

Waldo – Recreation Use EA

Appendices

Appendix A: Recreation Opportunity Spectrum

Appendix B: 1998 User Profile Survey at Waldo Lake

Appendix C: Water Quality

Appendix D: PAC Authorization and Recommendations of the Waldo Lake Subcommittee

Appendix E: 2002 Public Comment Content Analysis

Appendix F: 2005 Wildlife Biological Evaluation

Appendix G: Heritage Resources Letter of Compliance

Appendix H: 2003 Visitor Survey at Waldo Lake

Appendix I: 2005 Botanical Biological Evaluation

Appendix J: Description of Dispersed Sites on Waldo Lake

Appendix A: Recreation Opportunity Spectrum

The recreation opportunity spectrum (**ROS**) is a system of describing a variety of forest settings provided on National Forest lands. Beyond the typical activities that visitors pursue on public lands, research has shown that the setting for these activities matters a lot to visitors. For example, camping is a universally recognized activity for visitors on public lands.

However there is a dramatic contrast between camping within a developed campground next to a forest highway and camping next to a wilderness lake. While the activity is the same, the settings are different. The **ROS** system offers managers a tool for managing landscapes to effectively provide a range of recreation settings for visitors to experience.

There are six (6) major setting categories within the ROS system. These are: Urban, Rural, Roded Natural, Semi-Primitive Motorized, Semi-Primitive Non-Motorized, and Primitive. And as the names imply they range from very developed and convenient (*Urban*) to very rustic and remote (*Primitive*).

The following descriptors are used to differentiate between categories and give agencies evaluation tools for monitoring the success of their efforts. Agency staff can also use these descriptors to guide decisions on site development proposals (*building a bridge, installing signs*). These descriptors can also help informed visitors to select forest settings that match with their expectations. These descriptors are:

- * **Access**
- * **Remoteness**
- * **Naturalness**
- * **Social Encounters**
- * **Visitor Impacts**
- * **Visitor Mgt**
- * **Facilities & Site Mgt**

In the tables below, the term “*Norm*” defines the typical state of conditions when a given setting is managed according national standards. The term “*Inconsistent*” highlights some incompatibility between ground conditions and standards for the setting. Often minor changes can be pursued to rectify these situations. Some situations are left inconsistent with national standards, because they meet local management objectives. Setting conditions that are deemed “*Fully Compatible*” easily meet or exceed the national standards. And finally when conditions fall into the “*Unacceptable*” range, significant management changes are necessary to bring the setting back into its desired state. In some cases where site changes are not possible to rectify unacceptable conditions, the agency may consider changing the allocation to fit actual ground conditions.

Access describes the type and mode of travel compatible within the each setting (*Table 1*). An urban or rural campground setting generally has full access for motor vehicles, whereas a primitive setting offers cross-country travel by foot or stock only.

Table 1: Access Criteria

| | X-country Travel | Non-Motorized Trails | Motorized Trails and Primitive Roads | Single Lane Gravel Roads; High clearance Vehicles | Full Access by all vehicles |
|-------------------------------------|------------------|----------------------|--------------------------------------|---|-----------------------------|
| Primitive | Norm | | Unacceptable | | |
| Semi-Primitive Non-Motorized | Fully Compatible | Norm | Inconsistent | Unacceptable | |
| Semi-Primitive Motorized | Fully Compatible | | Norm | Inconsistent | Unacceptable |
| Roaded Natural | Fully Compatible | | | Norm | |
| Rural | Fully Compatible | | | | Norm |
| Urban | Fully Compatible | | | | Norm |

Remoteness defines the perception of being removed from the sights and sounds of human activities (Table 2). The more developed settings (*Urban, Rural, Roaded Natural*) place no value on remoteness, whereas Primitive settings should offer isolation (*1 ½ hour walking distance*) from human sights and sounds.

Table 2: Remoteness Criteria

| | Out of Sight & Sound of Human Activity; More than 1 ½ mile walk | Distant Sight and Sound of Human Activity; More than ½ Mile Walk from any Motorized Roads | Distant Sight and Sound of Human Activity; More than ½ Mile Walk from Improved Roads | Remoteness of little Relevance | Remoteness of little Relevance |
|-------------------------------------|---|---|--|--------------------------------|--------------------------------|
| Primitive | Norm | Inconsistent | Unacceptable | | |
| Semi-Primitive Non-Motorized | Fully Compatible | Norm | Inconsistent | Unacceptable | |
| Semi-Primitive Motorized | Fully Compatible | | Norm | Inconsistent | Unacceptable |
| Roaded Natural | Fully Compatible | | | Norm | |
| Rural | Fully Compatible | | | | Norm |
| Urban | Fully Compatible | | | | Norm |

Naturalness describes the physical conditions of the setting as compared to a natural environment (*Table 3*). This descriptor is primarily a visual evaluation of the surrounding landscape, and describes the level of human modifications. A primitive setting would display no significant human change from a natural forest setting. By contrast, visitors should expect lots of human-caused change to their surroundings in an urban or rural setting.

Table 3: Naturalness Criteria

| | Preservation | Retention | Partial Retention | Modification | Maximum Modification |
|------------------------------|------------------|--------------|-------------------|--------------|----------------------|
| Primitive | Norm | Inconsistent | Unacceptable | | |
| Semi-Primitive Non-Motorized | Fully Compatible | Norm | Inconsistent | Unacceptable | |
| Semi-Primitive Motorized | Fully Compatible | | Norm | Inconsistent | Unacceptable |
| Roaded Natural | Fully Compatible | Norm | | | Inconsistent |
| Rural | Fully Compatible | | Norm | | |
| Urban | Fully Compatible | | | | N/A |

Preservation – Only natural changes to the visual landscape should be occurring.

Retention – Human-created change should mimic natural processes in size, shape, color, and texture.

Partial Retention – Human-created change can differ (*size, shape, color, texture*) from natural processes but must remain subordinate (*hidden or unnoticeable*) to the typical landscape features.

Modification – Human-created change should borrow from natural forms, colors, shapes and texture such that the change blends into the surrounding landscape features.

Maximum Modification – Human-caused change can dominate the surrounding landscape features, however they will appear as natural occurrences when viewed as background scenery.

Social Encounters tries to define the appropriate frequency of meeting others during the course of a day’s activities (*Table 4*). This really comes closest to describing a sense of solitude for the forest visitor. A lack of encounters with other visitors is not relevant to someone using a Rural or Urban setting, while someone seeking out a Primitive setting should expect few encounters (*6 or less per day*). Such encounters are most likely during travel on trail systems, but could also involve neighboring camps at popular destination sites (*lakes, open meadows, mountain tops*).

Table 4: Social Encounters Criteria

| | 6 or less Parties Met per Day; Less than 3 Campsites Visible | 6-15 Parties per Day; 6 or less Campsites Visible | Mod. to High Contact on Roads; Mod. to Low Contact on Trails and in Campsites | Moderate to High Contact on Roads, Trails and Campsites | High Contacts on Roads, Trails, and in Campsites |
|-------------------------------------|--|---|---|---|--|
| Primitive | Norm | Inconsistent | Unacceptable | | |
| Semi-Primitive Non-Motorized | Fully Compatible | Norm | Inconsistent | Unacceptable | |
| Semi-Primitive Motorized | | | | | |
| Roaded Natural | Fully Compatible | | Norm | Inconsistent | Unacceptable |
| Rural | Fully Compatible | | | Norm | Inconsistent |
| Urban | Fully Compatible | | | | Norm |

Visitor Impacts describe the physical change that human use produces in the environment (*Table 5*). These criteria focus on “*how much change will be allowed and what tools for control are appropriate*” rather than “*how can impacts be prevented*”. Physical change from visitors should include soil, vegetation, wildlife habitat and presence, and forms of pollution (*air, water and noise*).

Table 5: Visitor Impacts Criteria

| | Unnoticeable Impacts, No Site Hardening | Subordinate Impacts, No Site Hardening | Subordinate Impacts, Limited Site Hardening | Subtle Site Hardening | Site Hardening May be Dominant, but in Harmony |
|-------------------------------------|---|--|---|-----------------------|--|
| Primitive | Norm | Inconsistent | Unacceptable | | |
| Semi-Primitive Non-Motorized | Fully | Norm | Inconsistent | Unacceptable | |
| Semi-Primitive Motorized | Compatible | | Norm | Inconsistent | Unacceptable |
| Roaded Natural | Fully Compatible | | | Norm | Inconsistent |
| Rural | Fully Compatible | | | | Norm |
| Urban | | | | | Fully |

Visitor Management focuses on the amount of regulation and control, plus the level of information and services, provided to visitors (*Table 6*). The more developed settings (*Urban, Rural and sometimes Roaded Natural*) offer sufficient regulation and services to provide the necessary level of visitor security. Whereas a Primitive setting lacks such management, thereby demanding independence, self-reliance, and a level of risk-taking from visitors.

Table 6: Visitor Management Criteria

| | No On-Site Controls or Information Facilities | Subtle On-Site Controls & Limited Information Facilities | Noticeable On-Site Controls & Facilities, but Simple in Design | Obvious & Numerous On-Site Controls & Facilities, but Harmonize w/ Setting | Obvious & Numerous On-Site Controls & Facilities; Sophisticated in Design |
|------------------------------|---|--|--|--|---|
| Primitive | Norm | Inconsistent | Unacceptable | | |
| Semi-Primitive Non-Motorized | Fully Compatible | Norm | Inconsistent | Unacceptable | |
| Semi-Primitive Motorized | | | | | |
| Roaded Natural | Fully Compatible | | Norm | Inconsistent | Unacceptable |
| Rural | Fully Compatible | | | Norm | Inconsistent |
| Urban | Fully Compatible | | | | Norm |

Facilities and Site Management refers to the level of site development (*Table 7*). Many visitors seek out a setting with convenience and comfort (*Urban, Rural*) with facilities for socializing. While others prefer no creature comforts (*Primitive*) or some state of facilities between these two conditions. A Primitive setting provides a sense of self-reliance and challenge not expected in more developed settings.

Table 7: Facilities and Site Management Criteria

| | Few Rustic Facilities for Site Protection Only; Native Materials Only | More Rustic Facilities, Primarily for Site Protection; Native Materials Only | Rustic Facilities for User Comforts and Site Protection; Commonly Native Materials | Some Facilities can be more Complex for User Comforts; Materials vary but Harmonize with site | Most Facilities for User Comforts; Synthetic Materials are Common; Designs may be very Complex |
|------------------------------|---|--|--|---|--|
| Primitive | Norm | Inconsistent | Unacceptable | | |
| Semi-Primitive Non-Motorized | Fully Compatible | Norm | Inconsistent | Unacceptable | |
| Semi-Primitive Motorized | | | | | |
| Roaded Natural | Fully Compatible | | Norm | Inconsistent | Unacceptable |
| Rural | Fully Compatible | | | Norm | Inconsistent |
| Urban | Fully Compatible | | | | Norm |

Appendix B: 1998 User Survey at Waldo Lake

In preparation for the Waldo Lake -Managing Recreation Use EA, the Middle Fork Ranger District designed and conducted visitor surveys to better understand the population of lake visitors. An earlier user survey was also completed in 1997 using a different survey protocol.

The 1997 survey involved completing a half page of visitor and behavior descriptions completed by district interviewers at the lake, or by visitors at prominent self-issue locations (*e.g. trailheads and boat launches*).

The survey in 1998 was statistically more rigid in design and more comprehensive than the 1997 survey. The 1998 survey focused on similar visitor and recreation use data as the 1997 survey, but used a stratified and unbiased sampling scheme. In 1998, 3143 numbered surveys were handed to visitors traveling up the Waldo Lake Road during 170 sample periods of three-hours each that were randomly stratified across 132 sample days. The earliest survey period began at 8:00 am and the latest survey period started at 7:00pm. Surveying began on June 22, 1998 (Monday) and ended on October 31, 1998 (Saturday). Fridays and Saturdays were randomly allocated two different survey periods to recognize the increased traffic flows on weekends. Contacted visitors were asked to complete the survey and return them to drop points at campgrounds and boat launches.

Survey Information

Both 1997 and 1998 surveys collected characteristic data on visitors and the activities they pursued at Waldo Lake. Visitor characteristics included:

- Dates of Visit
- Zip Code
- Number of People in Party
- Number of Stock Animals and Dogs

The primary focus of both surveys was documenting the types of visitor activities and included:

- Camping behavior and locations around the lake
- Trail Use and Mode of Travel
- Boating behavior and Mode of Travel (*including motor types*)
- Other Types of Lake Activities

Data Summary for 1998 Visitor Survey

Survey information can be evaluated in two distinct ways. The typical way would be to generate some trends about the nature of visitors at Waldo Lake and the activities they pursue. This method would characterize survey respondents, and treat all respondents in the same manner.

The following questions about respondents could be answered with the survey data:

- Visitation trends
- Average number of people per party
- Percentage of respondents camping and where they camp
- Percentage of respondents pursuing various recreation activities
- Percentage of boat types brought to the lake

Each question could be further segregated by characteristic groups, such as “What percentage of respondents were camping and boating”.

Additional analysis allows an examination of recreation use trends at Waldo Lake during defined periods. In this analysis, survey data would be expressed in visitor days (persons per day) and would give greater representative weight to visitors whose length of stay is longer. Such a design allows the District to examine the carrying capacity trends or activity patterns for particular time periods (*days, weeks, or months*).

However, such an analysis would introduce bias when answering questions addressed by the first analysis method. The second analysis design could prove useful in evaluating visitor impacts, particularly if the entire visitor population for the year were known. Appropriate questions to ask under the second analysis would be:

- What percent of the surveyed population is participating in various recreation activities during any given time period:
 - camping, boating, hiking, etc.
 - motorized versus non-motorized
 - camping at dispersed versus campground sites
- For a specified time period, what is the profile of the visiting population
- What is the frequency or distribution of recreation activities throughout the year

Survey Results

The following results were produced by treating each respondent as a single sample (ie. length of stay did not define the data set). A total of 1579 survey forms were returned from the total 3143 forms handed out. Responses were distributed across week days and the total sample period accordingly.

Table B-1: 1998 Sample Responses at Waldo Lake by Month

| Month | Total Sample Days | Total Sample Periods | Number of Surveys Returned |
|-----------|-------------------|----------------------|----------------------------|
| June | 19 | 21 | 66 |
| July | 31 | 40 | 368 |
| August | 31 | 40 | 606 |
| September | 30 | 38 | 448 |
| October | 31 | 41 | 91 |

Stay Length - Respondents averaged slightly over 2 days per Waldo Lake visit. Stay length for campers averaged slightly over 3 days. There was little difference in stay length between campground visitors (3.32 days) and dispersed site visitors (3.06 days).

Group Size - Respondents averaged slightly over 3 people per party, with the largest party being 60 members. Large groups (10 people or more) were atypical and more often campers (4.9%) than day visitors (0.8%). Medium-sized groups (5-9 people) were also more commonly campers (14.9%) than day visitors (7.9%).

Table B-2: Group Sizes within 1998 Waldo Lake Survey

| Party Size | Day Visitors | Campers |
|---------------|----------------|----------------|
| 1 to 4 people | 719 (91.4%) | 635 (80.2%) |
| 5 to 9 people | 62 (7.9%) | 118 (14.9%) |
| 10+ people | 6 (0.8%) | 39 (4.9%) |
| Total | 787 | 792 |

Percentages are calculated from column totals.

Group size did not vary sharply between campground and dispersed site visitors. Most camping respondents were in parties of 4 or less people (78.7% for campground and 85% for dispersed site respondents). Groups with 5-9 people were slightly more represented in the campground respondents (16.4%) than dispersed site respondents (9.4%). And groups with 10 or more people were equally found in campgrounds (4.9%) and dispersed (5.6%) sites. It is possible that some respondents may have misunderstood the question about group size, by describing the number of people in their vehicle, rather than the size of the social group they were with during their Waldo Lake visit.

Season of Visitation – Visitation to Waldo Lake peaked in August and early September, with visitation higher in July than June or October use. The following table shows the distribution of survey responses across the recreation season. Poor weather conditions and the number of days when the lake is snow free influence use during these two shoulder season months. The number of survey days was almost twice as much in October than in June because of weather conditions. For the months of July through September, the use distribution represented by survey responses applied similarly to day visitors and campers.

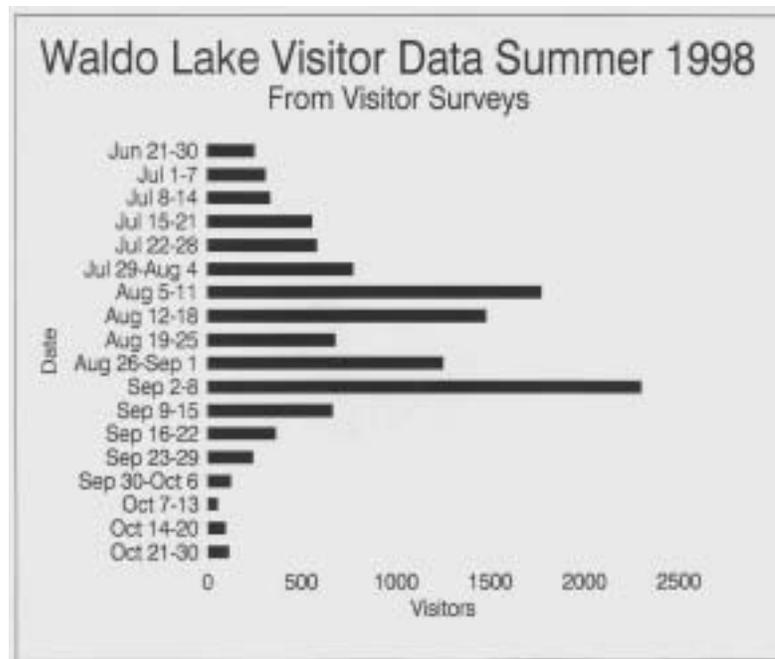
Table B-3: Visitor Types from 1998 Waldo Lake Survey

| Month of Visit | Total Visitors | Day Visitors | Campers | Campground Users | Dispersed Site Users |
|----------------|----------------|----------------|----------------|------------------|----------------------|
| June | 67 (4.2%) | 49 (6.2%) | 16 (2.0%) | 11 (1.7%) | 5 (2.8%) |
| July | 369 (23.4%) | 204 (25.9%) | 165 (20.8%) | 120 (19.1%) | 48 (26.7%) |
| August | 605 (38.3%) | 250 (31.8%) | 356 (45.0%) | 294 (46.7%) | 72 (40.0%) |
| September | 447 (28.3%) | 211 (26.8%) | 237 (29.9%) | 192 (30.5%) | 49 (27.2%) |
| October | 91 (5.8%) | 73 (9.3%) | 18 (2.2%) | 12 (1.9%) | 6 (3.3%) |
| Totals | 1579 | 787 | 792 | 629* | 180* |

Percentages are calculated from column totals.

* Difference between the sum of these numbers and the total overnight visitors comes from some visitors checking both campground and dispersed sites on survey.

The following histogram displays the distribution of survey respondents across the recreation season. In this display, survey data is influenced by length of stay. This pattern is fairly representative of total use over a typical year at Waldo Lake. Variations in use during the peak summer season occur from year to year due to weather conditions. For example the period August 19-25th contained a rainy weekend in 1998.



For most campers, their visits were centered on weekends (Fri.-Sun). This trend did not appreciably differ between campground users and dispersed site users, or by month of the season. Survey results did show one variation in trip planning between campground and dispersed site users. Dispersed site visitors (41.5%) showed a higher preference for arriving on Saturdays than campground users (25.7%).

Table B-4: Visitors by Arrival Day for 1998 Waldo Lake Survey

| Arrival Day | Total Campers | Campground Users | Dispersed Site Users |
|-------------------|----------------|------------------|----------------------|
| Monday | 60 (7.7%) | 52 (8.5%) | 8 (4.9%) |
| Tuesday | 54 (7.0%) | 42 (6.9%) | 12 (7.3%) |
| Wednesday | 57 (7.3%) | 49 (8.0%) | 8 (4.9%) |
| Thursday | 82 (10.6%) | 70 (11.4%) | 12 (7.3%) |
| Friday | 239 (30.8%) | 193 (31.5%) | 46 (28.0%) |
| Saturday | 225 (29.0%) | 157 (25.7%) | 68 (41.5%) |
| Sunday | 59 (7.6%) | 49 (8.0%) | 10 (6.1%) |
| Total Respondents | 776* | 612 | 164 |

* 16 respondents selected both campground and dispersed sites and are not represented in this table. Percentages are calculated from column totals.

Camping Behavior – About half of the total respondents (50.2%) planned to camp at Waldo Lake. Most overnight visitors (77.3%) stayed in one of the three developed campgrounds, with the rest (21.0%) choosing a dispersed campsite on the lakeshore. A small number of respondents (1.7%) used both developed campgrounds and dispersed campsites during their Waldo Lake visit.

Month of the season influenced the distribution of day visitors and campers. Survey respondents were less likely to camp in June (25%) and October (19.8%) than during the heat of the summer (52.3%). This is not surprising considering the intense mosquito populations at Waldo Lake in June and the colder temperatures in October. When displayed as a percent of total campers by month, dispersed site users had a slightly larger presence in June (31.2%) and October (33.3%), than during the heat of the summer season (22.8%). The small sample sizes in June and October could bias this result.

Table B-5: Visitor Types by Month from 1998 Waldo Lake Survey

| Month of Visit | Total Visitors | Day Visitors | Campers | Campground Users | Dispersed Site Users |
|----------------|----------------|----------------|----------------|------------------|----------------------|
| June | 67 (4.2%) | 49 (75%) | 16 (25%) | 11 (68.8%) | 5 (31.2%) |
| July | 369 (23.4%) | 204 (55.3%) | 165 (44.7%) | 120 (71.4%) | 48 (28.6%) |
| August | 605 (38.3%) | 250 (41.2%) | 356 (58.8%) | 294 (80.3%) | 72 (19.7%) |
| September | 447 (28.3%) | 211 (47.1%) | 237 (52.9%) | 192 (79.7%) | 49 (20.3%) |
| October | 91 (5.8%) | 73 (80.2%) | 18 (19.8%) | 12 (66.7%) | 6 (33.3%) |
| Totals | 1579 | 787 (49.8%) | 792 (50.2%) | 629* (79.4%) | 180* (20.6%) |

Percentages in the first column are calculated from total visitors. Percentages for day visitors and campers are calculated from monthly totals. Percentages for campground and dispersed site users are calculated from Camper totals by month.

* Difference between the sum of these numbers and the total Campers comes from some visitors checking both campground and dispersed sites on survey.

In general, dispersed camping visitors were scattered around the lake zones. Waldo Wilderness sites were the most popular destinations (25.5%) for dispersed campers responding to the survey. Sites on the north (17.0%) and northwest (16.5%) shoreline were the other popular areas for dispersed campers. Twenty-two respondents listed two or more zones for their camping activities. Only 5.9% of dispersed camping respondents claimed to be sleeping on a boat while visiting Waldo Lake.

Recreation Activities – Respondents were asked to identify their intended use of trail systems around Waldo Lake and mode of travel. Respondents were also asked to identify boating activities they planned to do, as well as specific information about their boats. Finally respondents were asked to check or list other recreation activities (e.g. swimming, scuba diving, and fishing) they planned to pursue during their Waldo Lake visit.

Trail Activities – Slightly more than three-quarters (76.8%) of respondents planned to use trails around Waldo Lake during their trip. Among these trail users, 89.7% planned to travel by foot, 19.0% would travel by bicycle, and 1.6% would travel by stock.

Table B-6: Trail User Types from 1998 Waldo Lake Survey

| Activity Type | Visitors | Trail Users |
|-----------------|-----------------|-----------------|
| Non-Trail Users | 366 (23.2%) | |
| Trail Users* | 1213 (76.8%) | |
| Hikers | | 1088 (89.7%) |
| Bicyclists | | 231 (19.0%) |
| Stock Riders | | 19 (1.6%) |

* Sum of trail users exceeds total trail users because some participants used more than one method of travel.
Percentages by trail user type are calculated from total trail users.

Campers were more likely (88.7%) to use trails around Waldo Lake than day visitors (64.8%). Within the Campers group, trail users were more often staying in campgrounds (79.5%) than non-trail users (60%), though this difference could simply be an expression of the overall trend of more visitors using campground than dispersed sites.

Table B-7: Trail Users by Visitor Type from 1998 Waldo Lake Survey

| Activity Type | Total Respondents | Day Visitors | Campers |
|-------------------|-------------------|----------------|----------------|
| Non-Trail Users | 366 | 276 (35.1%) | 90 (11.4%) |
| Trail Users | 1213 | 510 (64.8%) | 703 (88.7%) |
| Total Respondents | 1579 | 787 | 792 |

Boating – Only 40% of survey respondents planned to boat on Waldo Lake during their visit. Boaters were much more likely to be camping (72.0%) than day visiting (28.0%). By contrast, non-boaters were less likely to be campers (35.5%). This connection between boating and camping was similar for both non-motorized and motorized boating subgroups.

Table B-8: Boaters by Visitor Type From 1998 Waldo Lake Survey

| Activity Type | Total Respondents | Day Visitors | Campers |
|-----------------|-------------------|----------------|----------------|
| All Respondents | 1579 | | |
| Boaters | 633 (40.1%) | 177 (28.0%) | 456 (72.0%) |
| Non-Boaters | 946 (59.9%) | 610 (64.5%) | 336 (35.5%) |

Percentages for day visitors and campers are calculated off boater and non-boater totals

The survey also asked boaters if their boats had self-contained sanitation devices. Very few (4.3%) boating respondents carried toilet facilities in their craft. This result was not surprising given the dominance of paddle boats and small motorized boats on Waldo Lake.

Most boating respondents used non-motorized craft (86.4%) on the lake, leaving only 13.6% of boating respondents using a motorized craft. Only 4 respondents used both motorized and non-motorized watercraft during their trip.

Table B-9: Activity Types by Boat Type from the 1998 Waldo Lake Survey

| Activity Type | Total Respondents | Non-motorized | Motorized |
|------------------------|-------------------|----------------|---------------|
| Total Boaters | 633 | 547 (86.4%) | 86 (13.6%) |
| Day visitors | 177 (28.0%) | 153 (86.4%) | 24 (13.6%) |
| Campers | 456 (72.2%) | 394 (86.4%) | 62 (13.6%) |
| Campground Boaters | 356 (78.1%) | 313 (87.9%) | 43 (12.1%) |
| Dispersed Site Boaters | 100 (21.9%) | 81 (81%) | 19 (19.0%) |

Percentages in the first column are calculated from Total Boater and Campers totals. Percentages in the second and third columns are calculated from totals by Activity Type.

A majority (65.1%) of motorized boats were equipped with 2-cycle motors, followed by 25.6% of boats equipped with 4-cycle motors. Electric motors were used by a small number (9.3%) of surveyed boaters. Motorized boats were typically conventional motorboats of varying sizes. Sailboats represented only 4.9% of all boating respondents and 32.5% of motorized boating respondents. Slightly more than 90.3% of the 31 survey respondents with sailboats were equipped with motors.

Table B-10: Motor Types from the 1998 Waldo Lake Survey

| Activity Type | Total Respondents |
|-----------------------|-------------------|
| All Motorized Boaters | 86 |
| 2-Cycle Motors | 56 (65.1%) |
| 4-Cycle Motors | 22 (25.6%) |
| Electric Motors | 8 (9.3%) |

Motorized boats comprised a higher percentage of total boats in June (19.2%) and October (35.0%) than for the other three months or compared to the total seasonal average of 13.0%. This difference may likely be an artifact of a small sample size for these two months. A greater focus on fishing and hunting among visitors in June and October may also explain the increase in motorized boats during these months.

Table B-11: Boater Types by Month from the 1998 Waldo Lake Survey

| Month of Visit | Total Boaters | Non-motorized | Motorized |
|----------------|----------------|----------------|---------------|
| June | 13 (2.1%) | 11 (80.8%) | 3 (19.2%) |
| July | 120 (19.0%) | 103 (85.8%) | 17 (14.2%) |
| August | 279 (44.1%) | 245 (87.8%) | 34 (12.2%) |
| September | 200 (31.6%) | 178 (88.0%) | 25 (12.5%) |
| October | 20 (3.2%) | 13 (65%) | 7 (35%) |
| Totals | 632 | 550 (86.6%) | 86 (13.4%) |

Percentages in June and September were adjusted to account for 4 respondents participating in both motorized and nonmotorized boating activities.

One-third (33.7%) of motorized boaters claimed to be fishing during their stay, while 16.8% of non-motorized respondents marked fishing down as an activity. By contrast, only 9.4% of non-boaters were fishing during their stay.

Other Water Related Activities - The most frequent water activity listed by respondents was swimming (53.2 %), followed by boating (40.0%) and fishing (13.3 %) showing a small constituency. Scuba diving and windsurfing had very few responses.

Appendix C: Water Quality

I. Introduction

Waldo Lake is known for its outstanding water quality. The water has exceptional clarity and the deep blue color contributes substantially to the aesthetic appeal of the area. It is thought to be one of the most oligotrophic (nutrient poor) large lakes in the world. From the surface, it is often possible to see to depths of more than 100 feet. The high degree of clarity of Waldo Lake is due to low concentrations of organic and inorganic suspended particles and low concentration of dissolved organic substances. The water chemistry is reported to be similar to that of distilled water (Salinas 2000). The productivity of microscopic free-floating algae (phytoplankton primary production) is extremely low. Larson (2000) summarizing results of early investigations reported that Waldo Lake may be one of the least productive, freshwater, temperate lakes known.

The lake has a long water retention time estimated to be 32 years (Johnson et al. 1985). It has a maximum depth of 420 feet (128 m) and an average depth is 128 feet (39 m). There are no perennially flowing streams leading into the lake however there are numerous seasonally flowing streams generated by snowmelt runoff. The surface area of Waldo Lake is 6,298 acres (2,549 hectares) comprises approximately one-third of the entire lake basin. These factors along with the relatively stable geology and low levels of human impact are major factors contributing to low nutrient concentrations and low phytoplankton productivity in the lake.

Although the water quality of Waldo Lake remains very high, monitoring data has lead some scientists to conclude that the lake may be changing including a shift toward higher levels of biological productivity in the water column since the 1960s (Larson 2000).

These potential changes are primarily based on analysis of three types of monitoring data:

- A change in the optical properties of the water resulting in reduced penetration of blue light into the deeper regions of the lake
- A 20-fold increase in the primary production of phytoplankton
- An increase in the abundance of zooplankton and a shift in the species composition

Additional data is necessary to confirm these results. The Willamette National Forest has completed a Waldo Lake Science Plan (USDA 1999) that contains a strategy for studying baseline conditions and plans for a long-term monitoring program. At the current time, portions of the Science Plan are being implemented and additional studies are anticipated.

In June of 1997, the Willamette National Forest completed a report outlining a management strategy to protect the water quality of Waldo Lake from potential adverse effects associated with recreational use of the area (USDA 1997). The Willamette National Forest has implemented facilities and management changes since 1997 to insure the long-term protection of the water quality of Waldo Lake. These actions include:

- A permanent prohibition of camping on islands

- A temporary ban on camping along a portion of the north shoreline burned in a wildfire in 1996
- Implementation of a visitor education program on low impact recreation techniques
- Decommissioning of a recreational vehicle holding-tank dump station

Projects currently underway to improve facilities in developed campgrounds include:

- Replacement of older flush toilet facilities connected to drain fields and vault toilets with new composting toilets and vault toilets
- Replacement of existing gray water sumps in North Waldo and Islet Campgrounds and installation of new gray water sumps where none previously existed in Islet Campground

The potential for recreational use of the area to have adverse effects on water quality is a concern. This appendix addresses the potential for use of motorized watercraft or shoreline dispersed recreation sites to affect the water quality of the lake.

II. Potential Impacts of Motorized Boats

Watercraft equipped with gas-powered motors release a variety of contaminants into the air and water. Pollutants are released into the water during motor operation, from spills during refueling, and by draining bilge water from boats when they are taken out of lakes at boat ramps. Boat generated turbulence can increase shoreline erosion or re-suspension of bottom sediments increasing the concentration of organic and inorganic particles and nutrients into the water column.

Generally both four-cycle and two-cycle boat motors discharge their exhaust directly into the water. Most watercraft are powered by conventional carbureted two-cycle motors, these engines are reported to expel between 25 percent to 30 percent of their fuel into the water unburned (USEPA 1996, Boughton and Lico 1998, Asplund 2000). Some pollutants evaporate rapidly or they can be mixed into the water and persist for a period of hours to several weeks. In addition some pollutants associated with internal combustion engines can be adsorbed onto particles in the water and settle to the lake bottom where they can persist in the sediments.

Factors that can affect the fuel burning efficiency of two and four-cycle motors include; engine speed, the altitude at which engines are operated and how well they are tuned. Based on the findings of several investigators, Jackivicz and Kuzminski (1973) concluded that outboard motors are less efficient at lower engine speeds. The lower air pressure at high altitudes results in less complete fuel burning, and a poorly tuned outboard engine can use approximately three times more fuel than one properly tuned (Boughton and Lico 1998). A report prepared for the Environmental Quality Commission by the Oregon Department of Environmental Quality reviewed studies assessing the effects of motorized boats on water quality in lakes (Correll 1999). The report concluded that gas-powered boat motors have some negative but as yet unquantified impact on water quality in Oregon.

A. Hydrocarbons and Other Pollutants

Exhaust from conventional outboard motors contains a variety of pollutants. The most commonly studied are several volatile organic compounds (VOCs) including the hydrocarbons; benzene, toluene, ethylbenzene, xylene (BTEX). It is also possible that the fuel and exhaust may contain Methyl *tert*-butyl ether (MTBE). In addition, exhaust emissions contain polycyclic aromatic hydrocarbons (PAHs), and nitrous oxides (Boughton and Lico 1998). The EPA has estimated that a typical new outboard motor can emit as many VOCs in one hour as the typical passenger car traveling 800 miles (USEPA 1991). Motor boat use has also been associated with the potential for discharge of sewage and wastes into lakes. Little is known about the effects of chronic exposure to low concentrations of many motorized boat emissions. Several factors can influence the susceptibility of aquatic organisms to adverse effects of pollution including species specific sensitivity and the life stage of the organism (Bouchard 2000-01).

Volatile Organic Compounds

Although the concentration of BTEX can be exceptionally high immediately after the passage of a motorized boat, the concentration of these compounds in the water declines rapidly as a large portion is volatilized into the air (Correll 1999, Bouchard 2000-01). The rate of evaporation will depend to some extent on the air and water temperature and the degree of mixing with deeper water. If BTEX compounds are mixed below 3.3 feet, the rate of evaporation slows and is a function of the rate of mixing in the water column (Correll 1999).

The BTEX compounds can cause short and long-term adverse health effects. Oregon Administrative Rules for drinking water include maximum contaminant levels¹ (MCL) for VOCs including the BTEX compounds². Oregon Administrative Rules for water quality list benzene, toluene, and ethylbenzene as priority water pollutants³ (see Table 1).

MTBE is added as a fuel oxygenator for more complete combustion of fuel and has been found in lakes with motorized boating activity. MTBE is highly soluble in water and is resistant to biodegradation (Sakata 2000-2001). The presence of MTBE in lake water has been found to follow the general pattern of recreational use by motorized watercraft with internal combustion engines. The highest concentrations of MTBE are found around marinas or other areas of heavy motorized use (Lico 2004). Studies have measured the highest concentrations during the peak of the boating season and suggest that there is little inter-annual persistence (Reuter et al. 1998). Volatilization is a major mechanism resulting in the loss of MTBE from lake water with wind speed being a primary factor affecting the transfer rate of MTBE from the water to the air (Reuter et al. 1998).

In Oregon, ethanol rather than MTBE is generally used as an oxygenator in motor fuel. Ethanol biodegrades more quickly than MTBE and is expected to have a lower level of risk for drinking water. Although the Oregon Department of Environmental Quality

¹ Maximum contaminant level (MCL) – the highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

² OAR 333-061-0030, Table 4

³ OAR 340-41, Table 20: Water Quality Criteria Summary

(DEQ) does not require MTBE to be added to gasoline in Oregon, it has been detected in small amounts in the state's gasoline supply. Surveys conducted by DEQ found up to 2 percent MTBE in the gasoline supply. It is thought that it may be entering the state's gasoline supply as a residual component of gasoline from neighboring states such as California that use MTBE extensively. Small amounts of MTBE may also be added to gasoline sold in Oregon to increase octane levels (ODEQ, MTBE Fact Sheet).

Table C-1: Maximum Contaminant Levels (MCL) and Concentrations for Protection of Aquatic Life as Specified in Oregon Administrative Rules

| Contaminant | MCL (mg/L) | Concentration for Protection of Aquatic Life (mg/L) Fresh Water Acute Criteria |
|--------------------|-------------------|--|
| Benzene | 0.005 | 5.300 |
| Toluene | 1. | 17.500 |
| Ethylbenzene | 0.7 | 32.000 |
| Xylenes (total) | 10 | - |

Small concentrations of MTBE can cause drinking water to be non-potable due to offensive taste and odor. At higher levels it may pose a risk to human health. In December of 1997 the EPA released a non-regulatory advisory for MTBE in concentrations of 20 to 40 parts per billion to avoid unpleasant taste and order effects. The EPA believes MTBE in gasoline poses an unreasonable risk to the environment and has proposed rules to reduce or eliminate its use as a gasoline additive (USEPA, Federal Register, March 24, 2000, Volume 65, no. 58, Proposed Rules, p. 16094-16109).

During the summer of 1997, the U.S. Geological Survey, in cooperation with the Tahoe Regional Planning Agency and the Tahoe Research Group, sampled lakes in the Tahoe Basin for VOCs to determine the presence of gasoline products from watercraft or other sources (Boughton and Lico 1998). Sample sites included areas of boating activity on Lake Tahoe, as well as other lakes with limited or no motorized boating activity as background reference sites.

Results from the USGS study showed detectable levels of MTBE in all Lake Tahoe samples. Concentrations of MTBE were highest in areas with substantial motorized boat activity. In addition, some of the Lake Tahoe samples contained BTEX compounds. In lakes with no motorized boating or where use was limited to a few boats with small two-cycle engines, no MTBE, benzene, or ethylbenzene was detected. Small concentrations of toluene and xylene were detected in some samples from lakes with little or no motorized activity, as well as some quality control samples. Unintentional sample contamination was suspected in those samples from lakes with little or no motorized boating activity. Pollutants from boat motors varied spatially and temporally during the

sample period, however, no violations of drinking water standards or health advisories were detected.

Scientists studying Lake Tahoe concluded that 2-cycle motors used in personnel watercraft and other outboard motors accounted for more than 90 percent of the MTBE, 70 percent of the benzene, and 80 percent of the toluene into the lake. By contrast, four-cycle, inboard, fuel injected motors emitted 8 percent of the MTBE, 28 percent of the benzene, and 17 percent of the toluene. There was no evidence of deposition or accumulations of MTBE or BTEX to the bottom of the lake (USDA 2000a).

In another study on Lake Tahoe, researchers found in open waters with motorized boat use, concentrations of MTBE and BTEX were at or below detectable limits. At sites with concentrated use by 50 to 100 watercraft motors, samples contained MTBE and benzene concentrations that exceeded drinking water standards, however, concentrations did not approach the criteria for protection of aquatic life (USDA 2000a).

Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbons (PAHs) are organic compounds that include several petroleum products and their derivatives. PAHs make up approximately 30 percent of the compounds found in gasoline. The PAHs in gasoline have primarily two or three benzene rings⁴ and during the combustion process, heavier four or five ring compounds can be formed. In general, PAHs with more than three rings have poor biodegradability and can bioaccumulate (TRPA 1999).

The presence of PAHs in aquatic environments has been documented in many locations around the world (Wakeham et al. 1980, Helfrich and Armstrong 1986, Mastran et al. 1994, Vilanova et al. 2001). PAHs in the environment originate from many sources including; natural petrogenic (petroleum-generating) processes (Mastran et al. 1994), combustion processes including forest and prairie fires, decaying organic matter (Wakham et al. 1980), and volcanic eruptions (Ogunfowokan et al. 2003). The combustion of gasoline and diesel fuels, coal and wood are most likely the greatest sources of anthropogenic PAHs (Helfrich and Armstrong 1986). Inputs of anthropogenic PAHs into aquatic environments can come from atmospheric deposition (Heit and Klusek 1984, Vilanova et al. 2001), urban storm water runoff, municipal or industrial effluents (Helfrich and Armstrong 1986), or from motorized boat emissions (Mastran et al. 1994, Mosisch and Arthington 2001). PAHs have been detected even in remote mountain lakes with little human disturbance in their basins indicating atmospheric deposition as the primary pathway in these locations (Vilanova 2001, Heit and Klusek 1984). The concentration of PAHs found in remote aquatic environments is much lower than levels found in polluted aquatic systems associated with higher levels of human use (Heit and Klusek 1984).

Although some PAHs in lakes can originate from atmospheric deposition or are carried to the lake in surface water runoff, internal combustion engines associated with boating activity are thought to be the significant source of PAHs in lakes with this activity

⁴ A single benzene ring is composed of 6 carbon atoms and 6 hydrogen atoms

(Mastran et al. 1994, Mosisch and Arthington 2001). Mastran et al. (1994) found detectable levels of PAHs in the water column of a reservoir used as a source of drinking water and for boating with engines size limited to a maximum of 10 horsepower during peak boating periods. In that study no PAHs were detected in the water column during periods of low boating activity. Concentrations of PAHs tend to be highest in the vicinity of marinas or other area of heavy boating activity (Mastran et al. 1994, Asplund 2000, Lico 2004).

PAHs are not as soluble as some other pollutants (Mastran et al 1994) and tend to evaporate at a lower rate than BTEX compounds (TRPA 1999, Bouchard 2000-2001). The PAHs benzo(a)pyrene, chrysene, fluoranthene, phenanthrene and pyrene are known to be associated with the combustion of fossil fuels (Mosisch and Arthington 2001). Mastran et al. (1994) reported that fluoranthene, phenanthrene, and pyrene were common in the sediments of a reservoir with motorized boating activity. Mosisch and Arthington (2001) reporting on PAH residues from motor boats in the sediments of a lake found benzo(a)pyrene, fluoranthene, and pyrene at all sample locations. PAHs derived from combustion sources tend to have more of the higher molecular weight compounds including phenanthrene, fluoranthene, pyrene, and benzo(a)pyrene (Helfrich and Armstrong 1986, Mastran et al. 1994). The lower molecular weight PAHs (acenaphthene, naphthalene, and fluorene) are generally rapidly removed from the water column through volatilization and microbial degradation. The higher molecular weight PAHs are more susceptible to losses due to photo-oxidation and may be deposited in the sediments (Mastran et al. 1994). As a result, PAHs found in the water column do not persist one season to the next (Bouchard 2000-01) and are generally associated with recent or chronic pollution (Mastran et al. 1994). It has been estimated that up to 50 percent of the higher molecular weight PAHs entering the water can be deposited into bottom sediments where they are resistant to degradation and can persist for long periods of time (Mosisch and Arthington 2001).

In a study at Lake Tahoe before and after a ban on two-stroke motors, Lico (2004) reported that PAH concentrations and distributions were similar before and after the ban. Lico (2004) noted that the newer type of direct-injected two-stroke motors have been reported to emit similar amounts of PAHs when compared to those released by older carbureted two-stroke motors.

PAHs are known carcinogens and mutagens, and are toxic to aquatic organisms. Oris et al. (1998) conducted a series of experiments at Lake Tahoe to assess the potential toxic effects of ambient levels of motorized watercraft emissions on zooplankton and fish larvae. These investigators found sufficient concentrations of PAHs present to cause measurable adverse impacts on fish larvae growth and zooplankton survival and reproduction; and that the PAH concentration was related to the level of motorized watercraft activity. In a study of the effects of outboard motor emissions on fish, Koehler and Hardy (1999) concluded that moderate use of two-cycle outboard motors on large lakes resulted in little to no adverse effects on water quality. However, these investigators found that heavy use of two-cycle motors on small lakes with limited dilution capacity could result in PAH concentrations large enough to inhibit early life

stage development of some fish. Table 2 contains threshold effect and probable effect concentration values for PAHs for the protection of aquatic life in sediments as stated in guidelines proposed by the US Environmental Protection Agency (USEPA 2002).

Nitrogen Oxides

Nitrogen oxide compounds are released into the water from outboard motors and can potentially be converted to nitrates. Nitrogen oxide compounds discharged into the air from boat motors can also be transformed into nitrates by atmospheric processes and potentially be deposited into the lake (TRPA 1997). Nitrates are essential nutrients for aquatic plants and algae and their availability often limits plant growth in aquatic environments.

Table C-2: Consensus-based Threshold Effect Concentrations⁵ (TEC) and Probable Effect Concentrations⁶ (PEC) for PAHs in Sediment in µg/kg dry weight (USEPA 2002).

| PAH compound | Consensus-Based TEC | Consensus-Based PEC |
|----------------------|---------------------|---------------------|
| Naphthalene | 176 | 561 |
| Acenaphthylene | NG | NG |
| Acenaphthene | NG | NG |
| Fluorene | 77.4 | 536 |
| Phenanthrene* | 41.9 | 1170 |
| Anthracene | 57.2 | 845 |
| Fluoranthene* | 111 | 536 |
| Pyrene* | 53 | 1520 |
| Benzo(a)anthracene | 31.7 | 1050 |
| Chrysene* | 57.1 | 1290 |
| Benzo(b)fluoranthene | NG | NG |
| Benzo(k)fluoranthene | NG | NG |
| Benzo(a)pyrene* | 31.9 | 1450 |

* PAHs known to be associated with the combustion of fossil fuels. NG – No Guidance

⁵ Threshold Effect Concentration below which harmful effects are unlikely to be observed (USEPA 2002)

⁶ Probable Effect Concentration above which harmful effects are likely to be observed (USEPA 2002)

Sewage and other wastes

Discharge of sewage and other wastes from boats has the potential to degrade water quality particularly where motorized boat use is concentrated. Large boats can discharge black wastes⁷ or gray water⁸ from facilities on board or human wastes can be tossed over the side of boats. Liddlf and Scorgie (1980) noted that the degree sewage from boats has potential to impact the nutrient status of a water body depends to some extent on the “natural” nutrient status of the water body and the quantity and composition of the effluent. In oligotrophic lakes, even a small increase in nutrient availability can promote the growth of algae.

B. Sediment and Physical Disturbance from Motorized Boats

Physical effects of motorized boat operation can include the cutting effects of propeller action on aquatic vegetation, and direct contact of the boat or motor with benthic organisms (Liddlf and Scorgie 1980, Mosisch and Arthington 1998). In addition, studies have shown motorized boats can generate suspended sediment due to shoreline erosion from boat wakes, or in shallow areas, by the turbulence created near the sediment water interface (Asplund 2000). The re-suspension of bottom sediments can also incorporate nutrients that promote the growth of phytoplankton into the water column. Yousef et al. (1980) concluded that suspension of bottom sediments by motorboats can increase turbidity and concentrations of orthophosphate and total phosphorus in the water column potentially increasing lake productivity. However, Yousef et al. (1980) found that in a deep lake with a sandy bottom the potential to effect turbidity or nutrients was significantly reduced.

An additional factor that can reduce the potential for phosphorus mixed into the water column by boat turbulence to contribute to lake productivity is how well the nutrient phosphorus is strongly adsorbed onto sediment particles under oxygenated conditions (Wetzel 2001). Increases in suspended particulate matter, either organic or inorganic, has the potential to reduce water clarity. In addition, particles suspended in the water can reduce light penetration potentially reducing the productivity of a lake (Kirk 1985).

C. Revised EPA Standard for Boat Motors

The EPA established a new standard for watercraft motors that went into effect December 3, 1996 (USEPA, Federal Register, October 4, 1996, Volume 61, No. 194, Rules and Regulations, pp. 52087-52169). These regulations apply only to new outboards and new personal watercraft motors.

The new standard requires a 75 percent reduction in hydrocarbon emissions, from 1996 levels by the year 2006. The new standard is being applied on a corporate average basis requiring that the average emissions of engines for a manufacturer must comply over its

⁷ “Black waste” means human body wastes including feces, urine, or other extraneous substances of body origin and toilet paper. OAR 340-071-0100(16)

⁸ “Gray water” means sewage such as bath water and kitchen waste water that does not contain human body wastes including feces, urine, other extraneous substances of body origin and toilet paper. OAR 340-071-0100(68)

entire product line. Some new engines could still use conventional technology after the year 2006 as long as emission reductions are achieved when averaged over the entire range of products. The emission controls for these new engines have an increasingly stringent phase-in period that began in 1998. One benefit the EPA anticipates from the new emission standards is an increase in fuel economy. The EPA estimates changing outboard engines from conventional two-cycle to four-cycle technology will result in decreased fuel consumption by approximately 31.5 percent (USEPA 1996b)

The new EPA emission standards are expected to increase the amount of nitrogen oxide emissions from outboard and personal watercraft motors by a relatively small amount. Nitrogen oxide emissions from these engines are expected to increase from a range of 0.5 g/kw/hr up to 4.0 g/kw/hr to a maximum rate of 6.0 g/kw/hr over the phase-in period (USEPA 1996b). Depending on the amount of nitrate and nitrite which is converted from nitrogen oxide emissions, this change in engine technology has potential to increase nitrogen loading to the lakes to some extent.

There are a number of existing motor technologies that currently meet the new EPA standard for reduced hydrocarbon emissions. These available options include two-cycle direct fuel injection engines, four-cycle engines, and electric motors.

III. Dispersed Recreation Sites

Studies attempting to link the intensity of dispersed recreation on water quality have produced a variety of conflicting results ranging from a positive correlation to none (USDA 2000a). Nevertheless, dispersed recreation sites have the potential to be source areas for sediment or other contaminants introduced by visitors.

A. Sediment and Dispersed Recreation

Heavily impacted dispersed recreation sites located on or near the shoreline of lakes can be source areas of sediment. Although the impacts of dispersed recreation on sediment delivery have not been systematically quantified (USDA 2000a), the trampling of vegetation in heavily used sites results in core areas of bare soil and user defined trails that lack soil-stabilizing vegetation. Liff and Scorgie (1980) noted that along shorelines some people will deliberately clear marginal vegetation to gain easier access to the water and vegetation may also be damaged by people walking parallel to the water's edge. Surface runoff from heavily impacted sites has the potential to contribute sediment to adjacent water bodies. As the frequency of dispersed site use or the number of dispersed sites increases around a water body, there is the potential for adverse water quality effects by sediment transport from these dispersed recreation sites.

B. Microorganisms and Pollutants

Improper use of soaps and detergents by people using dispersed recreation sites can also be a source of pollution for lakes. Introduced soaps and detergents, particularly those with high phosphorus content, have the potential to increase the availability of nutrients for algae or aquatic plants growing in the lake. Increased growth of phytoplankton in

lakes has the potential to decrease water clarity and penetration of light to deepwater areas.

Improper disposal of wastes from humans or their animals has the potential to introduce pathogenic microorganisms (i.e. *Cryptosporidium* spp. and *Giardia* spp.) into adjacent water bodies. However, pathogenic microorganisms have been found in water in watersheds where recreation is prohibited (USDA 2000a). Human or animal waste in lake water can also be a source of nutrients (particularly nitrogen and phosphorus) that can increase productivity in the lake.

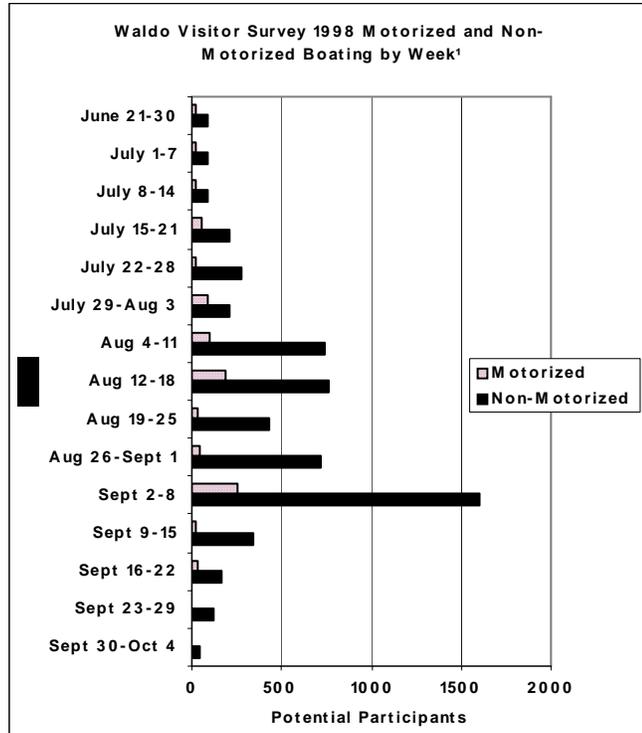
IV. Potential Impacts to Waldo Lake

A. Motorized Boats

The number of motorized boats currently using Waldo Lake during the summer boating season is low. The peak recreation season is short, generally from mid-June through the first week of September with the most of the use occurring on weekends. The majority of current boating use on Waldo Lake is non-motorized (boats propelled by paddle or sail). Figure 1 displays a summary of data collected during the 1998 summer season comparing the numbers of people using motorized versus non-motorized boats.

The State of Oregon has placed a speed restriction for motorized boats over the entire surface of Waldo Lake (OAR 830.185/250-020-0221). A 10 mph speed limit applies to the majority of the lake, however within 300 feet of a boat ramp or moorage, a slow no wake, 5 mph maximum is in effect. These speed restrictions have essentially eliminated water skiing and use by personal watercraft (e.g. brand name Jetskis or similar watercraft) is very rare.

Figure C-1: Boating Use by Week



¹ Data includes only surveyed visitors, not total boating use, as a representative sample.

Hydrocarbons and Other Pollutants

Since the majority of motorized boat use on Waldo Lake occurs in late summer when air and surface water temperatures are relatively high, volatilization rates of unburned hydrocarbons, including BTEX compounds and lower molecular weight PAHs, will be high. In addition, the water of Waldo Lake generally contains few suspended particles that would potentially act adsorption sites for higher molecular weight PAHs.

Waldo Lake becomes thermally stratified during the summer boating season causing warmer surface waters to be highly resistant to mixing with deeper, colder water. Since the average depth of Waldo Lake is 128 feet (39 m) and the thermocline is generally at a depth between approximately 33 feet (10 m) and 66 feet (20 m) (Salinas 2000), a large portion of the bottom area of the lake is isolated from surface waters during the summer boating season. This stratification minimizes the potential for direct impacts of boat motor emissions to the biota of these deeper areas.

The risk of contamination by detectable levels of MTBE in Waldo Lake is low due to the small percentage of the state’s gasoline supply containing MTBE, low motorized use levels on Waldo Lake, volatilization rates of MTBE, and short season of use. In addition,

it is likely the use of MTBE as a gasoline additive will be greatly reduced or eliminated in the future.

Areas near boat ramps and docks are more susceptible to impacts from motorized boats than open water areas. Waters around the North Waldo and Shadow Bay boat ramps, and to a lower degree at the Islet boat ramp, experience more concentrated motor boat use and related vehicle traffic. These waters are also shallow and partially confined by islands or peninsulas which limit the degree they mix with water from the large, open portions of the lake. These factors result in a decreased dilution potential near these boat ramps.

In addition to more concentrated boat traffic, boats frequently refuel at these sites, bilge water is drained from boats when removed from the lake on ramps, operators frequently warm-up the boat engines by idling them in one location for period of time, and gas and oil residues from tow vehicles can wash into the water. In the vicinity of boat ramps and docks, PAHs or BTEX compounds may be detectable in the water column during peak boating periods primarily from August 1 through the Labor Day weekend. These pollutants would not be expected to persist in the water column from one season to the next. Due to the potential for PAHs to be adsorbed onto sediment particles and the slower rate of biodegradation of these compounds, there is a potential for accumulations of PAHs in sediments adjacent to boat ramps where they could potentially be damaging to benthic organisms.

Limited monitoring data is available to determine the current level of hydrocarbon or other potential pollutants from boat motors in Waldo Lake. To determine if motorized boat emissions have resulted in significant build-up of PAHs in the sediments of Waldo Lake, sediment samples were collected in November 2003 at eight sites in Waldo Lake and analyzed for PAHs. Two samples were taken near each of the three boat ramps and two additional samples were taken at more remote sites in the southern portion of the lake. CH2M Hill Applied Science Laboratory located in Corvallis, Oregon performed the PAH analysis on these samples. These samples were analyzed for PAHs known to persist in lake sediments and include those PAHs associated with the burning of fossil fuels and motorized boat use. None of the samples analyzed contained concentrations of PAHs above detectable levels at the specified reporting limits as displayed in Table 3. All of the reporting limit values from Waldo Lake sediment samples (Table 3) were lower than the Threshold Effect Concentrations (Table 2) below which harmful effects are unlikely to be observed (USEPA 2002).

As newer reduced-emission engines become more common in the future, the potential for watercraft engines to adversely affect water quality will decrease. It likely will be several years, however, before significant reductions in emissions can be achieved through new emission standards as the replacement of older engines with new technology has been moderately slow.

Table C-3: Lowest Detectable Reporting Limit for PAHs in Waldo Lake Sediment Samples ($\mu\text{g}/\text{kg}$ dry weight)

| Analyte (PAH) | Sample Location and Site Number | | | | | | | |
|-----------------------------|---------------------------------|------------------|------------|------------|-----------------|-----------------|-------------------------------|-------------------------------|
| | North Waldo 1 | North Waldo 2 | Islet 1 | Islet 2 | Shadow Bay 1 | Shadow Bay 2 | South Waldo ¹ 1 | South Waldo ¹ 2 |
| Naphthalene | 16 | 19 | 10 | 15 | 13 | 13 | 14 | 14 |
| Acenaphthylene | 16 | 19 | 10 | 15 | 13 | 13 | 14 | 14 |
| Acenaphthene | 16 | 19 | 10 | 15 | 13 | 13 | 14 | 14 |
| Fluorene | 16 | 19 | 10 | 15 | 13 | 13 | 14 | 14 |
| Phenanthrene ² | 16 | 19 | 10 | 15 | 13 | 13 | 14 | 14 |
| Anthracene | 16 | 19 | 10 | 15 | 13 | 13 | 14 | 14 |
| Fluoranthene ² | 16 | 19 | 10 | 15 | 13 | 13 | 14 | 14 |
| Pyrene ² | 16 | 19 | 10 | 15 | 13 | 13 | 14 | 14 |
| Benzo(a)anthracene | 16 | 19 | 10 | 15 | 13 | 13 | 14 | 14 |
| Chrysene ² | 16 | 19 | 10 | 15 | 13 | 13 | 14 | 14 |
| Benzo(b)fluoranthene | 16 | 19 | 10 | 15 | 13 | 13 | 14 | 14 |
| Benzo(k)fluoranthene | 16 | 19 | 10 | 15 | 13 | 13 | 14 | 14 |
| Benzo(a)pyrene ² | 16 | 19 | 10 | 15 | 13 | 13 | 14 | 14 |

¹ Remote sites distant from areas of concentrated use near boat ramps

² PAHs known to be associated with the combustion of fossil fuels

The EPA expects that emissions of hydrocarbons from boat motors will be reduced by 50 percent by the year 2020, and by 75 percent by the year 2025 (USEPA 1996a). It should be recognized however that a 75 percent reduction in hydrocarbons is measured as a corporate average, and it is possible that the cumulative emissions of motorized boats used on Waldo Lake may not actually achieve this level of reduction. In addition, hydrocarbon emissions from motors operated at Waldo Lake could be greater due to the lake's altitude. Engines properly tune for lower elevations would likely burn fuel less efficiently at the elevation of Waldo Lake (5,414 feet), and potentially increase emissions during operation.

Nutrient loading from motorboats has the potential to increase in the future depending on the amount of nitrogen oxide emissions converted to nitrate. The extent that nitrogen

compounds from boat motor emissions would add to the nutrient loading of the lake cannot be reliably estimated. Algal bioassays conducted on water from Waldo Lake by Miller et al. (1974) indicated that the addition of nitrogen alone did not increase algal growth, so some other nutrients (other than nitrogen or phosphorus) could be limiting algal growth in Waldo Lake. In addition, several species of cyanobacteria capable of fixing nitrogen are known to cover a large portion of benthic surfaces in Waldo Lake (Johnson and Castenholz 2000). These benthic cyanobacteria can provide a nitrogen source in a form that plants can utilize for growth when nitrogen becomes limiting. Because nitrogen has not been found to limit algal growth in Waldo Lake, it is not likely that increased nitrogen loading from motor boat use in Waldo Lake would have a significant effect on the water quality or lake biota.

The 10 mile-per-hour speed limit on Waldo Lake when combined with new engine technology would likely reduce the potential for contaminants from outboard motors. Four-cycle outboard motors operating at the low to mid-range of their capability are very fuel-efficient and generally would achieve the maximum speed allowed within this range of operation. At full throttle, however, both four and two-cycle of engine tend to use more fuel and are similar in efficiency (Fleming 2000).

Some outboard motors on Waldo Lake are used primarily for auxiliary power. Large sailboats often use outboard motors only while maneuvering near boat ramps and bays, or when wind conditions are not favorable for sailing under wind power alone.

Contamination during refueling is likely to be a small source of pollutants due to the relative low numbers of motorized boats and a lack of refueling facilities within the basin. Releases that do occur during refueling are the result of individual operator error, but should be infrequent.

As use of gasoline-powered boat motors, including older two-cycle motors, continues on Waldo Lake into the future and use levels increase in parallel with projected population increases in Oregon, contaminate levels in Waldo Lake from boat motor use will likely increase for at least several years. The new EPA emission standard will likely decrease the potential for pollution from boat motor hydrocarbons over time. Detectable impacts to water quality could occur in the future, however, if there is a substantial increase in the number of gasoline-powered motorboats. Due to unknown factors related to the future rate of emissions and variables affecting the persistence of pollutants in the environment, a threshold for acceptable gasoline-powered boat motor use to avoid adverse environmental effects cannot be reliably quantified.

Sewage

Since the majority of boat use is non-motorized and large boats comprise a small component of the recreation use, the current discharge of sewage into Waldo Lake from motorized boats is not likely to be a notable problem. This finding is consistent with observations by Forest Service personnel who have noted few problems associated with the discharge of sewage from boats. In addition, the Forest Service has received few complaints from lake visitors related to the discharge of sewage from boats. Improperly treated human waste from dispersed recreation areas along the shoreline of the lake could represent a higher risk of water pollution than waste discharge from boats.

Sediment and Physical Disturbance from Motorized Boating

Nearly all of the shoreline of Waldo Lake is composed of rocky substrate of various sizes highly resistant to the erosive effects of waves. In addition, the State of Oregon has placed a 10 mph speed limit for motorboats and a slow no-wake maximum 5 mph speed restriction within 300 feet of boat ramps. These speed limits further reduce the potential for significant shoreline erosion from boat wakes (ORS/OAR 830.185/250-020-0221).

Because the majority of Waldo lake is relatively deep (average depth 128 feet), only a small portion of the lake bottom is susceptible to suspension of sediments from boat motor-generated turbulence. Due to the small area affected, re-suspension of bottom sediments and associated nutrients (primarily nitrogen and phosphorus) are not likely to have a significant effect on water quality. Algal bioassays conducted on water from Waldo Lake by Miller et al. (1974) indicated that some other nutrients besides nitrogen or phosphorus could limit algal growth in the Waldo Lake.

Adverse effects to submerged aquatic plants from motorized boating in Waldo Lake is likely to be minor because of average water depths and the generally rocky substrate near shore does not support an extensive macrophyte population in this shallow water zone. Although boating use does result in disturbance to emergent vegetation along the shoreline in popular areas where people pull their boats up onto the shore, overall the number of dispersed sites impacted by this activity is higher from non-motorized boat use.

An exception to the deep water condition is the area near the boat ramp in Shadow Bay. Due to the shallow water in this area, particularly during the late summer and fall seasons, turbulence from motorized boats can disturb fine bottom sediments. Surface observations have shown that the visible effects of this sediment disturbance are short in duration. In addition, under oxygenated conditions, the phosphorus potentially released from the sediments by motor turbulence in this area is strongly adsorbed back onto particles in the water and the majority of phosphorus returns to the lake bottom with sediment particles. Due to the small area affected, a short boating season, and lower use levels than the North Waldo boat ramp, disturbance of lake sediments by boat motors is not likely to have significant adverse effect on water quality in the lake.

B. Dispersed Recreation Sites

Visitor surveys from the Waldo Lake area indicate the majority of overnight visitors stay in developed campgrounds where facilities help to reduce the potential impact of concentrated use. Use of dispersed sites is less regulated and has the potential to produce adverse impacts.

One important factor for reducing water quality impacts from dispersed recreation activities is visitor education that emphasizes proper waste disposal and appropriate camping behaviors. The Willamette National Forest has an ongoing visitor education program at Waldo Lake during the summer season. Goals of this program include educating visitors about low impact techniques to help protect the water quality of Waldo Lake, and the unique qualities of the Waldo Lake ecosystem.

Sediment and Dispersed Recreation

Currently fifty-one (51) inventoried dispersed recreation sites are located along the lakeshore outside of developed campgrounds. The principal use of these sites is for overnight camping. These sites typically have barren core areas of compacted soil and trails which lack soil stabilizing vegetation or a buffering duff/litter layer. Currently the combined barren core area of all 51 dispersed recreation sites totals less than two acres.

Without mitigating management actions, an increase in the use of dispersed recreation sites in the future would likely lead to expansion of the barren core areas of at least the most popular sites. In addition, as the number of visitors exceeds the capacity of the existing number of sites, additional new sites will likely be established in the future to meet demand.

Although it is unlikely that dispersed recreation sites are creating measurable adverse impacts to water quality at the current time, a substantial increase in the number or size of barren core areas and user trails in the future cumulatively could have the potential to produce adverse effects.

Microorganisms and Pollutants

Since pathogenic microorganisms have been found in water even where human recreational use is prohibited, the presence of these organisms in Waldo Lake is possible under any dispersed site use level. Increasing human use in the future could increase the risk of introduced contaminants from human wastes or products such as soaps or detergents affecting the water quality of Waldo Lake. A short season of high recreational use, the fact that most overnight visitors stay in developed campgrounds where wastes can be more effectively managed, and the dilution capacity of the lake all contribute to lowering the potential for adverse water quality effects from human contaminants. This potential is not likely to change much in the future, at the projected rate of growth in recreation use at Waldo Lake.

Algal bioassays have shown that increases in nitrogen alone to Waldo Lake water did not stimulate algal growth (Miller et al. 1974). In addition, several species of cyanobacteria are known to cover a large portion of benthic surfaces within Waldo Lake (Johnson and Castenholz 2000). Some of these species of cyanobacteria are known to have the ability to fix nitrogen and have the potential to be a significant source of this nutrient under conditions when nitrogen limits productivity. As a result, an increase in the availability of combined nitrogen in Waldo Lake from human waste as a result of dispersed recreation use is not likely to significantly increase productivity in Waldo Lake.

The addition of the phosphorus to Waldo Lake from improperly disposed human waste at dispersed recreation sites, however, does have the potential to increase nutrient availability to a limited degree. Such increases are not likely to significantly increase the productivity of the lake due to factors such as a short season of use and the concentration of overnight use in the campgrounds where human wastes can be effectively managed. Current management direction prohibiting camping on islands also ensures that human wastes are not deposited near the shoreline of the lake. Finally, the environmental education program at Waldo Lake helps mitigate phosphorous sources by providing visitors with information on how to properly dispose of human waste and kitchen water.

Additional management regulations that limit use or restrict certain types of visitor behavior would reduce the potential for adverse effects to water quality in the future. Requiring potentially high impact activities to occur further from the edge of the lake (e.g. designating the location of overnight dispersed sites) would reduce the risk of adverse effects to water quality from human use.

V. Conclusions

No evidence currently exists that conclusively links recreation activities on or in the vicinity of Waldo Lake to a decline in the water quality of the lake. If water quality has indeed changed over the last 30 years, increasing recreational use (including motorized boating or dispersed camping) has potential to contribute to changes in water quality. Further studies will be necessary to understand how these recreational uses may be impacting the ecology of the lake.

At current use levels, however, it is unlikely that motor boats or dispersed site use is having significant adverse effects on the water quality or biota of the lake. In the future, as population growth continues in the state's urban areas, recreational use of Waldo Lake is likely to grow in all seasons but particularly during the mid-summer to fall seasons. Increasing recreational use is likely to place more stress on the relatively fragile environment surrounding the lake, which may require additional measures to protect these unique qualities of Waldo Lake.

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Appendix D: Willamette PAC Authorization and Recommendations of Waldo Lake Subcommittee

WILLAMETTE PROVINCE ADVISORY COMMITTEE

Meeting Notes

April 9, 1998

ATTENDANCE

Members Present: Denis Williamson (Chair), Herb Wick (for Darrel Kenops), Lorna Stickel, Wade Stampe, Cole Gardiner, Cliff Adams, Russ Peterson, Wayne Geisy, Dave Schmidt, Robert Buckman, Art Mancl, Ellie Dumdi, Mark Shaw, Neal Forrester (Designate Federal Official).

Member Absent: Michael Rylko, Gary Varner, Michelle Day, Joe Evans, Olney Itatt, Judie Hamerstad, Ross Mickey, Dick Vander Schaff, Jeff Kohnstamm, Scott Pineo, Tamera Townsend-Berger, Arley Smith.

Other Attendees: Harold Belisle, REO; Wayne Elliott, Eugene BLM; Chris Pazzula, Mt Hood NF; Mark Lawrence, Dick Prather, Salem BLM; Brad Levitt, Brian McGinley, Donna Short, Todd Bucholz, Sweet Home RD; Jim Williams, South end District; Peter Watt, Willamette Valley Livability Forum.

MEETING MINUTES

Willamette Valley Livability Forum (Peter Watt) -The WVLF is comprised of 88 Willamette Valley citizens brought together by Governor Kitzhaber to find and promote collaborative solutions to the growth and development issues facing Willamette Valley communities. Mr. Watt made a presentation explaining in greater detail the goals and objectives of the Forum, accomplishments to date and their projected schedule or timeline. Follow up questions and discussion with PAC members clarified how the Forum and the PAC could most effectively interact to accomplish common goals.

Objectives of the WVLF: Sharing information, Making Connections, Building a Vision.

The goal of the forum is to produce a Vision of the Willamette Valley for the next 50 years with the expectation that this vision will influence decision makers at all levels in the Valley (state, county, community) as they make policy decisions affecting development and growth. The schedule is to complete this Vision statement/document by June 2000.

Darrel Kenops and Denis Williamson are ex-officio Forum members representing federal land managers and Mark Lawrence is a member of the Resource Task Force or subcommittee of the Forum.

Questions and comments raised by PAC members:

- Concern that the membership on the Forum does not adequately represent agriculture and timber production in the Willamette Valley.
- Most of the valley population is urban and the values are increasingly reflect urban values and the values of rural residents (including smaller communities) are overshadowed. Non-

urban areas are increasingly looked at as their primary purpose is to provide benefits for the urban populations (recreation, pristine watersheds) rather than areas to produce agricultural commodities.

PAC Discussion:

The economic recovery strategy for the Northwest Forest Plan involved more than just the Federal land and natural resource agencies. The Department of Labor and the Small Business Administration just to name two, were major players in providing direct economic assistance at the regional and local levels to encourage economic recovery and growth. It would be good to get a follow up speaker(s) at a future PAC meeting that could describe the broader picture of economic assistance programs and what they have accomplished.

WALDO BASIN – SUBCOMMITTEE PROPOSAL (Jim Williams, Brian McGinley)

The Willamette National Forest, in response to on-going issues and concerns, is proposing a planning and assessment project for Waldo Lake it's surrounding basin area. The assessment will address water quality, relationships between human use and water quality and social issues associated with recreation use on and around the lake. After reviewing the scale and scope of these issues and the level of public interest, the Forest proposes that a collaborative planning approach with the participation of the Willamette PAC (both directly and through subcommittee) is more likely to succeed than traditional Forest Service planning processes. The specific proposal is for the PAC to authorize/create a subcommittee that would spend 14-16 months working through the various issues and propose a management strategy to the Forest Service. The subcommittee membership would include a few PAC members and/or their delegated representative and individuals that represent major users and constituents of Waldo Lake and the basin.

PAC Discussion:

- Concern about the ability for the entire PAC to be informed enough about the process and recommendations because of the intensity of the subcommittee work that is proposed and the length of time that it will be occurring.
- Many of the current PAC members appointments will expire at the end of this calendar year. That could present a problem for continuity through the process, PAC members being knowledgeable of the issues and background.
- Most PAC members will not have the time to be personally involved in the subcommittee process because of the number of additional meetings that are envisioned.
- Not sure exactly what the scope or depth of issues are based on information that is available. That makes it difficult to decide how to be involved or to provide feedback on potential PAC involvement.

PAC DECISION (Consensus based on polling of the members in attendance by the PAC Chair) **The Willamette PAC supports and agrees to the formation of a PAC subcommittee to work on the Waldo Lake issues as presented.** The PAC wants periodic updates and interaction with the subcommittee (or representatives) at regularly scheduled PAC meetings so that the entire PAC can follow the development of issues and recommendations and provide feedback during the process, not just be presented with a final recommendation at the end. PAC members interested in participating on the subcommittee (or identifying someone to represent them) should contact Neal Forrester by May 1. Notices and schedules of all subcommittee meetings will be sent to PAC members.

WILLAMETTE PROVINCE ADVISORY COMMITTEE

Committee Meeting Notes
February 17, 2000
Salem BLM District Office

Leadership Announcement – Julia Dougan, Associate District Manager Eugene BLM will serve as the Willamette PAC Chair for the next several months while Denis Williamson, Eugene BLM District Manager is filling in as District Manager at the Salem BLM District. Darrel Kenops, Willamette National Forest Supervisor will continue to be the alternate PAC Chair for the remainder of the 2000.

Attendance:

PAC Members – Julia Dougan, Darrel Kenops, Dave Schmidt, Wade Stampe, Ginny Van Loo, John Davis, Peter Wakeland (for Cliff Adams), Cole Gardiner, Jim Zelenka, Jim Thrailkill (for Dana Erickson), and Wayne Giesy. Neal Forrester, DFO.

Others in attendance – Rob Iwamoto, Willamette National Forest, Harold Belisle, REO, Scott Abdon, Salem BLM.

Meeting Notes

PAC Agendas for 2000

Neal Forrester, DFO presented the proposed agenda topics survey results. The committee reviewed a proposed outline of meeting dates and topics for the remainder of 2000. The significant modification to the proposed schedule was the addition of a July 20 meeting to deal with several important topics that will be coming before the committee this summer. The modified meeting schedule was adopted by consensus. (Copy of schedule enclosed)

Information Sharing

Cole Gardiner – Attended Pacific Gas and Electric relicensing meeting and was impressed with the forthrightness of National Marine Fisheries Service presentation on what project modifications would be required to protect fisheries. He is also involved again this year with planting trees on private lands (stream banks, abandoned pasture lands) in the Clackamas River watershed as part of the Watershed Council's restoration efforts.

Jim Zelenka – Shared two handouts with the group. First, the Annual Report of the Cascade Pacific Resource Conservation and Development Council and second a summary of the Oregon Resource Conservation and Development Councils and Project Activities. Both publications provide good overviews of how the RC&D Councils are working to achieve the natural resource and community goals in the Willamette Province and the State as a whole.

Jim Thrailkill – Plans are underway for an October statewide meeting of watershed councils and soil and water conservation districts. Topics at the meeting will include examples and lessons learned from restoration projects, watershed council

liability issues, the need for and potential sources of technical support. OWED is working on a framework for watershed councils to use when planning projects that should be useful to the councils.

Wayne Giesy – Shared information on the status of the lawsuit brought by local organization against the National Marine Fisheries Service over the management of hatchery fish in the Alsea River. The group does not agree with the policy/practice of killing large numbers of returning hatchery adults. Also attended one of the NFMS public meetings on the proposed 4d rule and noted that a large number of people attending had serious concerns with the agency's plan.

Scott Abdom – The Salem BLM recently has become more active in the proposed 4d rule and its implementation in the Bull Run/Little Sandy River watershed. Part of the reason for the increased involvement is the BLM's role in a proposed land exchange in the watershed. The proposed rule is a major issue/concern for the City of Portland and how it will interact with management of the watershed as a municipal water supply. As a result of this concern, the city has proposed a policy level working group of federal, state, and local agencies to discuss Sandy River basin issues. The policy group will advise a technical working group (biologists and others). The ultimate goal is a Habitat Conservation Plan for the basin.

John Davis – On-going and upcoming issues that affect the province are the lynx listing and the coastal cutthroat trout proposed listing and change from NMFS to USFWS. The State Director's position has been filled (Kemper McMaster) and will be reporting in mid to late March. Once he is on-board, other vacancies in the State Office will be filled.

Julia Dougan – Distributed handouts for Paul Jeske, River Navigator for the American Heritage River program on the Willamette.

Harold Belisle – At the last IAC/RIEC meeting, the proposal for a joint PACs and IAC meeting was tabled because of the large cost to the Forest Service. However, several IAC members were still interested in pursuing ways to improve communication with the PACs. The proposals include, more active REO participation on the PACs (letter coming from RIEC soon with REO member assignment by PAC), several IAC members meeting with individual PACs at the PAC meetings, or individual IAC members meeting with PACs if agenda topics are pertinent to their area of responsibility or expertise.

On monitoring, a regional monitoring team is being set up. Al Horton, Forest Service, will be heading up the implementation monitoring for 2000 and there is still time to get suggestions to him. Dave Bush has also offered to provide an update to the PAC on the overall monitoring program.

Ginny Van Loo – Clackamas County forum for ESA compliance has begun to meet. The next forum meeting will include groups outside the county government. One of the biggest or most immediate issues facing the county is the issue of culverts and fish passage.

Darrel Kenops – Introduced Rob Iwamoto, Deputy Forest Supervisor on the Willamette National Forest who has been here for about 3 months. Shared information on an emerging controversy on the Forest, the Warner Creek Fire Process RNA, specifically the timeframe and resource availability for doing the analysis and NEPA documentation required to make a significant amendment or revision to the Willamette National Forest Plan. Was in Washington DC in December briefing the WO and congressional staff on the quality jobs program.

Wade Stampe – The Corps of Engineers has submitted a Biological Assessment to the USFWS and NFMS for the Corps Willamette Basin projects. This is the first step in getting a Biological Opinion.

Dave Schmidt – The proposed 4d rule for listed fish has been a major topic at the county government level. Also, Scio, a small town in Linn County, has been flooded several times in the past decade. The Corps of Engineers is working with Scio on a flood control study.

Public Forum

Several persons connected with the special forest products (or nontimber forest resources) industry were on hand to address the PAC. Their interest in speaking to the PAC was a provision in the fiscal year 2000 interior appropriation bill that directed the Forest Service to make significant changes in how special forest products are sold and how the funds collect from the sale of these products are used. The speakers specific concerns included: surprise by the law and concerned that the people most affected were not involved, concern about how the fair market value would be established, the lack of adequate science and basic knowledge to determine sustainability, and concern about how the funds from the sale of the products would be used. Persons addressing the PAC were Kathy Patterson, Rebecca McLain, Eric Jones, and Arlie Smith. Their request to the PAC was to contact the Secretary of Agriculture and request involvement as the Forest Service goes about writing the regulations and policy to implement the provisions in the appropriations act.

After discussion among the PAC members, the following course of action was approved. First, Arlie Smith will send a letter to the PAC documenting the group's issues and concerns with the new special forest products laws. Second, after receiving this letter, Darrel will draft a letter to the Secretary from the PAC requesting a waiver so the special forest products businesses can continue to operate under current policy and direction until the details of the new legislation are sorted out. Third, the Forest Service will check with the Washington Office on what the timetable is for writing the regulations and agency policy for implementing the legislation.

Payments to Counties, Receipts from Federal Lands Issue Update

Dave Schmidt shared what he knew about the status of legislation currently pending in Congress regarding payments to counties. Tom Haswell noted several provisions in the legislation Dave was discussing were controversial and it was being opposed by several environmental organizations.

Rechartering and Membership

Neal Forrester shared with the group that the IAC and PAC charter expires later this year. The Regional Office has started gathering the information necessary to recharter the committees. PAC members that will exceed six years of membership will need a special waiver. More information on this will follow in the coming months.

PAC Comments on Forest Service revised planning regulations

The subcommittee on the proposed revision to the planning regulations met twice, once in December and again in January. The consolidated comments were sent to the team working on the regulations. Since the entire PAC was not involved the comments were described as a collection of comments of individual PAC members, were not a consensus of the committee, and did not reflect the views of all the members.

Survey and Manage Draft EIS Comments

The PAC reviewed comments proposed by the subcommittee assigned to this task. The group discussed each individual comment. Each member present at the meeting was asked for his or her thoughts on the comments and to propose modifications or additions. After discussion, the group decided if there was a consensus each individual comment. If not, they moved on to discuss the next comment. The overall outcome was five comments with group consensus and two comments that the group could not reach consensus on. The final comments have been forwarded to the EIS Team and the RIEC. (Copy enclosed)

Waldo Lake Basin Recommendations

The subcommittee on the Waldo Lake basin issues that was formed in the fall of 1998 presented their recommendations to the PAC. The subcommittee dealt with seven issue categories and was able to arrive at consensus recommendations on five categories. On the other two issues, the subcommittee had arrived at recommendations that had support from a majority of the subcommittee, but not the consensus of the all members. The PAC discussed the recommendations and arrived at a consensus decision to forward the subcommittees recommendations for the five issue categories as submitted to the Willamette National Forest officials. The PAC did not feel that they could arrive at a consensus on the remaining two issues. Those issues were forwarded those issues to the Willamette officials with the subcommittee's comments and an understanding that the Forest would continue to pursue a decision on those issues through a NEPA process with public involvement.

Issue categories with consensus recommendations were: Charlton Tie Road Issue, Waldo Lake Recreation Opportunity Spectrum Classification Issue, Dispersed Recreation Site Management Issue, Nonnative Fish Issue and Outfitter Guide Permit Allocation Issue.

The issue categories where a consensus recommendation was not reached were: Boat Motor Issue and Snowmobile Issue.

Members of the Waldo subcommittee present at the meeting: Bob Bumstead, Gary Guttormsen, Bud Baumgartner, Joni Mogstad, and Wayne Schuyler. Also attending were

Jim Williams, recreation staff Middle Fork Ranger District, Willamette NF, Rick Scott, District Ranger, Middle Fork RD, and Brian McGinley, Sweet Home RD Willamette NF (subcommittee facilitator).

The meeting was adjourned at 3:45.

Re: Waldo Basin Subcommittee Recommendations

To: Darrel Kenops, Forest Supervisor, Willamette National Forest
Rick Scott, District Ranger, Middle Fork Ranger District

In the fall of 1998, the Willamette Province Advisory Committee (PAC) agreed to form a subcommittee to review a variety of management issues in the Waldo Lake Basin on the Willamette National Forest with the objective of providing advice and recommendations on those issues to the Forest. On February 17 2000, the subcommittee presented the results of their work to the PAC. The PAC has reviewed the enclosed subcommittee recommendations concerning the management issues in the Waldo Lake Basin and pass them on to the Willamette National Forest as follows.

The PAC concurs with those issues that the subcommittee reached consensus on and adopts those recommendations as presented. This includes the issue categories: Charlton Tie Road, Waldo Lake Recreation Opportunity Spectrum Classification, Dispersed Recreation Site Management and Outfitter and Guide Permit Allocation.

The PAC accepts the subcommittee's report on the two issue categories where consensus was not reached on a single set of recommendations. This is the Boat Motor Issue and the Snowmobile Issue. The PAC's recommendation is that the Willamette National Forest officials use the subcommittee's work on these issues as a beginning point for further analysis and public involvement through the NEPA process. The PAC will consider reviewing the NEPA analysis and documentation on these issues and providing advice if requested by the Forest.

On behalf of the PAC, I wish to express my appreciation to the members of the subcommittee for their work and Forest Service staff that provided the logistical support for the subcommittee. The final report and recommendations and presentation to the PAC were well done and are indicative of the time and energy that obviously went into this effort.

Julia Dougan
Acting District Manager Eugene BLM
Willamette Province Advisory Committee Chair

Waldo Subcommittee Recommendations

The following is a synthesis of the many hours that the Waldo Subcommittee spent on seven assigned resource issues in the Waldo Lake basin. The subcommittee was formed by the Willamette Province Advisory Council (PAC) to investigate management options around this resource issues and submit recommendations for the Forest Service to consider. The subcommittee was also able to reach consensus on recommendations for all but two issues (*boat motors on the lake* and *off-road snowmobile use*). As the group agreed, when consensus cannot be reached, recommendations with the greatest support would be presented with a description of support and concerns from the subcommittee.

Issue Summaries

Charlton Tie Road: What type of road surface and maintenance level should the Willamette and Deschutes National Forests chose for the Charlton Tie Road, which connects the Waldo Lake Road to the Cascade Lakes Highway?

Currently the Charlton Tie Road is mostly a rough, cinder/gravel road that receives periodic maintenance in the form of clearing winter storm damage and periodic surface grading.

The subcommittee considered options ranging from a two-lane paved road maintained every year to a more primitive road then current conditions.

Recommendations:

- Continue managing this road at its current condition and level, which is a rough cinder/gravel surfaced road with periodic maintenance.
- Seek funding opportunities to narrow the road right of way, particularly at the junction with the Waldo Lake road.
- Consensus was reached with twelve (12) members.

Rationale:

- Waldo Lake is relatively unique as a large Cascades lake with limited access. Visitors treat Waldo Lake as a destination site rather than one stop along an itinerary. Improving the Charlton Tie road would change this recreation setting and visitor experience, and diminish the uniqueness of Waldo Lake.
- Having one main access point into the Waldo Lake basin allows the Forest Service to more effectively reach visitors with an education program aimed at protecting Waldo Lake.
- Impacts from growing use levels are starting to show at Waldo Lake. Improving the Charlton Tie road would only be encouraging more use and requisite impacts.
- An improved Charlton Tie road would increase through-traffic to the Cascade Lakes highway, not only bringing more traffic, road hazards and pollution into the Waldo Lake basin; but also possibly changing how people use the Waldo Lake area. Most Waldo visitors are overnight visitors seeking a primitive experience around a large lake. Day users may come seeking different goals.

- Significant money will be required to improve this road and to maintain it once it is improved. The subcommittee prefers to see limited road budgets allocated to rehabilitate the wide road right of way, rather than to improve the road surface. The right of way was originally created wide with expectations for constructing a paved highway. This wide right of way is no longer needed.
- Subcommittee members felt that even modest road surface improvements would begin the process of incremental change toward major future road change, eventually resulting in a paved road. Crescent Junction Cutoff road is a prime example of a cinder forest road that evolved in such a way.
- Finally, a lower standard road was considered and rejected because it would fail to adequately serve the trailheads on both forests.

Waldo Lake ROS Classification: Recreation Opportunity Spectrum (ROS) is a land-based classification system used to guide decisions on resource development and visitor use levels toward identified goals defining the desired recreation setting and visitor experiences.

Waldo Lake was assigned a default ROS class of “*Roaded Natural*” by the 1990 Willamette National Forest Land and Resource Management Plan. This ROS class represents a majority of landscape settings on the Willamette National Forest, and allows most forms of development (campgrounds, roads, signs, harvest units, boat launches, and buildings) and sets low expectations for visitor solitude and self-reliance.

The subcommittee was asked to consider the expectations and desires of most Waldo Lake visitors (relative to recreation setting, level of development and uses, and their experiences) and determine if the current ROS class is appropriate for the lake surface, or if another ROS class would be a better management guide.

Recommendations:

- The subcommittee recommends changing the lake surface’s Recreation Opportunity Spectrum (ROS) class from the current “*Roaded Natural*” to “*Semi-Primitive*”.
- The change in ROS should be compatible with decisions made on the boat motor issue. Further distinction of the ROS as “*motorized*” or “*non-Motorized*” will occur through resolution of the boat motor issue.
- Consensus was reached with thirteen (13) members.

Rationale:

- Waldo Lake is a unique recreation experience, due to its large size and primitive nature outside of campgrounds. Most visitors appreciate and are attracted to these conditions when they visit Waldo Lake. Most visitors would like to see the natural ambiance at Waldo Lake maintained or enhanced over time.
- While subcommittee members felt concerned over the ability to meet social objectives of a *Semi-Primitive* ROS on some parts of the lake surface, we agreed in general that this ROS provides better management guidance to the district than a *Roaded Natural* ROS.

- Generally, most of the lake surface currently meets a *Semi-Primitive* ROS, and making this change simply highlights the importance of protecting Waldo's uniqueness as use levels increase in the future.
- The ROS change should recognize the inherent need for transition zones around the three campgrounds and their boat launches on the lake's east shore. At these interfaces, the subcommittee recognizes the difficulties of meeting the social objectives of a *Semi-Primitive* ROS for the lake surface.

Dispersed Site Management: Semi-primitive lakeshore dispersed campsites, accessible by boat, attract thousands of visitors annually to Waldo Lake. Such use has established up to 52 dispersed campsites (identified by campfire rings, barren core areas, vegetation loss, damaged trees, and user trails from the lakeshore). Several other campsites have been created, used very little over time, and quickly reclaimed by nature.

The increasing level of recreation use is creating physical impacts to shoreline resources, and more social conflicts among visitors particularly on heavy use weekends (August and September). Use levels Waldo Lake can be expected to increase over the next 20 years as population levels in neighboring (within 200 miles) urban centers grow.

Managing social impacts is more difficult on lake surfaces, where human sights and sounds carry so well and where visitors insist on camping close to the shoreline. These user conflicts are complicated by high visitor expectations for few interactions with others and an agency mission to meet a *Semi-Primitive* ROS setting.

The subcommittee was asked to develop strategies for managing user impacts (both physical and social) currently being seen along the lakeshore assuming an existing ROS setting of *Semi-Primitive* for the shoreline.

Recommendations:

Phase 1

- Develop a visitor education program that promotes *Leave No Trace* camping behavior around the lakeshore.
- Discourage the building of new campfire rings within 200 feet of the lake.
- Evaluate existing campfire locations at dispersed sites, and move or obliterate campfire pits according to resource needs.
- Open up the north shore to camping, but ban open campfires until resource conditions have suitably recovered.
- Close three sites conflicting with the North Waldo campground.
- Limit group size to 12 people per dispersed site.
- Establish the following thresholds for changes in site conditions, and monitor site conditions. If thresholds are exceeded, then implement the next phase of recommendations.
 - Monitoring Thresholds:
 - Net increase of 5 established dispersed sites around the lake, *or*
 - Net increase in the cumulative barren core area of existing sites by 20%.

Phase 2

- If Phase 1 thresholds are exceeded, implement the following restrictions.

- Restrict all camping within 200 feet of lakeshore to designated and marked sites
- Post information maps at boat launches to identify designated sites
- Continue monitoring sites for further change

Phase 3

- If conditions still do not improve over time, through site rehab and Phase 2 restrictions; implement further restriction of use
 - Limited entry/reservation system for dispersed campsites.
- Consensus was reached with twelve (12) members.

Rationale:

- Dispersed camping causes physical resource impacts along the lakeshore, such as vegetation loss, damage to trees, exposure of bare soil to erosion, and loss of downed woody material from campfires. While such impacts are noticeable and disturbing, the total impact from the 51 established sites is relatively small on a watershed scale (even when comparing it to just riparian reserve acres around the lake).
- The subcommittee is more concerned with the social effects that these impacts and connected use have on visitors to Waldo Lake. Most visitors come to the area to enjoy a semi-primitive experience, free from excessive human impacts or presence. Our recommendations aim to maintain or improve a semi-primitive recreation experience (outside of the campgrounds).
- Reaching out to visitors to inform them of appropriate behavior is the foundation of managing recreation use impacts. Promoting a *Leave-No-Trace* camping attitude around the lake will help maintain the pristine character of the lakeshore, without unduly restricting people's behavior.
- Campfires were recognized as the focal point around most human impacts created at dispersed sites, and contrary to *Leave-No-Trace* camping ethics. Once fire rings become established at a site, the site becomes easier to discover and reuse. Our strategy focuses on campfires as a regulating and monitoring device for these reasons.
- While we do not want more dispersed sites being established around the lakeshore, we recognized more user capacity was possible with little impact to resources or other visitors, if more folks use *Leave-No-Trace* camping techniques.
- We also recognized that many of the social impacts were created by visitors camping close to the lakeshore, in the form of visual and sound disturbance. Therefore, our concern for dispersed site creation was primarily focused within 200 feet of the lakeshore.
- Clearly some established sites were poorly located and needed rehab work or relocation. Forest Service staff will need to review all sites and remedy specific problem areas where appropriate. In some cases, this may result in the closure of a site if effects to resources are unacceptable.
- Potential camping impacts along the north shore (in the burn area) were not seen as a large enough concern to continue the camping closure for another year.

However, maintaining a campfire ban to guard against fire hazards from abandoned campfires in this area seemed like a prudent precaution.

- Establishing a monitoring system with thresholds for measuring success is a critical step for managing the social impacts of dispersed camping use. Once again site establishment is the proxy for measuring these social impacts.
- Defining a second phase of action (further restrictions) seemed sensible for any serious public campaign to change recreation behavior. Visitors must recognize the benefits of proposed changes to their recreation experiences at Waldo Lake, but also the consequences if conditions deteriorate beyond the stated thresholds.
- Three sites next to North Waldo campground should be closed because they directly compete with the developed campground sites. Such closures are common for dispersed sites within close walking distance of campgrounds.
- Dispersed site impacts (physical and social) generally grow exponentially with large groups of people. Semi-primitive recreation settings are difficult to maintain when large groups of people are involved. Therefore, a group size limit was suggested (similar to the wilderness standards) to manage the physical impacts at specific sites, and the social impacts that large groups cause to their neighbors.
- Finally, trying to control site development along the lakeshore allows the district to maintain attractive and pristine camping options for visitors who prefer camping without firerings and associated impacts.

Outfitter/Guide Permit Allocation: The district has issued twelve (12) special use permits in the Waldo Lake area with most of the use occurring between June and September. Each year the district receives additional requests for permits from other outfitters. Prior to approving more permits, the district wants to assess the public need for such services at the Waldo Lake, and the impacts such commercial use may have on public visitors (Needs Assessment).

Generally special use permits are denied if the proposed activity can be accommodated on private lands, or if it creates unacceptable conflicts with the visiting public. A permit may also be denied if perceived resource impacts caused by the activity are unacceptable.

The subcommittee was asked to review the current permit situation and develop guidelines for issuing and managing additional permits, if they found that Waldo Lake could sustain additional permitted activity.

Recommendations:

- No new O/G permits for dispersed camping (between the lakeshore and Waldo Lake trail) should be approved between August 1st and September 15th.
- No new O/G bicycle permits on the Waldo Lake trail should be approved between May 1st and September 15th.
- Permits involving the Waldo Lake trail should only be approved if use of the trail is incidental to a larger trip, such that the Waldo Lake trail is a connective link critical to the entire route.
- Permit holders should not be allowed to use the campgrounds between August 15th and September 15th.

- Permit requests outside of the above constraints will be approved on a case by case basis and subject to the following conditions:
 - Group sizes will be restricted to 12 persons, including the group leaders.
 - Camping will be restricted to established & hardened sites.
 - Camping groups will be required to provide and use porta-potties.
- Existing permits will fall under the same conditions as new permits when they come up for renewal (except that their season of use will continue to be honored).
- Permit holders will be required to promote *Leave No Trace* techniques to their clients.
- Permitted use levels and these restrictions will be monitored for ten years to assess whether recreation goals and recreation protection needs are being met.
- Consensus was reached with eight (8) members.

Rationale:

- A general philosophy guiding our thoughts is that O/G permitted use should not unduly compete with public visitors at Waldo Lake. Surveys and campground records show that public use is close to capacity levels during the months of August and September. Therefore, allowing more permits during this prime part of the season did not seem prudent.
- Trail use around the lake, particularly mountain biking, is growing tremendously with impacts being felt in physical and psychological ways. Given our goals for a semi- primitive recreation experience and existing use levels, more permitted bicycle use should not be encouraged.
- While the subcommittee did not favor more permitted use on the Waldo Lake trail, we recognized this trail connected to other trails in the basin and watershed. In some cases, a permittee may need to use the Waldo Lake trail as a link in a larger trip, and if no other options are available such use should be permitted.
- Outside of the prime recreation season, the district should encourage permittees to use developed campgrounds as a way of concentrating use on hardened sites with facilities. This strategy will help minimize impacts to dispersed sites and campers. However, to avoid competing with the visiting public, permittees should be steered away from campgrounds during the busiest months of the summer.
- Pre-selecting established or hardened dispersed sites suitable for the specific group size will help manage resource impacts, and hopefully provide a positive experience for the permitted clients.
- Clearly group size has an effect on the impacts the group may create at a site or impart to its nearest neighbors. In order to manage these impacts, permitted groups should be restricted to 12 persons. Larger groups can be split into subgroups at separate sites. Such limits will help to keep dispersed sites from growing, and limit the social impacts that large parties can create.
- More and more throughout the country, permittees are being asked to manage the human waste created by their clients, particularly in settings involving rivers and lakes. Because of the high water quality at Waldo Lake and growing use levels around the lake, it is time for permittees that are dispersed camping to provide

porta potties for clients. Most permittees access sites by boat making the facility transport and management a practical matter.

- Education is and will continue to be the most effective tool for creating change in our visitors at Waldo Lake. Our permittees are some of the most responsible users and best examples for others to follow. It stands to reason that they can be excellent ambassadors for promoting *Leave No Trace* behavior. Many of them practice these techniques already.
- In order to treat all permitted users equitably, existing permit holders should follow the same restrictions as new permittees. For ease of implementation, such changes should be voluntary until permit renewal, and mandatory under the revised permit.

Boat Motors: For many reasons, Waldo Lake attracts lots of visitors for boating pleasure. Current boating regulations restrict motorized boat speeds to less than 10 mph. This restriction discourages many boaters typically attracted to a lake as large as Waldo Lake (6672 acres). The largest boats tend to be sailboats taking advantage of stiff afternoon winds, but occasionally a cabin cruiser or houseboat will visit the lake. Most boaters (85%+) use small, non-motorized craft.

Public concern over water quality in one of the world's cleanest lakes and the desire of many visitors for a semi-primitive recreation setting are two major rationale driving the debate about the presence of boat motors on Waldo Lake. Surveys show users of boat motors represent a small proportion of total boating visitors, but their presence does not go unnoticed.

The subcommittee was asked to look at boat motor options and their consequences to all lake users and to Waldo Lake.

Recommendations:

- Limit boat motor use to electric-motors-only starting in 2005.
- Use an aggressive education program to inform the public about the motor use change to help the transition.
- Use free mandatory permits for boat users to collect user information.
- Allow exceptions for search & rescue, fire suppression, law enforcement, and approved research.
- Consensus was NOT reached on this issue. Nine members (9) supported the recommendations, and three members (3) did not support the recommendations. The Oregon State Marine Board, Sailboat, and Motorboat representatives were members that did not support these recommendations.

Rationale Supporting Recommendations

- Most lake visitors desire and anticipate a peaceful, semi-primitive setting outside of developed campgrounds.
- Internal combustion boat motors do not blend well with the recreation experience that most visitors (outside of campgrounds) at Waldo Lake come to enjoy.

- Some visitors need power assistance to enjoy Waldo Lake, and we believe electric motors can fill their need.
- This restriction should not substantially reduce the ability of Americans with disabilities to recreate on Waldo Lake. Boaters with special disabilities have successfully been able to boat on lakes with internal combustion engines ban (Gold Lake).
- All but the largest boats can be successfully powered by existing electric motor technology, so very few users would be affected by this change.
- Postponing motor restrictions until 2005 will help visitors to transition to different motor options, and electric technology options are likely to increase for larger boats (>18 feet) and for longer duration trips.
- Electric motors are a less expensive motor option than some of the newer quieter, less polluting internal combustion engines.
- Providing a phase-in period should help those who are economically burdened by giving them more time to transition to a different motor option.
- Public support for this management change may improve through a focused user education program at the lake that focuses on all user behavior and the unique character of the Waldo Lake basin. If this change is seen in the context of a larger strategy of changes, acceptance may grow.
- Using a permit system during the transition period and beyond 2005 will provide a valuable understanding of how our management actions affect visitor use patterns and ultimately recreation setting. Having such a monitoring plan helps us assess whether we are successful with our decisions.
- Although studies have not been done to show that internal combustion engines are affecting water quality at Waldo Lake, such engines clearly discharge pollutants into the water and air. Several subcommittee members are concerned about the potential future impacts from these pollutants if motor use patterns are allowed to continue.

Rationale Against Recommendations:

- We have safety concerns over the inadequate power of electric motors, particularly in the rough water or bad weather that occurs on Waldo Lake.
- Some boaters will be excluded from Waldo Lake because their boats are too large for the current electric motor technology.
- Forcing visitors to transition to other motor options will place an economic burden on them that may be difficult to absorb, notably some local users.
- The electric charge on marine batteries may not last all week/weekend. The noise of generators recharging batteries around the lake may be replacing the noise of gas powered boat motors.
- These recommendations exclude a minority user group for the benefits of the majority. A solution should focus on meeting everyone's needs.
- Changing the visitors' behavior (through voluntary compliance and education) that is connected to the user conflict should be attempted first before the agency adopts stricter regulations.

- This boat motor change will raise challenges for visitors with physical disabilities, either because they won't be able to paddle a self propelled boat or simply because they won't be able to climb into a smaller boat with an electric motor.
- We should immediately begin addressing pollution and noise concerns with a 10 hp limit and 4 cycle engine requirement, in coordination with our user education program and not wait until 2005. As motor technologies improvements are made we can adjust our restrictions to protect the lake as much as possible.
- The recommendations are not appropriately based on data or standards that characterize the social context framing the true issues. Much of the group's early discussions focused on environmental concerns of boat motors, but supporting data was lacking to manage boat motors around these concerns. As such environmental concerns were not included as rationale for these final recommendations. Similarly, adequate data on the social conflicts is also not available to support these recommendations. Aside from anecdotal comments and complaints, no effort to specifically frame the social issues through surveys or to collect data regarding attitudes and opinions about the issues or potential solutions has been undertaken. Standards for social carrying capacities have also not been thoroughly researched, proposed, established or discussed by the agency or this committee. Lacking these basic data and standards, the Marine Board believes the recommendations would be seen as arbitrary and impossible to defend as good public policy.
- The approach taken in crafting recommendations on this issue was different than with other issues. For most other issues, recommendations support status quo use patterns or prescribe rational controls or limits. Users of gasoline-powered boats (being a status quo use) would be precluded from using Waldo Lake under these recommendations. Considering the other options available to reduce engine noise, the subcommittee's recommendations seem excessively proscriptive against one single user group.
- The Marine Board is willing to work with the Forest Service to explore alternative approaches that would systematically define the problem and establish standards and measures against which a tailored regulatory remedy could be crafted, if regulation is needed. As the state boating agency we are unable to support these recommendations as crafted in light of existing state laws and the lack of supporting data.

Off-road Snowmobile Access: Prior to 1990, local snowmobile riders were free to run their machines in the Waldo Lake basin if they chose. Some riders would even try to make it to the top of The Twins, east of Waldo Lake road. Land allocation changes created by the 1990 Willamette Forest Land and Resource Management Plan unintentionally ended this group's fun while trying to regulate summer off-road vehicle use in the basin.

Although the land allocation change was not focused on winter recreation sports, it had negative consequences for existing users. The subcommittee was asked to review this change to validate its application to winter recreation vehicles.

Specifically they were asked whether snowmobiles should be allowed off-road east of Waldo Lake road, between the Bobby Lake trail and Charlton Tie Road (only on the Willamette National Forest, the adjacent Deschutes National Forest is already open).

Recommendations:

- In considering whether to change the Forest Plan to allow snowmobiles off-road east of the Waldo Lake road between the Bobby Lake trail and Charlton Tie road, the subcommittee believes snowmobile use should remain restricted to roadways.
- Consensus was NOT reached on this issue. Ten (10) members supported the recommendations and two (2) Snowmobile reps did not support the recommendations. Two of the supporting members did have some reservation in their support for these recommendations.

Rationale Supporting Recommendations:

- The area being considered is part of one of the largest roadless areas on the forest; which will be reviewed in a national roadless area review process. Many subcommittee members feel now is not the time to propose changing the area's administrative status from *semi-primitive non-motorized* to *semi-primitive motorized*.
- The basin currently receives very little snowmobile use, and this pattern is not likely to change much in the near future. Also the off-road area in question is not very attractive for most snowmobile users because dense forest makes travel difficult. In short, there appears to be no strong user-group interest to advocate for this change.
- In reviewing other options, the subcommittee considered opening up a narrow travel corridor roughly following the Bobby Lake trail. Such a corridor would allow access to eastside trail systems from the Waldo Lake snopark. The subcommittee rejected this proposal for a number of reasons.
 - The corridor would be difficult to maintain and manage, and may actually encourage more snowmobile use in the basin with little interest in Waldo Lake.
 - The Deschutes National Forest was not receptive to designating such a low standard (ungroomed) trail corridor.
 - Not enough interest from advocacy groups existed for the agency to invest the NEPA process energy on such a proposal.

Rationale Against Recommendations:

- It makes sense to have the same access management on two adjacent forests for similar land areas. There is no real difference in resources from one side of the forest boundary to the other. The Deschutes National Forest allows off road snowmobile use in this area; the Willamette National Forest should do the same.
- Reestablishing a local use pattern (off-road travel with snowmobiles) for people to pursue is appropriate, if no resources are being harmed.

- Not allowing off road travel only because it offends our sense of appropriate behavior (or because it's the way we have always managed snowmobiles) is not strong reasoning.

Non-Native Fish Populations: Since the late 1800's, private citizens and government agencies have been stocking non-native fish in Waldo Lake. Scientists believe that prior to these efforts Waldo Lake did not support a native fish population. The Oregon Department of Fish and Wildlife (*ODFW*) has only recently agreed to cancel the fish stocking program in Waldo Lake due to the politics of resource concerns.

These concerns over fish impacts on native aquatic species and nutrient cycling in the lake have brought forward the suggestion that non-native fish populations should be removed or controlled. The subcommittee was asked to review this issue, possible options for control, and their implications.

Recommendations:

- Continue current management of existing fish populations (*eg. No stocking and consumptive angling regulations*).
- Continue to monitor water quality and biological systems for changes. If research shows fish populations are substantially impacting these systems, then efforts to reduce fish populations should be made.
 - ODFW and USFS biologists agree that netting adult fish (mainly brook trout) during fall spawning season is the most effective means of population reduction. Netting is estimated to cost about \$7500 per year. After several years, netting may be necessary less often.
 - The ODFW Commission would need to approve any proposals for reducing fish populations.
- Consensus was reached on this issue, with nine (9) members.

Rationale:

- There is no clear evidence that fish populations in Waldo Lake are substantially impacting the natural system. Since a reduction in the fish population is the best result we can achieve and any reduction effort will be expensive, the agencies should have sound science to support this decision before it is made.
- The current fish populations are not large for Waldo Lake. While the fish are reproducing naturally, the total population is likely not increasing. The existing fish population also feeds mostly on insects, rather than amphibians or zooplankton. Therefore, waiting for better information before taking action is a low risk option to the natural systems.
- The brook trout provide a quality angling experience for a growing number of anglers during the spring and fall. Population control would eliminate this experience.
- A multi-agency effort is in process to assess and develop policies for managing the effects of non-native fish on native fauna in Oregon. There is value in delaying management changes until these broader policies are developed.

Appendix E: Public Comments Content Analysis

A. Process

In addition to the typical letters received for this project, the public was also willing to share their thoughts using direct email and a website comment sheet. The website comment sheet was viewed as a successful tool, not only because of the ease with which people could share their thoughts but also because critical project information was near the comment form on the website. This information proximity should help create more focused input from the public.

Of the 243 responders giving comments about the project during the first scoping period in 2001-2002, the responses came in the following forms:

Letters – 153 responders

Website – 59 “

Email – 31 “

For the record, approximately 30-40 additional responders sent in their thoughts in September and October after the close of the comment period for the released environmental assessment. These late responders used typical letters and email messages to convey their thoughts.

Over 110 responders provided comments during the second scoping period in 2004. These comments followed a similar pattern of forms, though website and email responses were slightly more frequently used than during the first analysis period.

Those commenting during the second period in 2004 were doing so for the first time. Only 10 percent of respondents during the second comment period had participated in the first comment period. This low rate of replication could be largely due to the second scoping letter assuring the public that public comments during the first analysis would be considered for the second analysis.

B. General Results

- Responders generally kept their comments brief and focused on a few key points.
- Most responders were individuals, less than 5 % were organizations.
- No form letters were received, though a large number of responder's statements were similar enough to suggest many responders were reacting to a common source of secondary information such as an advocacy website or newsletter.
 - A large number of responders simply advocated for three actions: *Ban motors, ban fish stocking, and designate the lake as an Outstanding Resource Water.*
- Responders also shared comments on recreation issues outside the scope of the analysis.
 - A majority of these actions revolved around the developed campgrounds, facilities improvements and other recreation activities (*e.g., mountain bikes, horses*).

C. Specific Results

1. Only about 32 percent of respondents declared their support for one of the alternatives in the analysis. Because the current set of alternatives is substantially different from the initial alternatives, these preference results are no longer valid. The new alternative set only considers restrictions on boat motors, floatplane access, and public use of chainsaws and generators at dispersed sites. The new analysis set also has a fifth alternative which responds to public comments advocating for a seasonal restriction on boat motors.

2. The following shows where respondents focused their attention among the seven resource issues originally discussed by the Waldo Subcommittee, along with two other issues consistently mentioned in public comments**.

- a. Boat Motors -- **84.0%** of respondents
- b. ROS or recreation setting -- **30.9** ***
- c. Dispersed Campsites -- **11.1**
- d. Outfitter/Guide Permits -- **3.7**
- e. Snowmobile Access -- **9.5**
- f. Charlton Tie Road -- **4.9**
- g. Non-native Fish -- **11.9**
- h. Water Pollution -- **79.8**
- i. Noise -- **37.4**

** Results reflect responders sharing thoughts on more than one issue.

*** This does not include a large number of responders who wanted to "...keep Waldo Lake clean and pristine". Such statements seemed focused on water quality and recreation setting, though it would be difficult to separate the two in many peoples' minds.

3. The following lists actions supported by respondents. These actions respond directly to resource issues within the project's original purpose and need for action. Many of these actions do not meet the current purpose and need for this project.

- a. Ban Boat Motors -- **64.6%** of respondents *
- b. Ban only 2-stroke Motors -- **4.5**
- c. Change Lake ROS -- **8.2**
- d. Restrict Dispersed Camping -- **7.2**
- e. Restrict O/G Permits -- **2.1**
- f. Restrict Snowmobiles -- **6.2**
- g. Charlton Tie Road Mgt -- **2.1** **
- h. Ban Fish Stocking -- **7.0**
- i. No management changes -- **3.7** ***

* - Focused on banning gasoline motors, but also includes requests to ban all motors.

** - This percent includes both reduced maintenance and more development.

*** - This percent focused almost exclusively on boat motors.

4. Other suggestions by respondents included:

- a. Ban motors immediately, no transition period
- b. Start with a trial period (electric motors or better only) first
- c. Invest in more visitor education to deal with user conflicts
- d. Invest in better enforcement of existing regulations
- e. Ban motors above a certain horsepower (e.g.. 10hp)
- f. Limit motors to certain hours of day (e.g. 10am to 5pm)
- g. Allow gas-motor exceptions for sailboats, elderly, physically-challenged visitors.

5. A handful of respondents made comments about NEPA process, the original analysis, or legal issues around the proposed action.

- a. Three respondents challenged the Forest Service’s legal right to regulate boat use on Waldo Lake; claiming instead this right belongs to the State of Oregon.
 - b. One respondent challenged the adequacy of the analysis in showing that user conflicts were significant enough to justify management change and claimed the proposed action was excessive for the current situation.
 - c. Another respondent claimed that the proposed action would not meet resource objectives for the Semiprimitive, Nonmotorized lakeshore management area.
 - d. One respondent challenged the accuracy of dispersed campsite data, and therefore its adequacy as a monitoring benchmark for supporting a dispersed site strategy.
 - e. One respondent questioned the Forest Service’s legal basis for regulating floatplanes on Waldo Lake, since planes fall under the jurisdiction of the FAA.
6. Finally, respondents offered suggestions on issues outside the scope of the project:
- a. Designate Waldo Lake as Outstanding Resource Water
 - b. Improve sewage facilities in campgrounds
 - c. Improve campground management to deal with camper behavior
 - d. Ban chainsaws, generators, RV’s
 - e. Ban long-term sailboat moorage on lake
 - f. Use stay limits for campers
 - g. Use campfire restrictions to control dispersed camping impacts around lake
 - h. Ban further facilities expansion around lake
 - i. Close roads
 - j. Designate areas surrounding Lake as wilderness
 - k. Ban mountain bikes
 - l. Remove outlet dam and reestablish old channel
 - m. Invest in more research
 - n. Install battery charging stations in campgrounds for electric motors
 - o. Ban all snowmobiles in basin
 - p. Ban all motorized use in basin
 - q. Provide stock water at Harrelson Horse Camp

D. Response to Substantive Comments

This segment responds to scoping comments that were judged to be substantive, defined as meeting one of the following descriptors:

- Raises an issue not discussed in the environmental analysis
- Challenges the validity or adequacy of some part of the analysis
- Challenges a part of the NEPA process followed

Most comments simply expressed a preference for a certain alternative or action(s) along with rationale explaining the responder’s position. Submitted comments offered useful information to the Interdisciplinary Team (IDT) and decision maker about public attitudes and preferences, but they were not necessarily substantive comments.

A number of respondents made suggestions (listed above in C-4) around stated issues that were not seen as part of any action alternative. Two such suggestions...increase visitor education, and increase enforcement efforts are inherent parts of all action alternatives.

Other suggestions listed in C-4 were originally considered by the Waldo IDT when defining the project's purpose and need for action, but ultimately did not meet the stated purpose and need for action or were considered too difficult to administer successfully. These suggestions were not analyzed as part of any alternative.

Three respondents, including the Oregon State Marine Board, claimed that regulation of boating on Waldo Lake was the jurisdiction of the State of Oregon because Waldo Lake was meandered in the 1800's and therefore considered a navigable state waterway. Navigable waterways are considered by these three respondents to be State owned. The USDA Forest Service claims legal authority over public lands and waters within the boundaries of National Forests and Grasslands, unless such authority has been adjudicated differently in Federal Court.

Another respondent claimed that data describing dispersed recreation sites was inaccurate and therefore not sufficient to implement the proposed dispersed recreation strategy described under the action alternatives. The Middle Fork Ranger District has completed periodic inventories of dispersed campsites around Waldo Lake and identified all "established" campsites. Inventories collect a number of parameters describing the physical conditions at these sites. Other locations around the lake may have been used in the past, as the respondent claims, but they did not qualify as "established" due to the absence of tangible conditions (e.g. barren core area, fire ring, vegetation loss, man-made structures) created by repeated human use over time.

One respondent challenged the ability of the proposed action to meet **ROS** setting standards conditions for the Semiprimitive Nonmotorized lakeshore. The respondent' claim was mostly based on the belief that allowing electric boat motors violates **ROS** standards. The range of alternatives is designed to move setting conditions closer toward **ROS** standards for the lakeshore while addressing other issues. The most difficult **ROS** standards to meet for a *Semiprimitive* setting will be Remoteness and Access. The current analysis compares how each alternative affects attainment of these two setting standards.

One respondent challenged the legal authority of the Forest Service to regulate floatplane access to Waldo Lake. A representative of the Federal Aviation Administration (FAA) stated during a 2005 phone conversation that a floatplane on the water is considered a boat and the FAA claims no jurisdiction over the regulation of boats.

Finally, a substantial number of respondents suggested other actions (described above under section C-6) to manage recreation use around Waldo Lake. The IDT considered most of these suggestions to be outside the current scope of this project analysis. Two of these suggestions were within the scope of this project analysis. Restricting chainsaws and generators at dispersed sites has been added to the proposed action. Additionally, the installation of battery charging stations could be a connected to the proposed action, which restricts boat motors to electric models only. The IDT chose to delay a decision on battery charging stations until after project implementation and the magnitude of public demand for such stations is more fully understood.

Appendix F: Wildlife Biological Evaluation

United States
Department of
Agriculture

Forest
Service

Willamette
National Forest

Middle Fork RD
Highway 58
Westfir, OR 97492
(541)-782-2283,,,,,,,,

Reply To: 1950, 2670, Planning, Threatened,
Endangered and Sensitive Species

Date: April 1, 2001

Revised: 6/13/2005 and 1/7/06

Subject: BIOLOGICAL EVALUATION: Threatened, Endangered and Sensitive Wildlife

To: Waldo Basin Plan Environmental Analysis File

Introduction

This document addresses potential effects to proposed, threatened, endangered or sensitive (TES) fauna listed in the Region 6 Regional Forester's Federally Listed or Proposed, and Sensitive Species Lists (dated 7/21/04) with documented or suspected occurrences on the Willamette National Forest from activities associated with a timber salvage sale project. Biological evaluations of the potential effects to threatened, endangered and sensitive fish and flora are in separate documents prepared by the District Fish Biologist and District Botanist. This evaluation, required by the Interagency Cooperative Regulations (Federal Register, January 4, 1978), ensures compliance with the provisions of the Endangered Species Act of 1973, P.L. 93-205 (87Stat. 884), as amended. A review of potential effects to non-TES wildlife species is presented in the body of the Environmental analysis.

Pre-field Review

A pre-field review was conducted to determine the presence and location of known TES wildlife populations or their habitat in the project area. The potential for TES sensitive species habitat is determined with the use of the R-6 Regional Forester's and Willamette NF Potential Endangered, Threatened and Sensitive Wildlife Lists, Oregon Natural Heritage Database and Willamette NF Database, previous wildlife surveys, aerial photos, USGS topographical maps, and the knowledge of individuals familiar with the area.

Brief Description of the Alternatives

Alternative 1 – No Action

No changes to management at Waldo Lake would occur, except more visitor education effort. Current management consists primarily of:

- All boat motors would be allowed and boat speed limit would remain 10 mph.
- Float planes would be allowed on the lake surface.
- An existing visitor education strategy.
- Chainsaw and generator use at dispersed campsites would be permitted, except during fire closures.

Alternative 2

- Boat motors would be restricted to 4 cycle gas-powered and electric models only and boat speed limit would remain 10 mph.
- Floatplanes would be allowed on the lake surface.
- Chainsaw and generator use at dispersed campsites would be permitted, except during fire closures.

Alternative 3

- Boat motors would be restricted to 4 cycle gas-powered and electric models only and boat speed limit would remain 10 mph. Gas-powered boat motors would be prohibited on the lake from July 15th to the 1st Monday after Labor Day.
- Floatplanes would be prohibited on the lake surface year-round.
- Chainsaw and generator use at dispersed campsites would be permitted, except during fire closures and the boat motor closure period described above.

Alternative 4 (Proposed Action)

- Boat motors would be restricted to electric models only, and boat speed limit would remain 10 mph.
- Floatplanes would be prohibited on the lake surface year-round.
- Chainsaw and generator use at dispersed campsites would be prohibited year-round.

Alternative 5

- All boat motors, including electric models, would be prohibited.
- Floatplanes would be prohibited on the lake surface year-round.
- Chainsaw and generator use at dispersed campsites would be prohibited year-round.

Impacts to Threatened, Endangered, or Sensitive Species within the Waldo Basin Project Area.

The only Threatened, Endangered, or Sensitive (TES) species currently known to inhabit the Waldo Basin Project area is recognized by a historic Bald Eagle nest on the southwest (T21S, R55E-Section 36) corner of the lake. The nest is located along the southwest shoreline of Waldo Lake and currently has a Bald Eagle Management Area (BEMA) boundary delineated to protect the integrity of the historic nest location. During the past 13 years, this site has been monitored (1992-2005) but has not successfully reared young. This could be due to the low prey availability at Waldo Lake or other factors.

We continue to monitor this site in cooperation with Oregon Cooperative Fish & Wildlife Research Unit, Department of Fisheries and Wildlife at Oregon State University-Frank Isaacs, principle investigator. Frank Isaacs monitored this site in 2005 and will continue monitoring it into the foreseeable future. The historic nest site and adjacent roost trees are located across the lake from developed campgrounds and the area receives low use by dispersed campers. The primary mode of potential disturbance at this site would occur from noisy recreation-users or boat traffic, as no trails are directly adjacent to the nest site and no special-use permits direct recreation use near this historic nest site location.

Continued public use of motorized boats may increase the likelihood of future disturbance to the nesting eagles at this site. Most recreational boating at Waldo Lake occurs in August and September due to weather and pesky mosquito populations.

Alternatives 4 and 5 have *the lowest potentials among the alternatives for causing future disturbance to the nesting birds by prohibiting public use of gas-powered boat motors on the lake.* **Alternative 3** creates *slightly higher potential than Alternatives 4 and 5 for boaters to disturb nesting birds at this site by permitting public use of 4-cycle boat motors prior to July 15 and after the Monday following Labor Day in September.* Alternatives 1 and 2 allow motorized boating throughout the recreation season, and therefore create higher potential than other alternatives for boater disturbance to nesting eagles.

The continued monitoring of this nest and adjacent roosting site conditions will determine what, if any, additional restrictions or measures should be taken to protect the integrity of this nest site. Past mitigation measures applied in special-use permits for large group activities around Waldo Lake have been avoidance of the nesting habitat during the critical-use period (Jan 1-August 31). Furthermore, no new special-use permits are being issued for group activities on the southwest end of the lake. No other restrictions or closures are currently in effect specific to this historic bald eagle nest site.

All Action Alternatives provide for better protection from any potential adverse effects from increased recreation use around Waldo Lake by proactively managing future recreational use, particularly motorized uses.

Determination

A ***NO EFFECT*** determination for Alternatives 4 and 5 was found due to the restrictive nature of these alternatives (both reduce motorized boat traffic and noise associated with such traffic). A ***May Effect, Not Likely To Adversely Effect*** was determined for Alternatives 1, 2 and 3; however, none of these three alternatives will lead towards a downward trend in species viability. **No habitat modification occurs in any of the alternatives, the only potential effect is disturbance and where possible disturbance is mitigated or prevented by applying seasonal restrictions around nest sites during critical breeding season (Jan. 1-July 31st) if nesting birds are located.**

Non-habitat modifying conclusions for ALL alternatives suggests that this type of action would be potential disturbance only, therefore these actions are covered under the Programmatic Disturbance Biological Assessment and subsequent, Biological Opinion. This was originally consulted on in the 2001 Disturbance Biological Assessment and subsequent Biological Opinion dated May 29th, 2001 and was re-submitted in the current Biological Assessment for Disturbance FY06-07 in August of 2005 and the subsequent letter of concurrence.

If other TES wildlife species are located after the decision notice is signed, mitigation measures will be applied to protect the viability of the species/population.

Deborah L Quintana

Revised 6-13-2005 & 1-7-2006

Prepared by:

Date:

Deborah L. Quintana

Supervisory Wildlife Biologist, Middle Fork Ranger District

Table 1: Initial Screening for Effects Determination

| | STEP 1 <i>PreField</i> <i>Review</i> Habitat Present | STEP 2 <i>Field</i> <i>Recon.</i> Species Survey? | STEP 3 <i>Conflict</i> <i>Determination</i> Species Present? | STEP 4 <i>Analysis of</i> <i>Significance</i> Conflict? | STEP 6 <i>FWS Review</i> Consultation |
|--|---|--|---|---|--|
| Spotted Owl <i>Strix occidentalis caurina</i> | no | no | no | no | no-n/a |
| Bald Eagle <i>Haliaeetus leucocephalus</i> | yes | yes | yes | No Effect for Alt 4 & 5; May Effect Not Likely to Adversely Effect for Alts 1, 2 & 3 | Yes, Willamette Prog. B.O. Disturbance Concurrence May 29, 2001 |
| Canada Lynx <i>Lynx canadensis</i> | no | n/a | no | no | no |
| Least Bittern <i>Ixobrychus exilis</i> | no | n/a | no | no | |
| Bufflehead <i>Bucephala albeola</i> | no | n/a | no | no | |
| Harlequin Duck <i>Histrionicus histrionicus</i> | no | n/a | no | no | |
| American Peregrine Falcon <i>Falcon peregrinus anatum</i> | no | no | no | no | |
| Yellow Rail <i>Coturnicops noveboracensis</i> | no | n/a | no | no | |
| Black Swift <i>Cypseloides niger</i> | no | n/a | no | no | |
| Tricolored Blackbird <i>Agelaius tricolor</i> | no | n/a | no | no | |
| Baird's Shrew <i>Sorex bairdii permiliensis</i> | yes | no* | unknown | no | |
| Pacific Shrew <i>Sorex pacificus cascadenis</i> | yes | no* | unknown | no | |
| California wolverine <i>Gulo gulo</i> | no | n/a | no | no | |
| Pacific Fisher <i>Martes pennanti</i> | potential | n/a | no | no | |
| Pacific Fringe-tailed Bat <i>M. thysanodes vespertinu</i> | yes | no* | unknown | no | |
| OR Slender Salamander <i>Batrachoseps wrighti</i> | yes | no* | unknown | no | |
| Cascade Torrent Salamander <i>Rhyacotriton cascadae</i> | yes | no* | unknown | no | |
| Foothill Yellow-legged Frog <i>Rana boylei</i> | no | n/a | no | no | |
| Oregon Spotted Frog <i>Rana pretiosa</i> | no | n/a | no | no | |
| Northwestern Pond Turtle <i>C. marmorata marmorata</i> | no | n/a | no | no | |

New Sensitive Species

Oregon Slender Salamander (*Batrachoseps wrighti*)

Range: West slope Cascades from the Columbia River to Southern Lane County

Habitat: Under bark and moss in mature and second growth Douglas fir forests. Under rocks or logs of moist hardwood forests within coniferous forest landscapes.

Ecology: Found near surface during fall and spring but retreats underground in late spring and summer.

Cascade Torrent Salamander (*Rhyacotriton cascadae*)

Range: Cascade mountains of southern Washington and northern Oregon with a disjunct population in the southern Oregon Cascades.

Habitat: In rocks bathed in a constant flow of cold water, in cool rocky streams, lakes and seeps, usually within conifer or alder forests.

Ecology: Dependent on nearly continuous access to cold water. Can be found moving about in forests during wet weather.

Foothill Yellow-legged Frog (*Rana boylei*)

Range: Coastal and Cascade mountains

Habitat: Found in permanent slow flowing streams in a variety of habitat types, including grassland, chaparral, and coniferous or deciduous forests and woodlands. They prefer streams with rocky bottoms, streamside vegetation, and sloping banks.

Ecology: Streams inhabited may dry to a series of potholes connected by trickles in summer. Small adults have been found 50 meters from permanent water on moist outcrops.

Least Bittern (*Ixobrychus exilis*)

Range: West coast, from Oregon south to Baja, California. Oregon is the northern limit of its range. It is not illustrated with the boundaries of the WNF.

Habitat: Breeds in freshwater cattail and bulrush marshes east of the cascades.

Ecology: A solitary and secretive species rarely seen. Does not winter in Oregon.

Bufflehead (*Bucephala albeola*)

Range: Breeds from Alaska across Canada and south to Oregon, California, and Wisconsin.

Habitat: nests near mountain lakes surrounded by open woodlands containing snags. In many areas, the preferred nest trees are aspen, but it will also nest in ponderosa pine and Douglas fir.

Reproduction: In Oregon, most Buffleheads nest in artificial nest boxes. Nesting begins in late April, young are fledged in early August. A game species in Oregon. Only several hundred pair are thought to breed in the state.

Ecology: After the breeding season, Buffleheads can be found on open waters throughout the state, along major rivers, and along the coast.

Yellow Rail (*Coturnicops noveboracensis*)

Range: Breeds from central and eastern Canada south to New England and Great Lakes region. The Oregon populations are extralimital and were thought to have disappeared early this century. Illustrated in south central Oregon only. Not shown within the bounds of the WNF. Listed as a games species in Oregon, but not present in fall.

Habitat: Inhabits freshwater marshes and wet meadows with a growth of sedges, usually surrounded by willows, and often with standing water up to a foot deep during the breeding season.

Reproduction: Begins nesting in Oregon by May. Nest is a cup, built of marsh vegetation, and attached to emergent plants above water levels.

Ecology: Very secretive and little is known about its habits in Oregon. Mainly detected through its vocalizations during breeding season. Winter residence of Oregon populations is unknown.

Black Swift (*Cypseloides niger*)

Range: Scattered distribution in western North America and Central America. Breeds from southern Alaska south to California and east to Colorado and Utah. The only illustrated locations in Oregon is on the western slope of the cascades in southeast Lane County.

Habitat: Nests in cliff faces near or behind waterfalls. In western North America, these situations are usually in deep canyons in wooded areas.

Reproduction: Breeding season is likely in June. Nests in small colonies. Nest consists of a cup made up of mosses, ferns, and other plant matter. A single egg is laid.

Ecology: Colonies consist generally of 5-15 pairs. They use a variety of habitats in other parts of their range such as sea cliffs and caves. They winter in Central America and Caribbean Sea Islands.

Comments: Black Swifts were discovered during the breeding season in Oregon at Salt Creek Falls, in Lane County, on the WNF. There are other sites in Oregon that qualify as breeding habitat. At Salt Creek Falls, it has not been possible to confirm breeding (eggs or nestlings seen). This is partly due to accessibility of the nesting area.

Tricolored Blackbird (*Agelaius tricolor*)

Range: Restricted breeding distribution from southern Oregon south through cismontane California to northern Baja, California. Illustrated only outside boundaries of the WNF.

Habitat: Prefers to breed in freshwater marshes with emergent vegetation (cattails) or in thickets of willows or other shrubs. In Oregon it has bred in Himalayan blackberry growing in and around wetlands. Often found breeding in the company of Red-winged Blackbirds.

Reproduction: Breeds in April. Migrates to Oregon breeding grounds. Nest is made up of plant fibers attached to emergent vegetation or secured in a thicket of shrubs.

Ecology: This blackbird is colonial rather than territorial, defending only a few feet from the nest. After breeding season, it forms large flocks. Most of Oregon's Tricolored Blackbirds winter in California.

Baird's Shrew (*Sorex bairdii permiliensis*)

Range: In Oregon, this species occurs in the Coast Range from Portland south to Lane County. Also occurs along the west slope of the Cascade Range from the Columbia River south to central Lane County.

Habitat: Open Douglas fir stands with numerous rotting logs. More specific habitat requirements are lacking.

Pacific Shrew (*Sorex pacificus Canadensis*)

Range: Endemic to Oregon. Occurs in the Cascade Range from northeast Linn County to southern Jackson County.

Habitat: Moist wooded areas with fallen decaying logs and brushy vegetation.

Pacific Fisher (*Martes pennanti*)

Range: From Boreal forest region in southern half of Canada with extensions into the United States in the Rocky Mountains, Cascade, Coast, and Sierra Nevada Ranges. Of the three specimens on deposit in systematic collections, two are from Lane County.

Habitat: Widespread, continuous-canopy forests at relatively low elevations. Most abundant in mountainous regions. Less abundant in foothill regions. Fishers occupy a wide variety of densely forested habitats at low to mid-elevations, (100-1800m). Typical habitats include subalpine Pacific fir (26%), western hemlock (54%), and Sitka spruce (20%). Aubry and Houston suggest that habitat for Fishers would be enhanced by minimizing forest fragmentation; both in remaining old growth and second growth; maintaining a high degree of forest floor structural diversity in intensively managed plantations; preserving large snags and live trees with dead tops; maintaining continuous canopies in riparian areas; and protecting swamps and other forest wetlands.

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Appendix G: Heritage Resources Letter of Compliance

File Code: 1950 NEPA

Date: January 6, 2006

Subject: Waldo Lake Environmental Analysis

To: Brian McGinley, Recreation Planner
Planning and Program Files

In compliance with 36 CFR Part 800, the National Historic Preservation Act, the National Environmental Policy Act, Executive Order 11593, the 2004 Programmatic Agreement between the Advisory Council on Historic Preservation, Oregon State Historic Preservation Officer and the USDA Forest Service, Region 6 and other pertinent federal and state laws, the Waldo Lake Environmental analysis was reviewed for heritage resource concerns.

The project is located in the sections within and surrounding Waldo Lake in T21S and T22S, R5½E, R6E, R6½E on the Waldo Mountain and Waldo Lake 7.5' quads. The environmental analysis addresses three motorized activities around Waldo Lake: motorized boating, floatplane access to the lake, and chainsaw or generator use at dispersed campsites. The proposed actions to manage these motorized activities do not have ground-disturbing potential except for the placement of information signing near boat launches and access roads.

New information or regulatory signs will likely be placed in previously disturbed areas and therefore will not be located in any historically significant areas. As such, this project may proceed as exempt from further review under Appendix B (7) and (12) of the Programmatic Agreement.

It will be necessary to coordinate with the district archaeologist, if signs will be located in undisturbed areas in order to assess the level of inspection and monitoring needed during implementation, so please notify the archaeologist whenever ground disturbing activities are planned.

Catherine H. Lindberg
Forest Archaeologist
Willamette National Forest

**Appendix H: Recreation at Waldo Lake: An Examination of User
Characteristics, Behaviors, and Attitudes**

by

**Robert C. Burns
West Virginia University**

**Alan R. Graefe
The Pennsylvania State University**

Report Submitted to the Willamette National Forest

Region 6, Portland OR
USDA Forest Service

December, 2004

Table of Contents

Introduction.....

Methodology.....

Executive Summary

Demographics and Trip Visitation Patterns

Activity Participation.....

Watercraft Use

Visitor Perceptions.....

Management Options

Noise –related Issues.....

Changes at Waldo Lake

Crowding and Conflict Issues

Overall Satisfaction.....

Conclusion

Appendices

 A. Open-ended Comments.....

 B. Survey Instrument

Introduction

People go to lakes to participate in a variety of recreational activities such as fishing, motorized and non-motorized water travel, camping, viewing natural features, viewing wildlife, picnicking, etc. The popularity of such areas for recreational use has led to a range of environmental impacts that can disrupt the overall health of the ecosystem and also cause dissatisfaction and conflict among different user groups. Waldo Lake, located in the Willamette National Forest in central Oregon, receives several thousand visitors during the summer months who come to participate in these types of activities.

Understanding the noise-related and crowding/conflict issues at Waldo Lake is important in determining potential alternative methods of management that might help reduce the negative effects of these concerns. Communication and compromise between management and recreational users can help assure the continued satisfaction of visitors without sacrificing the overall quality of the lake and its attributes.

The purpose of this investigation was to examine user characteristics, behaviors and attitudes at Waldo Lake, Oregon. Possible management options pertaining to motorized boating activities at Waldo Lake were also explored as a part of this study, which was done in conjunction with the National Visitor Use Monitoring (NVUM) initiative of the USDA Forest Service. Under this initiative, recreational use studies are being conducted in all National Forest units, with twenty-five percent of the national forests conducting surveys each year over a four-year period.

Methodology

Data were collected through an on-site interview survey designed to gather information about several aspects of recreational use at Waldo Lake from the varied user groups in the area. The data presented here include a total of 430 completed surveys obtained at Waldo Lake during the period of May 20 thru August 1, 2003. During each six to eight hour sampling period, different types of visitor sites (i.e. campsites, boat ramps, trailheads, etc.) were observed and the areas that were experiencing a higher level of use were targeted for administering the survey at that time. Therefore, the sample for this study consists of both land and water-based recreation visitors participating in both motorized and non-motorized boating, hiking, camping, and other day use activities.

Thanks to...

We wish to express our sincere thanks to many people who made this study a reality. Thanks to Jim Williams and Brian McGinley, our key contacts at the Middle Fork District, Willamette NF. Their vision and interest was the impetus for this study. Within Region 6 RLM, we thank Chuck Frayer for allowing us to work directly with individual National Forests while conducting the NVUM study.

Executive Summary

- Waldo Lake attracts thousands of visitors annually, consisting of various user groups including both land and water-based recreationists.
- A total of 430 completed surveys were collected from respondents at campsites, boat ramps, and trailheads at Waldo Lake. Respondents were participating in motorized and non-motorized boating, hiking, camping, and other day use activities.
- The majority of respondents were males and had visited Waldo Lake in the past.
- Nearly all of the respondents were residents of Oregon and traveled an average distance of 232 miles to visit Waldo Lake.
- The respondents tended to be in large groups (mean number of people=4.36) and spent an average of 3.37 days at Waldo Lake on their trip.
- Respondents participated in a variety of activities at Waldo Lake. The primary activity that was noted most often and participated in by nearly all of the respondents was general recreating/relaxing/hanging out.
- Nearly three-quarters of respondents used some sort of watercraft on their trip to Waldo Lake.
- Many types of motorized and non-motorized watercraft were used at Waldo Lake, including canoes, inflatable boats, kayaks, sailboats, fishing boats, etc. The largest proportion of respondents used a canoe as their main type of watercraft.
- In this study, Waldo Lake boaters were classified based on the primary source of power for their primary boat. Those using gas-powered boats for their primary watercraft were classified as motorized boaters while those using other power sources were classified as non-motorized boaters.
- Over half of the Waldo Lake boaters used a paddle/oar as their primary boat power, while a quarter of the respondents reported gasoline as their primary source of power.
- The majority of respondents classified as motorized boat users reported their primary power source as a four-cycle engine.
- Over one-fourth of Waldo Lake boaters used an electric motor as a secondary power source. Nearly all of the electric motor users supported the idea of a solar powered recharge station at the lake's boat ramps that would be funded by a user fee.
- Overall, the respondents enjoyed their trip to Waldo Lake, thought the recreation areas were in good condition, and thought their trip was well worth the money they spent on it.
- Crowding concerns, including the number of people at recreation areas and number of boats on the lake, were not an issue for the respondents. However, respondents visiting Waldo Lake for the first time reported feeling significantly less crowded than more experienced lake users.
- Overall, there was an extremely high level of acceptability regarding the number of people seen at Waldo Lake. Respondents generally reported that the number of other visitors at Waldo Lake neither enhanced nor detracted from their enjoyment.
- Respondents that had visited Waldo Lake in the past were less likely than first-time visitors to agree that the recreation areas and their surroundings were in good condition.
- Motorized watercraft users were more accepting than non-motorized users of the idea of having more watercraft on the lake during their visit.

- Respondents felt that pollution from motorized boating needs to be controlled, yet they reported that the shorelines are in good condition.
- All user groups recognized that motorized boating affects water quality, although non-motorized boaters were most concerned about this.
- Visitor perceptions varied significantly between motorized and non-motorized watercraft users, with non-motorized boaters generally more likely to recognize negative impacts of motorized boating.
- The vast majority of respondents indicated that their recreation experience was not interfered with by motorized noise. However, one-third of the respondents reported that their overall experience at Waldo Lake was negatively impacted by human-induced noise.
- Overall, motorized watercraft users were less likely to report interference of motorized sounds, while non-motorized watercraft users were more likely to report some interference.
- Non-motorized watercraft users were more likely to report that noise from motorized watercraft interfered with their experience, while motorized watercraft users were more likely to report that loud music interfered with their experience.
- Many Waldo Lake repeat visitors did not know whether the amount of boating or environmental quality of the lake has changed within the past few years. About one-fourth felt that the environmental quality had declined, while 6% felt it had improved.
- Motorized watercraft users were more likely to report that the environmental quality has been improving or not changing very much, while non-motorized users were more likely to report that the environmental quality has been declining.
- On a 10-point satisfaction scale, where 1 represents the worst possible experience and 10 represents the best possible experience, visitors reported a mean score of 8.54. Therefore, the respondents were very satisfied with their experiences at Waldo Lake.
- Waldo Lake users strongly supported controlling the level of noise from motorized recreation and establishing “off-limit” zones to protect sensitive areas as potential management actions.
- Waldo Lake visitors generally opposed the ideas of zoning activities for different boat uses at different times and limiting the number of boats on the lake at one time.
- Responses about potential restrictions on motorized watercraft at Waldo Lake were strongly polarized between the user groups.
- Overall, non-motorized watercraft users were more likely to support various controls or limits on motorized water-based activity, while motorized watercraft users generally opposed these actions.
- Respondents were divided on whether certain sections of the lake should be limited to non-motorized boating only, with motorized boaters tending to oppose this idea and non-motorized boaters and land-based users more likely to support it.
- However, the majority of all groups favored controlling the level of noise from motorized recreation and limiting the size and power of boats using Waldo Lake.
- All user groups tended to favor limiting motorized boating to 4-cycle engines only.

Demographics and Trip Visitation Patterns

Table 1. Demographics and Trip Visitation Patterns

| | Frequency | Percent |
|---|-----------|---------|
| Gender: | | |
| Male | 277 | 66.0 |
| Female | 143 | 34.0 |
| Type of visit: | | |
| First | 109 | 25.4 |
| Repeat | 320 | 74.6 |
| Mean number of days at Waldo Lake during this trip | | |
| | 3.37 | |
| Mean number of days at Waldo Lake in 2002 | | |
| | 4.40 | |
| Primary destination Waldo Lake: | | |
| Yes | 423 | 98.6 |
| No | 6 | 1.4 |
| Recreate just at Waldo Lake or other places: | | |
| Just Waldo Lake | 332 | 77.6 |
| Other places | 96 | 22.4 |
| Permanent Home: | | |
| Country: | | |
| USA | 428 | 99.5 |
| Israel | 2 | 0.5 |
| State: | | |
| Oregon | 401 | 93.3 |
| Other | 29 | 6.7 |
| Distance in miles from permanent home to Waldo Lake (recoded): | | |
| 1-75 | 129 | 31.5 |
| 76-150 | 127 | 31.0 |
| 151-200 | 108 | 26.3 |
| 201 and up | 46 | 11.2 |
| Mean | 231.79 | |
| Median | 110.0 | |
| Group size(recoded): | | |
| 1 | 18 | 4.2 |
| 2 | 148 | 34.4 |
| 3 | 62 | 14.4 |
| 4 | 79 | 18.4 |
| 5-30 | 123 | 28.6 |
| Mean | 4.36 | |
| Part of an organized group: | | |
| Yes | 22 | 5.1 |
| No | 407 | 94.9 |

Demographics and Trip Visitation Patterns

- Three-quarters of the respondents (75%) were repeat users, and two-thirds of the respondents (66%) were males.
- Nearly all of the respondents (93%) were from Oregon.
- Nearly all of the respondents (99%) indicated that Waldo Lake was their primary destination on this trip, and over three-quarters (78%) were visiting only Waldo Lake on this trip.
- The respondents' average distance traveled from their permanent home was 232 miles (median=110).
- The mean number of days respondents spent at Waldo Lake in 2002 was 4.40, and the mean number of days respondents were spending on this trip was 3.37.
- The respondents tended to be in large groups (mean=4.36), and only a small minority of the respondents (5.1%) was part of an organized group.

Activity Participation

An analysis of activity participation was conducted to understand what recreation activities respondents were participating in, and which activity was their primary activity while at Waldo Lake. The activity format was based on the National Visitor Use Monitoring (NVUM) project so that results can be compared with data collected in other locations within the national forest. The activity participation shown in Table 2 represents the summer season, during which the study was conducted, and thus may differ from what goes on during other seasons of the year.

Table 2. Activity Participation and Primary Activity

| | Participation in Activity (Percent) | Primary Activity (Percent) |
|---|--|---|
| General/other-relaxing, hanging out, escaping heat, noise, etc. | 98.1 | 40.1 |
| Non-motorized water travel (sailboarding, kayaking, rafting, canoe, etc.) (circle all that apply) | 57.4 | 19.0 |
| Camping in developed sites (family or group sites) | 73.7 | 16.7 |
| Motorized water travel (boats, ski sleds, etc.) | 21.4 | 5.6 |
| Bicycling, including mountain bikes (circle all that apply) | 29.8 | 3.8 |
| Other non-motorized activities (swimming, games, and sports) | 75.6 | 3.3 |
| Other motorized land/air activities (plane, other) | 0 | 3.3 |
| Backpacking, camping in unroaded areas | 8.1 | 2.8 |
| Picnicking and family day gatherings in developed sites (family or group sites) (circle all that apply) | 72.6 | 2.3 |
| Hiking or walking | 77.7 | 1.4 |

| | | |
|---|------|-----|
| Horseback riding | 1.6 | 1.2 |
| Viewing wildlife, birds, flowers, fish, etc. on NF lands (circle all that apply) | 91.6 | <1 |
| Viewing natural features such as scenery, flowers, etc. on NF lands (circle all that apply) | 96.5 | <1 |
| Visiting a nature center or nature trail (circle all that apply) | 5.1 | <1 |
| Nature study | 20.0 | <1 |
| 4-wheelers, dirt bikes, etc. (circle all that apply) | 2.3 | <1 |
| Gathering mushrooms, berries, firewood, or other natural products (circle all that apply) | 78.6 | <1 |
| Fishing—all types | 28.6 | <1 |
| Visiting historic and prehistoric sites/areas (circle all that apply) | 18.4 | 0 |
| Hunting—all types | <1 | 0 |
| Driving for pleasure on roads | 30.9 | 0 |

- Nearly all of the Waldo Lake respondents participated in general relaxing/hanging out (98%), viewing natural features (97%), and viewing wildlife, birds, flowers, fish, etc. (92%).
- Other popular activities at Waldo Lake included hiking or walking (78%), other non-motorized activities (76%), and picnicking and family day gatherings (73%).
- The primary activity that was noted most often was general recreating/relaxing/hanging out (40%), followed by non-motorized water travel (19%) and camping in developed sites (17%).
- Only a small percentage of respondents (6%) participated in motorized water travel as their primary activity.

Table 3. Primary Activity by Type of Visit (Percent)

| | Type of Visit | | |
|-------------------------------|---------------|--------|-------|
| | First | Repeat | Total |
| Passive recreation activities | 57.8 | 41.5 | 45.6 |
| Camping/backpacking | 16.5 | 20.6 | 19.5 |
| Non-motorized water travel | 12.8 | 21.2 | 19.1 |
| Active recreation activities | 11.0 | 9.8 | 10.1 |
| Motorized water travel | 1.8 | 7.0 | 5.6 |

- Respondents visiting Waldo Lake for the first time were more likely to participate in passive recreation activities, while respondents who were repeat visitors were more likely to select camping or motorized or non-motorized water travel as their primary activity.
- Passive recreation activities included general relaxing, nature study and the various viewing-related activities.
- No significant differences were noted by gender or by distance traveled.

Watercraft Use

The respondents were asked if they were using watercraft on this trip, and those who replied yes were then asked additional questions seeking specific information about the type of watercraft they were using. These participants were asked to report the type, length, and primary and/or secondary boat power of the watercraft they were using. Electric motor users were asked an additional set of questions pertaining to their battery source and charging methods.

Table 4. Type of Watercraft

| | Percent | Length (Mean) |
|---------------------|---------|---------------|
| Canoe | 23.3 | 16 ft. |
| Inflatable boat | 14.7 | 10 ft |
| Kayak | 14.4 | 16 ft |
| Runabout (<25 feet) | 14.2 | 19 ft |
| Sailboat | 9.5 | 20 ft |
| Other _____ | 5.6 | 15 ft |
| Fishing/Bass Boat | 4.7 | 16 ft |
| Sailboard | <1 | 10 ft |
| Pontoon Boat | <1 | N/A |
| Cruiser (≥ 24ft) | N/A | N/A |

- Nearly three-quarters of the respondents (72%) used some sort of watercraft on this trip to Waldo Lake.
- The most popular type of watercraft was a canoe (23%), followed by an inflatable boat (15%).
- No respondents reported using a cruiser that was greater than 24 feet in length.
- Respondents reported the following types of watercraft for the “other” category:
 - Second kayak (11)
 - Second canoe (7)
 - Catamaran (1)
 - Dingy (1)
 - Drift boat (1)

Table 5. Type of Watercraft Used by Distance Traveled (Percent)

| | Distance Traveled | | | | |
|---------------------|-------------------|--------|---------|----------------|-------|
| | 1-75 | 76-150 | 151-200 | 201 or greater | Total |
| Runabout (<25 feet) | 8.5 | 21.3 | 14.8 | 4.3 | 13.7 |
| Sailboat | 4.7 | 5.5 | 18.5 | 13.0 | 9.5 |

- Respondents in the two lower distance brackets were more likely to report using a runabout (<25 feet) at Waldo Lake.
- Respondents that traveled more than 150 miles from their permanent home were more likely to use a sailboat.
- No significant differences were noted for the other types of boats or by gender or type of visit.

Waldo Lake boaters were classified based on the primary source of power for their primary boat. Those using gas powered boats for their primary boat were classified as motorized boaters while those using other power sources were classified as non-motorized boaters. In the remainder of this report, these two types of boaters are compared, along with land-based visitors to Waldo Lake.

Table 6. Primary and Secondary Boat Power of Watercraft Users

| | Primary Boat Power | Secondary Boat Power |
|--|---------------------------|-----------------------------|
| | -----Percent----- | |
| Type: | | |
| Paddle/oar | 58.3 | 20.0 |
| Gas | 25.9 | 48.5 |
| Wind/sail | 14.6 | 3.8 |
| Electric | 1.3 | 27.7 |
| Diesel | 0.0 | 0.0 |
| | | |
| Horsepower (mean) | 58 | 13 |
| | | |
| (If motorized) power source used: | | |
| 2 cycle | 16.5 | 61.9 |
| 4 cycle | 83.5 | 38.1 |

- The most popular type of boat power for a respondent's primary boat was paddle/oar (58%), followed by gas (26%).
- For secondary boat power, gas motors were the most popular type of power (49%).
- The mean horsepower for primary boat power was 58 hp, while the mean horsepower for secondary boat power was 13 hp.
- Over three-fourths of motorized boat users (84%) reported that their primary power source was 4 cycle, while the majority (62%) of secondary power sources were 2 cycle engines.

Respondents who used electric boat motors were asked a separate set of questions regarding this power source.

Table 7. Electric Motor Use at Waldo Lake

| | Percent |
|---|----------------|
| Battery source used: | |
| 12 volt battery | 95.1 |
| 24 volt battery | 4.9 |
| Charging Method: | |
| Electric charger at home | 39.0 |
| Electric charger on site | 29.3 |
| Other (generator, car charger) | 17.1 |
| Solar charger | 9.8 |
| Gas powered charger on your vessel | 4.9 |
| Would you support a solar powered recharge station at the surrounding boat ramps that would be funded by a user fee? | |
| Yes | 87.8 |
| No | 12.2 |
| If yes, how often would you use it? | |
| Sometimes | 30.6 |
| Often | 30.6 |
| Always | 19.4 |
| Not sure | 13.9 |
| Never | 5.6 |

- Nearly all of these respondents had a 12-volt battery (95%).
- Nearly two-fifths of these respondents used an electronic charger at home (39%), while nearly one-third used a charger on-site (29%).
- Approximately one-fifth of the respondents (17%) selected the “other” category, which included five respondents who reported using a car charger and two respondents who reported using a generator.
- Nearly all of the electric motor users (88%) supported the idea of having a solar-powered charging station at Waldo Lake.
- The majority of these respondents said that they would use the solar-powered charging station often/always (50%) or sometimes (31%).

Visitor Perceptions

Respondents were asked to rate their level of agreement with several statements pertaining to their recreation experience at Waldo Lake on this trip, including several statements about the possible impact that other recreation users may have had on their experience. These statements have been organized in the table below by separating the positively - worded statements from the negatively – worded statements.

An additional section then asked respondents a series of specific questions about their recreation experience at Waldo Lake on this trip. Over half of these questions pertained to the possible effects of motorized boating.

Table 8. Visitor Perceptions about Waldo Lake

| | Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree | Mean |
|---|-------------------|----------|-----------|-------|----------------|-------------|
| (Positively-worded statements: Higher mean score is more positive response) | | | | | | |
| | -----Percent----- | | | | | |
| I thoroughly enjoyed my trip | .2 | 1.6 | 2.8 | 30.1 | 65.2 | 4.58 |
| I thought the recreation area and its surroundings were in good condition | <1 | 2.1 | 3.5 | 35.4 | 58.0 | 4.48 |
| My trip was well worth the money I spent to take it | <1 | 3.5 | 11.9 | 28.3 | 55.4 | 4.34 |
| (Negatively-worded statements: Lower mean score is more positive response) | | | | | | |
| | -----Percent----- | | | | | |
| I did not participate in some boating activities because of crowded conditions at the lake | 80.9 | 16.7 | 1.5 | <1 | <1 | 1.23 |
| I stayed off the lake during parts of the day because there were too many boats on the lake | 79.0 | 19.2 | 1.5 | <1 | --- | 1.23 |
| I avoided my favorite parts of Waldo Lake because there were too many people | 71.7 | 20.2 | 3.6 | 3.4 | 1.1 | 1.42 |
| There were too many people at the lake | 68.2 | 25.2 | 3.3 | 2.1 | 1.2 | 1.43 |
| There were too many watercraft on the lake | 71.6 | 16.8 | 7.3 | 2.6 | 1.7 | 1.46 |
| I wish there were more watercraft on the lake during my visit | 74.0 | 10.8 | 6.3 | 7.3 | 1.6 | 1.52 |
| My trip was not as enjoyable as I expected it to be | 63.3 | 25.9 | 5.4 | 4.2 | 1.2 | 1.54 |
| The number of people at the recreation area reduced my enjoyment | 60.4 | 30.3 | 4.2 | 4.2 | <1 | 1.55 |
| I was disappointed with some aspects of my trip | 53.5 | 25.8 | 7.3 | 12.4 | <1 | 1.81 |
| The behavior of other people at the recreation area lowered the quality of my experience | 54.3 | 25.4 | 5.8 | 11.2 | 3.3 | 1.84 |

Response Code: 1 = “Strongly disagree” and 5 = “Strongly agree”

Nearly all of the respondents showed agreement with the following statements:

- I thoroughly enjoyed my trip (4.58)
 - I thought the recreation area and its surroundings were in good condition (4.48)
 - My trip was well worth the money I spent to take it (4.34)
- There was strong agreement that the number of other people and the amount of watercraft use on the lake did not impact the respondents' recreation experience negatively.

Table 9. Visitor Perceptions about Waldo Lake by Gender, Type of Visit, Type of User and Distance Traveled (Mean)

| (Positively-worded statements: Higher mean score is more positive response) | | | | |
|---|----------------------|----------------------|--------------------------|-------|
| | Gender | | | |
| | Male | Female | Total | |
| My trip was well worth the money I spent to take it | 4.26 | 4.46 | 4.33 | |
| | Type of Visit | | | |
| | First | Repeat | Total | |
| I thought the recreation area and its surroundings were in good condition | 4.63 | 4.42 | 4.47 | |
| | Type of User | | | |
| | Land-Based | Motorized Watercraft | Non-Motorized Watercraft | Total |
| I thoroughly enjoyed my trip | 4.55 | 4.39 | 4.67 | 4.58 |
| My trip was well worth the money I spent to take it | 4.33 | 4.08 | 4.43 | 4.34 |

Response code: 1 = "Strongly disagree" and 5 = "Strongly agree"

| (Negatively-worded statements: Lower mean score is more positive response) | | | | | |
|--|----------------------------------|----------------------|--------------------------|----------------|-------|
| | Type of User | | | | |
| | Land-Based | Motorized Watercraft | Non-Motorized Watercraft | Total | |
| I wish there were more watercraft on the lake during my visit | 1.27 | 2.23 | 1.40 | 1.52 | |
| I did not participate in some boating activities because of crowded conditions at the lake | 1.75 | 1.16 | 1.22 | 1.23 | |
| | Distance Traveled (miles) | | | | |
| | 1-75 | 76-150 | 151-200 | 201 or greater | Total |
| I avoided my favorite parts of Waldo Lake because there were too many people | 1.36 | 1.40 | 1.40 | 1.93 | 1.43 |
| I was disappointed with some aspects of my trip | 1.63 | 2.01 | 1.82 | 1.89 | 1.83 |

Response code: 1 = "Strongly disagree" and 5 = "Strongly agree"

Female respondents were significantly more likely than males to feel that their trip to Waldo Lake was well worth the money they spent to take it.

- Repeat visitors were less likely than first-time visitors to agree that the recreation area and its surroundings were in good condition.
- Non-motorized watercraft users were less likely to agree that they wished more watercraft were on the lake during their visit, while motorized watercraft users were less likely to agree with the following statements:
 - I thoroughly enjoyed my trip
 - My trip was well worth the money I spent to take it
 - I did not participate in some boating activities because of crowded conditions at the lake
- Respondents that traveled the shortest distances to Waldo Lake from their home were less likely to agree that they avoided some of their favorite parts of Waldo Lake because there were too many people, and also that they were disappointed with some aspects of their trip.

Table 10. Additional Visitor Perceptions

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | Mean |
|---|-------------------|----------|---------|-------|----------------|-------------|
| | -----Percent----- | | | | | |
| Pollution from motorized boating needs to be controlled | <1 | 1.6 | 3.5 | 30.5 | 63.7 | 4.55 |
| The shorelines are in good condition at Waldo Lake | <1 | 4.7 | 17.5 | 35.0 | 42.7 | 4.15 |
| Motorized boating has a negative impact on primitive recreation experiences | 3.7 | 8.1 | 12.8 | 25.3 | 50.0 | 4.10 |
| Certain sections of the lake should be limited to non-motorized boating | 7.4 | 13.0 | 11.6 | 21.2 | 46.7 | 3.87 |
| Motorized activities negatively impact wildlife | 4.2 | 10.5 | 22.3 | 21.2 | 41.9 | 3.86 |
| Litter is not a problem at Waldo Lake | 4.0 | 11.6 | 19.3 | 39.3 | 25.8 | 3.71 |
| Motorized boating has <u>no</u> effect on water quality | 66.5 | 26.7 | 5.3 | 1.2 | .2 | 1.42 |

Response Code: 1 = “Strongly disagree” and 5 = “Strongly agree”

- Nearly all of the respondents (93-94%) agreed that pollution from motorized boating needs to be controlled at the lake and *did not agree* that motorized boating has no effect on water quality.
- Over three-fourths of the respondents (78%) agreed that the shorelines are in good condition at Waldo Lake and approximately two-thirds of the respondents (65%) felt that litter is not a problem at Waldo Lake; however, almost one-fifth of the respondents were neutral in responding to these statements.
- Three-fourths of the respondents (75%) agreed that motorized boating negatively impacts primitive recreation experiences, and over two-thirds of the respondents (68%) agreed that certain sections of the lake should be limited to non-motorized boating.

Table 11. Additional Visitor Perceptions by Type of Visit and Type of User (Mean)

| | Type of Visit | | | Total |
|---|---------------|----------------------|--------------------------|-------|
| | First | Repeat | | |
| Motorized boating has <u>no</u> effect on water quality | 1.28 | 1.47 | | 1.42 |
| | Type of User | | | |
| | Land-based | Motorized Watercraft | Non-Motorized Watercraft | Total |
| Pollution from motorized boating needs to be controlled | 4.53 | 3.90 | 4.79 | 4.55 |
| The shorelines are in good condition at Waldo Lake | 4.13 | 3.87 | 4.28 | 4.16 |
| Motorized boating has a negative impact on primitive recreation experiences | 4.14 | 2.74 | 4.55 | 4.10 |
| Certain sections of the lake should be limited to non-motorized boating | 4.00 | 2.11 | 4.41 | 3.86 |
| Motorized activities negatively impact wildlife | 3.78 | 2.56 | 4.35 | 3.86 |
| Motorized boating has <u>no</u> affect on water quality | 1.42 | 2.05 | 1.20 | 1.42 |

Response Code: 1 = “Strongly disagree” and 5 = “Strongly agree”

- Respondents visiting Waldo Lake for the first time were less likely to agree that motorized boating has no effect on water quality.
- Motorized watercraft users were more likely than non-motorized or land-based users to feel that motorized boating has no effect on water quality.
- Overall, the largest differences between types of users were noted between motorized watercraft users and non-motorized watercraft users. Motorized watercraft users were far less likely to agree with the following statements:
 - Pollution from motorized boating needs to be controlled
 - The shorelines are in good condition at Waldo Lake
 - Motorized boating has a negative impact on primitive recreation experiences
 - Certain sections of the lake should be limited to non-motorized boating
 - Motorized activities negatively impact wildlife
- No significant differences were noted by gender nor distance traveled.

Management Options

Waldo Lake respondents were asked to indicate if they favored, opposed, or were not sure about several possible management options at Waldo Lake. All of the potential management actions pertained to motorized boating activities and suggested imposing various types of limitations.

Table 12. Management Options at Waldo Lake

| | FAVOR | OPPOSE | NOT SURE |
|---|-------------------|--------|----------|
| | -----Percent----- | | |
| Zone activities to provide for different boat uses at different times | 10.0 | 53.1 | 36.8 |
| Limit the number of boats on the lake at one time | 30.7 | 55.1 | 14.2 |
| Zoning the waters to provide for specific uses at specific places | 44.0 | 41.4 | 14.7 |
| Limit motorized boat motors to 4-cycle engines only | 69.3 | 13.5 | 17.2 |
| Restrict boat use in certain areas | 69.1 | 19.1 | 11.9 |
| Only permit non-motorized boats and electric motors in Waldo lake | 68.8 | 21.4 | 9.8 |
| Limit the size and power of boats using Waldo Lake | 79.8 | 12.6 | 7.7 |
| Control the level of noise from motorized recreation | 85.8 | 7.4 | 6.7 |
| Establish “Off Limit” Zones to protect sensitive areas | 87.2 | 8.1 | 4.7 |

- The vast majority of respondents favored the establishment of off-limit zones to protect sensitive areas (87%), and felt that management should control the level of noise from motorized recreation (86%).
- Over two-thirds of the respondents (69%) favored the following actions:
 - Limit motorized boat motors to 4-cycle engines only
 - Restrict boat use in certain areas
 - Only permit non-motorized boats and electric motors in Waldo lake
- Over three-quarters of the respondents (80%) favored limiting the size and power of boats using Waldo Lake, while the greatest opposition was noted for limiting the number of boats on the lake at one time (55%).

Table 13. Management Options at Waldo Lake by Type of Visit and Type of User (Percent)

| | Type of Visit | | | |
|---|----------------------|----------------------|--------------------------|-------|
| | First | Repeat | Total | |
| Zoning the waters to provide for specific uses at specific places | | | | |
| Favor | 54.1 | 40.3 | 43.8 | |
| Oppose | 32.1 | 44.7 | 41.5 | |
| Not sure | 13.8 | 15.0 | 14.7 | |
| | Type of User | | | |
| | Land-based | Motorized Watercraft | Non-Motorized Watercraft | Total |
| Zoning the waters to provide for specific uses at specific places | | | | |
| Favor | 45.4 | 12.5 | 54.6 | 44.2 |
| Oppose | 26.9 | 81.3 | 34.5 | 41.1 |
| Not sure | 27.7 | 6.3 | 10.9 | 14.7 |
| Only permit non-motorized boats and electric motors in Waldo lake | | | | |
| Favor | 66.4 | 8.8 | 90.8 | 68.7 |
| Oppose | 10.1 | 86.3 | 4.8 | 21.5 |
| Not sure | 23.5 | 5.0 | 4.4 | 9.8 |
| Limit the size and power of boats using Waldo Lake | | | | |
| Favor | 80.7 | 52.5 | 88.6 | 79.7 |
| Oppose | 5.9 | 36.3 | 7.9 | 12.6 |
| Not sure | 13.4 | 11.3 | 3.5 | 7.7 |
| Restrict boat use in certain areas | | | | |
| Favor | 65.5 | 47.5 | 78.2 | 68.9 |
| Oppose | 14.3 | 41.3 | 14.0 | 19.2 |
| Not sure | 20.2 | 11.3 | 7.9 | 11.9 |
| Control the level of noise from motorized recreation | | | | |
| Favor | 81.5 | 63.8 | 95.6 | 85.7 |
| Oppose | 8.4 | 21.3 | 2.2 | 7.5 |
| Not sure | 10.1 | 15.0 | 2.2 | 6.8 |
| Limit motorized boat motors to 4-cycle engines only | | | | |
| Favor | 65.5 | 47.5 | 78.2 | 68.9 |
| Oppose | 14.3 | 41.3 | 14.0 | 19.2 |
| Not sure | 20.2 | 11.3 | 7.9 | 11.9 |
| Zone activities to provide for different boat uses at different times | | | | |
| Favor | 14.3 | 1.3 | 11.0 | 10.1 |
| Oppose | 45.4 | 55.0 | 56.1 | 52.9 |
| Not sure | 40.3 | 43.8 | 32.9 | 37.0 |

- Only one significant difference was noted between respondents who were repeat visitors and those who were visiting for the first time. Repeat visitors were slightly less likely to favor zoning the lake for specific uses at specific places.
- Seven of the eight management options at Waldo Lake showed significant differences between the types of users.
- Overall, non-motorized watercraft users were more likely to support controlling or limiting motorized water-based activity while motorized watercraft users were more likely to oppose these actions.
- Land-based users were more likely to report uncertainty regarding most of the management issues.

- No significant differences were noted by gender nor distance traveled.

Noise Related Issues

This section asked respondents a series of specific questions regarding the possible impact that noise had on their recreation experience at Waldo Lake on this trip. Respondents were asked whether their overall experience at Waldo Lake has been negatively impacted by human-induced noise; those saying yes were then shown a list of different types of noise and asked to select the types that had interfered with their experience.

An additional section then asked respondents to rate the degree of interference – ranging from not at all to extremely - that motorized sounds had on different aspects of their experience.

Table 14. Types of Noise

| | Percent |
|--|---------|
| Power generators | 39.3 |
| Dogs | 34.8 |
| Motorboats | 30.0 |
| Loud music | 19.3 |
| Cars/trucks/planes (circle all that apply) | 15.7 |
| Other (please list) | 42.1 |

- Overall, one-third of the respondents (33%) reported that their experience was negatively impacted by human-induced noise.
- Among those who were bothered by noise, the major sources of noise included:
 - Power generators (39%)
 - Dogs (35%)
 - Motorboats (30%)
- Over two-fifths of the respondents (42%) reported that their experience was negatively impacted by “other” types of noise, which are listed in Appendix A.

Table 15. Types of Noise by Gender and by Type of User (Percent)

| | Gender | | | Total |
|--|--------------|----------------------|--------------------------|-------|
| | Male | Female | | |
| Cars/trucks/planes (circle all that apply) | 11.1 | 25.5 | | 16.1 |
| | Type of User | | | |
| | Land-based | Motorized Watercraft | Non-Motorized Watercraft | Total |
| Motorboats | 12.5 | 6.3 | 39.6 | 29.5 |
| Loud music | 12.5 | 50.0 | 16.5 | 19.4 |

- Female respondents were more likely than males to report that noise from cars/trucks/planes interfered with their experience.

- Non-motorized watercraft users were more likely to report that noise from motorboats interfered with their experiences, while motorized watercraft users were more likely to report that loud music interfered with their experience.
- No significant differences were noted by type of visit or distance traveled.

Table 16. Interference of Motorized Sounds

| How much did motorized sounds interfere with your: | Not at all | Slightly | Moderately | Very much | Extremely | Mean |
|---|-------------------|-----------------|-------------------|------------------|------------------|-------------|
| | -----Percent----- | | | | | |
| Appreciation of the historical/cultural significance | 85.7 | 4.4 | 6.3 | 1.4 | 2.1 | 1.30 |
| Enjoyment of the area | 76.0 | 7.2 | 10.0 | 5.3 | 1.4 | 1.49 |
| Appreciation of the natural quiet | 75.3 | 6.7 | 10.0 | 4.9 | 3.0 | 1.53 |
| Appreciation of the sounds of nature | 75.8 | 6.0 | 9.5 | 4.9 | 3.7 | 1.55 |

Response Code: 1 = “Not at all” and 5 = “Extremely”

- When queried about the extent to which motorized sounds interfered with various aspects of their recreation experience at Waldo Lake, the vast majority of respondents were “not at all” impacted.

Table 17. Interference of Motorized Sounds by Type of User (Mean)

| Did motorized sounds interfere with your: | Type of User | | | |
|--|---------------------|-----------------------------|---------------------------------|--------------|
| | Land-based | Motorized Watercraft | Non-Motorized Watercraft | Total |
| Appreciation of the historical/cultural significance | 1.25 | 1.10 | 1.38 | 1.29 |
| Enjoyment of the area | 1.32 | 1.20 | 1.67 | 1.49 |
| Appreciation of the natural quiet | 1.34 | 1.20 | 1.75 | 1.53 |
| Appreciation of the sounds of nature | 1.34 | 1.20 | 1.77 | 1.54 |

Response Code: 1 = “Not at all” and 5 = “Extremely”

- Significant differences between types of users were noted for all four of the items pertaining to interference from motorized sounds.
- Overall, motorized watercraft users were less likely to report interference of motorized sounds, while non-motorized watercraft users were more likely to report some interference.
- The land-based users were generally in between the motorized and non-motorized watercraft users in their response to these items, but generally were closer to the motorized watercraft users.
- No significant differences were noted by gender, type of visit, nor distance traveled.

Changes at Waldo Lake

Only repeat visitors were asked if changes have occurred at Waldo Lake within the past few years. They were asked to assess possible changes regarding the amount of boating and the environmental quality at Waldo Lake.

Table 18. Changes at Waldo Lake

| | Increasing | Not changing very much | Decreasing | Don't know |
|--|-------------------|------------------------|------------|------------|
| Within the past few years, do you think the amount of boating use has been: | | | | |
| | -----Percent----- | | | |
| | 11.7 | 32.8 | 9.7 | 45.9 |
| Within the past few years, do you think the environmental quality (water quality, noise pollution, litter, etc.) at Waldo Lake has been: | Improved | Not changing very much | Degraded | Don't know |
| | 6.0 | 31.3 | 27.1 | 35.6 |

- Approximately one-half of the repeat visitors (46%) reported that they did not know if boating use had increased at Waldo Lake, and one-third (33%) indicated that boating use had not changed very much.
- The greatest proportion of repeat visitors (36%) also did not know whether the environmental quality of the lake had changed. Over one-fourth of these respondents (27%), however, felt that the environmental quality of the lake had been degraded.

Table 19. Changes at Waldo Lake by Type of Visit and Type of User (Percent)

| Within the past few years, do you think the amount of boating use has been: | Type of User | | | |
|--|--------------|----------------------|--------------------------|-------|
| | Land-based | Motorized Watercraft | Non-Motorized Watercraft | Total |
| Increasing | 5.6 | 2.9 | 17.6 | 11.7 |
| Not changing very much | 28.1 | 38.2 | 33.2 | 32.9 |
| Decreasing | 6.7 | 16.2 | 8.8 | 9.7 |
| Don't know | 59.6 | 42.6 | 40.4 | 45.7 |
| Within the past few years, do you think the environmental quality (water quality, noise pollution, litter, etc.) at Waldo Lake has been: | | | | |
| Increasing | 1.1 | 17.6 | 4.1 | 6.0 |
| Not changing very much | 32.6 | 41.2 | 27.5 | 31.4 |
| Decreasing | 15.7 | 2.9 | 40.4 | 26.9 |
| Don't know | 50.6 | 38.2 | 28.0 | 35.7 |

- Motorized watercraft users were more likely to report that the amount of motorized boating has been decreasing, while non-motorized watercraft users were more likely to report that it has been increasing.
- Additionally, motorized watercraft users were more likely to report that the environmental quality has been increasing or not changing very much, while non-motorized users were more likely to report that the environmental quality has been decreasing.

- Land-based users were more likely to report uncertainty about changes in the amount of boating and environmental quality within the past few years.
- Since only respondents who were repeat visitors to Waldo Lake could address this question, significant differences between first time and repeat visitors were not examined.
- No significant differences were noted by gender nor distance traveled.

Crowding and Conflict Issues

This section asked respondents several questions about possible crowding issues. Using a 9-point scale respondents were asked to rate their feelings regarding the level of crowding, the acceptability of the number of other visitors, the possible effects that other people had on their enjoyment, and finally, their desire to see an alternate number of visitors. Respondents were also asked to compare their prior expectations of crowding with their current perception of crowding at Waldo Lake.

Perception of Crowding

Respondents were asked to rate how crowded they felt - from not at all crowded to extremely crowded - at Waldo Lake by selecting a representative number on the 9-point crowding scale.

Table 20. Perception of Crowding

| Not at all Crowded | | Slightly Crowded | | Moderately Crowded | | Extremely Crowded | | | |
|--------------------|------|------------------|-----|--------------------|-----|-------------------|----|----|-------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Mean |
| 40.9 | 28.6 | 16.5 | 7.7 | 2.8 | 2.1 | <1 | <1 | <1 | 2.16 |

Response Code: 1 = “Not at all crowded” and 10 = “Extremely crowded”

- Overall, crowding appears to be very low at Waldo Lake. Most respondents indicated that they did not feel crowded while recreating at Waldo Lake. The mean score on the 9-point crowding scale was 2.16.
- Over two-thirds of the respondents (70%) rated their feeling of crowdedness as a “1” or “2” on the 9-point scale, indicating that they felt “not at all crowded.”
- Very few respondents indicated that they perceived conditions to be “extremely crowded.”

Table 21. Perception of Crowding by Type of Visit (Mean)

| | Type of Visit | | |
|------------------------|---------------|--------|-------|
| | First | Repeat | Total |
| Perception of Crowding | 1.83 | 2.27 | 2.16 |

Response Code: 1 = “Not at all crowded” and 10 = “Extremely crowded”

- Respondents visiting Waldo Lake for the first time reported feeling less crowded.
- No significant differences were noted by gender, type of user, nor distance traveled.

Acceptability of the Number of Other Visitors

Respondents were asked to rate the acceptability of the number of visitors by selecting a representative number on the 9-point scale.

Table 22. Acceptability of the Number of Other Visitors (Percent)

| Very Unacceptable | | Neither Acceptable nor Unacceptable | | | | | Very Acceptable | | |
|-------------------|----|-------------------------------------|-----|------|-----|------|-----------------|------|-------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Mean |
| <1 | <1 | 2.1 | 4.7 | 17.3 | 7.7 | 16.6 | 18.2 | 32.2 | 7.11 |

Response Code: 1 = “Very unacceptable” 9 and = “Very acceptable”

- When the respondents were queried about the acceptable level of other people at the lake, they reported a mean score of 7.11 on the 9-point scale, indicating that the number of people at the lake was generally acceptable.
- Approximately one-third of the respondents (32%) gave the highest possible rating of acceptability for the number of people they saw (“9” on the 9-point scale).
- Over two-thirds of the respondents rated their acceptability of the number of other people they saw as a “7” or higher.
- Few visitors responded in the “unacceptable” range of the response scale.

Table 23. Acceptability of the Number of Other Visitors by Type of User (Mean)

| | Type of User | | | |
|----------------------|--------------|----------------------|--------------------------|-------|
| | Land-based | Motorized Watercraft | Non-Motorized Watercraft | Total |
| Acceptability Rating | 7.08 | 6.20 | 6.92 | 6.95 |

Response Code: 1 = “Very unacceptable” 9 and = “Very acceptable”

- Respondents participating in motorized watercraft activities considered the number of people they saw as less acceptable than those participating in land-based or non-motorized watercraft activities.
- No significant differences were noted by gender, type of visit, nor distance traveled.

Effects on Enjoyment Caused by the Number of Other Visitors

Respondents were asked to rate the possible effect that other visitors may have had on their enjoyment by selecting a representative number on the 9-point scale.

Table 24. Effects on Enjoyment Caused by the Number of Other Visitors (Percent)

| Detracted from your Enjoyment | | | Neither Enhanced nor Detracted from your Enjoyment | | | Enhanced your enjoyment | | | |
|-------------------------------|-----|-----|--|------|------|-------------------------|-----|------|-------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Mean |
| <1 | 1.6 | 3.7 | 9.1 | 47.0 | 10.7 | 7.7 | 7.9 | 11.4 | 5.70 |

Response Code: 1 = “Extremely detracted” and 9 = “Extremely enhanced”

- When respondents were asked how the number of other people at the lake affected their enjoyment, they reported a mean score of 5.70, indicating a slightly positive effect of other visitors.
- Almost half of the respondents (47%) reported a “5” on the 9-point scale, indicating that the number of people neither enhanced nor detracted from their enjoyment.
- No significant differences were noted by gender, type of visit, type of user, nor distance traveled.

Desire to See Alternate Number of Visitors

Respondents were asked to rate their desire to see a different amount of visitors, compared to the amount that they saw, by selecting a representative number on the 9-point scale.

Table 25. Desire to See Alternate Number of Visitors (Percent)

| Far Less People at the Lake | | | The Same Number of People as You Saw | | | Far More People at the Lake | | | |
|-----------------------------|-----|-----|--------------------------------------|------|-----|-----------------------------|----|----|-------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Mean |
| 7.2 | 3.0 | 9.8 | 14.7 | 53.5 | 7.7 | 3.3 | <1 | <1 | 4.45 |

Response Code: 1 = “Far less people” and 9= “Far more people”

- When respondents were queried about the number of people they would like to have seen during their visit to Waldo Lake, over half of the respondents (54%) indicated that they would have liked to see about the same number of people as they actually saw.
- Those indicating a preference for a different number were more likely to prefer seeing less, rather than more, people at the lake.
- No significant differences were noted by gender, type of visit, type of user, nor distance traveled.

Table 26. Perception of the Number of Other Visitors Compared with Expectations

| How did the number of people you saw during your visit to Waldo Lake compare with what you expected to see? | Frequency | Percent |
|---|-----------|---------|
| A lot less than you expected | 89 | 20.7 |
| A little less than you expected | 84 | 19.5 |
| About what you expected | 102 | 23.7 |
| A little more than you expected | 34 | 7.9 |
| A lot more than you expected | 20 | 4.7 |
| You didn't have any expectations | 101 | 23.5 |
| Total | 430 | 100.0 |

- When queried further about the number of people seen at Waldo Lake, one-fourth of the respondents (24%) said the number of people they saw was about what they expected, while an equal percentage of the respondents said they didn't have any expectations.
- Two-fifths of the respondents (40%) stated that the number of people they saw at Waldo Lake was *less* than they expected.
- Only a small minority of the respondents (13%) reported that the number of people they saw was *more* than they expected.

Overall Satisfaction

Respondents were asked to rate their overall experience at Waldo Lake by selecting a representative number on a 10-point satisfaction scale. The scale ranged from 1 (worst possible experience) to 10 (best possible experience).

Table 27. Overall Satisfaction

| Overall Satisfaction (%) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Mean |
|--------------------------|---|---|---|----|----|-----|------|------|------|------|-------------|
| | 0 | 0 | 0 | <1 | <1 | 1.4 | 11.7 | 36.8 | 24.4 | 24.4 | 8.54 |

Response Code: 1 = "Worst possible experience" and 10 = "Best possible experience"

- Generally, respondents' overall satisfaction scores were very high. The mean score was 8.54 on a 10-point satisfaction scale.
- The majority of the respondents (86%) rated their overall satisfaction "8" or higher on the satisfaction scale.
- No respondents rated their overall experience as a "3" or lower on the scale.

Table 28. Overall Satisfaction by Distance Traveled and Type of User (Mean)

| | Distance Traveled | | | | |
|----------------------|-------------------|----------------------|--------------------------|----------------|-------|
| | 1-75 | 76-150 | 151-200 | 201 or greater | Total |
| Overall Satisfaction | 8.59 | 8.24 | 8.65 | 8.87 | 8.53 |
| | Type of User | | | | |
| | Land-based | Motorized Watercraft | Non-Motorized Watercraft | Total | |
| Overall Satisfaction | 8.47 | 8.19 | 8.70 | 8.54 | |

Response Code: 1 = “Worst possible experience” and 10 = “Best possible experience”

- Respondents who traveled over 200 miles to Waldo Lake reported having a better experience at the lake than those traveling shorter distances.
- Non-motorized watercraft users reported the highest satisfaction ratings, while motorized watercraft users reported the lowest ratings.
- No significant differences were noted by gender or type of visit.

Conclusions

This report provides information about the characteristics, behaviors, and attitudes of visitors to Waldo Lake in the Willamette National Forest in central Oregon. The results published in this report are a compilation and analysis of the data collected at different campsites, boat ramps, and trailheads at Waldo Lake during the period of May 20 through August 1, 2003. The instrument was used to query visitors about their perceptions, opinions about potential management options, and satisfaction levels. The results indicate that visitors to Waldo Lake are generally quite satisfied with their visits. However, there are significant differences between the perceptions of different user groups. In particular, non-motorized and motorized watercraft users have very different opinions regarding potential management options and changes at Waldo Lake.

Regarding satisfaction levels, most respondents were clearly satisfied with their recreation experience and with the satisfaction measures listed on the survey instrument. While the data suggests that there is room for improvement in a few areas at Waldo Lake, it is equally important to recognize the numerous positive scores for various satisfaction indicators.

The crowding and conflict section of the study asked visitors about their perceptions of these issues at Waldo Lake. Overall, the visitors did not feel crowded and there was a high level of acceptability of other visitors at Waldo Lake. However, opinions about potential management options differed between user types.

Several results of this study can help resolve the issue of whether motorized boating should be allowed to continue on Waldo Lake. First, the level of conflict among current Waldo Lake users is low. Crowding and conflict indicators show consistent low levels and satisfaction of all user groups is high. Noise is not a major concern, as only one-third of the visitors reported being impacted negatively by noise at Waldo Lake, and power generators and noise from dogs were more problematic than noise from motorboats. Surprisingly, the motorized boaters showed lower overall satisfaction than the non-motorized users. Thus, even though non-motorized boaters expressed greater concern about impacts of motor boats, they still generally had very positive experiences at the lake and some of the problems they encountered were not strictly attributable to motorized boats.

Secondly, Waldo Lake users seem more concerned about environmental quality than about potential conflicts between user groups at the lake. All users generally recognized the potential impact of boat motors on water quality. Most of the existing motorboats already use 4 cycle engines, which are both quieter and cleaner than 2 cycle engines. This may contribute to the low levels of conflict among current users.

Thirdly, there was consensus about some of the proposed management options. For example, all user groups supported limiting the size and horsepower of motors allowed on the lake, and restricting motorized boating to 4 cycle or electric engines.

Finally, the issue of motor use is complicated by the fact that many non-motorized boats (i.e. sailboats) use motors as a secondary power source. The majority of these motors are 2 cycle engines. Depending on their level of use, these motors on the lake could be as harmful as, or worse, than those used by the true motorboats on the lake. Any future management changes should strive to treat user groups equally while protecting the quality of the environment and recreation experience, and user perceptions should be monitored over time in order to assess the effectiveness of these actions.

2003 Recreation Survey

Appendix A: Open-ended Comments

Table 29. Suggested Improvements

| If you could ask resource managers to improve some things about the way people experience the Waldo Lake area, what would you ask them to do? | Frequency |
|--|-----------|
| Eliminate motorboats | 128 |
| Add showers | 46 |
| Improve trails/facilities | 33 |
| Reduce fees | 32 |
| Decrease boating restrictions | 29 |
| Improve boat access | 25 |
| Increase information/education | 20 |
| Control mosquitoes | 18 |
| Reduce crowding | 15 |
| Separate RV campers from other campers | 14 |
| Enforce regulations | 10 |
| Miscellaneous | 6 |
| Total | 376 |

Table 30. Types of Behavior

| How did other people's behavior reduce your enjoyment? | Frequency |
|---|-----------|
| Noise | 27 |
| Speeding Motorboats | 8 |
| People Complaining | 7 |
| Dogs | 6 |
| Biking | 4 |
| Crowding | 3 |
| Total | 55 |

Table 31. Other Types of Noise

| | Frequency |
|---------------|-----------|
| Loud people | 11 |
| Rude people | 3 |
| Generator use | 2 |
| Profanity use | 1 |
| Vandalism | 1 |
| Total | 18 |

Table 32. Name of Organized Group

| | Frequency |
|-----------------------------|-----------|
| Fur Bearers Rendezvous | 3 |
| Powder House Dive Inc. | 3 |
| Family Reunion | 2 |
| Jefferson State Dive Locker | 2 |
| SGI USA (Buddhism group) | 2 |
| Windsurfer Group | 2 |
| Club Stop Motorboats | 1 |
| Diver Head | 1 |
| Oregon Trappers Association | 1 |
| The Wild Family | 1 |
| Wacap Project Team | 1 |
| Waldo Divers | 1 |
| Total | 20 |

Table 33. Site Where Most Time Was Spent

| Where did you spend the most time on this trip? | |
|--|-----------|
| Site | Frequency |
| On lake | 184 |
| Campgrounds | 135 |
| Trails | 36 |
| Islet campground | 22 |
| North Waldo campground | 19 |
| Shadow Bay area | 16 |
| Shadow Bay campground | 14 |
| Waldo lake trail | 14 |
| North Waldo area | 13 |
| Beach | 10 |
| Dispersed sites | 9 |
| All around area | 9 |
| Islet boat ramp | 7 |
| Islet area | 6 |
| Lake trail | 5 |
| Bike trails | 4 |
| Horse camp | 4 |
| Taylor Burns trail | 4 |
| North Waldo boat ramp | 4 |
| Islet picnic area | 3 |
| Shadow Bay area | 3 |
| Shadow Bay boat ramp | 3 |
| Picnic area | 2 |
| Islet beach | 2 |
| Hiking trails | 2 |
| South shore | 2 |
| West side | 2 |
| Total | 534 |

Table 34. Other Places Visited on This Trip

| Site | Frequency |
|-------------------------|-----------|
| Salt Creek Falls | 36 |
| Odell Lake | 22 |
| Crescent Lake | 15 |
| Deschutes | 8 |
| Charlton Lake | 7 |
| Crater Lake | 7 |
| Cultus Lake | 5 |
| Gold Lake | 5 |
| Columbia River Gorge | 4 |
| Taylor Burn | 4 |
| Davis Lake | 3 |
| Dexter Lake | 3 |
| Rigdon Lake | 3 |
| Betty Lake | 2 |
| Blue Lake | 2 |
| Bullards Beach | 2 |
| Dune City | 2 |
| Florence | 2 |
| Hosmer Lake | 2 |
| Lake Siskiyou | 2 |
| Mccredie Hot Springs | 2 |
| Mt. Fuji | 2 |
| Oregon Dunes | 2 |
| Sunriver | 2 |
| Wickiup | 2 |
| Bobby Lake | 2 |
| Clear Lake | 1 |
| Cougar Reservoir | 1 |
| Crane Prairie | 1 |
| Diamond Creek Falls | 1 |
| Diamond Peak Wilderness | 1 |
| Elk Lake | 1 |
| Eugene | 1 |
| Fern Ridge | 1 |
| Finley Wildlife Refuge | 1 |
| Frissel Crossing | 1 |
| Hells Canyon Area | 1 |
| Hills Creek Reservoir | 1 |
| Huckleberry Mountain | 1 |
| Irish Lake | 1 |
| Irish Mountain | 1 |
| Lava Beds | 1 |
| Lava Lake | 1 |
| Medicine Lake | 1 |
| Middle Fork Trail | 1 |
| Midnight Lake | 1 |
| Miller Lake | 1 |

Table 34. Other Places Visited on This Trip (continued)

| Site | Frequency |
|-------------------|-----------|
| Mount Shasta | 1 |
| Mt. Hood | 1 |
| North Fork River | 1 |
| Oregon Caves | 1 |
| Portland | 1 |
| Rogue River | 1 |
| San Francisco | 1 |
| South Sister | 1 |
| Trinity River | 1 |
| Tumalo Falls | 1 |
| Umpqua River | 1 |
| Waldo Wilderness` | 1 |
| Whiskytown Lake | 1 |
| Willamette | 1 |
| Total | 183 |

Table 35. Permanent Home State

| State | Frequency |
|-------|-----------|
| OR | 401 |
| CA | 10 |
| WA | 8 |
| FL | 2 |
| AK | 1 |
| AZ | 1 |
| NJ | 1 |
| NV | 1 |
| NY | 1 |
| OH | 1 |
| WI | 1 |
| Total | 428 |

Table 36. Permanent Home Zip Code

| Zip Code | Frequency |
|----------|-----------|
| 97405 | 56 |
| 97701 | 17 |
| 97463 | 15 |
| 97403 | 14 |
| 97330 | 9 |
| 97402 | 8 |
| 97401 | 7 |
| 97739 | 7 |
| 97006 | 6 |
| 97007 | 6 |
| 97493 | 6 |
| 97702 | 6 |
| 97123 | 5 |
| 97210 | 5 |
| 97219 | 5 |
| 97225 | 5 |
| 97231 | 5 |
| 97470 | 5 |
| 97492 | 5 |
| 97759 | 5 |
| 97010 | 4 |
| 97060 | 4 |
| 97202 | 4 |
| 97204 | 4 |
| 97206 | 4 |
| 97212 | 4 |
| 97239 | 4 |
| 97424 | 4 |
| 97455 | 4 |
| 97477 | 4 |
| 97014 | 3 |
| 97015 | 3 |
| 97027 | 3 |
| 97045 | 3 |
| 97116 | 3 |
| 97131 | 3 |
| 97321 | 3 |
| 97326 | 3 |
| 97370 | 3 |
| 97409 | 3 |
| 97504 | 3 |
| 97754 | 3 |

| | |
|-------|---|
| 97756 | 3 |
| 94087 | 2 |
| 97016 | 2 |
| 97019 | 2 |
| 97024 | 2 |
| 97026 | 2 |
| 97119 | 2 |
| 97148 | 2 |
| 97201 | 2 |
| 97214 | 2 |
| 97221 | 2 |
| 97223 | 2 |
| 97229 | 2 |
| 97233 | 2 |
| 97242 | 2 |
| 97303 | 2 |
| 97331 | 2 |
| 97333 | 2 |
| 97381 | 2 |
| 97392 | 2 |
| 97404 | 2 |
| 97426 | 2 |
| 97448 | 2 |
| 97456 | 2 |
| 97457 | 2 |
| 97478 | 2 |
| 97527 | 2 |
| 97537 | 2 |
| 97707 | 2 |
| 97720 | 2 |
| 97760 | 2 |
| 97846 | 2 |
| 99208 | 2 |
| 10035 | 1 |
| 32641 | 1 |
| 34653 | 1 |
| 43223 | 1 |
| 53562 | 1 |
| 85303 | 1 |
| 89523 | 1 |
| 91935 | 1 |
| 91941 | 1 |
| 92802 | 1 |
| 93022 | 1 |

| | |
|-------|---|
| 94705 | 1 |
| 95632 | 1 |
| 95648 | 1 |
| 96134 | 1 |
| 97011 | 1 |
| 97013 | 1 |
| 97017 | 1 |
| 97030 | 1 |
| 97031 | 1 |
| 97032 | 1 |
| 97034 | 1 |
| 97038 | 1 |
| 97042 | 1 |
| 97048 | 1 |
| 97068 | 1 |
| 97070 | 1 |
| 97071 | 1 |
| 97109 | 1 |
| 97111 | 1 |
| 97128 | 1 |
| 97140 | 1 |
| 97213 | 1 |
| 97215 | 1 |
| 97224 | 1 |
| 97230 | 1 |
| 97236 | 1 |
| 97266 | 1 |
| 97267 | 1 |
| 97301 | 1 |
| 97302 | 1 |
| 97308 | 1 |
| 97352 | 1 |
| 97366 | 1 |
| 97374 | 1 |
| 97378 | 1 |
| 97380 | 1 |
| 97384 | 1 |
| 97391 | 1 |
| 97394 | 1 |
| 97412 | 1 |
| 97413 | 1 |
| 97420 | 1 |
| 97431 | 1 |
| 97439 | 1 |

| | |
|-------|-----|
| 97452 | 1 |
| 97453 | 1 |
| 97473 | 1 |
| 97480 | 1 |
| 97487 | 1 |
| 97498 | 1 |
| 97520 | 1 |
| 97603 | 1 |
| 97639 | 1 |
| 97722 | 1 |
| 97833 | 1 |
| 97885 | 1 |
| 98258 | 1 |
| 98470 | 1 |
| 98520 | 1 |
| 98626 | 1 |
| 98665 | 1 |
| 98682 | 1 |
| 98764 | 1 |
| 99801 | 1 |
| Total | 415 |

2003 Recreation Survey

Appendix B: Survey Instrument

Waldo Lake Visitor Survey

Survey ID# _____ Interviewer _____ # of people at site **mean=14.8**
 Date _____ Location _____ # of watercrafts at site **mean=3.86**
 Time _____ Gender Male= **66.0** Female= **34.0**

Interviewer Script Hello, I am (name and affiliation, i.e. University student, etc.). Have you already been approached and interviewed? **Yes – Thank you for your time No - Continue**
 We are conducting a study for the US Forest Service of visitors to the Waldo Lake recreation areas. The information visitors give us will be used to help managers better serve the visiting public and protect Waldo Lake’s natural and cultural resources. You have been selected as part of a random sample of visitors to participate in this survey. Participation is voluntary and if you choose to participate, everything you tell us will be kept strictly confidential. The survey will take about 10 minutes to complete. May we proceed with the interview?

Yes - Go to question If NO - Thank you for your time

1. Is this your first visit to Waldo Lake? **25.4** Yes **74.6** No
 [If no], In what year did you make your first visit to Waldo Lake? _____ year
2. How many days did you spend at Waldo Lake in **2002**? **mean=4.40** Days
3. How many days do you plan to spend at Waldo Lake during this trip? **mean=3.37** Days ____ Not Sure

| 4. In what activities on this list did you participate (or do you plan to participate in) during this recreation visit at Waldo Lake? | | 5. Which of those is your primary activity for this recreation visit to Waldo Lake? |
|---|---|---|
| Question 4 answers | | Question 5 answer |
| 98.1 | General/other-relaxing, hanging out, escaping heat, noise, etc. | 40.1 |
| 57.4 | Nonmotorized water travel (sailboarding, kayaking, rafting, canoe, etc.) (circle all that apply) | 19.0 |
| 73.7 | Camping in developed sites (family or group sites) | 16.7 |
| 21.4 | Motorized water travel (boats, ski sleds, etc.) | 5.6 |
| 29.8 | Bicycling, including mountain bikes (circle all that apply) | 3.8 |
| 75.6 | Other nonmotorized activities (swimming, games, and sports) | 3.3 |
| 8.1 | Backpacking, camping in unroaded areas | 2.8 |
| 72.6 | Picnicking and family day gatherings in developed sites (family or group sites) (circle all that apply) | 2.3 |
| 77.7 | Hiking or walking | 1.4 |
| 1.6 | Horseback riding | 1.2 |
| 91.6 | Viewing wildlife, birds, flowers, fish, etc. on NF lands (circle all that apply) | <1 |
| 96.5 | Viewing natural features such as scenery, flowers, etc. on NF lands (circle all that apply) | <1 |

| | | |
|------|---|----|
| 5.1 | Visiting a nature center or nature trail (circle all that apply) | <1 |
| 20.0 | Nature study | <1 |
| 2.3 | 4-wheelers, dirt bikes, etc. (circle all that apply) | <1 |
| 54.9 | Gathering mushrooms, berries, firewood, or other natural products (circle all that apply) | <1 |
| 28.6 | Fishing—all types | <1 |
| 18.4 | Visiting historic and prehistoric sites/areas (circle all that apply) | 0 |
| <1 | Hunting—all types | 0 |
| 30.9 | Driving for pleasure on roads | 0 |
| 0 | Other motorized land/air activities (plane, other) | 0 |

5a. What areas of the lake did you visit on this trip? (ASK REpondent TO DRAW ROUTE FOLLOWED ON MAP)

5b. Where did you spend the most time on this trip

_____ Name of location(s)
 (CIRCLE LOCATION(S) ON MAP AND LABEL **MOST**)

6. Where is your permanent home? Country USA=**99.5** /State OR=**93.3**/County_____ /Zip code_____

7. About how many miles is it from your permanent home to Waldo Lake? **mean=231.79** (median=110) miles

8. How many people are in your group on this trip to Waldo Lake? **mean=4.36** people

8a. Are you part of an organized group? **5.1** Yes **94.9** No

8b. If yes, please list the name of the group: _____

This section of the survey asks you about your use of watercraft on this trip to Waldo Lake.

9. **72.3** Yes **27.7** No Did you/will you use some sort of watercraft on this trip to Waldo Lake?

(IF YES, ask the rest of the questions on this page)

10. What type of watercraft did you use on this trip? [Check the type of each boat]

11. What is the length of this boat? [Write length of each boat next to the type]

| | | | | | |
|-------------|---------------|---------------------|------------|---------------|------------------|
| 23.3 | 16 ft. | Canoe | 9.5 | 20 ft. | Sailboat |
| 14.4 | 16 ft. | Kayak | ---- | ---- | Cruiser (≥ 25ft) |
| 4.7 | 16 ft. | Fishing/Bass Boat | <1 | ---- | Pontoon Boat |
| 14.7 | 10 ft. | Inflatable boat | <1 | 10 ft. | Sailboard |
| 14.2 | 19 ft. | Runabout (<24 feet) | | | Other_____ |
| | | Other_____ | | | |

12. What is your primary boat power?

| | | | |
|-------------|----------|-------------|------------|
| 25.9 | Gas | 58.3 | Paddle/Oar |
| ---- | Diesel | 14.6 | Wind/Sail |
| 1.3 | Electric | Other, | _____ |

What is the horsepower of your primary power source? **58** hp

(If motorized) Is your primary power source:

16.5 2 cycle **83.5** 4 cycle

What is your secondary boat power?

| | | | |
|-------------|----------|-------------|------------|
| 48.5 | Gas | 20.0 | Paddle/Oar |
| ---- | Diesel | 3.8 | Wind/Sail |
| 27.7 | Electric | Other, | _____ |

What is the horsepower of your secondary power source? **13** hp

(If motorized) Is your secondary power source:

61.9 2 cycle **38.1** 4 cycle

ASK ONLY FOR ELECTRIC MOTOR USERS:

13. What type of battery source do you use? (How many batteries)

95.1 12 volt battery **4.9** 24 volt battery Other battery type: _____

14. How do you charge your battery(ies)?

| | | | |
|-------------|------------------------------------|-------------|-------------------------------|
| 39.0 | Electric charger at home | 9.8 | Solar charger |
| 29.3 | Electric charger on site | 17.1 | Other (generator, car charge) |
| 4.9 | Gas powered charger on your vessel | | |

15. Would you support a solar powered recharge station at the surrounding boat ramps that would be funded by a user fee? **87.8** yes **12.2** no

16. If yes, how often would you use it?

13.9 Not Sure **5.6** Never **30.6** Sometimes **30.6** Often **19.4** Always

17. Following are some statements about this visit to Waldo Lake. For each statement, please circle the response that best describes your feelings about your visit to this area. If the statement does not apply, do not answer the question.

| | Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree | Mean |
|---|-------------------|----------|-----------|-------|----------------|-------------|
| (Positively-worded statements: Higher mean score is more positive response) | | | | | | |
| I thoroughly enjoyed my trip | .2 | 1.6 | 2.8 | 30.1 | 65.2 | 4.58 |
| I thought the recreation area and its surroundings were in good condition | .9 | 2.1 | 3.5 | 35.4 | 58.0 | 4.48 |
| My trip was well worth the money I spent to take it | .9 | 3.5 | 11.9 | 28.3 | 55.4 | 4.34 |
| (Negatively-worded statements: Lower mean score is more positive response) | | | | | | |
| I did not participate in some boating activities because of crowded conditions at the lake | 80.9 | 16.7 | 1.5 | <1 | <1 | 1.23 |
| I stayed off the lake during parts of the day because there were too many boats on the lake | 79.0 | 19.2 | 1.5 | <1 | --- | 1.23 |
| I avoided my favorite parts of Waldo Lake because there were too many people | 71.7 | 20.2 | 3.6 | 3.4 | 1.1 | 1.42 |
| There were too many people at the lake | 68.2 | 25.2 | 3.3 | 2.1 | 1.2 | 1.43 |
| There were too many watercraft on the lake | 71.6 | 16.8 | 7.3 | 2.6 | 1.7 | 1.46 |
| I wish there were more watercraft on the lake during my visit | 74.0 | 10.8 | 6.3 | 7.3 | 1.6 | 1.52 |
| My trip was not as enjoyable as I expected it to be | 63.3 | 25.9 | 5.4 | 4.2 | 1.2 | 1.54 |
| The number of people at the recreation area reduced my enjoyment | 60.4 | 30.3 | 4.2 | .2 | <1 | 1.55 |
| I was disappointed with some aspects of my trip | 53.5 | 25.8 | 7.3 | 12.4 | <1 | 1.81 |
| The behavior of other people at the recreation area lowered the quality of my experience | 54.3 | 25.4 | 5.8 | 11.2 | 3.3 | 1.84 |
| <i>(If agree or strongly agree with above statement) How did other people's behavior reduce your enjoyment?</i> | | | | | | |

18. Would you favor or oppose each of the following management actions for Waldo Lake:

| | FAVOR | OPPOSE | NOT SURE | Mean |
|---|-------|--------|----------|-------------|
| Establish "Off Limit" Zones to protect sensitive areas | 87.2 | 8.1 | 4.7 | 1.17 |
| Control the level of noise from motorized recreation | 85.8 | 7.4 | 6.7 | 1.21 |
| Limit the size and power of boats using Waldo Lake | 79.8 | 12.6 | 7.7 | 1.28 |
| Only permit non-motorized boats and electric motors in Waldo lake | 68.8 | 21.4 | 9.8 | 1.41 |
| Restrict boat use in certain areas | 69.1 | 19.1 | 11.9 | 1.43 |
| Limit motorized boat motors to 4-cycle engines only | 69.3 | 13.5 | 17.2 | 1.48 |
| Zoning the waters to provide for specific uses at specific places | 44.0 | 41.4 | 14.7 | 1.71 |
| Limit the number of boats on the lake at one time | 30.7 | 55.1 | 14.2 | 1.83 |
| Zone activities to provide for different boat uses at different times | 10.0 | 53.1 | 36.8 | 2.27 |

19. For each item below please circle the response that is closest to the way you feel about Waldo Lake.

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | Mean |
|---|-------------------|----------|---------|-------|----------------|-------------|
| Pollution from motorized boating needs to be controlled | <1 | 1.6 | 3.5 | 30.5 | 63.7 | 4.55 |
| The shorelines are in good condition at Waldo Lake | <1 | 4.7 | 17.5 | 35.0 | 42.7 | 4.15 |
| Motorized boating has a negative impact on primitive recreation experiences | 3.7 | 8.1 | 12.8 | 25.3 | 50.0 | 4.10 |
| Certain sections of the lake should be limited to non-motorized boating | 7.4 | 13.0 | 11.6 | 21.2 | 46.7 | 3.87 |
| Motorized activities negatively impact wildlife | 4.2 | 10.5 | 22.3 | 21.2 | 41.9 | 3.86 |
| Litter is not a problem at Waldo Lake | 4.0 | 11.6 | 19.3 | 39.3 | 25.8 | 3.71 |
| Motorized boating has <u>no</u> affect on water quality | 66.5 | 26.7 | 5.3 | 1.2 | <1 | 1.42 |

20. Has your overall experience to Waldo Lake been negatively impacted by human-induced noise?

32.6 yes **67.4** no

If yes, which types of noise (check all that apply)

39.3 Power generators **15.7** Cars/trucks/planes (circle all that apply)

30.0 Motorboats **19.3** Loud music

34.8 Dogs **42.1** Other (please list) (loud people and pets)

21. How much did the sounds of motorized human activity (cars, airplanes, boats, etc.) interfere with the following aspects of your trip to Waldo Lake?

| Did motorized sounds interfere with your: | Not at all | Slightly | Moderately | Very much | Extremely | Mean |
|--|-------------------|-------------------------------|-------------------|-------------------|-----------|-------------|
| Appreciation of the historical/cultural significance | 85.7 | 4.4 | 6.3 | 1.4 | 2.1 | 1.30 |
| Enjoyment of the area | 76.0 | 7.2 | 10.0 | 5.3 | 1.4 | 1.49 |
| Appreciation of the natural quiet | 75.3 | 6.7 | 10.0 | 4.9 | 3.0 | 1.53 |
| Appreciation of the sounds of nature | 75.8 | 6.0 | 9.5 | 4.9 | 3.7 | 1.55 |
| For repeat visitors only: | | Circle answer below | | | | |
| 22. Within the past few years, do you think the amount of boating use has been: | Increasing | Not changing very much | Decreasing | Don't know | | |
| | 11.7 | 32.8 | 9.7 | 45.9 | | |
| | | Circle answer below | | | | |
| 23. Within the past few years, do you think the environmental quality (water quality, noise pollution, litter, etc.) at Waldo Lake has been: | Improved | Not changing very much | Degraded | Don't know | | |
| | 6.0 | 31.3 | 27.1 | 35.6 | | |

24. On a scale of one to ten, how would you rate your overall experience at Waldo Lake, with a rating of 10 being the best possible experience, and a rating of 1 being the worst possible experience you can imagine?
mean=8.54

25. If you could ask resource managers to improve some things about the way people experience the Waldo Lake area, what would you ask them to do?

26. How did the number of people you saw during this visit to Waldo Lake compare with what you expected to see?

- 20.7** A lot less than you expected
- 19.5** A little less than you expected
- 23.7** About what you expected
- 7.9** A little more than you expected
- 4.7** A lot more than you expected
- 23.5** You didn't have any expectations

27. During this visit how crowded did you feel at Waldo Lake? [Circle one number]

| | | | | | | | | |
|--------------------|-------------|------------------|------------|--------------------|------------|--------------|-------------------|--------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 40.9 | 28.6 | 16.5 | 7.7 | 2.8 | 2.1 | <1 | <1 | <1 |
| Not at all Crowded | | Slightly Crowded | | Moderately Crowded | | | Extremely Crowded | |

28. How acceptable was the number of other people you saw at the lake on this trip? [Circle one number]

| | | | | | | | | |
|-----------------|-------------|-------------|-------------------------------------|-------------|------------|------------|-------------------|--------------|
| +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 |
| 32.2 | 18.2 | 16.6 | 7.7 | 17.3 | 4.7 | 2.1 | <1 | <1 |
| Very Acceptable | | | Neither acceptable nor unacceptable | | | | Very Unacceptable | |

29. On this trip, would you say that the number of other people at the lake? [Circle one number]

| | | | | | | | | |
|-------------------------|------------|------------|--|-------------|------------|-------------------------------|------------|--------------|
| +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 |
| 11.4 | 7.9 | 7.7 | 10.7 | 47.0 | 9.1 | 3.7 | 1.6 | <1 |
| Enhanced your enjoyment | | | Neither enhanced nor detracted from your enjoyment | | | Detracted from your enjoyment | | |

30. Overall, on this trip, would you like to have seen: [Circle one number]

| +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 |
|--------------------------------|----|-----|---|------|------|--------------------------------|-----|-----|
| <1 | <1 | 3.3 | 7.7 | 53.5 | 14.7 | 9.8 | 3.0 | 7.2 |
| Far more people at the lake | | | The same number of people as you saw | | | Far less people at the lake | | |

31. Was Waldo Lake your primary destination for this trip? **98.6** Yes **1.4** No

32. Finally, on this trip did you recreate just at Waldo Lake or did you go to other National Forests, parks, or recreation areas? **77.6** Just Waldo Lake **22.4** Other places (please list) _____

Appendix I: Botany Biological Evaluation

File Code: 2670

Date: June 14, 2005

Route To:

Subject: Botanical Biological Evaluation Waldo Lake – Managing Recreation Use
Environmental Assessment

To: Waldo Analysis Files

Introduction

Forest management activities that may impact populations of or alter habitat for PETS (proposed, endangered, threatened, or sensitive) species require a Biological Evaluation (FSM 2671.44) to be completed. The Biological Evaluation process (FSM 2672.43) is used to assist in determining the possible effects the proposed management activities have on:

A. Species listed or proposed to be listed as endangered (E) or threatened (T) by the U.S. Fish and Wildlife Service (FWS).

B. Species listed as sensitive (S) by the USDA Forest Service, Region 6. There are 71 organisms listed on the Regional Forester's Sensitive Botanical List that are documented or suspected to occur on the Willamette National Forest (Attachment 1).

The Record of Decision (ROD) to remove or modify the survey and manage mitigation measure standards and guidelines (USDI and USDA, 2004) directed review and inclusion of former survey and manage species in the Special Status Species Program. The ROD further directs the Forest to conduct pre-project clearances for these species prior to habitat-disturbing activities. Assumptions were made that "if pre-project surveys were not practical under Survey and Manage Standards and Guidelines (most Category B and D species), then field surveys are not likely to occur for Special Status Species either" (p. 6). Therefore, the ROD directs us that habitat evaluation for presence of suitable or potential habitat and habitat examinations may suffice for pre-project clearances for species where single year surveys are impractical (for the Willamette this means fungi).

To comply with the 2004 ROD, a new Regional Forester's Sensitive Plant list was issued in July 2004. This list includes both vascular plant species from the 1999 Regional Forester's Sensitive Plant list and nonvascular former survey and manage species that meet the criteria for sensitive species. The latter list includes fungi, bryophytes and lichens. These species are split into those that are surveyable in a single field season (Table 1a) and those deemed non-surveyable (Table 1b).

Project Location and Description

This analysis addresses the potential effects of the **Waldo Lake Managing Recreation Use Environmental Analysis (EA)** on threatened, endangered or sensitive plant species listed in the R-6 Sensitive Species List. The purpose of the project is to amend the Forest Plan to regulate motorized recreation activities on and around Waldo Lake so as to meet recreation experience objectives for the Semiprimitive Nonmotorized shoreline management area and manage Waldo

Lake as a outstanding nonmotorized boating opportunity in the Pacific Northwest. The proposed action to meet the project's purpose and need is as follows:

Alternative 4 – Proposed Action:

- Restrict boat motor use to electric motors only year-round (except for emergencies and pre-approved research needs)
 - apply boat motor restriction after two-year transition period to allow boaters time to reinvest in electric motor options,
- prohibit floatplanes from accessing the surface of Waldo Lake year-round, and
- prohibit public use of generators and chainsaws in the Dispersed Recreation, Semiprimitive Nonmotorized management area (MA-10e) surrounding the lake.

Alternatives to the proposed action include:

Alternative 1 – No change in management of motorized recreation on or around Waldo Lake.

Alternative 2 – Restrict boat motors to four-cycle gas-powered or electric options only,

- apply boat motor restriction after a two-year transition period.

Alternative 3 –restrict all gas-powered boat motors from July 15 to the 1st Monday after Labor Day in September (except for emergencies and approved research, by Forest approval only),

- apply boat motor restriction after a two-year transition period.
- prohibit float planes from accessing the surface of Waldo Lake year-round, and
- prohibit use of generators and chainsaws in MA- 10e management area whenever boat motors are restricted.

Alternative 5 - Amend the Forest Plan to change the Waldo Lake ROS to Semiprimitive Motorized, plus

- prohibit all gas-powered boat motors from July 15 to the 1st Monday after Labor Day in September (except for emergencies and research, by Forest approval only),
 - apply boat motor restriction immediately.
- prohibit float planes from accessing the surface of Waldo Lake year-round, and
- prohibit use of generators and chainsaws in MA- 10e management area year-round.

The proposed project area is located at Waldo Lake within the Middle Fork Ranger District, Willamette National Forest. The legal description is T21S, R6E; T21S, R6 1/2E; and T22S, R6 1/2E. The elevation at the 9.8 square mile Waldo Lake is 5,414 feet. The management area surrounding Waldo Lake is *Dispersed Recreation, Semiprimitive Nonmotorized* (MA10e).

Biological Evaluation Process

Under the suggested procedure for conducting a biological evaluation as described in a memo issued August 17, 1995 by the Regional Foresters of regions 1, 4, and 6, the Biological Evaluation is a 7 step process to evaluate possible effects to Proposed, Endangered, Threatened, and Sensitive (PETS) species. The seven steps are as follows:

1. Review of existing documented information.
2. Field reconnaissance of the project area.
3. Determination of effects of proposed actions on PETS species
4. Determination of irreversible or irretrievable commitment of resources (required for

- listed and proposed species only).
5. Determination of conclusions on effects
 6. Recommendations for removing, avoiding, or compensating adverse effects
 7. Documentation of consultation with other agencies, references, and contributors

Evaluation of effects for each species may be complete at the end of step #1 or may extend through step #5, depending on project details.

Steps 1, 2 and 5 from above are included in this document.

Evaluation and Survey of the Planning Area

Prefield review was performed for all areas included in this analysis in order to determine the presence of known sites or habitat for 71 Region 6 sensitive species. Using the current list of potential PETS species (compiled from USFWS listings, Oregon Natural Heritage Program listings, Oregon Department of Agriculture listings, and the Regional Forester's sensitive species list), maps of known sensitive plant populations were checked for previously reported sites and aerial photos and topographical maps were scrutinized for potential habitat. The ISMS database was queried to determine if any sensitive species previously categorized as survey and manage occur in or adjacent to project areas.

The proposed restrictions on recreation use at Waldo Lake will have minimal ground disturbing effects (e.g. placement of information signs at boat launches/trailheads and roadways). For this reason extensive surveys have not been conducted for sensitive species in the Waldo Lake Basin. Sensitive plants have been looked for during wildflower field trips in the lakeside area at various times. Other past surveys efforts included searches in some of the dispersed areas, campgrounds and trail segments for small site-specific maintenance and improvement projects.

Surveys are not currently conducted for fungi because single pre-disturbance surveys for these species have been deemed impractical (USDA 1998; USDA, 2000; USDA, 2004). All fungi except *Bridgeoporus nobilissimus*, which is a perennial conk, were formerly Category B Survey and Manage Species (rare but pre-disturbance surveys impractical). In general, the habitat requirements of fungal species found on the Willamette National Forest sensitive species list are poorly understood. The literature provides very general habitat characteristics for most of these species; therefore they are listed in Table 1b as having potential habitat in forested areas.

Locations of sensitive species occurrence

Plants documented near Waldo Lake include *Scheuchzeria* (*Scheuchzeria palustris* var. *americana*), a rush-like plant in the Scheuchzeriaceae family, and, lesser bladderwort (*Utricularia minor*) an aquatic insectivorous plant in the Lentibulariaceae family, are both found in Gold Lake Bog to the south of Waldo Lake. Hairy cinquefoil (*Potentilla villosa*) in the Rosaceae family is documented on Fuji Mountain, southwest of Waldo Lake. This population is on a rock cliff at the top of a ~5500' peak. Similar habitat for *Scheuchzeria* is found in the analysis area, there is a low potential for occurrence of hairy cinquefoil in the analysis area.

Several sensitive species are documented to occur within the Waldo Lake analysis area.

Northern bog club moss, (*Lycopodiella inundata*), a pteridophyte in the Lycopodiaceae family, is a bog-inhabiting perennial herb with terminal spore producing cones on its upright branches and

spreading, freely rooting horizontal branches. Dr. David Wagner, who was conducting surveys for rare liverworts in the lake, incidentally discovered the population at the of the original stream outlet at the north end of Waldo Lake in the vicinity of Dam Camp, a popular dispersed camping site. The population resides next to a ponded area with sphagnum moss as an associate. Additional habitat for this species is found in several wet meadows either adjacent to the lakeshore or at small lakes and ponds in the Waldo Lake basin.

One non-vascular moss species, goblin’s gold (*Schistostega pennata*) is found on moist stream banks and root balls in several sites southeast of the lake. Two sites are directly adjacent to the Waldo Lake Trail. There is additional habitat around the lake in forested habitat with downed wood. The forested areas in the Waldo Basin are high in fungal diversity and are potential habitat for sensitive fungi. Fungi currently listed sensitive and documented in the Waldo Lake area include two mycorrhizal coral fungi, *Ramaria amyloidea* and *R. aurantiisiccescens*. These sites are associated with mixed conifer forested areas on the west side of the lake. The fruiting bodies of these species could be found in dispersed and managed recreation sites. All of these species are located in areas that are used for camping and hiking, thus are addressed in the effects section in this document.

Table’s 1a and 1b displays the results of pre-field review, the level of field surveys performed (if applicable), and the results of the surveys.

Table 1a: Summary of Evaluation Process for PETS Botanical Species for surveyable species

| Species | Prefield Review | Field Recon. | Species Presence |
|----------------------------------|------------------------|--|---|
| <i>Agoseris elata</i> | habitat present | Level A, dry to mesic meadows/open woods | unknown, comprehensive surveys not done |
| <i>Arabis hastatula</i> | habitat not present | | |
| <i>Arnica viscosa</i> | habitat present | Level A, rocky places, skree | unknown, comprehensive surveys not done |
| <i>Asplenium septentrionale</i> | habitat not present | | |
| <i>Aster gormanii</i> | habitat not present | | |
| <i>Botrychium minganense</i> | habitat not present | | |
| <i>Botrychium montanum</i> | habitat not present | | |
| <i>Botrychium pumicola</i> | habitat not present | | |
| <i>Bridgeoporus nobilissimus</i> | habitat present | Level A, true fir forest | unknown, comprehensive surveys not done |
| <i>Calamagrostis breweri</i> | habitat present | Level A, wet/mesic meadows, lake edges | unknown, comprehensive surveys not done |
| <i>Carex livida</i> | habitat not present | | |

| | | | |
|--|---------------------|--|--|
| <i>Carex scirpoidea</i> var. <i>stenochlaena</i> | habitat not present | | |
| <i>Castilleja rupicola</i> | habitat not present | | |
| <i>Chaenotheca subroscida</i> | habitat not present | | |
| <i>Cimicifuga elata</i> | habitat not present | | |
| <i>Coptis trifolia</i> | habitat present | Level A, “boggy” meadows | unknown, comprehensive surveys not done |
| <i>Corydalis aqua-gelidae</i> | habitat not present | | |
| <i>Dermatocarpon luridum</i> | habitat present | Level A, on rock in streams | unknown, comprehensive surveys not done |
| <i>Eucephalis(Aster) vialis</i> | habitat not present | | |
| <i>Frasera umpquaensis</i> | habitat not present | | |
| <i>Gentiana newberryi</i> | habitat present | Level A, meadows | unknown, comprehensive surveys not done |
| <i>Hypogymnia duplicata</i> | habitat present | Level A, old growth true fir and hemlock forests | unknown, comprehensive surveys not done |
| <i>Iliamna latibracteata</i> | habitat not present | | |
| <i>Leptogium burnetiae</i> var. <i>hirsutum</i> | habitat present | Level A, forest | unknown, comprehensive surveys not done |
| <i>Leptogium cyanescens</i> | habitat present | Level A, forest | unknown, comprehensive surveys not done |
| <i>Lewisia columbiana</i> var. <i>columbiana</i> | habitat not present | | |
| <i>Lobaria linita</i> | habitat present | Level A, forest, rock outcrops | unknown, comprehensive surveys not done |
| <i>Lupinus sulphureus</i> var. <i>kincaidii</i> | habitat not present | | |
| <i>Lycopodiella inundata</i> | habitat present | Level A, and B Sphagnum bogs/ meadows, pond/lake edges | present , site vicinity of lake outlet north edge, not all habitat surveyed |
| <i>Lycopodium complanatum</i> | habitat present | Level A, moist forest | unknown, comprehensive surveys not done |
| <i>Montia howellii</i> | habitat not present | | |

| | | | |
|--|---------------------|--|--|
| <i>Nephroma occultum</i> | habitat present | Level A, moist forest | unknown, comprehensive surveys not done |
| <i>Ophioglossum pusillum</i> | habitat not present | | |
| <i>Pannaria rubiginosa</i> | habitat not present | | |
| <i>Pellaea andromedaefolia</i> | habitat not present | | |
| <i>Peltigera neckeri</i> | habitat present | Level A, forest | unknown, comprehensive surveys not done |
| <i>Peltigera pacifica</i> | habitat not present | | |
| <i>Pilophorus nigricaulis</i> | habitat present | Level A, talus, rock outcrops, large boulders | unknown, comprehensive surveys not done |
| <i>Polystichum californicum</i> | habitat not present | | |
| <i>Potentilla villosa</i> | habitat not present | | |
| <i>Pseudocyphellaria rainierensis</i> | habitat not present | | |
| <i>Ramalina pollinaria</i> | habitat not present | | |
| <i>Rhizomnium nudum</i> | habitat adjacent | Level A, moist forest | unknown, comprehensive surveys not done |
| <i>Romanzoffia thompsonii</i> | habitat not present | | |
| <i>Scheuchzeria palustris var. americana</i> | habitat present | Level A, and B Sphagnum bogs/meadows, pond/lake edges | unknown, comprehensive surveys not done |
| <i>Schistostega pennata</i> | habitat present | Level A and B, root balls, shaded stream banks in moist forested areas | present , several sites west edge of Waldo Lake, not all habitat surveyed |
| <i>Scirpus subterminalis</i> | habitat present | Level A, wet shoreline edges | unknown, comprehensive surveys not done |
| <i>Scouleria marginata</i> | habitat present | Level A riparian aquatic | unknown, comprehensive surveys not done |
| <i>Sisyrrinchium sarmentosum</i> | habitat present | Level A, streams, meadow margins near lake | unknown, comprehensive surveys not done |

| | | | |
|-----------------------------|---------------------|---|---|
| <i>Tetraphis geniculata</i> | habitat adjacent | Level A, moist forest/downed wood | unknown, comprehensive surveys not done |
| <i>Thorluna disimilis</i> | habitat not present | | |
| <i>Usnea longissima</i> | habitat not present | | |
| <i>Utricularia minor</i> | habitat present | Level A, and B Sphagnum bogs/meadows, pond/lake edges | unknown, comprehensive surveys not done |
| <i>Wolffia borealis</i> | habitat present | Level A, and B Sphagnum bogs meadows, pond/lake edges | unknown, comprehensive surveys not done |
| <i>Wolffia columbiana</i> | habitat present | Level A, ponds, channels | unknown, comprehensive surveys not done |

Table 1b: Summary of Evaluation Process for PETS Botanical Species for Species Deemed Unsurveyable

| Group | Species | Prefield Review/Rationale |
|------------------------------------|------------------------------------|-----------------------------------|
| Mycorrhizal Fungi | <i>Boletus pulcherrimus</i> | habitat present/presence unknown |
| | <i>Cortinarius barlowensis</i> | habitat present /presence unknown |
| | <i>Gomphus kaufmanii</i> | habitat present /presence unknown |
| | <i>Leucogaster citrinus</i> | habitat present /presence unknown |
| | <i>Phaeocollybia attenuata</i> | habitat present /presence unknown |
| | <i>Phaeocollybia dissiliens</i> | habitat present /presence unknown |
| | <i>Phaeocollybia pseudofestiva</i> | habitat present /presence unknown |
| | <i>Phaeocollybia sipei</i> | habitat present /presence unknown |
| | <i>Ramaria amyloidea</i> | habitat present / present |
| | <i>Ramaria aurantiisiccescens</i> | habitat present / present |
| | <i>Ramaria gelatiniaurantia</i> | habitat present /presence unknown |
| | <i>Ramaria largentii</i> | habitat present /presence unknown |
| | | |
| Saprophytic on Litter Fungi | | |
| | <i>Cudonia monticola</i> | habitat present /presence unknown |
| | <i>Sowerbyella rhenana</i> | habitat present /presence unknown |
| Saprophytic on Wood | <i>Gyromitra californica</i> | habitat present /presence unknown |
| Parasitic Fungi | <i>Cordyceps capitata</i> | habitat present /presence unknown |

Potential Effects on PETS Species

Potential effects are listed in accordance with the formats put forth for listed species in the 1986 Endangered Species Act regulations (50 CFR Part 402), the March 1998 FWS/NMFS Endangered Species Consultation Handbook; and, for sensitive species, in the Forest Service Manual section 2670 and in the May 15 and June 11, 1992 Associate Chief/RF 2670 letters on

this topic. The suggestion to use this format was also included in a memo issued August 17, 1995 by the Regional Foresters of Regions 1, 4, and 6. Attachment 3 gives details on these effects categories. Table 2 shows conclusions for effects of proposed actions on sensitive species with respect to each alternative in the Environmental Assessment.

Direct/Indirect Effects on PETS species

The vegetation around Waldo Lake is typically slow to recover from disturbance; there is a short growing season here and harsh environmental conditions. This highlights the potential for adverse impacts to associated sensitive plant habitat from human disturbance.

The northern bog club moss (*L. inundata*) population appears vigorous and does not appear to be adversely affected at this time by recreational activities. However, the population is adjacent to dispersed camping sites and the Waldo Shoreline trail therefore, it is potentially susceptible to a higher degree of human visitation and potential trampling over the short and long term than sites known in more remote areas. Avoidance of this population area has already been stipulated in special use permits for large groups camping and recreating near this site to lessen trampling potential from foot traffic. Although this site has been reviewed on an annual basis for recreation impacts to the population, use regulations have up to this point only been specified for certain special use permits. Monitoring visits to this site will continue in the future to aid in tracking the health and stability of this population over time, and to determine if restrictions or other measures should be considered to mitigate habitat degradation from recreation use.

The two goblin's gold (*S. pennata*) sites are directly adjacent to shoreline trail segments and so the specific micro-site conditions favored by this species could potentially be impacted by recreation use and trail maintenance activities. Fortunately, there are no identified dispersed camping areas in the vicinity of these populations. This project does not propose actions that would directly or indirectly influence recreation activities near these sites. If future monitoring shows that recreation use is damaging these sites or similar habitat, then mitigation measures such as re-routing the trail may become necessary.

All fungus groups could be found in the Waldo Lake area within forested habitats, including campgrounds and dispersed camping areas. Impacts to fungi are described in terms of functional group (mycorrhizal, saprophytic on litter, saprophytic on wood). Since the parasitic *Cordyceps* is dependent on a mycorrhizal fungus for its survival, effects for parasitic fungi will be lumped into the mycorrhizal functional group. Due to the ephemeral nature of the visible fruiting bodies, management strategies are focused on protection/retention of below ground mycelial networks, growing substrate, host species, and adequate canopy retention.

Recreation use effects may be comprised of minor localized disruption of mycelial networks or substrate (wood, litter) caused by trampling or the creation of expanded or new areas of soil compaction, soil disturbance, and the removal of woody material, host trees or other vegetation affecting microsite conditions (Kranabetter and Wylie, 1998; Amaranthus and Perry, 1994). These effects typically occur around developed campgrounds and dispersed sites, and within trail rights of way.

This project directly influences only the removal of woody material and standing trees near dispersed sites around Waldo Lake by regulating the public's use of chainsaws. Fortunately public use of chainsaws for firewood gathering is not common at dispersed sites around Waldo

Lake and primarily occurs at a few of sites during the big game hunting seasons. Alternatives 1 and 2 retain the potential for the direct loss of large woody material and snags by allowing the visiting public to use chainsaws at dispersed camp sites. Alternative 3 has a slightly lower potential for allowing this habitat effect by prohibiting public use of chainsaws during 50-60 days in late summer when most use occurs. Alternatives 4 and 5 reduce the potential for the felling and loss of larger host snags and substrate biomass by prohibiting chainsaw use for firewood gathering throughout the recreation season. Under Alternatives 4 and 5, the dispersed site visitors would confine their firewood gathering to small-diameter ground wood.

Cumulative Effects on PETS species

Past, present and foreseeable related future actions and activities that could potentially contribute to cumulative effects to sensitive botanical species in the Waldo Lake area include those associated with facility and trail construction and maintenance, and recreation use of lakeshore areas that could or do support sensitive plants and fungi. Alternative 1 (No Action) does not modify recreational activities that cumulatively affect sensitive plant species over time. Alternative 2 would have the same cumulative effects on PETS species as Alternative 1. Alternatives 3, 4 and 5 would likely create a small reduction in the cumulative effects created by recreation use on PETS species. The incremental differences in cumulative effects on PETS species between these alternatives are small and insignificant. Planned actions and activities are subject to botanical review and survey prior to implementation if deemed necessary, and any potential impacts to known sites would be mitigated through avoidance or with protection measures.

For actions associated with this analysis, effects were categorized by alternatives as follows:

Table 2: Summary of Conclusion of Effects

| Species/Functional Group | Alternative 1 (No Action) | Alternative 2 | Alternative 3 | Alternative 4 (Proposed Action) | Alternative 5 |
|-----------------------------------|---------------------------|---------------|---------------|---------------------------------|---------------|
| <i>Arnica viscosa</i> | MIH | MIH | MIH | MIH | MIH |
| <i>Bridgeoporus nobillissimus</i> | MIH | MIH | MIH | MIH | MIH |
| <i>Calamagrostis breweri</i> | MIH | MIH | MIH | MIH | MIH |
| <i>Coptis trifolia</i> | MIH | MIH | MIH | MIH | MIH |
| <i>Dermatocarpon luridum</i> | MIH | MIH | MIH | MIH | MIH |
| <i>Gentiana newberryi</i> | MIH | MIH | MIH | MIH | MIH |
| <i>Hypogymnia duplicata</i> | MIH | MIH | MIH | MIH | MIH |
| <i>Leptigium cyanescens</i> | MIH | MIH | MIH | MIH | MIH |
| <i>Leptogium burnetiae</i> | MIH | MIH | MIH | MIH | MIH |
| <i>Lobaria linita</i> | MIH | MIH | MIH | MIH | MIH |
| <i>Lycopodiella inundata</i> | MIH | MIH | MIH | MIH | MIH |
| <i>Lycopodium complanatum</i> | MIH | MIH | MIH | MIH | MIH |
| <i>Mycorrhizal Fungi</i> | MIH | MIH | MIH | MIH | MIH |
| <i>Nephroma occultum</i> | MIH | MIH | MIH | MIH | MIH |
| <i>Peltigera neckeri</i> | MIH | MIH | MIH | MIH | MIH |
| <i>Peltigera pacifica</i> | MIH | MIH | MIH | MIH | MIH |

| | | | | | |
|--|------|------|------|------|------|
| <i>Pilophorus nigricaulis</i> | MIIH | MIIH | MIIH | MIIH | MIIH |
| <i>Rhizomnium nudum</i> | MIIH | MIIH | MIIH | MIIH | MIIH |
| <i>Saprophytic on Litter</i> | MIIH | MIIH | MIIH | MIIH | MIIH |
| <i>Saprophytic on Wood</i> | MIIH | MIIH | MIIH | MIIH | MIIH |
| <i>Scheuchzeria palustris</i> <i>var. americana</i> | MIIH | MIIH | MIIH | MIIH | MIIH |
| <i>Schistostega pennata</i> | MIIH | MIIH | MIIH | MIIH | MIIH |
| <i>Scirpus subterminalis</i> | MIIH | MIIH | MIIH | MIIH | MIIH |
| <i>Scouleria marginata</i> | MIIH | MIIH | MIIH | MIIH | MIIH |
| <i>Sisyrinchium</i> <i>sarmentosum</i> | MIIH | MIIH | MIIH | MIIH | MIIH |
| <i>Tetraphis geniculata</i> | MIIH | MIIH | MIIH | MIIH | MIIH |
| <i>Utricularia minor</i> | MIIH | MIIH | MIIH | MIIH | MIIH |
| <i>Wolffia borealis</i> | MIIH | MIIH | MIIH | MIIH | MIIH |
| <i>Wolffia columbiana</i> | MIIH | MIIH | MIIH | MIIH | MIIH |

Conclusion of Effects

Because of the proximity of locations of sensitive plant sites to popular dispersed sites around the Waldo Lake and the possibility that more sensitive plant sites may exist for 40 additional species, the effects conclusion is as follow. For implementation of the No Action, or any of the action alternatives, a “May Impact Individuals or Habitat, But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species (MIIH)” determination is made for species known or suspected to occur in the analysis area.

Key to Abbreviations in Table 2 (See attachment 4).

NI = No Impact

MIIH = May Impact Individuals or Habitat, But Will Not Likely Contribute to a Trend Towards Federal Listing or Loss of Viability for the Population or Species

WOFV* = Will Impact Individuals or Habitat with a Consequence That the Action May Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability for the Population or Species

BI = Beneficial Impact

* Considered a trigger for a significant action in NEPA

Kim McMahan, Botanist

Date June 14, 2005

ATTACHMENT 1: **Regional Forester's Sensitive Botanical Species List for the Willamette National Forest (Revised 2004).** Species of federal, state and local importance are included on the R-6 list.

| Species | Occurrence on WNF | ONHP Status | State Status | Federal Status | Habitat Types |
|----------------------------------|--------------------------|--------------------|---------------------|-----------------------|----------------------|
| <i>Agoseris elata</i> | S | 2 | | | MM, DM |
| <i>Arabis hastatula</i> | D | 1 | | SofC | RO |
| <i>Arnica viscosa</i> | S | 2 | | | RS |
| <i>Asplenium septentrionale</i> | S | 2 | | | RO |
| <i>Aster gormanii</i> | D | 1 | | | RS |
| <i>Boletus pulcherrimus</i> | D | 1 | | | CF |
| <i>Botrychium minganense</i> | D | 2 | | | RZ, CF |
| <i>Botrychium montanum</i> | D | 2 | | | RZ, CF |
| <i>Botrychium pumicola</i> | S | 1 | LT | | HV |
| <i>Bridgeoporus nobilissimus</i> | D | 1 | | | CF |
| <i>Calamagrostis breweri</i> | D | 2 | | | MM, RZ |
| <i>Carex livida</i> | S | 2 | | | WM |
| <i>Carex scirpoidea</i> | D | 2 | | | RO |
| <i>var. stenochlaena</i> | | | | | |
| <i>Castilleja rupicola</i> | D | 2 | | | RO |
| <i>Chaenotheca subroscida</i> | D | 3 | | | CF |
| <i>Cimicifuga elata</i> | D | 1 | C | | CF |
| <i>Coptis trifolia</i> | S | 2 | | | WM, CF |
| <i>Cordyceps capitata</i> | D | unlisted | | | CF |
| <i>Corydalis aqua-gelidae</i> | D | 1 | C | | RZ, CF |
| <i>Cudonia monticola</i> | D | not listed | | | CF |
| <i>Dermatocarpon luridum</i> | S | 3 | | | RZ on rock |
| <i>Eucephalis (Aster) vialis</i> | S | 1 | LT | SofC | CF |
| <i>Frasera umpquaensis</i> | D | 1 | C | | MM |
| <i>Gentiana newberryi</i> | D | 2 | | | MM |
| <i>Gomphus kaufmanii</i> | D | 3 | | | CF |
| <i>Gyromitra californica</i> | D | 2 | | | CF |
| <i>Hypogymnia duplicata</i> | S | 3 | | | CF |
| <i>Iliamna latibracteata</i> | S | 2 | | | CF, RZ |
| <i>Leptogium burnetiae</i> | | | | | |
| <i>var. hirsutum</i> | S | 3 | | | CF |
| <i>Leptogium cyanescens</i> | D | 3 | | | CF |
| <i>Leucogaster citrinus</i> | D | 3 | | | CF |
| <i>Lewisia columbiana</i> | D | 2 | | | RS |
| <i>var. columbiana</i> | | | | | |
| <i>Lobaria linita</i> | D | 2 | | | RO |
| <i>Lupinus sulphureus</i> | | | | | |
| <i>var. kincaidii</i> | S | 1 | LT | LT | MM, DM |
| <i>Lycopodiella inundata</i> | D | 2 | | | WM |

| <i>Lycopodium complanatum</i> | D | 2 | | | CF |
|----------------------------------|--------------------------|--------------------|---------------------|-----------------------|----------------------|
| Species | Occurrence on WNF | ONHP Status | State Status | Federal Status | Habitat Types |
| <i>Montia howellii</i> | D | 4 | C | | RZ |
| <i>Mycenia monticola</i> | D | not listed | | | CF |
| <i>Nephroma occultum</i> | D | 4 | | | CF |
| <i>Ophioglossum pusillum</i> | D | 2 | | | WM |
| <i>Pannaria rubiginosa</i> | D | 2 | | | CF |
| <i>Pellaea andromedaefolia</i> | S | 2 | | | RO |
| <i>Peltigera neckeri</i> | D | not listed | | | CF |
| <i>Peltigera pacifica</i> | D | not listed | | | CF |
| <i>Phaeocollybia attenuata</i> | D | 4 | | | CF |
| <i>P. dissiliens</i> | D | 3 | | | CF |
| <i>P. pseudofestiva</i> | D | 3 | | | CF |
| <i>P. sipei</i> | D | 3 | | | CF |
| <i>Pilophorus nigricaulis</i> | D | 2 | | | RO |
| <i>Polystichum californicum</i> | D | 2 | | | RO |
| <i>Potentilla villosa</i> | D | 2 | | | RS, RO |
| <i>Pseudocyphellaria</i> | | | | | |
| <i>rainierensis</i> | D | 4 | | | CF, RZ |
| <i>Ramalina pollinaria</i> | D | 2 | | | CF, RZ |
| <i>Ramaria amyloidea</i> | D | 2 | | | CF |
| <i>R. aurantiisiccescens</i> | D | 4 | | | CF |
| <i>R. gelatiniaurantia</i> | D | 3 | | | CF |
| <i>R. largentii</i> | D | 3 | | | CF |
| <i>Rhizomnium nudum</i> | D | 2 | | | CF |
| <i>Romanzoffia thompsonii</i> | D | 1 | | | RS |
| <i>Scheuchzeria palustris</i> | D | 2 | | | WM |
| <i>var. americana</i> | | | | | |
| <i>Schistostega pennata</i> | D | 2 | | | CF |
| <i>Scirpus subterminalis</i> | D | 2 | | | SW |
| <i>Scouleria marginata</i> | S | 3 | | | RZ |
| <i>Sisyrrinchium sarmentosum</i> | S | 1 | C | S of C | MM, DM |
| <i>Sowerbyella rhenana</i> | D | 3 | | | CF |
| <i>Tetraxis geniculata</i> | S | 2 | | | CF |
| <i>Thorluna disimilis</i> | D | 2 | | | CF |
| <i>Usnea longissima</i> | D | 3 | | | CF, RZ |
| <i>Utricularia minor</i> | D | 2 | | | SW |
| <i>Wolffia borealis</i> | S | 2 | | | SW |
| <i>Wolffia columbiana</i> | S | 2 | | | SW |

Occurrence on Willamette National Forest:

- S = Suspected
- D = Documented

Oregon Natural Heritage Program (ORNHP):

- 1 = Taxa threatened or endangered throughout range.
- 2 = Taxa threatened or endangered in Oregon but more common or stable elsewhere.
- 3 = Species for which more information is needed before status can be determined, but which may be threatened or endangered (Review).
- 4 = Species of concern not currently threatened or endangered (Watch).

Oregon State Status:

- LT = Threatened
- LE = Endangered
- C = Candidate

Federal Status: These plant species were originally published as CANDIDATE THREATENED (CT) in the Smithsonian Report, **Federal Register**, July 1, 1975, or as PROPOSED ENDANGERED (PE) in a later report, **Federal Register**, June 16, 1976. The latest **Federal Register** consulted was dated September 30, 1993. Updated listings appear periodically in the Notice of Review (USFWS); the status of several species is categorized as follows:

- LE = Listed as an Endangered Species
- LT = Listed as a Threatened Species
- PE = Proposed as an Endangered Species
- PT = Proposed as a Threatened Species
- C = Candidate for Listing as Threatened or Endangered
- Sof C = Species of Concern; taxa for which additional information is needed to support proposal to list under the ESA.

Habitat Types:

- | | |
|----------------------------------|----------------------------|
| MM = Mesic meadows | RS = Rocky slopes, scree |
| WM = Wet meadows | RO = Rock outcrops, cliffs |
| DM = Dry meadows | DW = Dry open woods |
| RZ = Riparian zones, floodplains | HV = High volcanic areas |
| CF = Coniferous forest | SW = Standing water |

ATTACHMENT 2: Field reconnaissance survey levels for determining presence potential for TES species.

| | | |
|----------|---|--|
| Level A: | Aerial photo interpretation and review of existing site records. Determination of the potential for a listed species to occur within the proposed project area. No field surveys completed. | |
| | Low potential: | Less than 40% potential for listed species inhabiting the project area. |
| | Moderate potential: | 40-60% potential for a listed species inhabiting the proposed project area. |
| | High potential: | Greater than 60% potential for listed species inhabiting the proposed project area. |
| Level B: | Single entry survey of probable habitats. Areas are identified by photos and existing field knowledge. Field surveys are conducted during the season most favorable for species identification. | |
| | Low intensity: | Selected habitat surveys (approximately 5-10% of area) are conducted with a single entry for listed species inhabiting the proposed project area. |
| | Moderate intensity: | Selected habitat surveys (approximately 10-40% of area) are conducted with a single entry for listed species inhabiting the proposed project area. |
| | High intensity: | Selected habitat surveys (approximately 40-60% of area) are conducted with a single entry for listed species inhabiting the proposed project area. |
| Level C: | Multiple entry surveys are conducted for listed species likely to inhabit the proposed project area. | |
| | Low intensity: | Selected habitat surveys (approximately 5-10% of area) are conducted with repeated entries for listed species inhabiting the proposed project area. |
| | Moderate intensity: | Selected habitat surveys (approximately 10-60% of area) are conducted with repeated entries for listed species inhabiting the proposed project area. |
| | High intensity: | Selected habitat surveys (approximately 60-80% of area) are conducted with repeated entries for listed species inhabiting the proposed project area. |

ATTACHMENT 3:

**Conclusions of Effects For Use In Biological Evaluations and Assessments
USDA Forest Service - Regions 1, 4, and 6
August, 1995**

Listed Species:

1. No Effect

Occurs when a project or activity will not have any “effect”, on a listed species, or critical habitat.

2. May Affect - Likely to Adversely Affect (LAA)

If the determination in the biological assessment is that the project May Affect - Likely to Adversely Affect a listed species or critical habitat, formal consultation must be initiated (50 CFR 402.12). Formal consultation must be requested in writing through the Forest Supervisor (FSM 2670.44) to the appropriate FWS Field Supervisor, or NOAA Fisheries office.

3. May Affect - Not Likely to Adversely Affect (NLAA)

If it is determined in the biological assessment that there are “effects” to a listed species or critical habitat, but that those effects are not likely to adversely affect listed species or critical habitat, then written concurrence by the FWS or NOAA Fisheries is required to conclude informal consultation (50 CFR 402.13).

4. Beneficial Effect

Written concurrence is also required from the FWS or NOAA Fisheries if a beneficial effect determination is made.

Requests for written concurrence must be initiated in writing from the Forest Supervisor to the State Field Supervisor (FWS or NOAA).

Proposed Species:

Whenever serious adverse effects are predicted for a proposed species or proposed critical habitat, conferencing is required with the FWS or NOAA Fisheries.

1. No Effect

When there are “no effects” to proposed species, conferencing is not required with FWS or NOAA.

2. Not Likely to Jeopardize the Continued Existence of the Species or Result in Destruction or Adverse Modification of Proposed Critical Habitat

This conclusion is used where there are effects or cumulative effects, but where such effects would not have the consequence of losing key populations or adversely affecting “proposed critical habitat”. No conferencing is required with FWS or NOAA if this conclusion is made. However, for any proposed activity that would receive a “Likely To Adversely Affect” conclusion if the species were to be listed, conferencing may be initiated.

3. Likely to Jeopardize the Continued Existence of the Species or Result in Destruction or Adverse Modification of Proposed Critical Habitat

This conclusion must be determined if there are significant effects that could jeopardize the continued existence of the species, result in adverse modification or destruction of proposed critical habitat, and/or result in irreversible or irretrievable commitments of resources that could foreclose options to avoid jeopardy, should the species be listed. If this is the conclusion, conferencing with FWS or NMFS is required.

Sensitive Species:

1. No Impact (NI)

A determination of “No Impact” for sensitive species occurs when a project or activity will have no environmental effects on habitat, individuals, a population or a species.

2. May Impact Individuals or Habitat, But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species (MIIH)

Activities or actions that have effects that are immeasurable, minor or are consistent with Conservation Strategies would receive this conclusion. For populations that are small - or vulnerable - each individual may be important for short and long-term viability.

3. Will Impact Individuals or Habitat With a Consequence That the Action May Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species (WIFV)

Loss of individuals or habitat can be considered significant when the potential effect may be:

1. Contributing to a trend toward Federal listing (C-1 or C-2 species);
2. Results in a significantly increased risk of loss of viability for a species; or,
3. Results in a significantly increased risk of loss of viability for a significant population (stock).

4. Beneficial Impact (BI)

Projects or activities that are designed to benefit, or that measurably benefit a sensitive species should receive this conclusion.

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Appendix J: Description of Dispersed Sites on Waldo Lake

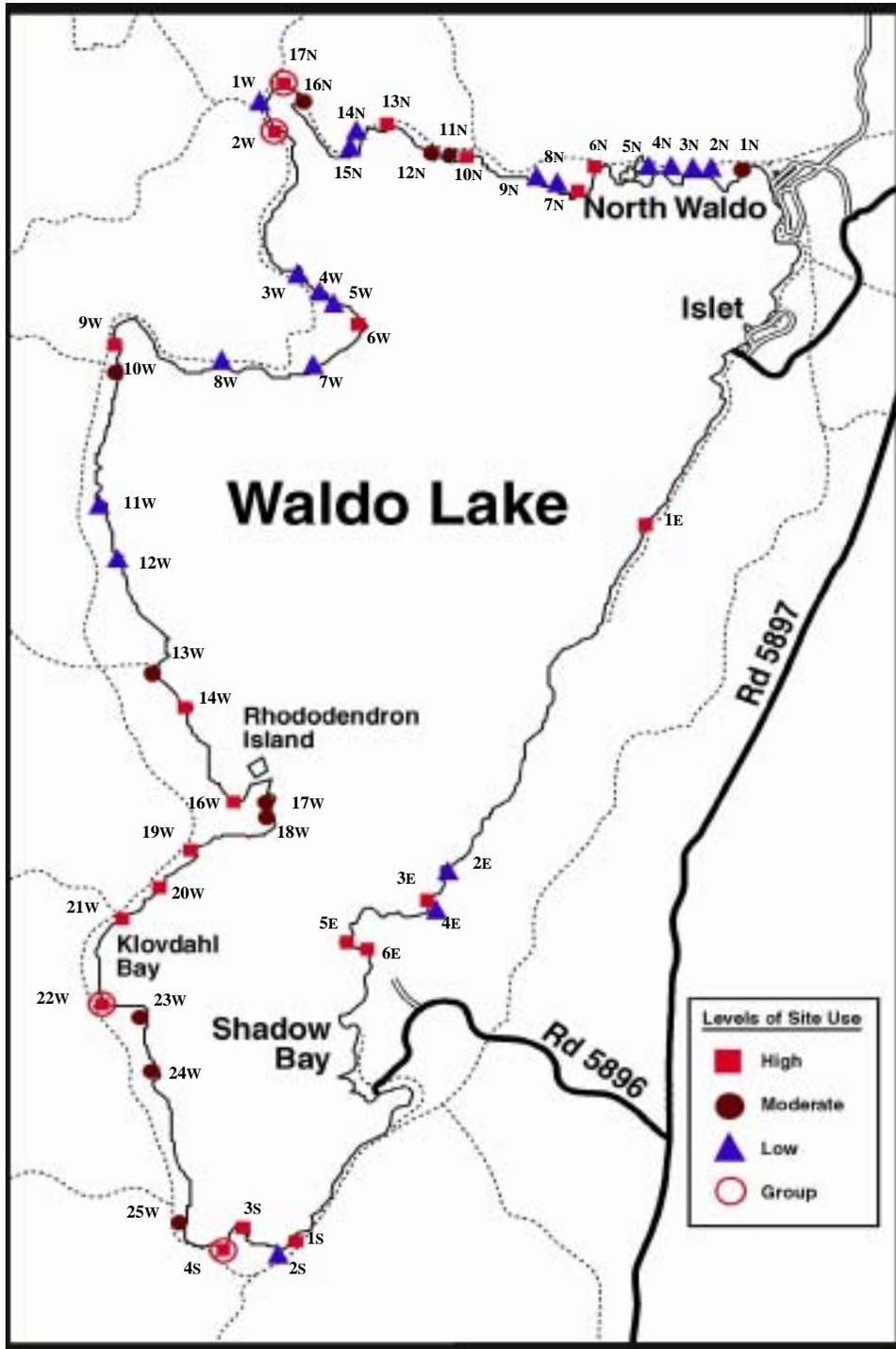


Table J1: Dispersed Site types around Waldo Lake based on distance from campgrounds

| Site Types | Number of Sites | Site Numbers |
|--------------------------------|-----------------|---|
| w/in ¼ mile of Campgrounds | 4 | 1N, 2N, 5E, 6E |
| w/in 1 mile of Campgrounds | 18 | 1N thru 9N, 1E thru 6E, 1S thru 4S 23W thru 25W |
| Beyond 1 mile from Campgrounds | 29 | 10N thru 17N 1W thru 22W |
| All Established Sites | 51 | All numbers |

Note: An established site is one that has been previously inventoried and possesses a Bare core area, fire pit, vegetation impacts, and user trails