TAHOE REGIONAL PLANNING AGENCY
ADVISORY PLANNING COMMISSION
NOTICE OF MEETING

NOTICE IS HEREBY GIVEN that the Advisory Planning Commission of the Tahoe Regional Planning Agency will conduct its regular meeting at 9:30 a.m. on January 13, 1999, at the Horizon Casino Resort, U.S. Highway 50, Stateline, Nevada. The agenda for the meeting is attached hereto and made a part of this notice.

January 4, 1999

[Signature]
Gordon W. Barrett, Chief
Long Range Planning Division

This agenda has been posted at the TRPA office and at the following post offices: Zephyr Cove and Stateline, Nevada, and Stateline and Al Tahoe, California. The agenda has also been posted at the North Tahoe Conference Center in Kings Beach, the Incline Village GID office, and the North Lake Tahoe Chamber of Commerce.
All items on this agenda are action items unless otherwise noted.

AGENDA

I. CALL TO ORDER AND DETERMINATION OF QUORUM

II. APPROVAL OF AGENDA

III. PUBLIC INTEREST COMMENTS (No Action)

Any member of the public wishing to address the Advisory Planning Commission on any agenda item not listed as a Public Hearing or a Planning Matter item, or on any other issue, may do so at this time. However public comment on Public Hearing and Planning Matter items will be taken at the time those agenda items are heard.

NOTE: THE ADVISORY PLANNING COMMISSION IS PROHIBITED BY LAW FROM TAKING IMMEDIATE ACTION ON, OR DISCUSSING ISSUES RAISED BY THE PUBLIC THAT ARE NOT LISTED ON THIS AGENDA.

IV. DISPOSITION OF MINUTES

V. PUBLIC HEARINGS

A. Amendment of the Round Hill Community Plan to Transfer in Bonus Tourist Accommodation Units from Kingsbury Community Plan PAGE 1

B. Amendment of Code Chapter 81, Water Quality Controls; and Goal #2, Chapter 2, Water Quality Subelement, of the Goals and Policies Plan to Clarify the Prohibition of Certain Watercraft in the Tahoe Region PAGE 9

VI. PLANNING MATTER

A. Status Report on Lowering the Individual Parcel Evaluation System (IPES) Line PAGE 29

VII. REPORTS

A. Executive Director

B. Legal Counsel

C. APC Members

VIII. ADJOURNMENT
TAHOE REGIONAL PLANNING AGENCY
ADVISORY PLANNING COMMISSION

North Tahoe Conference Center
Kings Beach, California

December 9, 1998

REGULAR MEETING MINUTES

Chairperson Robert Jepsen called the regular December 9, 1998, meeting of the Advisory Planning Commission ("APC") to order at 9:37 a.m. and asked for a roll call.

I. CALL TO ORDER AND DETERMINATION OF QUORUM

Members Present: Mr. Lohman, Mr. Doughty, Mr. Cole (arrived at 9:44 a.m.), Ms. Baldrica, Mr. Barham, Ms. Kemper, Mr. Porta, Ms. Rohr, Mr. Popoff, Mr. Morgan, Mr. Haen, Ms. Kvas, Mr. Combs, Mr. Marchio, Mr. Jepsen

Members Absent: Mr. Kehne, Mr. McDowell, Mr. Joiner, Mr. Lawrence

II. APPROVAL OF AGENDA

Executive Director Jim Baetge stated that there were no changes to the agenda.

MOTION by Ms. Baldrica, with a second by Mr. Porta, to approve the agenda as presented. The motion carried with Mr. Popoff abstaining.

III. PUBLIC INTEREST COMMENTS - None

IV. DISPOSITION OF MINUTES

MOTION by Ms. Baldrica, with a second by Mr. Morgan, to approve the November 12, 1998, APC minutes as presented. The motion carried unanimously.

V. PUBLIC HEARINGS

A. Amendment of Chapter 22, Height, to Provide Additional Height For Certain Structures in Adopted Ski Area Master Plans

Associate Planner John Hitchcock presented the staff summary amending Chapter 22, Height, of the TRPA Code of Ordinances, to allow additional height for certain buildings within adopted ski area master plans.

Mr. Morgan suggested taking out the word "downhill" in Section 22.4.A and leave the words "ski facilities" so the applicant would not have to come back at a later date and amend the TRPA Code.

Mr. Andrew Strain, representing Heavenly Ski Resort, discussed the proposed project.
A discussion ensued.

Chairperson Jepsen opened the meeting up for a public hearing. Since no one wished to comment, Chairperson Jepsen closed the public hearing.

**MOTION** by Mr. Doughty, with a second by Mr. Combs, to recommend approval to the Governing Board amending Chapter 22, Height, to allow additional height for certain buildings with adopted ski area master plans, including the words “cross country skiing” to Section 22.4.A. The motion carried unanimously.

**B. Amendment of Round Hill Community Plan to Add Bicycle Facilities And Sidewalks to the Transportation Element and the Design Standards And Guidelines and Amend Figure 20.2 of the Design Standards and Guidelines**

Assistant Planner Nick Haven presented the staff summary amending the Round Hill Community Plan to add bicycle facilities and sidewalks to the transportation element and design standards and guidelines of the community plan.

A discussion ensued.

Chairperson Jepsen opened the meeting up for a public hearing. Since no one wished to comment, Chairperson Jepsen closed the public hearing.

Mr. Doughty commented that he appreciated TRPA’s staff efforts in processing this item in a timely manner.

**MOTION** by Mr. Doughty, with a second by Mr. Porta, to recommend approval to the Governing Board amending the Round Hill Community Plan to add bicycle facilities and sidewalks to the transportation element and design standards and guidelines to the community plan. The motion carried unanimously.

Mr. Stan Hansen, former APC Member, commented on what a pleasure it has been working with the APC board over the last several years. He thanked all the members for their support and looked forward to working with them in the future.

Chairperson Jepsen read the resolution for Mr. Hansen.

**C. Review of 1998 Lake Tahoe Watercraft Report and Direction to Staff to Prepare Recommended Actions in Response to the Report**

Principal Planner Gordon Barrett presented a review of the 1998 Lake Tahoe Motorized Watercraft Report and direction to staff to prepare recommended actions in response to the report.

A discussion ensued

Mr. Brant Allen, with the U.C. Davis, Tahoe Research Group, presented the preliminary draft report prepared by the Tahoe Research Group.

A discussion ensued.
Mr. Haen suggested adding ""BTX" after "such as" on paragraph 10 of Attachment A, Goals and Policies, Chapter 2, Land Use Element, Water Quality Subelement.

(Break taken at 11:22 a.m.)

(Reconvened at 11:30 a.m.)

A discussion ensued.

Chairperson Jepsen opened the meeting up for a public hearing.

Mr. John Kleppe, from Fallen Leaf Lake and the individual who did the MTBE studies, believed that a one-year extension on the ban should be given to the fireboat at Fallen Leaf Lake for public safety reasons.

Mr. Poppoff questioned if one a season exemption would be appropriate, and Mr. Kleppe responded yes.

Mr. Don Morrison, a boating resident from Incline Village and concerned citizen, had a question on the definition of "fuel charged crankcase scavenged two-stroke propelled watercraft". He commented that he did not understand the definition. Mr. Morrison did not believe that the term applied to the engines that TRPA is attempting to ban.

Mr. Barrett responded that the term was a recommendation from the Environmental Protection Agency. He stated that if Mr. Morrison had a better technical way of describing the watercraft, he would be willing to accept it.

Mr. Morrison stated that TRPA should use the videos of the efforts that have been made to ban the two-stroke engines as part of a public relations program. He believed that the video was very effective and convincing.

Mr. Morrison also stated that the first step in enforcing the 600 foot no-wake, 5 mph speed limit is to remove the existing buoys that are sitting at 150 feet and 200 feet and moved to 600 feet. He also stated that in fairness to the sailors, exceptions should be given to small, two-cycle engines on sailboats since they are rarely used.

Mr. Fred Mesman, Boating Law Administrator with the State of Nevada, Division of Wildlife, stated that only about 3 percent of the people with non-complying motors said they would not adhere to the new regulations. He urged caution at the studies shown in the Hagler Bailly Preliminary Report. He suggested going back to the contractor and inquire as to how the data was analyzed and applied to the survey. In addition, he suggested that TRPA work with his Department to apply for Federal funding to make sure that pump out facilities are available at the marinas. The deadline for this funding is January 5, 1999. He supported TRPA’s graph on EPA-Certified Clean Technology Marine Engines on page 25 of the Staff Summary. In terms of removing the buoys, Mr. Mesman stated that they are established as a safety issue and cannot be removed.

Since no one else wished to comment, Chairperson Jepsen closed the public hearing.

Mr. Mesman, of the Nevada Division of Wildlife, stated that his Division has transferred its current non-complying boat and motor to Southern Nevada.
Mr. Morrison coined the term "crankcase charged fuel lubricator".

Ms. Kemper commended the TRPA staff and all the agencies and universities for working cooperatively in a timely manner to get all this information together for the hearings this month. She especially appreciated the efforts that the Tahoe Research Group made to pull all the data and synthesize and compile the information in the report that summarizes the key points.

Ms. Kvas stated that last year she was not comfortable with the research data but this year she is very comfortable with it and feels like she could support the ban. She believed that a lot of public relations work needs to be done to let them know that just because we have gone this far, that doesn't mean it is the end. This is just the beginning and as more research is done, the standards are going to be tighter. In addition, on enforcement, she suggested that once a particular personal watercraft has been checked and compliant for 1999, it would be wise to have a TRPA 1999 sticker so that the enforcement staff doesn't have to waste a lot of time continuously looking at a personal watercraft. Also, a brochure would be helpful to let people know where we are going.

Mr. Popoff congratulated staff on doing a good job on this work but hopes that we don't let down on the continuation of the PHA work because there seems to be some potential there that we need to understand. Mr. Popoff was concerned about the hot spots around the Lake and in and around the marinas where there are intake lines that exceed drinking water standards.

Ms. Kemper stated that the water purveyors have been notified of this and advised to do sampling right after the 4th of July weekend or in August, which would be the time of highest concentrations. She stated that Lahonton is hoping that with the new regulations, there will be a dramatic improvement next summer in the water quality.

A discussion ensued.

Ms. Rohr believed that TRPA should not be responsible for enforcing drinking water standards; the water purveyors need to take responsibility.

MOTION by Mr. Doughty, with a second by Mr. Morgan, to recommend approval by the Governing Board of the Lake Tahoe Motorized Watercraft Report with minor adjustments to the Goals and Policies and rewording the Code language for the June 1, 1999, prohibition of carbureted two stroke propelled watercraft to prohibit the operation, mooring, or launching of a fuel charged, crankcase scavenged two-stroke propelled watercraft after June 1, 1999, including the exception to the June 1, 2000 deadline of the Ordinance for public safety elements of the Lake until June 1, 2001, and rewording of the definition of fuel charged, crankcase scavenged two-stroke propelled watercraft.

Mr. Cole questioned if the APC wanted to extend the deadline for new watercraft purchased after June 25, 1997 and before December 1, 1998. Mr. Doughty agreed that the deadline should tie in with the date of the adoption of the Ordinance and left blank at this point in time.

The motion carried unanimously.

VI. PLANNING MATTERS

A. Discussion on Designating the Tahoe Region as an MTBE-Free Zone
APC REGULAR MEETING MINUTES DECEMBER 9, 1998

Associate Planner Jim Allison presented the staff summary on designating the Tahoe Region as MTBE-Free Zone.

Mr. Poppoff suggested that paragraph 3, on page 31 of the Resolution, be reworded for accuracy because he didn't think we have required people to stop using Lake water. Mr. Allison agreed.

Mr. Porta stated that he believed the jury was still out and debatable as to the issue that MTBE is carcinogenic. He was of the opinion that consensus had not been reached on that item.

Mr. Barham stated that he would have to abstain from this item because the Governor was reviewing this item and he is an employee of the Governor. Mr. Barham commented that the water runoff and rainfall washout are minor sources of MTBE and suggested that TRPA modify the resolution with a modifier such as "to a lesser extent" because they are not in the range of some of the other sources.

Mr. Morgan was of the opinion that the APC should wait and see what the State of California decides to do because this may be a non-issue in a few weeks.

A discussion ensued.

Chairperson Jepsen opened the meeting up for a public hearing.

Mr. Bob Baer, General Manager of the South Tahoe Public Utility District, commented that he appreciated the APC's comments and discussion and believed that this is an issue that a light has to be shined upon and appreciates the APC's support.

Mr. Cole requested that Mr. Baer give a quick overview as to what kind of ramifications MTBE has had on the water supply in South Lake Tahoe.

Mr. Baer commented that the District has 35 wells and provides water to the South Shore, California side, and 12 wells have been impacted or could be impacted which is about 17% of the water supply. Mr. Baer stated that the District has spent nearly $2,000,000 in investigations and trying to understand how the District can meet their water demands for next year. The State of California has helped with the costs. One of the requirements to receive state funds is that the District has to seek aggressive recovery against the dischargers, which is very time consuming. Mr. Baer commented that a lot of the discharge is caused by human error when the tank truck comes up and all of a sudden he realizes that he is putting regular in the premium tank and then tries to disconnect the hose quickly and a spill occurs.

Since no one else wished to comment, Chairperson Jepsen closed the public hearing.

Chairperson Jepsen questioned if Mr. Allison wanted action on this item, and Mr. Allison responded that it was for discussion purposes only today. Mr. Allison stated that he would incorporate the changes to the Resolution and present it to the Governing Board for action.

VII. RESOLUTIONS

A. For Former APC Members Hansen, Dodds, Jamin, Thompson and Caterino

Chairperson Jepsen questioned if there were any changes to the Resolutions, and Ms. Kvas stated that on page 35, fourth paragraph, the word "WHEREAS" should be indented.
APC REGULAR MEETING MINUTES DECEMBER 9, 1998

Chairperson Jepsen thanked Mr. Baetge for getting these Resolutions to the APC meeting, and Mr. Baetge stated it was Julie Frame who wrote them.

**MOTION** by Mr. Doughty, with a second by Ms. Kemper, to recommend approval of the Resolutions for former APC Members Hansen, Dodds, Jamin, Thompson and Caterino. The motion carried unanimously.

VIII. REPORTS

A. Executive Director

Executive Director Jim Baetge stated that the ARB meeting would be held tomorrow, December 10, 1998, in Sacramento and starts at 8:30 a.m. Mr. Baetge stated that John Marshall, Agency Counsel, was in trial in Reno regarding the **TSPC v. TRPA** case.

Mr. Popoff questioned who was representing TRPA, and Mr. Baetge replied Clem Shute with Shute, Mihaly & Weinberger, and Dan Siegel from the State of California.

B. Legal Counsel

Mr. Baetge commented that the APC would have to wait until next month for a legal report when Mr. Marshall returns.

C. APC Members

Ms. Kemper questioned what the status of the **Watercraft** case is, and Mr. Baetge responded that it is on hold until December 18, 1998. In addition, Ms. Kemper inquired about the status of **Sutum**, and Mr. Baetge did not know.

Mr. Morgan stated that he has been reappointed for another two years. Chairperson Jepsen congratulated him.

Ms. Kemper commented that Lahontan had been told by the State Water Recourse Control Board that they will be given $84,000 starting January 1, 1999, to hire a full-time, six-month position and a part-time, six-month position to work on MTBE issues.

Mr. Barham stated that the video shown at the APC meeting last month on carbureted two-stroke engines was going to be shown on the news today.

Ms. Kemper wished everyone a Merry Christmas.

Chairperson Jepsen wished everyone a Merry Christmas and a good Holiday Season.
IX. ADJOURNMENT – The meeting was adjourned at 12:55 p.m.

Respectfully submitted,

\[Signature\]

Sue Mikanovich
Clerk to the Commission

This meeting was taped in its entirety. Anyone wishing to listen to the tapes may call (702) 588-4547 to make an appointment. In addition, written documents submitted at the meeting are available for review at the TRPA office, 308 Doria Court, Zephyr Cove, Nevada.
MEMORANDUM

January 4, 1999

To: TRPA Advisory Planning Commission

From: TRPA Staff

Subject: Amendment of the Round Hill Community Plan to Transfer in Bonus Tourist Accommodation Units from Kingsbury Community Plan

Proposed Action: The applicant, Falcon Capital LLC, proposes to amend the Round Hill Community Plan to transfer 25 Bonus Tourist Accommodation Units (TAUs) from the Kingsbury Community Plan. In addition, the applicant proposes that the 25 TAUs be assigned to Douglas County Assessor Parcel Number 05-230-11 within Special Area #2.

Staff Recommendation: Staff recommends that the Advisory Planning Commission conduct the public hearing as noticed and recommend approval of the amendments in Attachments A and B to the TRPA Governing Board.

Discussion: Staff received an application from Falcon Capital LLC, proposing to amend the Kingsbury and Round Hill Community Plans. The amendment will transfer the 25 TAUs assigned to the Kingsbury Community Plan to the Round Hill Community Plan. The 25 TAUs will be assigned to Special Area #2 to develop a 138 unit residential timeshare project. The applicant has requested that the bonus units are assigned to APN 05-230-11, but the Code does not provide a mechanism to give bonus units to a property. Pursuant to Subparagraph 33.4.B(1), bonus units shall not be issued except in connection with a project approval. The amendment is a Regional Plan amendment and not a project approval. To solve this dilemma, staff proposes that the bonus units are transferred to the Round Hill pool with a special policy limiting the use of the bonus units to Special Area #2 (See Attachment C for location of Special Area 32).

Analysis: The Round Hill Community Plan has been designated as a local service retail node and tourist center. The Kingsbury Community Plan has been designated as a regional commercial area. Both plans encourage continuation of the existing land uses: Round Hill as a local retail and service commercial node with opportunities for recreation and tourist accommodation in the area, Kingsbury as a commercial, tourist, and public service node for Douglas County. Both plans recognize that a key part of the community plan is to provide the opportunity and incentive to upgrade and expand the existing uses, while providing environmental benefits and correcting past land use deficiencies.

A fundamental cornerstone of the Round Hill Community Plan is the conviction that the area should continue as a local serving retail commercial node and tourist center. Destination tourism demands a full complement of goods, services, and recreational
opportunities located within an easily accessible area. The destination tourist travels further, stays longer, is more likely to utilize transportation systems, and spend more in the local economy than the short-term or day-use visitor. The Round Hill Community Plan provides a full complement of goods, services and recreational access.

The recently upgraded Round Hill Mall provides goods and services to the local residents as well as the visitor. In addition the Round Hill Community Plan area is a gateway to recreational opportunities such as Nevada Beach and Round Hill Pines. Special Policy 1.B of the Urban Design and Development Objectives states that in Special Area #2 (Commercial/Tourist/Residential Area), storage, tourist accommodations, and housing are encouraged by the permissible use list. Although the special policy encourages development of tourist uses that would benefit from the existing services and recreational opportunities in the community plan, bonus units have not been assigned to the Round Hill Community Plan. Transferring the 25 bonus TAUs to the Round Hill Community Plan will help in achieving the goals and policies of the plan.

Staff has analyzed the traffic impacts that may occur with the transfer of the bonus units and have determined that the impact is not considered to be significant. The TRPA standard is to achieve level of service (LOS) "D" or better at signalized intersections. For roadway conditions, an increase of five percent of traffic would represent a significant impact. The existing intersection LOS currently operates at LOS "B", with a total delay of 11.0 seconds per vehicle on Highway 50. Vehicles westbound on Elks Point Road also experience a LOS "B" at the intersection with a delay of 13.5 seconds per vehicle. The transfer of the bonus units will not have an impact on the intersections and they will continue to operate at LOS "B".

Using TRPA trip generation rate of 10.10 daily vehicle trip ends (DVTE) per TAU and .60 trips per TAU generated during peak hours, it is estimated that the DVTE would be 253 and there would be 15 peak-hour trip ends as a result of transferring the bonus units. The DVTE will increase in the Round Hill Community Plan Area and an equal reduction of DVTE in the Kingsbury Community. This is not considered to be a significant impact.

In terms of Vehicle Miles Traveled (VMT) the bonus units were originally assigned to the Kingsbury Community Plan, because it was a preferred area for developing tourist accommodation uses rather than the Round Hill Community Plan. The Kingsbury area has a higher degree of existing development, goods and services, and closer to the Stateline Casino Core. Since the adoption of the two community plans the bonus units have not been used and a developer has shown an interest in using the TAUs in the Round Hill Community Plan. Since the adoption of the plans, a number of improvements have been put in the ground in the Round Hill area that can better support tourist accommodation uses. They include the upgrade to the Round Hill Mall, new pedestrian sidewalks, and NDOT has plans to link the Nevada Beach Trail to the Kingsbury Trail. Using the average trip length of 6.7 miles per TAU, it would result in a peak day increase of 168 vehicle miles of travel (VMT), an increase of .01 percent over the peak day VMT of 1,735,079 in the Tahoe Basin in 1997. Although the transfer will cause VMT to increase in the Round Hill Community Plan it is not considered to be significant impact.
Findings: Prior to amending Chapter 33, Allocation of Development, TRPA must make the following Findings.

Chapter 6 Findings

1. Finding: The project is consistent with, and will not adversely affect implementation of the Regional Plan, including all applicable Goals and Policies, Plan Area Statements and Maps, the Code, and other TRPA plans and programs.

Rationale: The Regional Plan provides and encourages the development of community plans as a way to concentrate commercial and tourist uses in appropriate areas. Incentives are created to encourage continual use and expansion while providing for environmental improvements to achieve the thresholds. These environmental improvement projects are adopted as part of the community plans and are required environmental targets which the community plan must achieve.

All projects that may occur due to this amendment are still subject to the TRPA Goals and Policies, the Code of Ordinances and the adopted Round Hill Community Plan. Community Plans may replace the Plan Area Statements for the areas within the community plan boundaries, but will retain certain features of the plan area statements. All Standards of Codes shall apply to the community plans, except that the community plan may establish standards that are equal or superior measures to achieve environmental thresholds.

2. Finding: The project will not cause the environmental thresholds to be exceeded.

Rationale: The amendment to the Kingsbury and Round Hill Community Plans to transfer bonus TAU's will not cause the environmental thresholds to be exceeded.

The Regional Plan recognizes that a key part of the community plan is to provide the opportunity and incentive to upgrade and expand the existing uses, while providing environmental benefits and correcting past land use deficiencies. Transferring the bonus units to the Round Hill Community Plan will provide the incentive to development tourist accommodation uses, a special policy of the Round Hill Community Plan. In addition, developing tourist uses in areas which provide a full complement of goods, services, and recreational opportunities, will help achieve and maintain the environmental thresholds. Visitors will be less dependent upon the automobile and will help achieve the recreation threshold of providing access to recreational activities.
3. **Finding:** Wherever federal, state, and local air and water quality standards applicable to the Region, whichever are stricter, must be attained and maintained pursuant to Article V(d) of the Compact, the project meets or exceeds such standards.

**Rationale:** See findings 1 and 2 above.

4. **Finding:** The Regional Plan and all of its elements, as implemented through the Code, Rules and other TRPA plans and programs, as amended, achieves and maintains the thresholds.

**Rationale:** See findings 1 and 2 above. Furthermore, all projects that may occur because of this amendment will still be subject to the Code, Goals and Policies, and the appropriate community plan and its guidelines for achieving and maintaining environmental thresholds.

**Environmental Documentation:** The applicant has prepared an Initial Environmental Checklist (IEC) for the proposed amendment. Staff proposes a Finding of No Significant Effect (FONSE) based on the Chapter 6 findings shown above.

Staff will begin this item with a brief presentation. Please contact John Hitchcock at 702-588-4547, or via email at trpa@sierra.net, if you have any comments regarding this item.

**Attachments**
### Proposed Amendments to the Kingsbury Community Plan

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<thead>
<tr>
<th>USE</th>
<th>MAXIMUM DENSITY</th>
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<tbody>
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<td>Residential</td>
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<td>Single Family Dwelling</td>
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<td><strong>Tourist Accommodation</strong></td>
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<td>Hotel, Motel and Other Transient Units</td>
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<td>• with less than 10% of units with kitchens</td>
<td>40 units per acre</td>
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<td>• with 10% or more units with kitchens</td>
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<tr>
<td>Timeshare</td>
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<td>Recreation</td>
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<td>Recreation Vehicle Parks</td>
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<tr>
<td>Developed Campground</td>
<td>8 sites per acre</td>
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</tbody>
</table>

**RESIDENTIAL BONUS UNITS**: Pursuant to Chapter 35, the maximum number of residential bonus units which may be permitted for this Community Plan Area is 130 units. *

**TOURIST ACCOMMODATION UNITS**: Pursuant to Chapter 35, the maximum number of tourist accommodation bonus units which may be permitted for this Community Plan Area is 25 0 units.

**ADDITIONAL DEVELOPED OUTDOOR RECREATION**: The following are the targets and limits for additional developed outdoor recreation facilities specified in Chapter 13 to be located within this Community Plan Area. Specific projects and their timing are addressed in the TRPA Five-Year Recreation Program pursuant to Chapter 33 Allocation of Development. The following additional capacities allowed are measured in persons at one time:

- **SUMMER DAY USES 0 PAOT**
- **WINTER DAY USE 0 PAOT**
- **OVERNIGHT USES 0 PAOT**

**COMMERCIAL FLOOR AREA ALLOCATION**: Pursuant to Chapter 33, the maximum amount of commercial floor area which may be allocated for additional development in the Community Plan Area until December 31, 1996, is 14,050 square feet.

**MAXIMUM CUMULATIVE NOISE LEVEL**: The maximum cumulative noise equivalent levels for this Community Plan Area is as follows:

1. Where applicable, a maximum 65 CNEL override for the U.S. Highway 50 corridor and a maximum 55 CNEL for the Highway 207 corridor is permissible.
2. The maximum CNEL for Special Area #3 is 60 CNEL.
3. The maximum CNEL for all areas of the community plan except as noted in 1 and 2 above is 65 CNEL.

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*Amended 05/28/97*
Recreation
Group Facilities  25 persons per acre
Recreational Vehicle Parks  10 sites per acre

RESIDENTIAL BONUS UNITS: Pursuant to Chapter 35, the maximum number of residential bonus units which may be permitted for this Community Plan Area is 0 units.

TOURIST ACCOMMODATION UNITS: Pursuant to Chapter 35, the maximum number of tourist accommodation bonus units which may be permitted for this Community Plan Area, Special Area #2 Only is 0-25 units.

ADDITIONAL DEVELOPED OUTDOOR RECREATION: The following are the targets and limits for additional developed outdoor recreation facilities specified in Chapter 13 to be located within this Community Plan Area. Specific projects and their timing are addressed in the TRPA Five-Year Recreation Program pursuant to Chapter 33 Allocation of Development. The following additional capacities allowed are measured in persons at one time:

SUMMER DAY USES 25 PAOT  WINTER DAY USE 0 PAOT  OVERNIGHT USES 0 PAOT

COMMERCIAL FLOOR AREA ALLOCATION: Pursuant to Chapter 33, the maximum amount of commercial floor area which may be allocated for additional development in the Community Plan Area until December 31, 1996, is 2,000 square feet. 

MAXIMUM CUMULATIVE NOISE LEVEL: The maximum cumulative noise equivalent levels for this Community Plan Area is as follows:

1. Where applicable, a maximum 65 CNEL override for the U.S. Highway 50 corridor is permissible.
2. The maximum CNEL for property in Special Area #2 abutting residential areas is 55 CNEL.
3. The maximum CNEL for all areas of the community plan except as noted in 1 and 2 above is 65 CNEL.

Amended 10/28/98
January 5, 1999

To: Advisory Planning Commission

From: TRPA Staff

Subject: Amendment of Code Chapter 81, Water Quality Control and Goal #2, Water Quality Subelement of the Goals and Policies to Clarify the Prohibition of Certain Watercraft in the Tahoe Region

Proposed Action: In response to the APC and Governing Board’s review of the Lake Tahoe Motorized Watercraft Report – An Integration of Water Quality, Watercraft Use and Ecotoxicology Issues (Report) in November and December, the staff drafted amendments (Attachments A and B) pursuant to the Governing Board’s direction to clarify the prohibition on certain two stroke powered watercraft (Attachment C). The APC is requested to consider recommendations to the Governing Board for adoption of the proposed amendments.

Staff Recommendation: Staff recommends adoption of the amendments proposed in Attachments A and B plus the underlined additions. These recommended amendments are as follows:

A. Minor adjustments to the Goals and Policies to clarify TRPA’s role in motorized watercraft regulation.

B. Rewording the Code language for the June 1, 1999 prohibition of carbureted two stroke propelled watercraft to prohibit the operation, mooring, or launching of watercraft powered by two stroke engines except:
   1. Any watercraft powered by a two stroke engine whose fuel is directly injected into the cylinder shall be exempt from the prohibition,
   2. Any watercraft powered by a two stroke engine whose fuel is injected into the crankcase prior to entering the cylinder and was purchased prior to January 27, 1999 shall be prohibited commencing October 1, 2001.

The underlined language is staff’s recommended additions to the Governing Board’s December direction. This modification is recommended to discourage concessionaires from buying fleets of electronic fuel injection PWCs instead of the direct injection PWCs. Conversations with concessionaires indicate that some are considering purchasing new electronic fuel injected two stroke PWCs for the upcoming season.

Background: In February 1997, the TRPA Governing Board held an extensive hearing on the impacts of motorized watercraft. In response to the hearing, the Governing Board
Amendment of Code Chapter 81, Water Quality Control and Goal #2, Water Quality Subelement of the Goals and Policies
January 4, 1999
Page 2

approved a course of action. Attachment D is a copy of the action. The March and June actions have been completed and the other actions are in progress.

In response to the March action item #1, the Motorized Watercraft Technical Advisory Group (MWTAG) was formed to study and further investigate the magnitude of fuel pollution from motorized watercraft. As noted in the June action item #1 and the June adopting ordinance, TRPA fully intended to continue the study of watercraft impacts on the lakes of the Region. The Lake Tahoe Motorized Watercraft Report is a summation of the studies occurring at Lake Tahoe since June of 1997.

Last winter the Governing Board considered possible amendments to the June 1997 action. It was decided that further action should be deferred until December 1998 so that the studies from the summer of 1998 could be considered. The December watercraft hearing was incorporated into the TRPA Work Program and into the schedule for processing the watercraft lawsuit.

Another major source of information was the California Air Resources Board. During 1998, the California Air Resources Board (CARB) studied and implemented regulations in regards to motorized watercraft. CARB worked with TRPA, the California State Water Quality Control Board, Lahontan Regional Water Quality Control Board and other water quality oriented agencies to establish emission standards that would also assist in the protection of water quality. CARB created a phased program (three tiers) to eliminate the undesirable watercraft through prohibition of sales. The sale of existing technology carbureted two strokes will be prohibited by 2001. These are the watercraft that are targeted for prohibition by TRPA.

At the November and December 1998 meetings, presentations were made on the findings of the various study components of the Report. It should be noted that the overall study is still in progress and this Report only reflects data collected as of November 1998. Also, because the MWTAG’s role is limited to providing scientific data and findings, the Report does not recommend policy actions.

Analysis: The attached EA (Attachment I) has been prepared by TRPA staff based on the findings of the Report and other information gathered by staff after June 1997. TRPA staff has reviewed the findings and data of the Report and this EA. A review of the evidence confirms that the 1997 action was correct based on the facts that:

- **Discharge of Petroleum Products Occurs from Boating** - Petroleum products are found in the lakes of the Region where motorized watercraft operate. The discharge of the pollutants occurs during the boating season and dissipates to a less than detectable level in the winter. However, these water quality problems occur annually, particularly in shallow high boating use areas during the summer.
- **Old Technology Two Strokes are a Major Source of Discharge** - The old technology, two stroke watercraft (fuel charged, crankcase scavenged two stroke engines) discharge an order of magnitude more pollutants than do the four strokes or the direct injected two strokes.
The following items have discussed in the November and December hearings and are presented here in a brief analysis. See the EA for a more in depth analysis on the items related to the Governing Board’s direction.

Goals and Policies Amendment Regarding Motorized Watercraft – TRPA legal counsel has suggested that the action to prohibit carbureted two strokes found in the Code should flow more directly from the language in the Goals and Policies. This is considered to be a technical supporting modification that has no impact on the substance of the TRPA prohibition. Based on APC and Governing Board input in November and December, the language has been modified and included in the recommended actions.

Criteria for Identifying Prohibited Watercraft – The Governing Board has requested drafting of amendments to the Code to refine the June 1999 prohibition. TRPA’s current ordinance bans the discharge of unburned fuel and oil from the operation of carbureted two stroke engines starting June 1, 1999. This ban was adopted in response to evidence that carbureted two stroke engines discharge as much as 25% of their fuel directly into the air and waters where they operate. However, it has been recognized that the language of the existing ordinance contains a technical “loop hole” which would allow the legal operation of electronically injected two-stroke engines after June 1, 1999. The footnote in the 1997 EA notes: “The focus of the regulation is on all charged crankcase scavenged two stroke engines; however, for regulatory reasons TRPA is limiting the ban on carbureted 2 stroke engines”. These engines, which electronically inject fuel into the crankcase prior to delivery to the combustion cylinder, still allow blow-by of fuel past the exhaust port. While these engines are slightly more efficient than their carbureted counterparts, their efficiency is not near that of direct injection and four-stroke engines. Attachment E indicates the EFI technology is similar to the carbureted technology based on in lake testing.

Prohibition of the Use of MTBE in Fuels – Recent studies indicate that the use of MTBE as gasoline additive is a problem. In December the Governing Board adopted a Resolution recommending the Governor of California take action prohibiting the use of MTBE as an oxygenate. The report verifies measurable levels in the lakes of the Region which allow motorized watercraft. The carbureted two strokes are a primary source of MTBE along with the BTEX compounds. Although banning MTBE would be helpful in eliminating MTBE pollution, it would not fix the problem for the other pollutants. However, the removal/replacement of MTBE as a fuel additive is a recommended mitigation measure for that type of pollution.

Possible Extensions and/or Exemptions from the June 1, 1999 Prohibition -
The issue of exemptions has been raised by some Governing Board members, the plaintiffs in the watercraft lawsuit, some boating agency representatives, and some members of the general public. Generally, the issues are the cost to change engines, the unavailability of new engines, and the possibility of an insignificant impact from a selected group.

First, as to the availability of the new technology engines (e.g., four strokes and direct injection two strokes), Attachment F demonstrates the wide range of outboards...
Amendment of Code Chapter 81, Water Quality Control and Goal #2, Water Quality Subelement of the Goals and Policies
January 4, 1999
Page 4

available. As to PWCs, it appears that the direct injection Polaris Genesis model and the Tigershark TS1100Li model will be available this summer. The fundamental problem is the conversion cost which can range between $500 for a small, used outboard to $10,000 for a new, large outboard or PWC.

The second issue relates to small horsepower engines and auxiliary engines that use only small amounts of fuel. Based on the incomplete surveys of the 1998 Hagler Bailly Watercraft Survey and some factors from the June 1997 TRPA Motorized Watercraft Environmental Assessment, TRPA staff has attempted to present an estimate of 1998 boating usage by watercraft type. In general, the new information indicates that the use of outboards is less at Lake Tahoe than was previously estimated. The boating numbers from the survey are still being compiled and may need further adjustment.

Under 10 hp two stroke carbureted outboard motors – Staff estimates that privately used, under 10 hp outboard two strokes accounted for 1.59% of the seasonal boating use in 1998 and used 0.3% (5476 gallons) of the boating season fuel. However, as one can observe in Attachments G and H, these engines are much less efficient on a horsepower basis than the larger motors and an order of magnitude more polluting than four strokes. They result in 4.49% (237 gallons) of the MTBE discharged into the Lake. In addition, these engines cost much less than the larger engines to replace. The significant contribution of pollutants and the low cost of engine replacement make it difficult to recommend exemption.

Auxiliary 2 Stroke Carbureted Outboards for Sailboats - Staff estimates that auxiliary outboard two strokes for sailboats accounted for 1.60% of the seasonal boating in 1998 and used 0.016% (2477 gallons) of the fuel boating season fuel. The hours of operation are much shorter. Although an order of magnitude smaller in discharge, the arguments regarding greater pollutant discharge and less cost for small outboards apply here. At this point, staff is not recommending pursuing these types of exemptions.

Fire Protection Boats – The APC recommended this in response to public testimony. At this point it would apply to one boat at Fallen Leaf Lake. The Governing Board did not accept this recommendation based primarily on the belief that public agencies should set the example. Information indicates that the boat was purchased after TRPA adopted Ordinance 97-12.

Two Stroke Carbureted Outboards on other Lakes of the Region – It was argued that other lakes of the Region should be exempted because they were not designated as outstanding natural water resources. The monitoring data indicates these other lakes have detectable limits of pollutants and an Echo Lake sample exceeded drinking water standards. Because both Fallen Leaf and Echo Lakes are used for drinking water and they both have detectable levels of pollutants, it would appear that exempting them would not be prudent. The alternative access choices for the Echo Lake homeowners are: get a four stroke motor, use the water taxi, or walk.

GWB/dmc

AGENDA ITEM V.B.
Findings: Prior to amending Chapter 81 and Goal #2 of the Water Quality Subelement, TRPA must make the following findings.

Chapter 6 Findings

1. Finding: The project is consistent with, and will not adversely affect implementation of the Regional Plan, including all applicable Goals and Policies, Plan Area Statements and Maps, the Code, and other TRPA plans and programs.

Rationale: The Regional Plan and the Compact require the protection of the water quality of the Region. The June 1997 action by the TRPA to prohibit the use of watercraft powered by old technology two stroke engines has been affirmed by the Lake Tahoe Motorized Watercraft Report – An Integration of Water Quality, Watercraft Use and Ecotoxicology Issues. The amendments further clarify that June 1997 action and only assist in the implementation of the Regional Plan programs protecting water quality.

2. Finding: The project will not cause the environmental thresholds to be exceeded.

Rationale: The purpose of these amendments is to protect water quality, fisheries, wildlife, and recreation. These amendments to the prohibition further restrict certain fuel injected engines determined to have significant discharges while allowing for the use of cleaner, certified two stroke powered watercraft.

3. Finding: Wherever federal, state, and local air and water quality standards applicable to the Region, whichever are stricter, must be attained and maintained pursuant to Article V(d) of the Compact, the project meets or exceeds such standards.

Rationale: These actions are consistent with federal and state water quality and air quality standards. These amendments help promote consistency with recent federal and state actions in regards to the regulation of watercraft and the protection of drinking water.

4. Finding: The Regional Plan and all of its elements, as implemented through the Code, Rules and other TRPA plans and programs, as amended, achieves and maintains the thresholds.

Rationale: See findings 1, 2 and 3 above. The prohibition of watercraft powered by two stroke engines (with exceptions for clean technology engines) provides for the attainment water quality thresholds while allowing for recreation threshold goals of increased public recreation capacity.

Ordinance 87-8 Findings
Amendment of Code Chapter 81, Water Quality Control and Goal #2, Water Quality Subelement of the Goals and Policies
January 4, 1999
Page 6

1. Finding: That the amendment is consistent with the Compact and with the attainment or maintenance of the thresholds.

Rationale: See Chapter 6 Findings.

2. Finding: One or more of the following.

   a) There is demonstrated conflict between provisions of the Regional Plan Package and the conflict threatens to preclude attainment or maintenance of thresholds;

   b) That legal constraints, such as court orders, decisions or Compact amendments, require amendment of the Goals and Policies or Code;

   c) That technical or scientific information demonstrates the need for modification of a provision of the Goals and Policies or Code;

   d) That the provision to be amended has been shown, through experience and time, to be counter-productive to or ineffective in attainment or maintenance of the thresholds;

   e) That implementation of the provision sought to be amended has demonstrated to be impracticable or impossible because of one or more of the following reasons:

      1) The cost of implementation outweighs the environmental gain to be achieved.

      2) Implementation will result in unacceptable impacts on public health and safety; or

      3) Fiscal support for implementation is insufficient and such insufficiency is expected to be a long-term problem.

   f) That the provision to be amended has shown through experience to be counter-productive or ineffective and the amendment is designed to correct the demonstrated problem and is an equal or better means of implementing the Regional Plan Package and complying with the Compact.

Rationale: Finding c) is the most appropriate. The amendments are consistent with the findings of the 1998 Lake Tahoe Motorized Watercraft Report – An Integration of Water Quality, Watercraft.
Use and Ecotoxicology Issues. Based on the rationales above, the amendments are a better means of implementing the Regional Plan Package and complying with the Compact.

Environmental Documentation: Staff has prepared an Environmental Assessment for the actions considered in this summary. Based upon this EA, staff proposes a Finding of No Significant Effect (FONSE) based on the Chapter 6 and Ordinance 87-8 findings shown above.

At the meeting, TRPA Legal Counsel will update the APC on the current status of the lawsuit. If you have any questions, please contact Gabby Barrett or John Marshall at 702-588-4547.
GOALS AND POLICIES, CHAPTER 2, LAND USE ELEMENT, WATER QUALITY SUBELEMENT

GOAL #2
REDUCE OR ELIMINATE THE ADDITION OF OTHER POLLUTANTS WHICH AFFECT, OR POTENTIALLY AFFECT, WATER QUALITY IN THE TAHOE BASIN.
Although controlling nutrient and sediment loads to Lake Tahoe is crucial to meeting water quality standards and adopted thresholds, several other existing or potential problems also must be controlled to preserve the scenic, recreational, and other values of the Tahoe Region.

POLICIES:

1. ALL PERSONS ENGAGING IN PUBLIC SNOW DISPOSAL OPERATIONS IN THE TAHOE REGION SHALL DISPOSE OF SNOW IN ACCORDANCE WITH SITE CRITERIA AND MANAGEMENT STANDARDS IN THE HANDBOOK OF BEST MANAGEMENT PRACTICES.
Melting snow in snow disposal areas can represent not only a significant source of nutrients, but also of harmful hydrocarbons, metals, and biological oxygen demand. Therefore, site criteria and management standards are required to protect Lake Tahoe’s extraordinary water quality. The Handbook of Best Management Practices shall be revised to address snow disposal practices.

2. DISCHARGES OF SEWAGE TO LAKE TAHOE, ITS TRIBUTARIES, OR THE GROUNDWATERS OF THE LAKE TAHOE REGION ARE PROHIBITED. SEWAGE COLLECTION, CONVEYANCE AND TREATMENT DISTRICTS SHALL HAVE APPROVED SPILL CONTINGENCY, PREVENTION, AND DETECTION PLANS.
Sewage discharges, regardless of their cause, not only contribute unnecessary nutrient loads to Lake Tahoe, but may also cause public health problems. Accidental discharges may be minimized through proper design and construction practices and comprehensive spill contingency, prevention, and detection plans. All agencies which collect or transport sewage should have plans for detecting and correcting exfiltration problems.

3. ALL INSTITUTIONAL USERS OF ROAD SALT IN THE LAKE TAHOE REGION SHALL KEEP RECORDS SHOWING THE TIME, RATE, AND LOCATION OF SALT APPLICATION. STORAGE OF ROAD SALT SHALL BE IN ACCORDANCE WITH THE HANDBOOK OF BEST MANAGEMENT PRACTICES.
Road salt can be very harmful to vegetation near application and storage areas. This vegetation, in turn, is crucial to maintaining the Region’s water quality. Better knowledge and control of salt application will have positive impacts on vegetation and water quality. The Handbook of Best Management Practices shall be revised to address application and storage of road salt.

4. UNDERGROUND STORAGE TANKS FOR SEWAGE, FUEL, OR OTHER POTENTIALLY HARMFUL SUBSTANCES SHALL MEET STANDARDS SET FORTH IN TRPA ORDINANCES, AND SHALL BE INSTALLED, MAINTAINED, AND MONITORED IN ACCORDANCE WITH THE HANDBOOK OF BEST MANAGEMENT PRACTICES.
Leaking underground tanks are becoming a major nationwide water quality problem. In the Tahoe Basin, the environmental impacts of leaking tanks may be especially noticeable and harmful to the values of the Region. The Handbook of Best Management Practices shall be revised to address underground storage tanks.
5. NO PERSON SHALL DISCHARGE SOLID WASTES IN THE LAKE TAHOE REGION BY DEPOSITING THEM ON OR IN THE LAND, EXCEPT AS PROVIDED BY TRPA ORDINANCE.

Landfilling or other practices for disposing of solid wastes can add harmful biological oxygen demand, nutrients, and toxic substances to the watershed of Lake Tahoe. Therefore, the control of solid waste disposal is necessary to protect and enhance water quality. Existing state policies and laws will continue to govern solid waste disposal in the Tahoe Region.

6. TRPA SHALL COOPERATE WITH OTHER AGENCIES WITH JURISDICTION IN THE LAKE TAHOE REGION IN THE PREPARATION, EVALUATION, AND IMPLEMENTATION OF TOXIC AND HAZARDOUS SPILL CONTROL PLANS.

A single spill of a toxic or hazardous material in the Basin could reverse progress in attaining water quality goals gained at great local expense and effort. TRPA will cooperate with the Forest Service, the EPA, and state water quality and health agencies to prevent and control toxic and hazardous spills.

7. THE BMPs WILL BE AMENDED TO INCLUDE SPECIAL CONSTRUCTION TECHNIQUES, DISCHARGE STANDARDS, AND DEVELOPMENT CRITERIA APPLICABLE TO PROJECTS IN THE SHOREZONE.

Sediment and other discharges from shorezone construction or dredging have an immediate and obvious impact on water clarity in localized areas, and are harmful to fish. Proper construction techniques and other measures will be required as necessary to mitigate activities in the shorezone and to protect the natural values of the shorezone.

8. LIQUID OR SOLID WASTES FROM RECREATIONAL VEHICLES AND BOATS SHALL BE DISCHARGED AT APPROVED PUMP-OUT FACILITIES. PUMP-OUT FACILITIES WILL BE PROVIDED BY PUBLIC UTILITY DISTRICTS, MARINAS, CAMPGROUNDS, AND OTHER RELEVANT FACILITIES IN ACCORDANCE WITH STANDARDS SET FORTH IN THE HANDBOOK OF BEST MANAGEMENT PRACTICES.

Attempts to control the addition of pollutants to Lake Tahoe and its tributaries should not overlook vehicle and vessel wastes. The present shortage of pump-out facilities contributes to the size of this problem. The Handbook of Best Management Practices shall be revised to address pump-out facilities.

9. EVALUATE THE FEASIBILITY AND EFFECTIVENESS OF PONDING FACILITIES ALONG STREAM CORRIDORS AS A STRATEGY FOR REMOVING INSTREAM LOADS OF SEDIMENT AND NUTRIENTS.

Streams in the Lake Tahoe Basin act as receiving waters for overland runoff which may contain substantial quantities of sediments, nutrients, and other impurities. In the absence of an effective filtering mechanism along the stream such as a marsh, these contaminants eventually will be deposited into Lake Tahoe. Diversions of stream water into settling ponds or marshes might be an effective mechanism for cleansing the stream water prior to it emptying into the Lake. The feasibility of this concept should be further evaluated based on its technical and environmental merits and consistency with the other goals and policies of this Plan.
10. **REDUCE THE IMPACTS OF MOTORIZED WATERCRAFT ON WATER QUALITY.**

The use of motorized watercraft on lakes within the region can adversely affect water quality through the discharge of pollutants such as methyl-tertiary-butyl ether (MTBE), polycyclic aromatic hydrocarbons (PAHs), human waste, and hydrocarbons. TRPA shall implement measures to attain and maintain TRPA, state, and federal water quality standards because these pollutants can adversely impact fish and wildlife, recreation and water supplies.
Proposed Amendment to Chapter 81 of the TRPA Code
Proposed by the Governing Board

81.2.D Prohibition of Toxic or Hazardous Waste Discharge: The discharge of toxic hazardous waste to Lake Tahoe, other lakes in the Region, their tributaries, the groundwaters of the Tahoe Region, the lands of the Tahoe Region, and the Truckee River within the Tahoe Region, is prohibited. The discharge of unburned fuel and oil from the operation of watercraft propelled by carbureted two-stroke engines shall be prohibited commencing June 1, 1999.

81.2.E Prohibition of Certain Marine Engine Types: Commencing June 1, 1999, the launching, mooring, or operation of all fuel-charged crankcase scavenged two stroke engine powered watercraft within the Region is prohibited, except that any new watercraft purchased after June 25, 1997 and before December 1, 1998 and propelled by a fuel-injected, fuel-charged crankcase scavenged two-stroke engine shall be prohibited commencing June 1, 2000.

81.2.E Prohibition of Certain Watercraft: Commencing June 1, 1999, the launching, mooring, or operation of all two-stroke engine powered watercraft within the Region is prohibited, except:

1) Any two stroke engine powered watercraft whose fuel is directly injected into the cylinder shall be exempt from the prohibition, or

2) Any watercraft powered by a two stroke engine whose fuel is injected into the crankcase prior to entering the cylinder shall be prohibited commencing October 1, 2001.
GOVERNING BOARD ACTION
Regular Meeting - December 16, 1998

MOTION by Ms. Bresnick to direct staff to draft an ordinance essentially as presented – not with the changes presented by Mr. Fagan of the NNMA – with the two exceptions being number one as worded by staff and exception two as revised by the Board to delete the dates and to commence the prohibition October 1, 2001. The motion failed.

(Numerous other motions and amendments were presented in the interim but failed. The following motion passed.)

MOTION by Mr. Upton to approve Ms. Bresnick’s motion with direct injected and extended time on the good faith purchase and, secondly, to have an evaluation come back to deal with the other reasonable exemptions. The motion carried.
TRPA Governing Board Action
2/26/97

MOTORIZED WATERCRAFT IMPACT ANALYSIS

The Governing Board directed TRPA staff to:

**Actions to be taken at the March Governing Board meeting.**

1. Draft a resolution requesting assistance from California Environmental Protection Agency (Cal EPA), Lahontan Water Quality Control Board, Nevada Department of Environmental Protection (NDEP) and Environmental Protection Agency (EPA) to help resolve issues related to motorized watercraft and MTBE.

2. Prepare a report on the feasibility of implementing a boating registration program and an inspection and maintenance program.

**Actions to be taken at the June Governing Board meeting.**

Direct staff to prepare the necessary findings, environmental documents, and ordinances for presentation at the June 1997 Governing Board meeting. This should include the following:

1. In response to the unburned fuel impacts – Draft an ordinance to be adopted that will phase out the use of carbureted 2 stroke engines in the Basin effective June 1, 1999. This ban may be modified with an ordinance amendment if further scientific data indicates a more or less restrictive measure is appropriate.

2. In response to noise impacts, water quality impacts, recreation conflicts, boating safety impacts, and wildlife impacts – Draft an ordinance that establishes a no wake zone (speed limit) for all watercraft that is sufficient to allow people on the beach to have a normal conversation at four to six feet (PSIL concept), sufficient to prevent recreational conflicts between beach users, swimmers, fishermen, and watercraft, sufficient to provide for increased boating safety in congested areas, sufficient to protect fish habitat and water intakes, and sufficient to protect shorezone wildlife.

3. In response to fishery and wildlife impacts – Draft an ordinance that bans use of motorized watercraft within tributaries of Lake Tahoe.

**Impacts and Mitigation to be Resolved with the Shorezone Consensus Process.**

1. In response to the impacts identified for all motorized watercraft – Direct TRPA staff and the Shorezone Consensus Group to consider standards and programs to mitigate the watercraft impacts identified at the February Governing Board meeting. This will include:
   a) An Inspection and Maintenance program for all motorized watercraft.
   b) An air quality mitigation fee focused on NOx.
   c) A limitation on the number of motorized watercraft permitted on the Lake.
   d) A program to require the use of bilge sponges.
e) A program to implement shorezone BMPs and other mitigation on existing uses related to motorized watercraft use.

f) Establishing of more restrictive noise standards for individual watercraft and special area performance standards.

g) Establishing of limits on the hours of operation for concessionaires who rent watercraft with 2-stroke engines.

h) Establishing a limit on the number of commercial watercraft until the regulations are adopted.

i) Establishing a boating registration program.

To be included in the 97/98 TRPA Work Program.

1. In response to the need to inform the public and to promote an orderly implementation of the mitigation measures over the next two years – Direct staff to include an educational program, a MOU program to establish enforcement program and possible use of TRPA mitigation fees, and a signage program.

2. In response to the need for coordination – Direct the Local Government Committee and staff to work with state and local agencies to implement the mitigation measures.
Figure 9. In-Lake Experiment-Comparison of Two-stroke Personal Watercraft Engine Efficiencies- Dissolved Toluene Exhausted for Four Pass Treatment at Operating Speed

Comparison of emissions from two-stroke carbureted PWC vs. two-stroke electronic fuel injected PWC after 4 passes at operating speed

Concentration (µg/L)

Surrogate gasoline constituent
Toluene

2SC-PWC-90hp  2SEFI-PWC-110hp

Marine engine
### Table 6
1998 and 1999 Model Two-Stroke Direct-Injected Outboard Engines

<table>
<thead>
<tr>
<th></th>
<th>0-100 hp</th>
<th>101-150 hp</th>
<th>151-200 hp</th>
<th>&gt;200hp</th>
</tr>
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<tr>
<td>Mercury</td>
<td>115, 135, 150</td>
<td>200</td>
<td>225</td>
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</tr>
<tr>
<td>OMC</td>
<td>90</td>
<td>115, 150</td>
<td>175</td>
<td>200, 225</td>
</tr>
</tbody>
</table>

1. Mercury Engines Use Orbital Direct-Injection Systems
2. OMC Engines Uses Ficht Direct-Injection Systems

### Table 7
1998 and 1999 Model Four-Stroke Outboard Marine Engines

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>0-20hp</th>
<th>21-40hp</th>
<th>41-60 hp</th>
<th>61-80 hp</th>
<th>&gt;80hp</th>
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</thead>
<tbody>
<tr>
<td>Honda</td>
<td>2, 5, 9.9, 15</td>
<td>25, 30, 40</td>
<td>50</td>
<td>75</td>
<td>90, 115*, 130*</td>
</tr>
<tr>
<td>Mercury</td>
<td>4, 5, 9.9, 13, 15</td>
<td>25, 30</td>
<td>40, 45, 50</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>OMC</td>
<td>5, 6, 8, 9.9, 15</td>
<td>40</td>
<td>50*</td>
<td>70*</td>
<td></td>
</tr>
<tr>
<td>Suzuki</td>
<td>9.9, 15</td>
<td>40</td>
<td>50*, 60*</td>
<td>70*</td>
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</tr>
<tr>
<td>Yamaha</td>
<td>4, 9.9, 15</td>
<td>25</td>
<td>40, 50</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

* Engines equipped with electronic fuel injection.
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<th></th>
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<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Fuel Use G/Hour</td>
<td>Hours/Tr</td>
<td>% Trips</td>
<td>Boat Trips</td>
<td>Fuel Use Gal.</td>
<td>Fuel Use G/Hour</td>
</tr>
<tr>
<td>Up to 10 hp</td>
<td>G2</td>
<td>1.81</td>
<td>3.19</td>
<td>20.20%</td>
<td>21,204</td>
<td>182,430</td>
<td>1.81</td>
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<tr>
<td>10 to 30 hp</td>
<td>G2</td>
<td>1.53</td>
<td>1.4</td>
<td>1.70%</td>
<td>1,784</td>
<td>1,673</td>
<td>1.53</td>
</tr>
<tr>
<td>Over 30 hp</td>
<td>G2</td>
<td>1.96</td>
<td>3.19</td>
<td>8.40%</td>
<td>20,259</td>
<td>5,012</td>
<td>30,946</td>
</tr>
<tr>
<td>Outboard Total</td>
<td>G2</td>
<td>1.81</td>
<td>3.19</td>
<td>20.20%</td>
<td>21,204</td>
<td>182,430</td>
<td>1.81</td>
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<tr>
<td>Auxiliary Sail</td>
<td>G2</td>
<td>0.67</td>
<td>1.4</td>
<td>1.70%</td>
<td>1,784</td>
<td>1,673</td>
<td>0.67</td>
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<tr>
<td>Outboard G4/G21</td>
<td>1.56</td>
<td>3.49</td>
<td>3.50%</td>
<td>3,674</td>
<td>20,259</td>
<td>1.58</td>
<td>3.49</td>
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<tr>
<td>Inboard/Outboard G4</td>
<td>0.76</td>
<td>3.16</td>
<td>43.40%</td>
<td>45,558</td>
<td>541,278</td>
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<td>3.16</td>
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<td>3.25</td>
<td>22.60%</td>
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<td>299,559</td>
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<td>Inboard Jet G4</td>
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<td>945</td>
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<td>3.88</td>
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<td>0.70%</td>
<td>735</td>
<td>689</td>
<td>0.07</td>
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<tr>
<td>Outboard D</td>
<td>1.20</td>
<td>4.69</td>
<td>0.10%</td>
<td>105</td>
<td>501</td>
<td>1.20</td>
<td>4.69</td>
</tr>
<tr>
<td>Auxiliary Sail D</td>
<td>0.67</td>
<td>1.4</td>
<td>0.90%</td>
<td>945</td>
<td>686</td>
<td>0.67</td>
<td>1.4</td>
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<tr>
<td>PWC1</td>
<td>G2</td>
<td>0</td>
<td>0.00%</td>
<td>-</td>
<td>-</td>
<td>1.82</td>
<td>2.34</td>
</tr>
<tr>
<td>PWC2</td>
<td>G4/G21</td>
<td>0</td>
<td>0.00%</td>
<td>-</td>
<td>-</td>
<td>1.09</td>
<td>2.34</td>
</tr>
</tbody>
</table>

Total Watercraft Trips Input 104,968 165,061 192,334
Total Watercraft Trips/Fuel Use 100.00% 104,967 997,652 100.00% 165,060 1,535,156 100.00% 192,334 1,725,425

Concessionaire
Two stroke G2 2.63 1.77 77.50% 15,862 73,839 2.63 1.77 70.00% 22,874 105,550 2.4 2.08
Two stroke DFI G2/D2I 3.17 1.04 6.50% 2,079 6,854 3.17 1.04 77.50% 28,502 93,965
Four Stroke G4 3.24 4.66 22.50% 4,605 69,528 3.24 4.66 22.50% 7,716 106,648 2.7 6.32 22.50% 6,275 141,205
Concession Input 20,467 30,980 36,777
Concession Total 100.00% 20,467 143,367 99.90% 31,949 221,052 100.00% 36,777 235,170
Total Motorized Watercraft 125,434 1,141,019 197,040 1,756,206 225,111 1,660,596

Percent increase over 1978 157% 154% 183% 172%

* See text above for assumptions

Shaded area is a TRPA estimate of the boat use by horsepower for two-stroke outboards. Because of different fuel use information, the horsepower breakdown does not equal the total fuel use for outboards.

1 Engine types: G2 Two-stroke carbureted engine
G4 Four-stroke carbureted engine
G21 Two-stroke direct fuel injection engine
Diesel Diesel

2 Personal Watercraft
Table 1. 1978 MTBE, Benzene, and Toluene Discharge by Engine Type and Gallons of Gasoline Used.

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>1978 Total Fuel Use, Gals</th>
<th>1978 Unburnt Soluble Fuels (Gals)</th>
<th>1978 Gals MTBE (Less Diesel Contribution)</th>
<th>Gals Benzene</th>
<th>Gals Toluene</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal Watercraft</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outboard Total:</td>
<td>G2</td>
<td>122,430</td>
<td>12,243</td>
<td>5,313.5</td>
<td>213.0</td>
</tr>
<tr>
<td>Auxiliary Sail</td>
<td>G2</td>
<td>1,673</td>
<td>167</td>
<td>72.6</td>
<td>2.9</td>
</tr>
<tr>
<td>Outboard</td>
<td>G4/G2I</td>
<td>20,259</td>
<td>203</td>
<td>65.2</td>
<td>7.3</td>
</tr>
<tr>
<td>Inboard/Outboard</td>
<td>G4</td>
<td>541,278</td>
<td>5,413</td>
<td>151.6</td>
<td>43.3</td>
</tr>
<tr>
<td>Inboard</td>
<td>G4</td>
<td>298,559</td>
<td>2,986</td>
<td>83.6</td>
<td>23.9</td>
</tr>
<tr>
<td>Inboard Jet</td>
<td>G4</td>
<td>11,293</td>
<td>113</td>
<td>3.2</td>
<td>0.9</td>
</tr>
<tr>
<td>Auxiliary Sail</td>
<td>G4</td>
<td>689</td>
<td>7</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Personal Watercraft</td>
<td>G2</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Watercraft</td>
<td>G4/G2I</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Watercraft Totals:</strong></td>
<td></td>
<td>997,658</td>
<td>21,131</td>
<td>5,689.8</td>
<td>291.4</td>
</tr>
<tr>
<td><strong>Concessionaire Watercraft</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two Stroke</td>
<td>G2</td>
<td>73,839</td>
<td>7,384</td>
<td>3,204.6</td>
<td>128.5</td>
</tr>
<tr>
<td>Two Stroke DFI</td>
<td>G2 DFI</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Four Stroke</td>
<td>G4</td>
<td>69,528</td>
<td>695</td>
<td>19.5</td>
<td>5.6</td>
</tr>
<tr>
<td>Concessionaire Totals</td>
<td></td>
<td>143367</td>
<td>8,079</td>
<td>3,224.1</td>
<td>134.0</td>
</tr>
<tr>
<td><strong>Total Motorized Watercraft:</strong></td>
<td></td>
<td>1,141,025</td>
<td>29,210</td>
<td>8,913.9</td>
<td>425.4</td>
</tr>
<tr>
<td>Engine Type</td>
<td>1998 Total Fuel Use, Gals</td>
<td>1998 Unburnt Soluble Fuels, Gals</td>
<td>Gals MTBE</td>
<td>Gals Benzene</td>
<td>Gals Toluene</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------------</td>
<td>----------------------------------</td>
<td>-----------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Private Watercraft</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 10 hp</td>
<td>G2</td>
<td>5,476</td>
<td>548</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 to 30 hp</td>
<td>G2</td>
<td>9,826</td>
<td>983</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 30 hp</td>
<td>G2</td>
<td>69,070</td>
<td>6,907</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outboard Total:</td>
<td>G2</td>
<td>80,055</td>
<td>8,006</td>
<td>3474.4</td>
<td>139.3</td>
</tr>
<tr>
<td>Auxiliary Sail</td>
<td>G2</td>
<td>2,477</td>
<td>248</td>
<td>107.5</td>
<td>4.3</td>
</tr>
<tr>
<td>Outboard</td>
<td>G4/G2I</td>
<td>30,946</td>
<td>309</td>
<td>99.6</td>
<td>11.1</td>
</tr>
<tr>
<td>Inboard/Outboard</td>
<td>G4</td>
<td>847,229</td>
<td>8,472</td>
<td>237.2</td>
<td>67.8</td>
</tr>
<tr>
<td>Inboard</td>
<td>G4</td>
<td>467,833</td>
<td>4,678</td>
<td>131.0</td>
<td>37.4</td>
</tr>
<tr>
<td>Inboard Jet</td>
<td>G4</td>
<td>15,775</td>
<td>158</td>
<td>4.4</td>
<td>1.3</td>
</tr>
<tr>
<td>Auxiliary Sail</td>
<td>G4</td>
<td>929</td>
<td>9</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Personal Watercraft</td>
<td>G2</td>
<td>87,872</td>
<td>8,787</td>
<td>1,230.2</td>
<td>140.6</td>
</tr>
<tr>
<td>Personal Watercraft</td>
<td>G4/G2I</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watercraft Totals:</td>
<td></td>
<td>1,535,439</td>
<td>30,668</td>
<td>5,284.6</td>
<td>401.9</td>
</tr>
<tr>
<td>Concessionaire Watercraft</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two Stroke</td>
<td>G2*</td>
<td>105,550</td>
<td>10,555</td>
<td>4,580.9</td>
<td>183.7</td>
</tr>
<tr>
<td>Two Stroke DFI</td>
<td>G2 DFI**</td>
<td>6,854</td>
<td>69</td>
<td>22.1</td>
<td>2.5</td>
</tr>
<tr>
<td>Four Stroke</td>
<td>G4***</td>
<td>108,648</td>
<td>1,086</td>
<td>30.4</td>
<td>8.7</td>
</tr>
<tr>
<td>Concessionaire Totals</td>
<td></td>
<td>221,052</td>
<td>11,710</td>
<td>4,633.4</td>
<td>194.8</td>
</tr>
<tr>
<td>*Outboard Factor Applied</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>**4-Stroke OB Applied</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>***4-Stroke IO Applied</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Motorized Watercraft:</td>
<td></td>
<td>1,756,491</td>
<td>42,378</td>
<td>9,918</td>
<td>597</td>
</tr>
</tbody>
</table>
Table 3. 2008 MTBE, Benzene, and Toluene Discharge by Engine Type and Gallons of Gasoline Used. (Projected)

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>2008 Total Fuel Use, Gals</th>
<th>1998 Unburnt Soluble Fuels (Gals)</th>
<th>Gals MTBE (Less Diesel Contribution)</th>
<th>Gals Benzene</th>
<th>Gals Toluene</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Watercraft</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outboard Total:</td>
<td>G2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Auxiliary Sail</td>
<td>G2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Outboard</td>
<td>G4/G2I</td>
<td>121,963</td>
<td>1,220</td>
<td>392.7</td>
<td>43.9</td>
</tr>
<tr>
<td>Inboard/Outboard</td>
<td>G4</td>
<td>971,226</td>
<td>9,712</td>
<td>271.9</td>
<td>77.7</td>
</tr>
<tr>
<td>Inboard</td>
<td>G4</td>
<td>537,487</td>
<td>5,375</td>
<td>150.5</td>
<td>43.0</td>
</tr>
<tr>
<td>Inboard Jet</td>
<td>G4</td>
<td>20,686</td>
<td>207</td>
<td>5.8</td>
<td>1.7</td>
</tr>
<tr>
<td>Auxiliary Sail</td>
<td>G4</td>
<td>4,150</td>
<td>42</td>
<td>1.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Personal Watercraft</td>
<td>G2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Personal Watercraft</td>
<td>G4/G2I</td>
<td>67,208</td>
<td>672</td>
<td>216.4</td>
<td>24.2</td>
</tr>
<tr>
<td>Watercraft Totals:</td>
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<td>1,725,425</td>
<td>17,227</td>
<td>1,038.5</td>
<td>190.8</td>
</tr>
</tbody>
</table>

Concessionaire Watercraft

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>2008 Total Fuel Use, Gals</th>
<th>1998 Unburnt Soluble Fuels (Gals)</th>
<th>Gals MTBE (Less Diesel Contribution)</th>
<th>Gals Benzene</th>
<th>Gals Toluene</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two Stroke</td>
<td>G2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Two Stroke DFI**</td>
<td>G2 DFI</td>
<td>93,965</td>
<td>940</td>
<td>302.6</td>
<td>33.8</td>
</tr>
<tr>
<td>Four Stroke***</td>
<td>G4</td>
<td>141,205</td>
<td>1,412</td>
<td>39.5</td>
<td>11.3</td>
</tr>
<tr>
<td>Concessionaire Totals</td>
<td></td>
<td>235,170</td>
<td>2,352</td>
<td>342.1</td>
<td>45.1</td>
</tr>
</tbody>
</table>

Total Motorized Watercraft: 1,960,595 19,579 1,381 236 696
MEMORANDUM

January 4, 1999

To: TRPA Advisory Planning Commission

From: TRPA Staff

Subject: Status Report on Lowering the Individual Parcel Evaluation System (IPES) Line

Staff will present the status report on this agenda item at the January APC meeting.
DRAFT

ENVIRONMENTAL ASSESSMENT FOR THE PROHIBITION OF CERTAIN TWO-STROKE POWERED WATERCRAFT

JANUARY 1999

Tahoe Regional Planning Agency
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**APPENDICES**

Appendix A  February 26, 1997 Action on Motorized Watercraft - March 26, 1997 Resolution

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*Watercraft Study*  
ENVIRONMENTAL ASSESSMENT  
January 1999
1.0 Scope of 1999 Environmental Assessment

1.1 Introduction
On June 25, 1997, the Governing Board of the Tahoe Regional Planning Agency (TRPA) adopted Ordinance 97-12. The relevant portion of this ordinance prohibits the "discharge of unburned fuel and oil from the operation of watercraft propelled by carbureted two-stroke engines" commencing June 1, 1999. This provision is codified as the second sentence of Section 81.2.D in TRPA's Code of Ordinances. In recognition of the need for further study of the operation of powered watercraft on Lake Tahoe, the Governing Board indicated that further research should be undertaken. In response to this new data, TRPA should consider (1) whether the management direction chosen was appropriate, and (2) if so, whether any refinement of the ordinance was necessary.

This Environmental Assessment (EA) supports recent Governing Board direction, after consideration of the new data, to affirm the fundamental approach to motorized watercraft and to implement certain refinements. This EA provides a background of the 1997 actions, summarizes the findings of the recent motorized watercraft studies, and assesses any potential impacts to the environment associated with the Governing Board's direction and two other alternatives.

1.2 Background

1997 Actions
Section 81.2.D of Chapter 81 of the TRPA Code of Ordinances prohibits the discharge of toxic hazardous waste to the waters of the Lake Tahoe Basin. In February 1997, the TRPA Governing Board held an extensive hearing on the impacts of motorized watercraft in the Lake Tahoe Basin. The Governing Board heard substantial and compelling evidence that watercraft powered by certain types of two-stroke engines degrade water quality by discharging significant amounts of oil and gas directly into Lake Tahoe and at highly disproportionate rates compared to other motorized watercraft. Data then available indicated that watercraft powered by carbureted two-stroke engines emit toxic pollutants (including methyl tertiary-butyl ether, benzene, ethylbenzene, toluene, and xylene) at a rate ten times higher than watercraft powered by other engine types.

In response to this, and other information, TRPA undertook the following actions. In March 1997, the Governing Board adopted a resolution requesting assistance from other public agencies in the Lake Tahoe Basin to conduct further study of the problem. In June 1997, the Governing Board adopted Ordinance 97-12 which prohibited the use of watercraft powered by carbureted two-stroke engines, created a 600 foot "no-wake" zone, and banned operation of motorized watercraft in tributary waters. The Governing Board also adopted a list of other watercraft-associated issues to be addressed in the Shorezone Consensus/EIS process (to be completed in 1999) and enforcement and education programs to be included in the TRPA Work Program.

In response to the March 1997 resolution requesting assistance, a Motorized Watercraft Technical Advisory Group (MWTAG) was formed.
Figure 1. Motorized Watercraft Technical Advisory Group

<table>
<thead>
<tr>
<th>Tahoe Regional Planning Agency</th>
<th>Nevada Division of Environmental Protection</th>
<th>U.S. Geological Survey</th>
<th>National Marine Manufacturers Association</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Air Resources Board</td>
<td>State and Lahontan Water Quality Control Boards</td>
<td>Environmental Protection Agency</td>
<td>Nevada Division of Wildlife</td>
</tr>
<tr>
<td>Tahoe Research Group</td>
<td>University of Nevada Reno</td>
<td>Lake Tahoe Marinas</td>
<td>California Boating and Waterways</td>
</tr>
</tbody>
</table>

MWTAG members devised a series of scientific studies and monitoring efforts commencing in the spring of 1997 to further investigate the magnitude of fuel pollution from motorized watercraft. In December 1997, the Governing Board considered possible amendments to Ordinance 97-12. The Governing Board decided to defer further action until December 1998 to permit the completion and consideration of the MWTAG studies.

Results of the MWTAG and Related Studies

During 1997 and 1998, MWTAG and others conducted at least 10 different studies relevant to motorized watercraft in the Tahoe Basin. These studies are synthesized in the Lake Tahoe Motorized Watercraft Report – An Integration of Water Quality, Watercraft Use and Ecotoxicology Issues (Report), appended hereto. As indicated in the Report, the results of these studies confirm the two basic justifications relied upon by the Governing Board to adopt Ordinance 97-12: (1) petroleum products are in the lakes of the Region as a result of motorized watercraft operation, and (2) watercraft powered by old technology two-stroke engines discharge pollutants at an order of magnitude greater than do watercraft powered by newer technology engines.

The Report synthesized studies completed in 1997 and 1998, most of which studied the impacts of motorized watercraft specifically on Lake Tahoe. The referenced studies¹ include the following:


¹ Some studies are not yet complete, and will continue into the 1999 boating season. Preliminary results have been provided where indicated.


The Report summarizes the results of the studies with the following principal findings:

1. MTBE (methyl tertiary butyl ether) and BTEX (benzene, toluene, ethylbenzene, zylene) compounds have been measured at concentrations above the analytical limit of detection at a number of nearshore locations in Lake Tahoe and in other lakes in the Tahoe basin which allow motorized watercraft.

2. These compounds, as well as PAHs (polycyclic aromatic hydrocarbons), appear directly related to motorized watercraft activity.

3. In areas of high watercraft use on the order of 50-100 marine engines in operation (e.g. Ski Run Marina region), concentrations of MTBE and benzene were found to exceed drinking water standards. The occurrence of high watercraft use near drinking water intake lines could result in contamination.

4. The calculated mean values for MTBE and BTEX as monitored in the nearshore of Lake Tahoe did not exceed drinking water standards.

5. At no time did ambient concentrations of MTBE or BTEX approach criteria for protection of aquatic life.

6. Polycyclic aromatic hydrocarbons (PAHs) were present in Lake Tahoe waters in sufficient concentration to cause negative impacts on biota. Ultraviolet radiation-induced toxicity of PAH was found to be significant for fish growth and zooplankton survival. However, zooplankton reproduction was also affected in the no-UV treatments indicating a direct toxicity. Calculated N.O.E.C levels (no observable effect concentration) for phototoxic PAH ranged from 3.4 – 9.0 ng/L. Values for total PAH ranged from 5-70 ng/L.

7. Concentrations of MTBE and BTEX at the open-water sampling station (mid-lake) were very low and either near or below the analytical limit of detection.

8. Complete depth sampling from the surface to 450 m, gave no indication that MTBE or BTEX was either transporting to depth or accumulating in the Lake. Concentrations dropped at the end of the summer boating season and was consistent with other studies.

9. Sampling of intake water by drinking water purveyors has been limited. No data indicates any violation of drinking water standards at the locations sampled.
10. The total amount of fuel used at Lake Tahoe during the 1998 boating season was approximately 1.5 million gallons. Two-cycle carbureted marine engines, including personal watercraft (PWCs) and outboards used only 11-12 percent. A full 87 percent was used by 4-cycle inboard/outboard engines, the types associated with ski boats and pleasure craft.

11. Field and lab experiments demonstrated that the two-cycle carbureted models had the largest percent of unburned fuel passing through the engine and into the water. For MTBE, the two-cycle outboard engines were the least efficient. Over 30 percent of the MTBE initially contained in the watercraft's fuel tank was deposited into the water during operation. Similarly, 10 percent of the MTBE in fuel used by the PWCs was loaded to the Lake. Values for both categories of 4-cycle engines were lower, at 2.3 percent and 0.2 percent for 4-cycle outboards and 4-cycle inboard/outboards and inboards, respectively. The results for benzene and toluene were similar.

12. Based on the volumes of fuel used by each class of engine as reported by the watercraft use study, and the calculated soluble fractions, carbureted two-cycle engines contributed a disproportionate load of MTBE, benzene, and toluene to Lake Tahoe. Combining PWC and two-cycle outboard classes to represent the two-cycle carbureted engines, they contributed over 90 percent of the MTBE to Lake Tahoe, while only utilizing about 11-12 percent of the total fuel. Similarly these engines were responsible for over 70 percent of the benzene and 80 percent of the toluene deposited during the boating season. In contrast to this, the four-cycle inboard and inboard/outboard class consumed 87 percent of the fuel used by boating on Lake Tahoe but was responsible for 8 percent of the estimated MTBE, 28 percent of the estimated benzene, and 17 percent of the estimated toluene loading to the Lake.

13. Estimated gallons of constituent load to Lake Tahoe during the 1998 boating season from 2-cycle engines was on the order of thousands of gallons of MTBE, hundreds of gallons of benzene, and tens of hundreds of gallons of toluene.

14. Field testing using engines with the newer fuel injection system (Ficht Injected) revealed that nearly 90 percent of the MTBE, 70 percent of the benzene, and 80 percent of the toluene would not have been deposited into the lake had this technology been in full use in 1998, i.e., if all 2-cycle carbureted engines been replaced with this, or a similar effective technology.

15. The potential for increased NOx emissions from motorized watercraft engines was estimated as negligible as compared to the impact of automobile exhaust.

16. Future study needs: (1) expanded monitoring of nearshore and open-water portions of the lake to evaluate the effect of management decisions (a focus should be placed on those areas where drinking water intakes are located) and (2) additional PAH studies are essential. PAH monitoring was not sufficient for us to assess the spatial, temporal, or depth distribution of these compounds. In addition, engine emission studies did not include PAH. Given the available ecotoxicology for PAHs in Lake Tahoe, a carefully conducted study which includes (a) distribution of PAH, (b) PAH emission tests from marine engines under operating conditions, (c) more comprehensive ecotoxicity experiments using biota resident to Lake Tahoe, and (d) ecological risk assessment is strongly recommended.
1998 CARB Action
During 1998, the California Air Resources Board (CARB) studied and implemented regulations in regards to motorized watercraft. The October 23, 1998 Staff Report Executive Summary stated:

Based on the latest emissions estimates, outboard and personal watercraft engines account for 777 tons per day of reactive organic gas (ROG) and NOX emissions on weekend summer days (days which are associated with peak ozone episodes). An example of the impact of emissions for a single engine is the comparison between the operation of a personal watercraft to the emissions of a passenger car. The operation of a 100 horsepower personal watercraft for 7 hours results in more ozone precursor emissions (hydrocarbons + oxides of nitrogen) than the operation of a 1998 passenger car over 100,000 miles. Carbureted two-stroke engines discharge as much as 25 to 30 percent unburned fuel into the water and subsequently into the air. For example, a typical personal watercraft consuming five gallons of gasoline per hour and operated 41 hours per year, discharges between 50 and 60 gallons of unburned fuel into the environment. Consequently, in addition to air quality impacts, since marine engines exhaust through the water, water quality is also impacted.

CARB worked with TRPA, the California State Water Quality Control Board, the Lahontan Regional Water Quality Control Board, and other water quality oriented agencies to establish emission standards that would also assist in the protection of water quality. Figure 2 demonstrates how CARB created a phased program (three tiers) to eliminate the undesirable watercraft through prohibition of sales. As demonstrated by Figure 2, the emissions from carbureted two-strokes will be over the limit set for the first, 2001, tier. These are the watercraft described in bold above and are targeted for prohibition by TRPA.

Figure 2. All U.S. EPA 1998-1999 Certified Marine Engine Families Including Two-Stroke Carbureted, Two-Stroke Direct Injection, and Four-Stroke Technologies.
Another CARB action important to TRPA is the establishment of emission standards for 2004 and 2008 which are more restrictive on sales than the EPA. (See Table 1). Although TRPA's prohibition is equal to CARB's 2001 standard, TRPA will get the benefit of cleaner technology sales limits in 2004 and 2008.

<table>
<thead>
<tr>
<th></th>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Tier 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation Date</td>
<td>2001</td>
<td>2004</td>
<td>2008</td>
</tr>
<tr>
<td>Percent of U.S. EPA 2006 Standard</td>
<td>100%</td>
<td>80%</td>
<td>50%</td>
</tr>
</tbody>
</table>

### 1.3 Purpose and Proposed Action

At the December 1998 TRPA Governing Board meeting, the Governing Board held a public hearing on the research results presented in the *Lake Tahoe Motorized Watercraft Report – An Integration of Water Quality, Watercraft Use and Ecotoxicology* and other recent reports. After hearing the testimony and reviewing the evidence, the Governing Board directed TRPA staff to draft some amendments to extend the prohibition to certain two-stroke powered watercraft and reword the ordinance to clarify the prohibition. For the January 1997 Governing Board meeting, staff was directed prepare the necessary findings, environmental documents, and ordinances for presentation. The ordinances include the following:

A. Minor adjustments to the Goals and Policies to clarify TRPA's role in motorized watercraft regulation.

B. Rewording the Code language for the June 1, 1999 prohibition of carbureted two-stroke propelled watercraft to prohibit the operation, mooring, or launching of watercraft powered by two-stroke engines except:

1. Any watercraft powered by a two-stroke engine whose fuel is directly injected into the cylinder shall be exempt from the prohibition, or

2. Any watercraft powered by a two-stroke engine whose fuel is injected into the crankcase prior to entering the cylinder shall be prohibited commencing October 1, 2001.

### 1.4 Responsible Agencies

Watercraft activities are also subject to regulation by the following agencies: (The text in the brackets notes the agency's primary concern.)

- California State Lands (ownership and leasing mooring and launching facilities)
- California Air Resources Board (air quality)
- Nevada State Lands (ownership and leasing of mooring and launching facilities)
- Nevada Department of Wildlife (fisheries, wildlife, boating safety)
- California Department of Fish and Game (fisheries, wildlife)
° U.S. Environmental Protection Agency (water and air quality)
° U. S. Army Corps of Engineers (navigation/wetlands)
° U. S. Coast Guard (boating safety)
° U. S. Fish and Wildlife (fisheries, wildlife, endangered species)
° Nevada Department of Environmental Protection (air and water quality)
° California Regional Water Quality Control Board Lahontan Region (water quality)
° Local sheriff and police (law enforcement)

1.5 Alternatives

The alternatives considered in this environmental assessment are specific to the limited scope of the December 1998 Governing Board direction. All the alternatives assume that TRPA will pursue the other studies programs and regulations that were recommended in the February 1997 Governing Board action. This includes an air quality fee focused on mitigation of NOx, a program to implement boating and fueling BMPs, regulations limiting the use of motorized watercraft, and the eventual elimination of MTBE as a fuel additive.

The alternatives are as follows:

Alternative 1: No Project – June 1997 Prohibition in Effect

Under this alternative, the TRPA takes no action. The prohibition of carbureted two-stroke powered watercraft starting June 1, 1999 remains as adopted.

Alternative 2: Proposed Action

This alternative is based on the direction of the Governing Board in December of 1998. This alternative assumes all the existing regulations and the adoption of new regulations to clarify the prohibition. The regulations would:

A. Make minor adjustments to the Goals and Policies to clarify TRPA’s role in motorized watercraft regulation.

B. Reword the Code language for the June 1, 1999 prohibition of carbureted two-stroke propelled watercraft to prohibit the operation, mooring, or launching of watercraft powered by two-stroke engines except:

1. Any watercraft powered by a two-stroke engine whose fuel is directly injected into the cylinder shall be exempt from the prohibition,

2. Any watercraft powered by a two-stroke engine whose fuel is injected into the crankcase prior to entering the cylinder shall be prohibited commencing October 1, 2001,

Alternative 3: Alternative 2, with Exemptions

This alternative has the same assumptions as Alternative 2, except it considers the following exemptions to the regulation phasing out of carbureted two-stroke engines. For purposes of this analysis, the first three exemptions are limited to three boating seasons and use the same date for practical enforcement reasons:
1. Exempt sailboats utilizing carbureted two-stroke engines as auxiliary power until October 1, 2001.

2. Exempt watercraft using outboard carbureted two-stroke engines under 10 horse power until October 1, 2001.


4. Exempt watercraft powered by a two-stroke engine whose engine is certified by the Environmental Protection Agency as meeting the U.S. EPA 2006 standard or is certified by the California Air Resources Board as meeting the CARB 2001 standard.
2.0 Update to 1997 Motorized Watercraft Assessment

The information in the 1997 Motorized Watercraft Assessment is incorporated by reference for this EA. The following information is provided as an update to the 1997 EA.

2.1 Watercraft Use Estimates

In order to assess the impacts of modifying the motorized watercraft use, TRPA needs estimates of boating use. At this time, there are no official boating use or projections numbers for Lake Tahoe. When the June 1997 EA was prepared there were no official annual counts of watercraft usage at Lake Tahoe so staff prepared estimates for impact analysis purposes.

Since then, the Lake Tahoe Motorized Watercraft Report – An Integration of Water Quality, Watercraft Use and Ecotoxicology was completed and it includes a preliminary watercraft usage study for the summer of 1998. The 1998 Hagler Bailly Watercraft Use Study Lake of Tahoe Preliminary Report (in progress) presents boating use data from the summer of 1998. The HB Report includes surveys at boat ramps and marinas, of homeowners, and of concessionaires. Table 2, TRPA Boating and Fuel Use Estimates, incorporates the HB Report and represents TRPA’s update of the June 1997 Motorized Watercraft EA’s estimates found in Chapter 2. Again, these counts and projections are TRPA estimates based on improved but still limited information.

1998 Use Estimates

TRPA has attempted to build an estimate of a 1998 base year by combining the three Hagler Bailly surveys. TRPA has made some assumptions in developing the 1998 estimates because the surveys are not complete, there is insufficient data in some boating categories, and because of the difference in questions found in the surveys. The new information is based on a shorter boating season (Memorial Day weekend to Labor Day weekend) than the May 15 to September 15 estimate used in the 1997 EA.

Other modifications included:

- TRPA used the 1997 estimates for diesel powered sailboats since there were no 1998 survey estimates available;
- As there were no data for direct fuel injection engine fuel use rate, TRPA reduced the carbureted PWC fuel use rate estimate by 25%;
- As the homeowner survey contained no estimates for outboard two-stroke/four-stroke watercraft, the distribution is assume to be the same as the boat ramp/marina survey estimates; and
- The fuel use figures for two-stroke outboard use required adjustment due to limited samples.

Since only 12 of the 18 (66%) concessionaire surveys were completed, the use estimate was increased by 25%. A lower percentage was used because most of the unreturned surveys were from smaller operations. The distribution of types of watercraft is assumed to be the same as the 12 returned surveys.
Table 2. TRPA BOATING FUEL USE ESTIMATES - BOATING SEASON

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Fuel Use</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>G/Hour</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hours/trip</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>% Trips</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trips</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gal.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 10 hp G2</td>
<td></td>
<td>1.81</td>
<td>3.19</td>
<td>20.20%</td>
</tr>
<tr>
<td>10 to 30 hp G2</td>
<td></td>
<td>1.37</td>
<td>1.40</td>
<td>1.70%</td>
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<tr>
<td>Over 30 hp G2</td>
<td></td>
<td>1.58</td>
<td>3.49</td>
<td>3.50%</td>
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<tr>
<td>Total Outboard G2</td>
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<td>1.58</td>
<td>3.49</td>
<td>3.40%</td>
</tr>
<tr>
<td>Total Inboard G4(G2)</td>
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<td>3.76</td>
<td>3.10</td>
<td>43.40%</td>
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<tr>
<td>Total Inboard G4</td>
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<td>3.06</td>
<td>3.25</td>
<td>28.60%</td>
</tr>
<tr>
<td>Total Inboard G4(G2)</td>
<td></td>
<td>3.06</td>
<td>3.25</td>
<td>28.60%</td>
</tr>
<tr>
<td>Total Inboard G4(G2)</td>
<td></td>
<td>3.06</td>
<td>3.25</td>
<td>28.60%</td>
</tr>
<tr>
<td>Total Auxiliary Sail G4(G2)</td>
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<td>3.06</td>
<td>3.25</td>
<td>28.60%</td>
</tr>
<tr>
<td>Total PWC 2</td>
<td></td>
<td>1.82</td>
<td>2.34</td>
<td>12.50%</td>
</tr>
<tr>
<td>Total PWC 2 G4(G2)</td>
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<td>1.09</td>
<td>2.34</td>
<td>0.00%</td>
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<td>Total Total Watercraft Trips Input</td>
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<td>165,061</td>
<td></td>
<td></td>
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<td>Total Watercraft Trips/Fuel Use</td>
<td>100.00%</td>
<td>192,334</td>
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<td></td>
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<tr>
<td>Concessionaire Two stroke G2</td>
<td>2.63</td>
<td>1.77</td>
<td>77.50%</td>
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<td>Two stroke DFI G2(G2)</td>
<td>2.63</td>
<td>1.77</td>
<td>70.90%</td>
<td>22,674</td>
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<td>Four Stroke G4</td>
<td>3.17</td>
<td>1.04</td>
<td>6.50%</td>
<td>2,079</td>
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<td>Concession Input</td>
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<td></td>
<td>31,860</td>
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<td>Concession Total</td>
<td></td>
<td>20,457</td>
<td>143,367</td>
<td>36,777</td>
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<td>Total Motorized Watercraft</td>
<td>125,433</td>
<td>1,141,019</td>
<td>197,040</td>
<td>1,756,208</td>
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</tbody>
</table>

Percent increase over 1978: 157% 154% 183% 172%

* See text above for assumptions

Shaded area is a TRPA estimate of the boat use by horsepower for two-stroke outboards.
Because of different fuel use information, the horsepower breakdown does not equal the total fuel use for outboards.

1 Engine types: G2 Two-stroke carbureted engine
G4 Four-stroke carbureted engine
G21 Two-stroke direct fuel injection engine
Diesel Diesel

2 Personal Watercraft
2008 Future Use Projections

Based on past trends described in Chapter 2, TRPA is estimating a 15% growth in boating use for the next ten years. These projections reflect EPA estimated trends (Chapter 2 Figure 2-11) for increased PWC use and decreased outboard use. The TRPA prohibition on carbureted two-stroke powered watercraft is included in this projection. TRPA’s assumption is that by 2008, the old technology engines will be replaced by four-stroke and direct fuel injection two-stroke engines without affecting overall use.

1978 Use Estimates

To establish boating use and fuel use level related to the 1980 designation of Lake Tahoe as Outstanding National Resource Water, staff has attempted to use estimates based on the 1978 Cumulative Impacts of Shorezone Development at Lake Tahoe report. Staff chose this study because there is no boating study for 1980. Staff assumed the same distribution of watercraft type except that there was no PWC use at that time. It is not clear in the 1978 study if the concessionaire use was included. It is TRPA’s assumption based on the low use numbers that they were not included. Therefore, TRPA used a reduced 1998 estimate equal to the difference between the overall usage estimates.

Table 3. 1978 MTBE, Benzene, and Toluene Discharge by Engine Type and Gallons of Gasoline Used.

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>1978 Total Fuel Use, Gals</th>
<th>1978 Unburnt Soluble Fuels (Gals)</th>
<th>Gals MTBE (Less Diesel Contribution)</th>
<th>Gals Benzene</th>
<th>Gals Toluene</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Watercraft</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outboard Total:</td>
<td>G2</td>
<td>122,430</td>
<td>12,243</td>
<td>5,313.5</td>
<td>213.0</td>
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<tr>
<td>Auxiliary Sail</td>
<td>G2</td>
<td>1,673</td>
<td>167</td>
<td>72.6</td>
<td>2.9</td>
</tr>
<tr>
<td>Outboard</td>
<td>G4/G2I</td>
<td>20,259</td>
<td>203</td>
<td>65.2</td>
<td>7.3</td>
</tr>
<tr>
<td>Inboard/Outboard</td>
<td>G4</td>
<td>541,278</td>
<td>5,413</td>
<td>151.6</td>
<td>43.3</td>
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<tr>
<td>Inboard</td>
<td>G4</td>
<td>298,559</td>
<td>2,986</td>
<td>83.6</td>
<td>23.9</td>
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<tr>
<td>Inboard Jet</td>
<td>G4</td>
<td>11,293</td>
<td>113</td>
<td>3.2</td>
<td>0.9</td>
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<tr>
<td>Auxiliary Sail</td>
<td>G4</td>
<td>689</td>
<td>7</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Personal Watercraft</td>
<td>G2</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Personal Watercraft</td>
<td>G4/G2I</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Watercraft Totals:</td>
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<td>997,658</td>
<td>21,131</td>
<td>5,689.8</td>
<td>291.4</td>
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<td>Concessionaire Watercraft</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two-Stroke</td>
<td>G2</td>
<td>73,839</td>
<td>7,384</td>
<td>3,204.6</td>
<td>128.5</td>
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<td>Two-Stroke DFI</td>
<td>G2 DFI</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Four-Stroke</td>
<td>G4</td>
<td>69,528</td>
<td>695</td>
<td>19.5</td>
<td>5.6</td>
</tr>
<tr>
<td>Concessionaire Totals</td>
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<td>143,367</td>
<td>8,079</td>
<td>3,224.1</td>
<td>134.0</td>
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<td>Total Motorized Watercraft:</td>
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<td>1,141,025</td>
<td>29,210</td>
<td>8,913.9</td>
<td>425.4</td>
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</tbody>
</table>
Table 4. 1998 MTBE, Benzene, and Toluene Discharge by Engine Type and Gallons of Gasoline Used.

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>1998 Total Fuel Use, Gals</th>
<th>1998 Unburnt Soluble Fuels, Gals</th>
<th>Gals MTBE (Less Diesel Contribution)</th>
<th>Gals Benzene</th>
<th>Gals Toluene</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Watercraft</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 10 hp</td>
<td>G2</td>
<td>5,476</td>
<td>548</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 to 30 hp</td>
<td>G2</td>
<td>9,826</td>
<td>983</td>
<td></td>
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</tr>
<tr>
<td>Over 30 hp</td>
<td>G2</td>
<td>69,070</td>
<td>6,907</td>
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</tr>
<tr>
<td>Outboard Total:</td>
<td>G2</td>
<td>80,055</td>
<td>8,006</td>
<td>3474.4</td>
<td>139.3</td>
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<td>Auxiliary Sail</td>
<td>G2</td>
<td>2,477</td>
<td>248</td>
<td>107.5</td>
<td>4.3</td>
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<tr>
<td>Outboard</td>
<td>G4/G2l</td>
<td>30,946</td>
<td>309</td>
<td>99.6</td>
<td>11.1</td>
</tr>
<tr>
<td>Inboard/Outboard</td>
<td>G4</td>
<td>847,229</td>
<td>8,472</td>
<td>237.2</td>
<td>67.8</td>
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<tr>
<td>Inboard</td>
<td>G4</td>
<td>467,833</td>
<td>4,678</td>
<td>131.0</td>
<td>37.4</td>
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<td>Inboard Jet</td>
<td>G4</td>
<td>15,775</td>
<td>158</td>
<td>4.4</td>
<td>1.3</td>
</tr>
<tr>
<td>Auxiliary Sail</td>
<td>G4</td>
<td>929</td>
<td>9</td>
<td>0.3</td>
<td>0.1</td>
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<td>Personal Watercraft</td>
<td>G2</td>
<td>87,872</td>
<td>8,787</td>
<td>1,230.2</td>
<td>140.6</td>
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<td>Personal Watercraft</td>
<td>G4/G2l</td>
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<tr>
<td>Watercraft Totals:</td>
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<td>1,535,439</td>
<td>30,668</td>
<td>5,284.6</td>
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<tr>
<td>Two-Stroke</td>
<td>G2*</td>
<td>105,550</td>
<td>10,555</td>
<td>4,580.9</td>
<td>183.7</td>
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<td>Two-Stroke DFI</td>
<td>G2 DFI**</td>
<td>6,854</td>
<td>69</td>
<td>22.1</td>
<td>2.5</td>
</tr>
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<td>Four-Stroke</td>
<td>G4***</td>
<td>108,648</td>
<td>1,086</td>
<td>30.4</td>
<td>8.7</td>
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<td>Concessionaire Totals</td>
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<td>11,710</td>
<td>4,633.4</td>
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<td>*Outboard Factor Applied</td>
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<td></td>
</tr>
<tr>
<td>**4-Stroke OB Applied</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>***4-Stroke IO Applied</td>
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<tr>
<td>Total Motorized Watercraft:</td>
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<td>1,756,491</td>
<td>42,378</td>
<td>9,918</td>
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### Table 5. 2008 MTBE, Benzene, and Toluene Discharge by Engine Type and Gallons of Gasoline Used. (Projected)

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>2008 Total Fuel Use, Gals</th>
<th>1998 Unburnt Soluble Fuels (Gals)</th>
<th>Gals MTBE (Less Diesel Contribution)</th>
<th>Gals Benzene</th>
<th>Gals Toluene</th>
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<tr>
<td>Private Watercraft</td>
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<td></td>
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<tr>
<td>Outboard Total:</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Auxiliary Sail</td>
<td>G2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Outboard G4/G2I</td>
<td>G4</td>
<td>121,963</td>
<td>1,220</td>
<td>392.7</td>
<td>43.9</td>
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<td>G4</td>
<td>971,226</td>
<td>9,712</td>
<td>271.9</td>
<td>77.7</td>
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<td>5,375</td>
<td>150.5</td>
<td>43.0</td>
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<td>20,586</td>
<td>207</td>
<td>5.8</td>
<td>1.7</td>
</tr>
<tr>
<td>Auxiliary Sail G4</td>
<td>G4</td>
<td>4,150</td>
<td>42</td>
<td>1.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Personal Watercraft</td>
<td>G2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Personal Watercraft G4/G2I</td>
<td>G4/G2I</td>
<td>67,208</td>
<td>672</td>
<td>216.4</td>
<td>24.2</td>
</tr>
<tr>
<td>Watercraft Totals:</td>
<td></td>
<td>1,725,425</td>
<td>17,227</td>
<td>1,038.5</td>
<td>190.8</td>
</tr>
<tr>
<td>Concessionaire Watercraft</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two-Stroke G2</td>
<td>G2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Two-Stroke DFI** G2 DFI</td>
<td>G2 DFI</td>
<td>93,965</td>
<td>940</td>
<td>302.6</td>
<td>33.8</td>
</tr>
<tr>
<td>Four-Stroke*** G4</td>
<td>G4</td>
<td>141,205</td>
<td>1,412</td>
<td>39.5</td>
<td>11.3</td>
</tr>
<tr>
<td>Concessionaire Totals</td>
<td></td>
<td>235,170</td>
<td>2,352</td>
<td>342.1</td>
<td>45.1</td>
</tr>
</tbody>
</table>

**Total Motorized Watercraft:**

1,960,595 19,579 1,381 236 696

---

Discharges calculated using the following assumptions:

- During 1998 Boating Season, PWC G4/G2I are not in use.
- During 2008 Boating Season, Outboard G2 and PWC G2 no longer operating on Lake Tahoe.
- Fuel Used calculated using Watercraft Use Study, Lakes of Tahoe (1998) data,
  Table 2-5, Estimated Boating Hours and Fuel Use for Motorized Watercraft – Lake Tahoe, Boat Ramp/Marina Sample and Concessionaire Survey Results.
- Fuel used does not include diesel component.
- Outboard factor applied to concessionaire two-stroke engines.
- Four-stroke OB factor applied to concessionaire two-stroke DFI engines.
- Four-stroke I/O factor applied to concessionaire four-stroke engines.

- Gallons of Constituent Discharged = Gallons Used x %Constituent by Wt. x %Constituent Solubility. %Constituent by Wt and Solubility Factors obtained from Lake Tahoe Motorized Watercraft Report (1998).
- Percent of constituent that is soluble varies by engine type.

- Conversion of gallons of gasoline (California Certified w/MTBE added as oxygenate) to gallons of MTBE, benzene, and toluene by engine type utilized factors below:
<table>
<thead>
<tr>
<th>MTBE</th>
<th>Benzene</th>
<th>Toluene</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWC, G2</td>
<td>PWC, G2</td>
<td>PWC, G2</td>
</tr>
<tr>
<td>0.014</td>
<td>0.0016</td>
<td>0.0088</td>
</tr>
<tr>
<td>Two-Stroke OB</td>
<td>Two-Stroke OB</td>
<td>Two-Stroke OB</td>
</tr>
<tr>
<td>0.0434</td>
<td>0.00174</td>
<td>0.00984</td>
</tr>
<tr>
<td>4-Stroke OB</td>
<td>4-Stroke OB</td>
<td>4-Stroke OB</td>
</tr>
<tr>
<td>0.00322</td>
<td>0.00036</td>
<td>0.00104</td>
</tr>
<tr>
<td>4-Stroke I/O</td>
<td>4-Stroke I/O</td>
<td>4-Stroke I/O</td>
</tr>
<tr>
<td>0.00028</td>
<td>0.00008</td>
<td>0.00024</td>
</tr>
</tbody>
</table>

### 2.2 Water Quality Update

**Introduction:**

In response to the research needs to be fulfilled, the MWTAG was formed which developed, coordinated, and implemented a research plan focused on the potential water quality and limnological impacts of motorized watercraft on Lake Tahoe. Among the many objectives of the studies were the evaluation of the transfer and fate of hydrocarbons and emission by-products, the identification of various classes of watercraft, the assessment of hazards and risk to human health and aquatic life, and the quantification of the magnitude of all unburned fuels by type of watercraft and spillage. The individual studies were divided up between the participants and the information obtained was used to prepare the Report. The major studies are:

- In Lake Watercraft Tests – University of Nevada Reno and Lahontan
- Watercraft Tank Test – California Air Resources Board
- Lake and Stream Monitoring – U.S. Geological Survey
- MTBE Monitoring – Tahoe Research Group
- Boating Use Survey - Nevada Division of Wildlife and California Boating and Waterways

**Water Quality Evaluation Criteria:**

It is important to note that before TRPA can approve any ordinance, TRPA must find that "Wherever federal, state, and local air and water quality standards applicable to the Region, whichever are stricter, must be attained and maintained pursuant to Article V(d) of the Compact, the project meets or exceeds such standards." The water quality standards at Lake Tahoe generally focus on two areas:

1. Clarity – reducing the loads of sediment and nutrients to Lake Tahoe.

**Standards:** In addition to the evaluation criteria outlined in the 1997 Motorized Watercraft EA, the 1998 Lake Tahoe Motorized Watercraft Report assessed the significance of motorized watercraft impact relative to drinking water quality standards and risk to aquatic life. Risk was evaluated by comparing concentrations of constituents found in Lake Tahoe and other lakes impacted by motorized watercraft activity to state drinking water quality standards and action levels with respect to aquatic life. Critical concentration levels for five gasoline constituents are outlined in Table 6, Drinking Water Quality Standards and Aquatic Life Protection Criteria, below:
### Table 6. Drinking Water Quality Standards and Aquatic Life Protection Criteria

For comparative purposes, the drinking water standards from both California and Nevada for MTBE and the BTEX compounds are listed below. Also included are values for taste and odor thresholds (action levels) and aquatic life toxicity, as available. All values are expressed as µg/L.

<table>
<thead>
<tr>
<th>CONSTITUENT &amp; CRITERIA</th>
<th>CA</th>
<th>NV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MTBE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Drinking Water Standard</td>
<td>14*</td>
<td>20</td>
</tr>
<tr>
<td>Secondary Drinking Water Standard</td>
<td>5*</td>
<td>---</td>
</tr>
<tr>
<td>Taste &amp; Odor Threshold*</td>
<td></td>
<td>---</td>
</tr>
<tr>
<td>Aquatic Life – M.A.T.C.</td>
<td>---</td>
<td>66,000*</td>
</tr>
<tr>
<td><strong>BENZENE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Drinking Water Standard</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Secondary Drinking Water Standard</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Taste &amp; Odor Threshold*</td>
<td></td>
<td>---</td>
</tr>
<tr>
<td>Aquatic Life – Acute L.O.E.L. †</td>
<td></td>
<td>5,500</td>
</tr>
<tr>
<td><strong>ETHYLBENZENE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Drinking Water Standard</td>
<td>700</td>
<td>700</td>
</tr>
<tr>
<td>Secondary Drinking Water Standard</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Taste &amp; Odor Threshold*</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Aquatic Life – Acute L.O.E.L. †</td>
<td></td>
<td>32,000</td>
</tr>
<tr>
<td><strong>TOLUENE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Drinking Water Standard</td>
<td>150</td>
<td>1000</td>
</tr>
<tr>
<td>Secondary Drinking Water Standard</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Taste &amp; Odor Threshold*</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Aquatic Life – Acute L.O.E.L. †</td>
<td></td>
<td>17,900</td>
</tr>
<tr>
<td><strong>XYLENE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Drinking Water Standard</td>
<td>1,750</td>
<td>10,000</td>
</tr>
<tr>
<td>Secondary Drinking Water Standard</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Taste &amp; Odor Threshold*</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Aquatic Life – Acute L.O.E.L. †</td>
<td></td>
<td>---</td>
</tr>
</tbody>
</table>

* Proposed by CAL-DHS  
* Maximum Allowable Toxic Concentration  
† Lowest Observable Effect Level – US EPA  
* Mancini and Stubblefield (1977)  

### Additional Information on Water Quality Impacts:

The 1997 EA analyzed loading of unburned fuel as gasoline, whereas studies completed by the University of Nevada at Reno, the University of California at Davis, and the California Air Resource Board produced data which enabled the Tahoe Research Group and TRPA to calculated loadings of unburned gasoline constituents including methyl-tertiary-butyl-ether (MTBE), benzene and toluene. These analyses have allowed TRPA staff to improve the quantitative analysis of motorized watercraft impacts with respect to type and intensity of motorized watercraft use.

The ability to quantify loading of gasoline constituents is particularly important with respect to the interpretation of Lake Tahoe's Outstanding National Resource Water (ONRW) status which requires Lake Tahoe's water quality to be maintained and protected. Assuming that MTBE may be prevented from being added to gasoline marketed in Lake Tahoe another gasoline constituent should be targeted as an indicator of gasoline loading to Lake Tahoe and other lakes of the Region.
Since total gallons of gasoline consumed by various watercraft/engine types result in varying emission loads of different gasoline constituents to the air and water, and since only a fraction of the 70+ constituents commonly found in gasoline have been studied on Lake Tahoe and other lakes of the region, analysis of gasoline emissions loading by quantification of specific gasoline constituents is required. Comparison of only gallons of gasoline consumed would require the reduction of numbers of boats to levels observed in 1980.

Table 7. Summary of MTBE, Benzene and Toluene Discharge by Engine Type and Gallons of Gasoline Used.

<table>
<thead>
<tr>
<th></th>
<th>MTBE</th>
<th>Benzene</th>
<th>Toluene</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fuel Used</td>
<td>Unburnt</td>
<td>Discharged</td>
</tr>
<tr>
<td>1978 Boating Season</td>
<td>1,141,025</td>
<td>29,210</td>
<td>0</td>
</tr>
<tr>
<td>1998 Boating Season</td>
<td>1,756,491</td>
<td>42,378</td>
<td>9,918</td>
</tr>
<tr>
<td>2008 Boating Season</td>
<td>1,960,595</td>
<td>19,579</td>
<td>1,381</td>
</tr>
</tbody>
</table>

All volumes measured in gallons.

Although gasoline consumption by motorized watercraft on Lake Tahoe is projected to increase by 927,751 gallons from 1978 to 2008, due to the conversion of two-stroke engines to direct injection and four-stroke technologies, discharges of MTBE, benzene, and toluene decrease significantly in boating year 2008. Since MTBE was not present as an oxygenate in 1978, the application of ONRW standards requires the phase-out of MTBE as an oxygenate additive in gasoline marketed in the Tahoe Region.

Assuming a phase-out of MTBE, although gasoline consumption increases, benzene and toluene loads decrease. With respect to maintenance of the character of water quality as mandated by ONRW standards, the benzene and toluene discharges are acceptable.

**Methly-Tertiary-Butyl-Ether (MTBE):** Recent studies indicate that the use of MTBE as gasoline additive is a problem. One concern with MTBE is its ability to leak from underground storage tanks or pipelines and rapidly pass through soil into groundwater, thus affecting drinking water supplies.

Concerns have also arisen with respect to motorized watercraft and MTBE. High levels of MTBE have been detected during the boating season. Water intake lines at Lake Tahoe have the same potential to be affected as do underground wells utilized for drinking water. Figure 3, Major Surface Water Intake Lines and Concentrated Boating Use Areas, below, shows the relationship between intake lines and potential "hotspots" of MTBE concentration due to operation of motorized watercraft.

Although banning MTBE would be helpful in eliminating MTBE pollution, it would not fix the problem for the other pollutants. However, the removal/replacement of MTBE as a fuel additive is a recommended mitigation measure for that type of pollution.
Figure 3. Major Surface Water Intake Lines and Concentrated Boating Use Areas
Concern over MTBE's effect on drinking water sources in the Region prompted the TRPA Governing Board to adopt RESOLUTION NO. 98-14, which recommends that the governor of California take action prohibiting the use of MTBE as a gasoline fuel oxygenate for California and the California portion of the Lake Tahoe Region.

**BTEX Compounds**: The so-called BTEX compounds commonly found in gasoline include benzene, toluene, ethylbenzene, and xylene. They are the most commonly studied gasoline constituents with regards to gasoline contamination of the soil and water. Benzene is the most common indicator of gasoline presence. There are approximately 70 or more hydrocarbon constituents in gasoline, approximately 13 of which are benzene derivatives. Benzene will always be present in gasoline.

Table 2.1 above shows the relative toxicity levels for the BTEX series with respect to drinking water quality and toxicity to aquatic life. At 1ppb, benzene has the lowest concentration with respect to drinking water quality standards. With respect to acute lowest observable effect level of toxicity to aquatic life, benzene again has the lowest concentration with 5,300 ppb.

**Benzene as a Gasoline Loading Indicator**: Benzene is a known carcinogen; toxicity levels are lower than toluene. There are approximately 70+ hydrocarbon constituents in gasoline, approximately 13 of which are benzene derivatives. The solubility of benzene is one of the highest of all the gasoline constituents at 1780 mg/L, vs 500 mg/L for toluene (MTBE = 50,000 mg/L). For the above reasons, benzene is a prime candidate for purposes of analyzing the impacts of gasoline loading by various types and numbers of watercraft engines.

### 2.3 Air Quality Update

**Revised Nox/Hydrocarbon loadings**

Revised pollutant loading figures are developed (see Table 8) that account for the revised fuel use figures. The emission factors utilized are found in Tables 4-6 and 4-7 of the original environmental assessment. The revised fuel use figures and the emission factors were used to estimate the pounds of various pollutants given the estimated mix of engines in use for 1998 and 2008. There is a significant increase in NOx generated by additional boating. As indicated in the 1997 EA, boating needs to be included in the TRPA Air Quality Mitigation Program. As to the impact on NOx loadings because of the changes in Alternative 2, see the NOx discussion below.
Table 8. TRPA Estimates of Pollutants per Pound - Boating Season

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>1998 Pounds (lbs) of Pollutant per Year</th>
<th>2008 Pounds (lbs) of Pollutant per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fuel Use</td>
<td>Fuel Use</td>
</tr>
<tr>
<td></td>
<td>G/Hour</td>
<td>TOG</td>
</tr>
<tr>
<td>Up to 10 hp</td>
<td>G2</td>
<td>5,476</td>
</tr>
<tr>
<td>10 to 30 hp</td>
<td>G2</td>
<td>9,826</td>
</tr>
<tr>
<td>Over 30 hp</td>
<td>G2</td>
<td>69,070</td>
</tr>
<tr>
<td>Private Watercraft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outboard Total</td>
<td>G2</td>
<td>80,055</td>
</tr>
<tr>
<td>Auxiliary Sail</td>
<td>G2</td>
<td>2,477</td>
</tr>
<tr>
<td>Inboard/Outboard G4</td>
<td>G4</td>
<td>847,229</td>
</tr>
<tr>
<td>Inboard G4</td>
<td>G4</td>
<td>467,833</td>
</tr>
<tr>
<td>Inboard Jet G4</td>
<td>G4</td>
<td>15,775</td>
</tr>
<tr>
<td>Auxiliary Sail G4</td>
<td>G4</td>
<td>929</td>
</tr>
<tr>
<td>Inboard D</td>
<td>D</td>
<td>929</td>
</tr>
<tr>
<td>Auxiliary Sail D</td>
<td>D</td>
<td>1,394</td>
</tr>
<tr>
<td>PWC G2</td>
<td>G2</td>
<td>87,672</td>
</tr>
<tr>
<td>PWC G4/G2</td>
<td>G4/G2</td>
<td>0</td>
</tr>
<tr>
<td>Total Watercraft Trips Input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Watercraft Trips/Fuel Use</td>
<td>1,535,156</td>
<td></td>
</tr>
<tr>
<td>Concessional Watercraft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two stroke G2</td>
<td>G2</td>
<td>105,550</td>
</tr>
<tr>
<td>Two stroke DFI G2 DFI</td>
<td>G2 DFI</td>
<td>6,854</td>
</tr>
<tr>
<td>Concession Input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concession Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Motorized Watercraft</td>
<td>1,755,208</td>
<td>876,211</td>
</tr>
</tbody>
</table>
NOx: Besides the NOx increases due to additional boating, the conversion of two-stroke engines to more efficient direct injection or four-stroke models results in increased discharges of nitrous oxide to the air. NOx emissions from watercraft were studied by Dr. Tom Cahill and Dr. Steve Cliff of the University of California, Davis in collaboration with the Tahoe Research Group. The scope of the study was to evaluate whether the concern over NOx emissions as a result of engine technology conversion was reasonable. The analysis evaluated the magnitude of NO and/or NOx emissions to the atmosphere by comparison of the loads expected from a 4-cycle 9.9 hp outboard engine (3.9 g NOx per pound of fuel) versus that of a 2-cycle 9.9 hp outboard engine (1.0 g NOx per pound of fuel) to a “virtual atmosphere box.”

The analysis concluded that the average increase in NOx emissions due to the conversion of old technology two-strokes was calculated at 0.0006% of the total NOx measured values. Therefore, the increase in NOx emissions to the air due to an engine conversion during 1998 (1988 boating data was utilized), is negligible and insignificant.

2.4 Biological Update

POLYCYCLIC AROMATIC HYDROCARBONS (PAHs): PAHs are organic compounds that resemble benzene in chemical behavior, which contain more than one benzene ring (polycyclic). A single benzene ring is composed of 6 carbon atoms and 6 hydrogen atoms. There are many forms of PAHs. The simplest form of PAH is naphthalene, which consists of two benzene rings. PAHs are found in gasoline, asphalt, coal tar, and creosote. They also form from the incomplete combustion of fossil fuels. Approximately 30 percent of the compounds found in gasoline are characterized as PAHs.

When released to water, PAHs are not subject to rapid volatilization under common environmental conditions. They have low aqueous solubility values and tend to sorb to soils and sediments and remain fixed in the environment. PAHs are expected to adsorb very strongly to soil. PAHs with more than three rings generally have poor biodegradability characteristics and tend to bioaccumulate.

Although the toxicity of the oil and gasoline mixture burned by outboard engines appears to be low, the combustion process can potentially lead to the formation of polycyclic aromatic hydrocarbons (PAHs), which are known to be carcinogenic and mutagenic. PAHs can remain in a micro-layer on the surface of the water, which is a breeding ground for small organisms that form the base for aquatic food chains (Widows et al). Only 0.03 parts per million of oil contamination reduces food absorption, stunts growth, and kills certain species. In contrast, a study conducted for Klekaeffer Mercury revealed no evidence of contamination by hydrocarbons found in exhaust water. Additional studies of the water and sediment showed that phytoplankton and bottom organisms were not affected by hydrocarbon emissions. The cumulative effects on the ecosystem are not known (Nelson, 1994). Concern over the potential impacts of PAHs and other emission contaminants resulted in Switzerland and Austria, which border Lake Constance, adopting regulations for marine emissions, making it the first public body of water to be protected in this manner.

Petroleum products containing PAHs accumulate in the surface waters and terrestrial interface (shoreline) of both fresh and saltwater environments. Unfortunately, these same locations are where fish spawning activities occur and are used as nurseries for developing fish.
Most studies conducted on PAH's have been in saltwater environments and relate to specific oil spill events, not emissions from watercrafts. Little information existed on freshwater environments, until completion of a study by Oris et al., 1997, in Lake Tahoe.

James T. Oris and colleagues conducted a series of experiments to assess the potential toxic impacts of ambient levels of motorized watercraft emissions in Lake Tahoe on zooplankton and fish larvae (Oris et al, 1997). Standard USEPA effluent toxicity testing using zooplankton (Ceriodaphnia dubia) and fish larvae (Pimephales promelas) was completed utilizing Lake Tahoe water impacted by motorized watercraft emissions. There was sufficient concentrations of PAHs present to cause measurable, negative impacts on fish larvae growth and on zooplankton survival and reproduction.

The Lake Tahoe Motorized Watercraft Report (1998) states that additional PAH studies are essential to understanding their impact on biota of Lake Tahoe. With respect to PAHs, the water quality benefits as a result of converting two-stroke engines to direct fuel injection and/or four-stroke type engines are not fully understood. Most PAHs present in gasoline are transformed into non-PAH by-products during the combustion process in a four-stroke engine. However, also being of pyrolytic origin (products of combustion) as well as constituents of raw fuel, conversion to engines which more (or less) completely burn PAHs may produce new, pyrolytic PAHs.

Of greater concern is the potential lack of benefit by conversion of carbureted two-stroke engines to direct injection, two-stroke engines. Reductions in PAH emissions due to this conversion may not correlate with reductions in MTBE, Benzene, and Toluene emissions. Whereas direct fuel injection engines inject fuel into the combustion chamber, lubricating oil is still introduced to the engine's moving parts via the crankcase, therefore, oil exhaust port blow-by still occurs and remains a potential significant impact. Due to the lack of studies of PAHs on Lake Tahoe, the magnitude of this impact remains uncertain. In addition, direct fuel injected engines produce greater quantities of particulate matter, which PAHs sorb to, possibly creating an impact to air quality as well as to water quality. The above uncertainties require that additional studies be completed on PAHs at Lake Tahoe.

2.5 Recreation Update

The 1997 EA provides an introduction and background to recreational issues at Lake Tahoe at which are hereby incorporated by reference.

Evaluation Criteria.

TRPA's Goals and Policies include a recreation element as part of the Regional Plan. The Regional Plan incorporates the relevant environmental threshold and states:

It shall be the policy of the TRPA Governing Body in development of the Regional Plan to preserve and enhance the high quality recreational experience including preservation of high-quality undeveloped shorezone and natural areas. In developing the Regional Plan, the staff and Governing Body shall consider provisions for additional access, where lawful and feasible to the shorezone and high quality undeveloped areas for low density recreational uses.
It shall further be the policy of the TRPA Governing Body in the development of the Regional Plan to establish and insure a fair share of the total Basin capacity for outdoor recreation is available to the general public.

The 1997 EA discusses TRPA’s efforts to attain these environmental thresholds. The 1997 EA, indicates that TRPA is in attainment with its interim goals to meet these thresholds and is hereby incorporated by reference.

**Impacts of Proposed Restrictions on Watercraft Powered by Two-stroke Engines.**

TRPA will consider the impacts of a proposed alternative to be significant if it substantially interferes with attainment of these environmental thresholds for recreation.

Recent survey information by Hagler Bailly at Lake Tahoe helps clarify the anticipated impacts. The survey information supports the original assumption that most boaters will comply with the ordinance. The impacts on overall boating are a concern. It was the assumption of the 1997 EA that there would be a significant reduction in use for private PWCs for several years, but would climb back to 1997 levels as soon as the watercraft became available. The two-year amortization/education period was added to the 1997 ordinance to mitigate these impacts. The 1997 and the 1999 analyses assume that by 2008 boating would be back to normal using the better technology watercraft.

However, reducing the number of jet skis and other watercraft powered by two-stroke engines does not interfere with the environmental thresholds described above. TRPA’s goal as embodied in the thresholds is to provide for a high quality recreational experience that is accessible to the general public. Conflicts among recreational users diminish this experience at Lake Tahoe. Evidence presented to TRPA during its consideration of Ordinance 97-12 strongly indicated that there is a growing conflict between users of personal watercraft and passive recreational users of Lake Tahoe, such as beach users. This discussion is contained in the 1997 EA and hereby incorporated by reference. In particular, people cited noise complaints and disruption of wildlife as key impacts associated with the use of personal watercraft. Discussion of noise impacts on people and wildlife is contained in the 1997 EA and is hereby incorporated by reference.

In addition, evidence demonstrates that two-stroke engines discharge disproportionate amounts of their fuel unburned directly into the water. This disproportionate level of pollution is not compatible with providing a high quality experience of the Lake Tahoe environment. Moreover, restricting this form of highly polluting boating activity does not interfere with other types of recreational uses, including the use of other less polluting motorized watercraft, swimming, hiking, beach use, and the use of non-motorized watercraft, such as canoes or kayaks.

The survey information (Table 9) from a boat ramp/marina sample and from a property owner sample demonstrates that the boating public is well aware of the June 1, 1999 prohibition. As to a reduction in boating, 19% of the boaters using marina and boat ramp facilities indicated they would stop boating on Lake Tahoe; however, only 1% percent of the property owners would stop boating. It appears that most boaters are aware of the prohibition and will comply.
### Table 9. Anticipated Impact of the June 1999 Ban on Carbureted Two-Stroke Motors on Lakes of Tahoe on Boaters’ Activities

<table>
<thead>
<tr>
<th>Percent of Boaters who:</th>
<th>Boat Ramp/ Marina Sample&lt;sup&gt;a&lt;/sup&gt; (n = 554)</th>
<th>Property Owner Sample&lt;sup&gt;b&lt;/sup&gt; (n = 97)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heard of proposal</td>
<td>77%</td>
<td>93%</td>
</tr>
<tr>
<td>Did not hear of proposal</td>
<td>23%</td>
<td>7%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Percent of All Boaters Who Anticipate the Ban will Cause Them To<sup>c</sup>:

<table>
<thead>
<tr>
<th>Action</th>
<th>Boat Ramp/ Marina Sample (n = 554)</th>
<th>Property Owner Sample (n = 97)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop boating on Lake Tahoe</td>
<td>19%</td>
<td>1%</td>
</tr>
<tr>
<td>Continue to boat and purchase a new motor that complies</td>
<td>9%</td>
<td>18%</td>
</tr>
<tr>
<td>Continue to use existing motor</td>
<td>23%</td>
<td>43%</td>
</tr>
<tr>
<td>Currently have a complying motor</td>
<td>97%</td>
<td></td>
</tr>
<tr>
<td>Currently have a non-complying motor</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Decrease the number of days spent boating on Lake Tahoe</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Boat about the same number of days on Lake Tahoe</td>
<td>55%</td>
<td>37%</td>
</tr>
<tr>
<td>Increase the number of days spent boating on Lake Tahoe</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>8%</td>
<td>9%</td>
</tr>
<tr>
<td>Currently do not boat</td>
<td>NA</td>
<td>14%</td>
</tr>
</tbody>
</table>

<sup>a</sup> Percent of boat ramp/marina sample from the intercept survey.

<sup>b</sup> Percent of property owner sample from the mail survey.

<sup>c</sup> Percent of all respondents, not limited to those who had heard about the ban prior to the survey.
3.0 Alternative Assessment:

3.1 Alternative 1: No Project – June 1997 Prohibition in Effect

This alternative proposes to maintain the existing TRPA ordinance language which prohibits carbureted two-stroke engines on June 1, 1999. TRPA has reviewed the findings and data of the Report and this EA. A review of the evidence confirms that the 1997 action was correct based on the facts that:

- **Discharge of Petroleum Products Occurs from Boating** - Petroleum products are found in the lakes of the Region where motorized watercraft operate. The discharge of the pollutants occurs during the boating season and dissipates to a less than detectable level in the winter. The problem areas are in the shallow high boating use areas during the summer.

- **Old Technology Two-Stroke are a Major Source of Discharge** - The old technology, two-stroke watercraft (fuel charged, crankcase scavenged two-stroke engines) discharge an order of magnitude more pollutants than do the four-strokes or the direct injected two-strokes.

It has been recognized that the language of the existing ordinance contains a technical “loop hole” which would allow the legal operation of electronically injected two-stroke engines after June 1, 1999. The footnote in the 1997 EA notes: “The focus of the regulation is on all charged crankcase scavenged two-stroke engines; however, for regulatory reasons TRPA is limiting the ban on carbureted two-stroke engines”. Engines, which electronically inject fuel into the crankcase prior to delivery to the combustion cylinder, still allow blow-by of fuel past the exhaust port. While these engines are slightly more efficient than their carbureted counterparts, their efficiency is not near that of direct injection and four-stroke engines. Figure 4 demonstrates that EFI technology is similar to the carbureted technology based on in lake testing. Alternative 2 addresses this issue.

**Figure 4. In-Lake Experiment: Comparison of Two-Stroke Personal Watercraft Engine Efficiencies – Dissolved Toluene Exhausted for Four Pass Treatment at Operating Speed.**
**Water Quality Impacts:** Maintaining the existing prohibition on carbureted two-stroke powered watercraft does not have a water quality impact since the measure will significantly reduce water quality impacts when it goes into effect June 1, 1999. However, analysis indicates the opportunity exists to further reduce discharges consistent with the TRPA’s original goal to reduce the discharge from old technology two-stroke powered watercraft. This issue is addressed in Alternative 2.

**Air Quality Impacts:** Maintaining the existing prohibition on carbureted two-stroke powered watercraft will not adversely affect air quality. When the prohibition goes into effect hydrocarbon emissions will be significantly reduced and, as discussed in Section 2.3, NOx emissions will not change significantly.

**Recreation Impacts:** Maintaining the existing prohibition on carbureted two-stroke powered watercraft does not have a significant recreation impact since the measure was determined in 1997 not to have a significant effect on recreation when it goes into effect June 1, 1999.

**Mitigation Measures:** There is no mitigation required from the no action alternative; however, as the analysis points out, there is an opportunity to improve the 1997 action which is described in Alternative 2 below.

### 3.2 Alternative 2: Proposed Action

The proposed action alternative that includes the ordinance language to improve and clarify the 1997 action prohibiting carbureted two-strokes commencing June 1, 1999. The Governing Board has requested consideration of the following action items:

**Goals and Policies Amendment Regarding Motorized Watercraft** – TRPA legal counsel has suggested that the action to prohibit carbureted two-strokes found in the Code should flow more directly from the language in the Goals and Policies. This is considered to be a technical supporting modification that has no impact on the substance of the TRPA prohibition. Based on APC and Governing Board input in November, the language has been modified and included in the recommended actions.

**Criteria for Identifying Prohibited Watercraft** – TRPA’s current ordinance bans the discharge of unburned fuel and oil from the operation of carbureted two-stroke engines starting June 1, 1999. This ban was adopted in response to evidence that carbureted two-stroke engines discharge as much as 25% of their fuel directly into the air and waters where they operate. TRPA’s goal in adopting this ordinance is to prevent the use of watercraft that discharge disproportionate amounts of their fuel into the waters of the Tahoe Basin.

As discussed in Alternative 1 above, TRPA’s carbureted two-stroke prohibition permits the use of electronic fuel injection two-stroke engines that also discharge significant amounts of their unburned fuel. Thus, TRPA recommends changing the current ordinance to prohibit the use of all watercraft powered by “fuel charged crankcases scavenged two-stroke engines” or, in laymen’s terms, carbureted and electronic fuel injection two-stroke engines. The Governing Board recommends the consideration of a three-year time extension for those who purchased a new watercraft or engine that meets the current ordinance, but that would be prohibited by the more inclusive language of the proposed amendment.
Water Quality Impacts: Maintaining the existing prohibition on carbureted two-stroke powered watercraft with the addition of EFI equipped two-stroke watercraft for three years does not have a water quality impact since the measure will significantly reduce watercraft emissions overall once the measure goes into effect. Pursuant to the discussion in Alternative 1 above, TRPA has quantified discharges by EFI two-stroke engines based on 1998 boating activity. Based on the 1997 assumption that four-stroke and DFI technology was the acceptable clean technology for the near future, it does not appear that EFI technology is an acceptable clean technology. It is TRPA's conclusion that EFI technology is similar to carbureted technology. This assumption is further confirmed by a review of CARB and EPA data that indicates these watercraft would not be certified as meeting the CARB 2001 standard.

With respect to EFI equipped two-stroke discharges, Table 10 shows the calculated loads of unburned gasoline and gasoline constituents based on levels of boating activity in year 1998. Despite the ordinance prohibiting the operation of carbureted two-stroke engines, it is assumed that 10% of the two-stroke engines are equipped with electronic fuel injection. This estimate is based on production information obtained from Mercury Marine, sales information from local marine retailers, and estimates of EFI use at a Lake Tahoe marina. EFI equipped two-stroke engines were first marketed in the early 1980's. Their advantage over carbureted engines is primarily ease of starting and overall operating performance. Tahoe Keys Marina estimated that up to 40% of the vessels operating in the marina are equipped with EFI in order to take advantage of the greater performance at Lake Tahoe's high altitude. (Motorized watercraft within this marina represent the higher horsepower range.) A Reno marine retailer, however, estimated that EFI equipped two-stroke engines comprised less than 5% of the two-stroke fleet, as most of the engines sold are small fishing engines or engines in the 40 to 75 horsepower range, which typically are not equipped with EFI. The number of after-market bolt-on EFI kits sold and installed to convert to EFI systems is not known at this time.

EPA estimates that EFI equipped engines are 15-24 percent cleaner than carbureted engines, based on percent reduction of hydrocarbons emitted (EPA Regulatory Impact Analysis, 1996). In comparison, four-stroke engines are 75-95 percent cleaner (with respect to hydrocarbon emissions) than carbureted two-strokes, and direct injection two-strokes are 75-90 percent cleaner. In general, EFI equipped two-stroke engines provide greater starting and operating performance, but are not significantly cleaner than carbureted two-stroke engines.

Alternative 2 eliminates the discharges of EFI equipped two-stroke engines commencing October 1, 2001; therefore there would be three more years of the seasonal loads from EFI equipped two-stroke engines, estimated below.
Table 10. Estimate of Unburned Soluble Fuel, MTBE, Benzene and Toluene Discharge by EFI Equipped Two-Stroke Engine Type and Gallons of Gasoline Used, 1998 Boating Season.

<table>
<thead>
<tr>
<th>EFI Equipped Two-Stroke OB:</th>
<th>Soluble Fuel</th>
<th>MTBE</th>
<th>Benzene</th>
<th>Toluene</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fuel Used</td>
<td>Discharged</td>
<td>Discharged</td>
<td>Discharged</td>
</tr>
<tr>
<td></td>
<td>Gallons</td>
<td>Gallons</td>
<td>Gallons</td>
<td>Gallons</td>
</tr>
<tr>
<td>All Motorized Watercraft:</td>
<td>11,348</td>
<td>685</td>
<td>492</td>
<td>19.7</td>
</tr>
<tr>
<td></td>
<td>1,756,491</td>
<td>42,378</td>
<td>9,918</td>
<td>597</td>
</tr>
<tr>
<td>Percent of Total:</td>
<td>0.64%</td>
<td>1.62%</td>
<td>4.96%</td>
<td>3.30%</td>
</tr>
</tbody>
</table>

Assumes 10% of two-stroke OB fleet equipped with EFI
Assumes EFI equipped two-stroke 20 percent more efficient combustion than carbureted two-strokes.

**Air Quality Impacts:** The proposed modifications to the existing prohibition on carbureted two-stroke powered watercraft will not adversely affect air quality impact. When the prohibition goes into effect, hydrocarbon emissions will be significantly reduced and, as discussed in Section 2.3, NOx emissions will not change significantly.

**Recreation Impacts:** Maintaining the existing prohibition on carbureted two-stroke powered watercraft does not have a significant recreation impact since the measure was determined in 1997 not to have a significant effect on recreation when it goes into effect June 1, 1999.

**Mitigation Measures:** There is no mitigation required from the proposed action alternative.

### 3.3 Alternative 3: Alternative 2, with Exemptions:

Alternative 3 is identical to Alternative 2, but includes consideration of exemptions to the June 1, 1999 prohibition of carbureted two-stroke powered watercraft as described below. Some Governing Board members, the plaintiffs in the watercraft lawsuit, some boating agency representatives, and some members of the general public, have raised the issue of exemptions. Generally, the issues are the cost to change engines, the unavailability of new engines, and the possibility of an insignificant impact from a selected group.

First, as to the availability of the new technology engines (e.g., four-strokes and direct injection two-strokes), review of the Technical Feasibility Section of the October 23, 1998 CARB Staff Report demonstrates the wide range of outboards available. As to PWCs, it appears that the direct injection Polaris Genesis model and the Tigershark TS1100Li model will be available this summer.

The fundamental problem is the conversion cost which can range between $500 for a small, used outboard to $10,000+ for a new, large outboard or PWC. To mitigate this impact, TRPA gave boaters two seasons to amortize and convert to the new technology.

The second issue relates to small horsepower engines and auxiliary engines that use only small amounts of fuel. Based on the incomplete surveys of the 1998 Hagler Bailly Watercraft Survey and some factors from the June 1997 TRPA Motorized Watercraft Environmental Assessment, TRPA staff has attempted to present an estimate of 1998 boating usage by watercraft type. In
general, the new information indicates that the use of outboards is less at Lake Tahoe than was previously estimated. The boating numbers from the survey are still being compiled and may need further adjustment; however, these estimates are adequate for analysis purposes. TRPA considered the following categories for three-year extensions from the prohibition.

Under 10 hp two-stroke carbureted outboard motors - Staff estimates that under 10 hp outboard two-strokes accounted for 1.59% of the seasonal boating use in 1998 and used 0.3% (5476 gallons) of the boating season fuel. However, as one can observe in Table 4, these engines account for 1.2% of the unburned soluble fuel discharged into the Lake. They are much less efficient on a horsepower basis than the larger motors and an order of magnitude more polluting than four-strokes. They result in 4.49% (247 gallons) of the MTBE discharged into the Lake. Also, these engines cost much less than the larger engines to replace. The significant contribution of pollutants and the low cost of engine replacement make it difficult to recommend exemption.

Auxiliary Two-Stroke Carbureted Outboards for Sailboats - Staff estimates that auxiliary outboard two-strokes for sailboats accounted for 1.6% of the seasonal boating in 1998 and used 0.016% (2477 gallons) of the fuel boating season fuel. The unburned soluble fuel discharge to the Lake is 0.5%. The hours of operation are much shorter. Although sailboats discharge one-half the amount of small outboards, the arguments regarding greater pollutant discharge per horsepower and less cost for small outboards apply here. Because of the previous two-year amortization period and the need for consistency in regulation, TRPA is not recommending pursuing these types of exemptions.

Fire Protection Boats - The APC recommended this in response to public testimony. At this point it would apply to one boat at Fallen Leaf Lake and the discharges could be considered insignificant. The Governing Board did not accept this recommendation based primarily on the belief that public agencies should set the example.

Exemptions for Certified Engines: This proposal has been discussed to provide the opportunity for all qualifying clean technology engines to be used in the Region. Currently direct fuel injection two-stroke engines are exempted. During the past year, CARB also has developed and implemented a set of standards for regulating the sale of marine engines based on their air quality and water quality impacts. Basically, CARB's prohibition on the sale of all engines that do not qualify for a 2001 Tier 1 certification approximates TRPA's prohibition on two-stroke engines (except DFI two-stroke engines). The CARB standard also reflects EPA's 2006 standard for marine engines. As part of its program, CARB is proposing a "sticker" program that will identify marine engines that comply with the CARB restrictions. It is TRPA's assumption that engines bearing a CARB 2001 sticker would comply with TRPA's prohibition. In general, any watercraft powered by a two-stroke engine whose engine is certified by the Environmental Protection Agency as meeting the U.S. EPA 2006 standard or is certified by the California Air Resources Board as meeting the CARB 2001 standard could be exempted from TRPA's prohibition. This exception would have no effect on discharge loading. It would provide program flexibility and coordination and would assist in providing more recreational opportunities.

Water Quality Impacts: With respect to discharge loads, Table 8 shows the calculated loads of gasoline constituents based on levels of boating activity in year 1998 for the two small engine exemptions. The addition of one or both of these exemptions is a significant deviation from the current standard that prohibits discharge commencing June 1, 1999. The fire boat exemption and the certified engine exemptions would not be measurable within the limits of this analysis.
and would be considered an insignificant impact. The result of the exemptions would be three additional years of discharge.

Table 10. Summary of MTBE, Benzene and Toluene Discharge by Engine Type and Gallons of Gasoline Used Private Watercraft, 1998 Boating Season.

<table>
<thead>
<tr>
<th></th>
<th>Boat Trips</th>
<th>Fuel Used Gallons</th>
<th>MTBE Gallons</th>
<th>Benzene Discharged</th>
<th>Toluene Discharged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two-Stroke Under 10 hp Outboards</td>
<td>Number &amp; Percent</td>
<td>2634</td>
<td>5476</td>
<td>237</td>
<td>9.5</td>
</tr>
<tr>
<td></td>
<td>1.59%</td>
<td>0.35%</td>
<td>4.48%</td>
<td>2.36%</td>
<td>2.78%</td>
</tr>
<tr>
<td>Two-Stroke Aux. Sailboats</td>
<td>Number &amp; Percent</td>
<td>2641</td>
<td>2477</td>
<td>107.5</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td>1.60%</td>
<td>0.16%</td>
<td>2.03%</td>
<td>1.07%</td>
<td>1.26%</td>
</tr>
</tbody>
</table>

Assumes 7.991 gallons of gas are used by G2 outboards, 10 hp or less, versus G4 outboards, 10 hp or less.

Air Quality Impacts: The air quality impacts would be similar to the water quality impacts.

Recreation Impacts: Permitting all the exceptions except for the fireboat exception would have a positive impact on short term recreational boating. The fire boat exemption has no impact on recreational boating.

Mitigation Measures: The fire exemption and the certified engine exemptions require no mitigation. The small engine exemptions are required to reduce impacts to water quality to less than significant levels for the three year exemption period by:

- TRPA providing a three-year program to offset the three-year discharges such as prohibiting electronic fuel injected powered watercraft during this period.

- TRPA enforcing restricted access of other watercraft during the period to offset the three year discharges.

- TRPA and other agencies improve the level the enforcement to reduce fuel spills and reduce the use of unauthorized watercraft.
4.0 REFERENCES

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4.5 GLOSSARY

Ambient standard - in-lake standard.

Backshore - an area where the water at high elevation meets the land.

Backwash - the return flow of water originating from the breaking of waves or swash.

Benthic - refers to the bottom of a body of water.

Bilge water - water which has collected in the lowest part of a boat. It often becomes contaminated with engine oils and other petroleum by-products from boat engines.

BMP - best management practice - any practice proven effective in erosion control or management of surface runoff.

Boat ramp apron - the most lakeward portion of a boat ramp.

Boat slip - a boat mooring, usually consisting of a floating dock which allows boaters direct access to land.

Breaker height - height of a breaking wave.

Breakwater - a structure located in a lake, designed primarily to protect shores from the effects of current or wave action. They are usually linear structures oriented parallel to the shoreline. They may be composed of boulders, sheet piling, or rock rib structures.

Bulkhead - a retaining structure, usually vertical, which separates lake waters from the land.

Buoy - a float on top of the water which is held in place by an anchor located on the bottom of a body of water.

Catwalk - a narrow structure that is part of pier and which provides access to and from a pier.

Channelization - creation of an artificial straight body of water.

Cross member - structural component of a pier which usually connects two pilings.

Cultural eutrophication - the accelerated discharge of nutrients to water resulting from human activity.

Density current - a current caused by the influx of denser water as a result of its cooler temperature or sediment load.

Disturbance zone - a delineated area in which human activities may be restricted to prevent disturbance to nesting wildlife.

Dredging - removing or rearranging soil components on the bottom of a water body or which are located lakeward of the high water line.
Earthbank - a linear, compacted soil structure designed to contain or separate flood waters from the land.

Endemic - prevalent in, or peculiar to, a particular locale or region.

Eulittoral "splash" zone - that area of Lake Tahoe's shoreline between the high and low annual water level of the lake.

Eutrophication - the discharge of nutrients to waters resulting from natural or human activities (See "cultural eutrophication").

Fetch length - the length of uninterrupted contact of the wind with a lake's surface. The greater the fetch length, the greater the wave energy produced.

Foreshore - an area of lake level fluctuation located between the high and low water lines.

Fry - fish hatchlings.

Game fish - fish typically caught for sporting pleasure.

Governance Board permit - a TRPA permit requiring review and approval from the TRPA Governing Board.

Groin - a structure that is similar to jetties but smaller. They are located in a lake, perpendicular to the shoreline. They may be composed of short sections of sheet piling, wood piling, or concrete.

Holding tank - a tank which is used for temporary storage and must be periodically emptied. On boats, they are used to temporarily contain human bodily waste.

Influence zone - a delineated area in which human activities may be restricted to prevent disturbance to the foraging habits of wildlife.

In-kind restoration or mitigation - restoration or mitigation which is of the same type (e.g., structure or capability district) as that which will be impacted.

Inlake relief - steep lake bottom topography.

Instability - area where the water meets the land.

Interstitial water - water located in lake bottom sediments, often referred to as "pore" water.

Jetty - a structure located in a water body, designed primarily to protect shores from the effects of current or wave action. They are usually linear in nature and oriented perpendicular to the shoreline. They may be composed of boulders, sheet piling, or rock crib structures.

Lake Tahoe Datum - the elevation of Lake Tahoe as reported by the United States Geological Survey, plus 1.14 feet.

Littoral parcel - a parcel of land next to the high water elevation of a lake.
Littoral processes - those processes along the shoreline of a body of water which affect and determine the shape of the shoreline. These processes include wind and wave action, current action, accumulation of solid material, and removal of solid material.

Littoral zone - an area around a lake’s perimeter which extends lakeward for some specified distance. In Lake Tahoe, the distance is 100 meters.

Mooring - a fixed object to which a boat is attached.

Mooring buoy - a mooring device consisting of a heavy anchor, anchor line or chain, and float, to which a boat is attached.

Nearshore - an area extending from the low water elevation of a lake to some specified distance away from the shoreline. In Lake Tahoe the distance is 350 feet.

Non-game fish - all fish that are not considered sporting fish.

Oligotrophic - containing low concentrations of nutrients to support the growth of algae. An oligotrophic lake is regarded as having high water clarity due to the absence of significant amounts of algae.

PAOT - person at one time.

Pelagic - refers to the deepest parts of a body of water. In Lake Tahoe, it specifically refers to those waters below 100 meters.

Periphyton - algae that is attached to fixed structures in the water (e.g., rocks, piers, buoys).

Phytoplankton - algae that is free floating.

Pier - fixed or floating platform or structure extending from the back shore to beyond the high water elevation of a lake.

Pile pier - a pier whose main structural component consists of vertical wooden or steel pilings.

Primary productivity - a measure of how rapidly an algal population is growing.

Qualified exempt activity declaration - a declaration made by the person responsible for the activity which does not require a TRPA permit. Retaining wall - a vertical structure which retains material behind it.

Revetment - a sloped, permeable structure, usually constructed of rock, which protects the shoreline from the effects of currents or waves.

Rip current - current created by the concentrated force of backwash.

Rock crib structure - an enclosure of wood, steel, or other material containing unconsolidated rock.

Rock crib pier - a pier whose main structural component is a rock crib structure.

Rode length - the length of the line connecting an anchor directly to a boat or buoy.
Seawall - a vertical device which protects the shoreline from waves or currents.

Secci disk - a disk, similar in size and shape to a dinner plate, with white markings used to determine the transparency of water. It is usually measured as the maximum depth at which the disk may be seen by the naked eye.

Settling velocity - the speed at which a particle drops through water and settles on the water's bottom. In general, larger particles have faster settling velocities than smaller particles.

Shoaling - temporary accumulation of lake bottom material due to storm action. Shoals may create a navigational hazard.

Sheet piling - heavy gauge sheets of steel which are driven vertically into the lake bottom.

Shoreline - the highest line normally covered by the waters of a lake or some other water body.

Shorezone - the area including the nearshore, foreshore, and backshore of a body of water.

SEZ - stream environment zone - an area which owes its physical and biological characteristics to the presence of surface or groundwater.

Spawning habitat - an area that attracts, or is capable of attracting, fish for reasons of producing and fertilizing eggs. Spawning areas are typically comprised of rock, cobble, or rubble.

Staff level permit - a TRPA permit approved at the staff level which does not require TRPA Governing Board review.

Sublittoral zone - the area which extends from just below the eulittoral zone to the bottom of the lake.

Superstructure - a structure within the foreshore or nearshore, other than a handrail, davit (hoist which is used to bring a sailboat from the pier deck to the lake), or flagpole, but including a boathouse, which projects above high water or ground elevation, more than five feet.

Swash - non-breaking waves which travel up the shore.

Swimline - a line which delineates a swimming area and within which boats are prohibited.

Tributyltins - toxic substances which are added to paints to prevent the growth of algae. They may leach from boat hulls and accumulate in lake bottom material.

Turbidity - a measure of reflected light from sediments or other matter suspended in the water. In general, the more matter in the water, the more reflection there is, and, therefore, the higher the turbidity.

VMT - a vehicle mile of travel.

Wave run-up - that area in the backshore extending from the point where waves first break on the sand to the point that marks their "run-up" onto the sand.

Wood pilings - large logs or timbers which are driven vertically into a lake bottom.