permitted/leased by other agencies with jurisdiction in Tahoe, but not by TRPA)

- Buoy permits issued during 2008-2010 utilized different standards (e.g. grandfathering of existing buoys) than are in effect now.

84.7 Mooring Buoys

This includes location standards and limitations and dimensional requirements. Design and construction criteria are to comply with existing State and federal recommendations.

Multi-use Facilities

Section 84.9, Multiple-use Facilities, includes additional development standards beyond those listed for piers, floating docks, boat launches and buoys above. These standards are intended to apply to such structures which are designed to serve individuals on a multiple- or commercial-use basis. Marinas have additional standards covered in Section 84.14.