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Environmental Assessment

Waldo Lake – Managing Recreation Use

Middle Fork Ranger District,
Willamette National Forest
Lane County, Oregon

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http://www.fs.fed.us/r6/willamette/manage/waldolake/index.html

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Summary of Proposal

The Willamette National Forest (hereafter referred to as the Forest) proposes to prohibit internal combustion boat motors and floatplanes on Waldo Lake, and to prohibit public use of chainsaws and generators within the Dispersed Recreation, Semiprimitive Nonmotorized management area (MA 10e) surrounding Waldo Lake (Figure 2) to provide a more tranquil recreation experience. The Forest is proposing these changes in response to a conflict between motorized activities and the recreation objectives for the Dispersed Recreation, Semiprimitive Nonmotorized management area (MA 10e) surrounding Waldo Lake. These recreation objectives are defined in the Willamette National Forest Land and Resource Management Plan, as amended (USDA. 1990b). By imposing these recreation use restrictions, the Forest will be promoting a unique nonmotorized recreation experience on a large lake (over 1000 acres), a recreation opportunity that is not currently available in the Pacific Northwest region.

The analysis area is located at Waldo Lake (T21S, R6E; T21S, R6½E; and T22S, R6½E) within the Middle Fork Ranger District, Willamette National Forest, Oregon (**Figure 1**).

The proposed action would be formalized by amending the Forest Plan with a forest-wide (FW) recreation standard and a management area (MA) standard for the Dispersed Recreation, Semiprimitive Nonmotorized Management Area (MA 10e). These new standards to the Forest Plan would be worded in the following way.

- **FW- 323 Public use of internal combustion (gasoline, diesel, ethanol, etc.) boat motors and floatplanes on the surface of Waldo Lake shall be prohibited.** Public use of electric boat motors on Waldo Lake is allowed. Administrative use (including search and rescue, law enforcement, fire suppression, authorized research, or trail maintenance) of internal combustion motors is allowed on Waldo Lake when approved in writing by the Forest Supervisor.

- **MA-10e-17 Public use of internal combustion devices (such as chainsaws and generators) on lands immediately surrounding Waldo Lake shall be prohibited.** Administrative use (including search and rescue, law enforcement, fire suppression, authorized research, or trail maintenance) of such devices may be allowed when approved in writing by the Forest Supervisor.

This Forest Plan amendment would change existing public activities on and around Waldo Lake by:

- Restricting boat motor use on Waldo Lake to electric motors only, with exceptions for the administrative use of internal combustion motors when approved by the Forest Supervisor on a case-by-case basis.
- Prohibiting floatplanes from using the surface of Waldo Lake.
- Prohibiting public use of generators and chainsaws within the Dispersed Recreation, Semiprimitive Nonmotorized management area (MA-10e) adjacent to Waldo Lake.

Figure 1: Proposed action Location

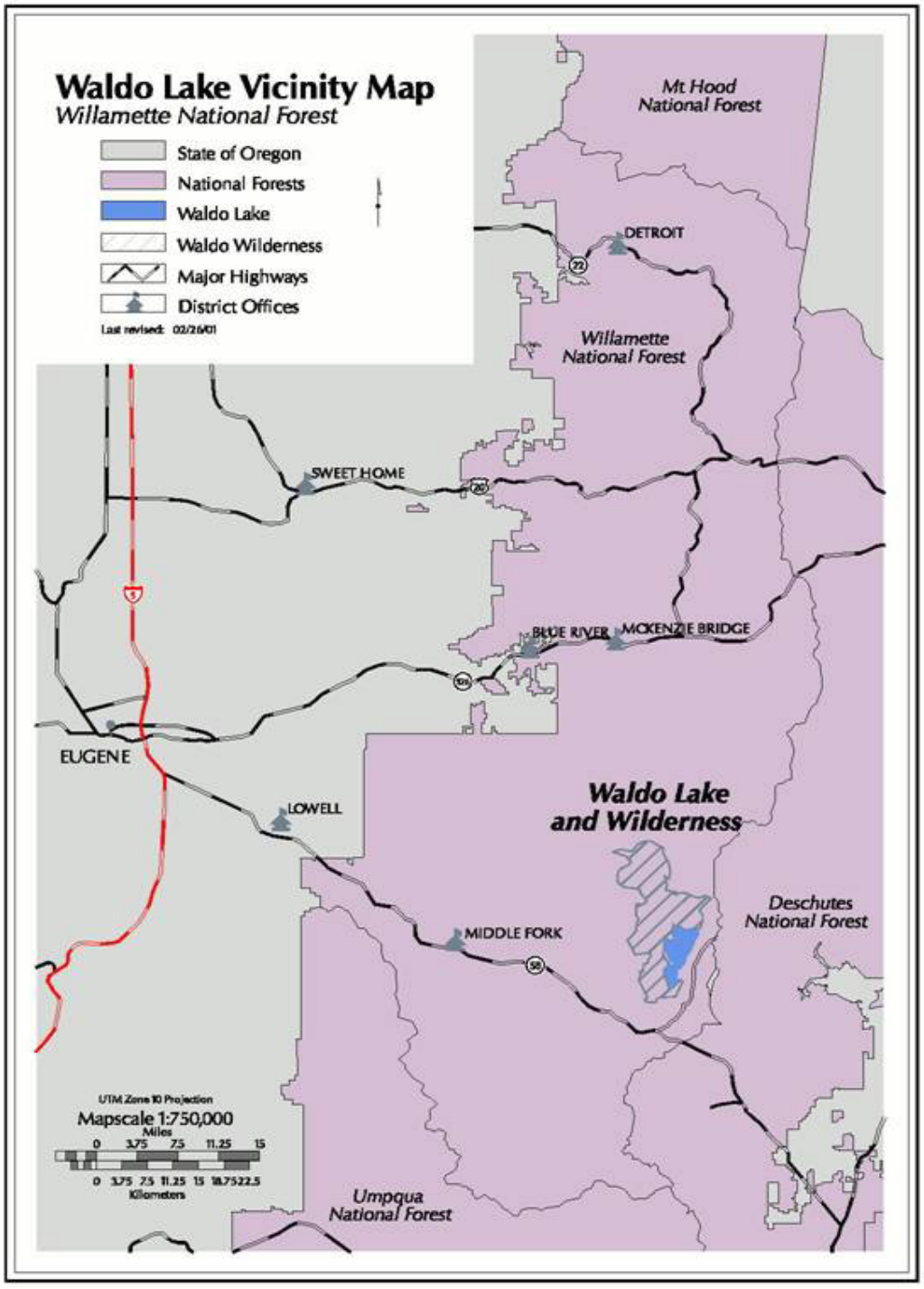
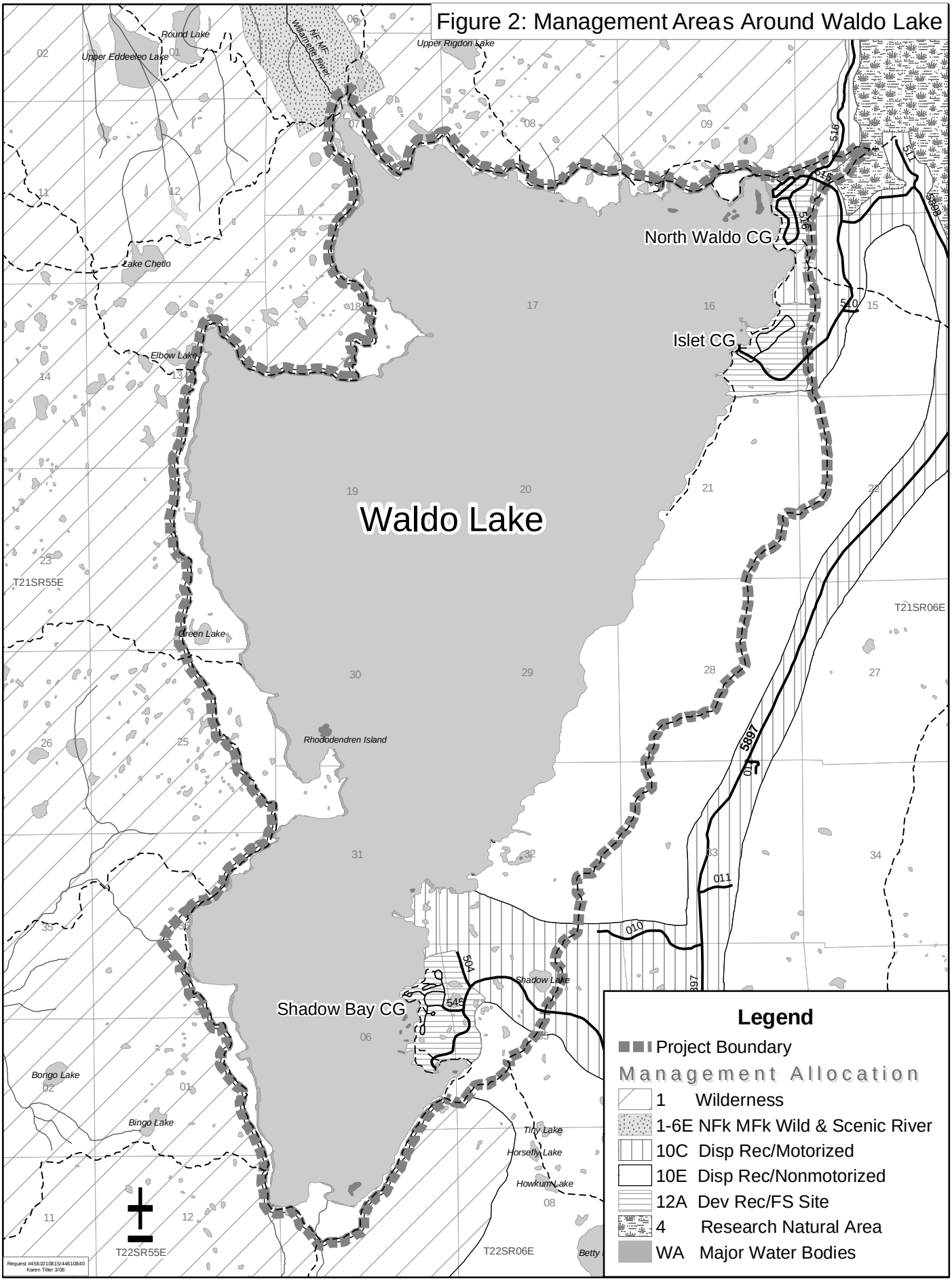


Figure 2: Management Areas Around Waldo Lake



The proposed standard MA-10e-17 would apply only to Dispersed Recreation, Semiprimitive Nonmotorized lands located between the Waldo lake shoreline and the Waldo Wilderness boundary or the Waldo Lake trail #3590 for the eastern shoreline. Forest lands affected by this new standard are outlined by the proposed action boundary line in **Figure 2**. This amendment would not change public use of internal combustion motors within management areas surrounding the three developed campgrounds (MA 12a) and their access roads (MA 10c) on the east side of Waldo Lake.

Evaluated alternatives to the proposed action (Alternative 4) include:

Alternative 1: No new restrictions on motorized uses on or around Waldo Lake.

Alternative 2: Restrict boat motor use on Waldo Lake to four-cycle internal combustion and electric motor options, and

- retain floatplane access to the surface of Waldo Lake, and
- retain public use of generators and chainsaws within the Dispersed Recreation, Semiprimitive Nonmotorized management area (MA-10e) around the lake.

Alternative 3: Prohibit use of all internal combustion boat motors on Waldo Lake from mid-July to early September (except for approved administrative uses), and

- restrict boat motor use to four-cycle internal combustion and electric models outside the closure period,
- prohibit floatplanes from using Waldo Lake year-round, and
- prohibit public use of generators and chainsaws within the Dispersed Recreation, Semiprimitive Nonmotorized management area (MA 10e) around the lake during the boat motor closure period (mid-July to early September).

Alternative 5: Prohibit all boat motor use year-round (except for approved administrative uses), and

- prohibit floatplanes from using Waldo Lake year-round, and
- prohibit public use of generators and chainsaws within the Dispersed Recreation, Semiprimitive Nonmotorized management area around the lake year-round.

Decisions to be Made

The Forest Supervisor (Deciding Official) will decide whether to prohibit (or restrict) the public's use of internal combustion motors on Waldo Lake and its undeveloped shorelines or to maintain current public uses represented by the No Action Alternative. Specific elements of this decision include:

- Whether and how to restrict public use of boat motors and floatplanes on Waldo Lake.
- Whether and how to restrict public use of generators and chainsaws within the Dispersed Recreation, Semiprimitive Nonmotorized management area surrounding Waldo Lake.

- Whether to allow exceptions on boat motor uses for administrative and emergency purposes on or around Waldo Lake.
- Whether to delay the enforcement of proposed motor restrictions for two years to give visitors and managers a transition period.

Introduction

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental effects that would result from the proposed action or one of the described alternatives. The document is organized into four parts:

- *Introduction:* This section includes background information about the proposed action, the purpose of and need for the proposed action, and the agency's proposal for achieving the proposed action's purpose and need. This section also summaries how the Forest Service informed the public about the proposed action and how the public responded.
- *Comparison of Alternatives, including the Proposed Action:* This section provides a description of the agency's proposed action as well as alternative methods for achieving the stated purpose and need for action. These alternatives were developed from significant issues raised by the Forest Service, the public, or other agencies. Depending on the project, this section may also include mitigation measures.
- *Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and the other alternatives, and is organized by issue. Within each issue section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluating and comparing the other alternatives that follow.
- *Agencies and Persons Consulted:* This section provides a list of people and agencies consulted during the development of the Environmental Assessment.

Appendices are provided to offer more detailed information that supports the analyses presented in the Environmental Assessment and meet requirements of NEPA.

Additional documentation, including project team meeting notes and individual public comments, can be found in the planning record located at the Middle Fork Ranger District Office (46375 Highway 58, Westfir, Oregon 97492; phone no. 541-937-2129).

Background

Motorized boat use dominates water recreation on most large lakes and reservoirs (>1000 acres) in the Pacific Northwest region. Although Waldo Lake is the 13th largest water body in Oregon, it receives a different mix of water recreation than Oregon's other large lakes and reservoirs. More than 86 percent of boat use on Waldo Lake is nonmotorized. This unusual boating pattern on a large lake is largely due to a 10 mph boat speed limit and possibly the lake's relatively low fish population. The infrequency of motorized disturbances combines with its remote location on the Cascade Mountains' crest and outstanding water clarity to make Waldo Lake a popular destination for visitors from the Willamette Valley and central Oregon communities. And public comments over the last 10 years have demonstrated how much Waldo Lake visitors appreciate its peacefulness

and remoteness, and how sensitive they can be to disturbance created by motorized traffic on the lake.

The peacefulness and solitude experienced on Waldo Lake's remote shoreline areas is popular among seasonal visitors and unique for a large lake setting in the Pacific Northwest. A broad search across the western half of the continent for lake settings similar to Waldo Lake's will produce few large lakes for people to visit and experience nonmotorized lakeside setting. Settings that currently exist are limited to portions of large lakes or reservoirs such as Yellowstone Lake, lakes in the Boundary Waters Wilderness/Quetico Provincial Park area of Minnesota and Ontario, a handful of lakes in British Columbia, and the remote lakes in Alaska. For this analysis, a nonmotorized lake setting is characterized as a place where visitors would be free from local motorized disturbances throughout their trip.

The following section describes current inconsistencies between assigned recreation experience objectives and existing recreation use patterns at Waldo Lake. These inconsistencies, as well as expressed public demand, provide the motivation for the Forest to develop options for managing motorized recreation activities under this analysis.

Purpose and Need for Action

The purpose of this proposed action is to manage motorized recreation activities at Waldo Lake to meet *Semiprimitive* recreation experience objectives for the lake's undeveloped shoreline. Experience objectives for the shoreline are defined in the Forest Plan for lands classified as Dispersed Recreation, Semiprimitive Nonmotorized management areas (MA 10e) and are further described by Recreation Opportunity Spectrum (ROS**)** descriptions for a *Semiprimitive* experience in Appendix A.

Waldo Lake is an atypical water body in the central Cascade Mountains of Oregon. As the only natural lake of over 1000 acres on the Forest, Waldo Lake is in a relatively remote setting with road access and recreation facilities intentionally developed in such a way as to preserve the lake's remote setting character. Access roads and campgrounds built in the 1960s were intentionally located away from the lakeshore to minimize their impacts on lake users. Campsites were also intentionally set back from the shoreline to make them less visible from the lake surface. The main access road was located up to a mile away from the lake and only three roads provide access to campgrounds on the east side of the lake. These original design decisions were meant to protect the lake's scenic integrity, tranquility, and sense of remoteness. Such setting features can not be found on other large water bodies (> 1000 acres) in the Cascade Mountains of Oregon during the summer season.

Its scenic qualities and sense of remoteness have helped to make Waldo Lake a popular recreation setting for forest visitors. Comments (letters, emails, conversations, and survey comments) over the years have demonstrated to District staff that visitors are seeking a peaceful and remote recreation setting around Waldo Lake once they leave their vehicles at a boat launch or trailhead.

This proposed action is a response to public demand for protecting the remoteness around Waldo Lake by prohibiting the use of internal combustion boat motors and floatplanes on

Waldo Lake and by prohibiting the use of chainsaws and generators at shoreline dispersed sites. These motor uses are inconsistent with *Semiprimitive* experience objectives assigned to the lake's *Semiprimitive* shoreline.

The Forest Plan lists three management goals assigned to most of the shoreline around Waldo Lake (USDA 1990b; page IV-195). These management goals are:

- Provide a full spectrum of recreation opportunities that meet (ROS) criteria for a *Semiprimitive Nonmotorized* experience through the management of user activities and natural resource settings.
- Provide users the opportunity to experience a sense of solitude, tranquility, self-reliance and closeness to nature. These experiences are provided through activities involving the application of outdoor skills in an environment that offers some challenge and risk.
- Provide for the conservation of unique geographic, topographic, biological, and ecological processes, as well as significant scenic, wildlife, recreation, and watershed values.

By meeting these management goals and the *Semiprimitive* experience objectives defined in the Desired Future Conditions for Management Area 10e, the Forest would be offering the public an exceptional nonmotorized experience on a large lake setting. The following section summarizes two needs for action for this analysis. Discussions of these needs for action are also located in the environmental consequences section.

Need for Action #1: Motorized activities on Waldo Lake and its remote shoreline areas are inconsistent with visitor experience objectives for the Dispersed Recreation, Semiprimitive Nonmotorized management area surrounding Waldo Lake. Restricting motorized activities on and around the lake would help meet the intended recreation experience objectives for this shoreline, as well as the expectations of visitors coming to this undeveloped shoreline. Ultimately, Waldo Lake and its shoreline should be managed for similar recreation experiences as lake surface activities can readily affect the experiences of shoreline visitors, and vice versa.

Large lakes can be difficult recreation settings for managing distinctly different but adjacent management areas because sights and sounds can travel easily over water to invade distant shoreline areas (Bloomberg, 2004). This character of water helps to magnify the degree to which and duration that contrasting activities in one management area can affect visitor experiences in an adjacent but more primitive area, such as the shoreline of Waldo Lake.

Lakeshores lack sufficient buffering capacity from terrain or vegetation to separate conflicting uses occurring on the lake and its shoreline. Lakeshores also are places where visitors naturally concentrate their activities for extended periods. At Waldo Lake, a motorized lake surface next to a nonmotorized shoreline produces inconsistent recreation experiences for shoreline visitors and ultimately may lead to visitor conflicts. Over the past 20 years, Waldo Lake visitors have complained to Forest staff about the disturbances from motor boats and generators (see Summary of Public Scoping Comments). The intrinsic connection between a lakeshore and lake surface, and public expectations for a *Semiprimitive Nonmotorized* experience along Waldo Lake's undeveloped shoreline, create a Forest need to manage lake surface activities to be compatible with shoreline recreation experience objectives.

Motorized boats create a distraction for visitors seeking the solitude and tranquility of a natural soundscape during their retreat to the distant shores of Waldo Lake. The same can be said for other human-induced disturbances, but mechanical disturbances in particular contrast with the ambient sounds of nature anticipated by Waldo Lake visitors during their shoreline experience. Kuhn (2004) points to past studies that have explored the relative importance of visitor expectations for a recreation setting in shaping their perceptions of distractions. Visitor reactions to motorized activities at Waldo Lake are more likely a measure of unmet expectations than any physical scale, volume and duration of disturbance.

These visitors have often expressed their desires to prohibit or restrict boat motors. Even the infrequent floatplane visits to Waldo Lake have produced visitor complaints about their disturbance to the lake setting. Public comments have made motor use the dominant issue at Waldo Lake since the Forest Plan was approved in 1990. Most public comments about motors have focused on their polluting potential and their disruptive effects on the serenity around the lake. Comments from visitors using areas outside the campgrounds have demonstrated their anticipation for a Primitive or Semiprimitive experience on and around the lake, and reveal strong beliefs that motorized recreation does not fit in the dispersed recreation setting around Waldo Lake.

Need for Action #2: Waldo Lake offers the Forest Service an exceptional opportunity to promote a nonmotorized experience on a large lake (>1000 acres) that is not found elsewhere in the Pacific Northwest. The Willamette National Forest needs to restrict motorized recreation uses on and around Waldo Lake to emphasize a nonmotorized large lake experience for forest visitors.

The Pacific Northwest currently offers no opportunities for nonmotorized boating on a large lake without the presence of motorized boats. All nonmotorized lakes in Oregon are less than 200 acres in size, and lakes that allow only electric motors in Oregon are less than 300 acres in size (Oregon State Statutes 830.180, and Oregon State Marine Board Regulations). For this analysis, a nonmotorized lake setting is characterized as a place where visitors are largely free from the local presence and disturbance of internal combustion motors once they leave the boat launch.

Virtually all large water bodies in the Pacific Northwest region are dominated by boats powered with internal combustion motors. The nine largest water bodies within 50 miles of Waldo Lake, and even more large water bodies within 100 miles, are lake settings heavily influenced by motorized boating. A broader search across the western half of the continent produces few large lakes offering a lake setting free of motorized uses. Portions of Yellowstone Lake, lakes in Minnesota's Boundary Waters Wilderness and Ontario's Quetico Provincial Park, and possibly a few remote lakes in British Columbia, are the nearest large lakes managed as nonmotorized settings for Pacific Northwest residents. Waldo Lake gives the Forest an opportunity to manage a large lake as a non-motorized setting that is currently not available in the region.

As the 13th largest lake in Oregon and located close to Oregon population centers, Waldo Lake currently receives little motorized boat activity. The 1998 visitor survey found only 13.6 percent of boaters and 5.4 percent of all respondents used motorized boats on Waldo

Lake. Boat motors often serve a supporting role to other recreation activities at Waldo Lake, such as dispersed camping or sailing.

The dominance of nonmotorized watercraft (86.4 percent of boaters surveyed in 1998) on Waldo Lake reflects a public demand for open-water paddle boating in Oregon. Survey results by the Oregon Parks and Recreation Department registered a 137.9 percent increase in nonmotorized boating between 1987 and 2002. By contrast, the same survey found motorized boating, excluding water skiing activities, increased only 3.1 percent and sailing actually decreased 59 percent for this same period (Oregon SCORP, 2003). This state-wide growth trend in nonmotorized boating coupled with a nonmotorized land allocation surrounding the lake and the public's stated preferences for a nonmotorized setting (Appendix E: Public Comments) at Waldo Lake support the need to manage this lake as an exceptional nonmotorized boating opportunity within the Region. In 2006, the Willamette National Forest looked at Forest and national recreation survey data to help characterize a market niche for the Forest recreation program. This discussion examined 2000 Forest data from the National Visitor Use Monitoring (NVUM) survey and 1999-2002 data from the National Survey on Recreation and the Environment. This data showed that nonmotorized boating was the recreation activity with the strongest demand among interviewed Forest visitors. An understanding of this strong public demand helps to further confirm the need for the Forest to pursue a change in recreation management at Waldo Lake.

Proposed Action

The Forest Supervisor is proposing management changes to affect recreation activities in the Waldo Lake area in order to meet the purpose and needs for action described above. Changes to recreation activities would include:

- Restricting boat motor use on Waldo Lake to electric motors only, with exceptions for the administrative use of internal combustion motors when approved by the Forest Supervisor on a case-by-case basis.
- Prohibiting floatplanes from using the surface of Waldo Lake.
- Prohibiting public use of generators and chainsaws within the Dispersed Recreation, Semiprimitive Nonmotorized management area (MA-10e) surrounding Waldo Lake.
- These three changes in recreation activities would be enforced two years after this decision is made to provide a transition period for forest visitors and managers.

Proposed management changes would be implemented by amending the Forest Plan with two new standards. A new Forest-wide recreation standard would be worded in the following way.

- **FW- 323 Public use of internal combustion boat motors and floatplanes on the surface of Waldo Lake shall be prohibited.** Public use of electric boat motors on Waldo Lake is allowed. Administrative use (including search and rescue, law enforcement, fire suppression, authorized research, or trail

maintenance) of internal combustion motors may be allowed on Waldo Lake when approved in writing by the Forest Supervisor.

A new management area standard for the Dispersed Recreation, Semiprimitive Nonmotorized Management Area (MA 10e) would be worded in the following way.

- **MA-10e-17 Public use of internal combustion devices (such as chainsaws and generators) on lands immediately surrounding Waldo Lake shall be prohibited.** Administrative use (including search and rescue, law enforcement, fire suppression, authorized research, or trail maintenance) of such devices may be allowed when approved in writing by the Forest Supervisor.

Decisions to be Made

Given the purpose and need, the Forest Supervisor (Deciding Official) will review the environmental effects of the proposed action and other analyzed alternatives, and decide whether to prohibit the public's use of internal combustion motors on Waldo Lake and its undeveloped shorelines or to maintain current public uses by selecting the No Action Alternative. Specific elements of this decision include:

- Whether and how to restrict public use of boat motors and floatplanes on Waldo Lake.
- Whether and how to restrict public use of generators and chainsaws within the Dispersed Recreation, Semiprimitive Nonmotorized management area surrounding Waldo Lake.
- Whether to allow exceptions on boat motor uses for administrative and emergency purposes on Waldo Lake.
- Whether to delay the enforcement of proposed motor restrictions for two years in order to give visitors and managers a transition period.

Public Involvement

The proposed action was initially listed in the Schedule of Proposed Actions (Forest Focus) in 1998, with a Project Initiation Letter (PIL) sent out to people on the Forest and District mail lists that same year. The PIL is intended to start the scoping process that asks the public for their thoughts and suggestions on a specific project. Planning updates have been posted on the Forest website beginning in 1999, with an option for website visitors to directly submit email comments. A summary of issues raised by public scoping comments can be found in Appendix E.

A second scoping invitation letter went out in April 2004 with references to additional data collection in 2003 and a description of a new proposed action described above. A third scoping letter was sent out in November 2005 describing the latest proposed action that focuses only on motorized recreation on and around Waldo Lake.

Additional outreach efforts for public comments on recreation use at Waldo Lake include, in reverse chronological order:

- News articles on this planning process and relevant management issues in the following Oregon newspapers in 2004: *Oregonian* - Portland, *Statesman Journal* - Salem, *Democrat Herald* - Albany, *Gazette Times* - Corvallis, *Register Guard* - Eugene, *Bend Bulletin* - Bend. These articles identified the Willamette National Forest website as an information source for people interested in knowing more about Waldo Lake or as an avenue for submitting comments. These articles created a surge of new comments from people and organizations that had not shared their views during the 2001 planning process.
- A visitor survey was designed by researchers from the University of Florida and Pennsylvania State University under contract, and conducted in 2003 at Waldo Lake. This survey differed from the 1997 and 1998 surveys by focusing on visitor attitudes toward recreation issues and their recreation experience. Respondents were also given an opportunity to voice any suggestions about recreation management at Waldo Lake they wished to share with the Forest Service. Most of the 430 respondents offered suggestions that largely mirrored the expanse of public comments received during project scoping. Results from this survey are posted on the Waldo Lake website and are listed in Appendix H.
- A Waldo Lake web page created in 2000 has offered visitors a source of project information and an avenue to directly email to the Forest their thoughts about the Waldo Lake area and this proposed action.
- Public meetings in 2000 were held in Oakridge and Eugene, Oregon to explain the proposed action (and possible alternatives) and the recreation issues involved. Agency resource specialists answered questions, and collected comment sheets and mailing addresses from participants.
- Recreation use surveys were conducted in 1997 and 1998 at Waldo Lake. These surveys were designed primarily to understand visitor behavior (see Appendix B for survey designs and results); however, respondents were given an opportunity to share any comments they had about Waldo Lake. Many comments, summarized below, expressed attitudes about the human use issues discussed by the Waldo Subcommittee.
- Visitor comment sheets were made available at Waldo Lake campground fee boards. Over 200 comment sheets collected at drop boxes in 1998 expressed visitor thoughts or attitudes about motorized boats on Waldo Lake.
- A 1997 Waldo Lake Conference occurred on the University of Oregon campus. This gathering of scientists and interested members of the public focused on current research about water clarity and microbiology changes, and expanded the public's dialog about human uses at the lake. The conference complemented a review of management issues described in the Forest Service's 1997 Waldo Lake Water Quality Strategy Report. This report focused on potential human use impacts on water quality, and suggested facility options in Waldo Lake campgrounds.

- Public meetings were held in late 1993 in Oakridge and Eugene to discuss access issues throughout the District. The intent of these meetings was to hear public views on proposals to close forest roads in order to reduce road densities and maintenance costs. The presence of motorized boats on the lake was an expressed concern during discussions about the Waldo Lake watershed.
- The Forest also received hundreds of letters and post cards prior to 1996 about managing recreation issues around Waldo Lake. These comments were lost in the fire that destroyed the Oakridge Ranger District office. District employees recalled receiving many public comments before 1996 that expressed concerns about motorized boating on Waldo Lake.

An early and key public outreach effort consisted of a series of discussions in 1999 by the Waldo Subcommittee. This Subcommittee was authorized by the Willamette Province Advisory Council (PAC) chartered under the Federal Advisory Committee Act (FACA) to provide management recommendations to the Forest. Representatives of 21 recreation user groups and organizations were invited to participate on this Waldo Subcommittee to look at seven recreation issues. Invitations to participate on the Subcommittee were also extended to four tribal organizations with historic ties to the Waldo Lake area.

Twelve representatives accepted the invitation to collaboratively work with agency specialists on the assigned recreation issues at Waldo Lake. The Waldo Subcommittee began meeting in late 1998, and presented recommendations to the Willamette PAC in 2000 (Appendix D). The subcommittee recommendations were reviewed and accepted by the Willamette PAC, which subsequently presented them to the Forest for consideration during the first Waldo Lake NEPA analysis in 2001-02.

An Environmental Assessment (EA) for the original proposed action was provided to the public, local tribes and interested agencies for a 30-day comment period in August 2001, with a Decision Notice released in December 2001. The 2001 decision document was subsequently withdrawn by the Forest. A letter describing this decision withdrawal was sent to people and organizations on a project mailing list. Since then, information updates have occurred on the Forest website and the proposed action has continued to be listed in the Schedule of Proposed Actions (Forest Focus).

This Waldo Lake EA can be found on the Forest's website to download, review and refer to when submitting comments. A notice about this document's availability on the Forest's website, or by request, was sent to everyone on the project mailing list.

Issues

This document separates issues into two groups: significant and non-significant issues. Significant issues are defined as those directly or indirectly caused by implementing the proposed action. Significant issues can be factors in creating alternatives to the proposed action for meeting the identified purpose and needs for action. Evaluation criteria for comparing effects from analyzed alternatives are identified at the end of each significant issue description.

Non-significant issues are identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan standards and guidelines, or other higher-level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not

supported by scientific or factual evidence. Non-significant issues are briefly discussed below, including reasons for categorizing them as non-significant.

Scoping with the public, Forest resource specialists, and other agency personnel helped the Forest IDT identify issues associated with this proposed action. Significant issues were used to develop alternatives to the proposed action. Other issues, some raised in public comments, many of them associated with Forest Plan standards and guidelines, legal requirements, and localized resource concerns, are briefly mentioned in the Environment Consequences section.

Significant Issues

Motorized Disturbances to Semiprimitive Shoreline Visitors: The current recreation experience objective for most of the Waldo Lake shoreline is to offer visitors a sense of remoteness and solitude in a forest setting without mechanization (especially mechanized travel) or designed improvements. Current use of internal combustion boat motors and floatplanes on Waldo Lake has the potential to interfere with visitors seeking to experience these setting qualities on the shoreline. The use of mechanized equipment, such as chainsaws or generators, near the undeveloped shoreline can also compromise the recreation experiences of remoteness and solitude that are intended for this *Semiprimitive* shoreline setting. Public comments to date (Appendix E) help reinforce how existing motorized recreation uses can interfere with visitor expectations for a tranquil experience on Waldo Lake.

Lakes and their shorelines are intrinsically connected to each other and essentially are part of the same recreation environment for visitors. Activities on the lake surface can affect the experiences of shoreline dispersed site campers and activities at these shoreline dispersed camps can be seen and heard by boaters on the lake. As such Waldo Lake and its shoreline should be managed for similar recreation experience objectives. Currently, they are managed with different objectives.

For this analysis, two ROS criteria defining recreation experience objectives are relevant to compare. These criteria are Remoteness and Access. The clearest way to assess these criteria is to describe the presence or absence of motorized disturbance that does not meet criteria standards for the Dispersed Recreation, Semiprimitive Nonmotorized shoreline.

> ***Issue Criteria*:** Number of days within the 150-day summer/fall season when motorized disturbances from boats, floatplanes, chainsaws, and generators may potentially be seen or heard by visitors on the Dispersed Recreation, Semiprimitive Nonmotorized shoreline. The 51 dispersed sites established around Waldo Lake will be used to represent the undeveloped shoreline.

Public Access: Restricting public use of boat motors on the lake would reduce lake access for some visitors who cannot physically travel on the lake without an internal combustion boat motor. Affected visitors include the elderly and visitors with physical disabilities. Prohibiting internal combustion boat motors would also make it difficult for larger sailboats (greater than 18 feet) to navigate boat launches or shallow bays. Owners of large sailboats in their public comments have questioned the capability of electric boat

motors to control their boats in windy conditions. Prohibiting internal combustion motors would also eliminate floatplane access to the lake surface (ODA, Division 738-40-0016 thru 0018).

> ***Issue Criteria*:** Number of days that Waldo Lake is open to motorized boats by motor type and floatplanes; and an estimated number of affected visitors.

Management Costs: Proposed actions would increase the need for information and regulatory signing, as well as the need for enforcement staff at Waldo Lake. This workload would increase the total costs for managing public use at Waldo Lake. The Forest annually spends about $3600 to manage dispersed recreation sites and dispersed site visitors at Waldo Lake. Another $2000 is spent to educate Waldo Lake visitors about the lake's unique properties and appropriate behavior on the lake and shoreline. Proposed actions would require more signing, visitor contacts, and monitoring of motor use around the lake. The cost of this increased workload at Waldo Lake would result in less funding available to manage and maintain other recreation sites on the Middle Fork Ranger District.

> ***Issue Criteria***: Annual costs for managing dispersed recreation at Waldo Lake.

Equipment Costs to Motorized Boaters: The 1998 visitor survey showed 13.6 percent of Waldo Lake boaters used motors during their visit. Slightly more than 65 percent of these motorized boaters used 2-stroke motors, while a little more than 25 percent used 4-stroke motors and slightly more than 9 percent used electric motors. Less than 5 percent of motorized boaters sampled possessed both internal combustion and electric motors on their boat. The proposed elimination of internal combustion motors on Waldo Lake would require most motorized boaters on the lake to purchase an electric motor or switch to nonmotorized boating options. Investing in new motor technologies is a financial cost that some motorized boaters would rather not bear.

> ***Issue Criteria*:** Estimated equipment costs for boaters investing in new motor technology and the estimated number of affected boat owners.

Nonsignificant Issues

Water Quality: The analysis area does not contain water bodies found on the State of Oregon's 303d list of water quality-impaired streams and the proposed action would not cause any water body to be placed on the State's 303d list. Further discussions of water quality can be found in Appendix C. This issue will not be analyzed further.

The exceptionally clear water and cobalt blue appearance of Waldo Lake contribute substantially to the area's aesthetic appeal and concerns were raised by the public about water quality impacts from water-based motorized recreation.

Despite the number of visitors and their activities during a short summer season at Waldo Lake, the latest water quality data has not linked any changes in water quality to recreational uses on the lake or at shoreline sites around the lake. Lake sediment samples were taken by Forest staff in 2003 near the three boat ramps to test for residual accumulations of compounds typically associated with motorized boat use. No

measurable levels of these compounds were found in the 2003 sediment samples. Additionally, water clarity tests in 2004 produced some of the best visibility readings in the history of sampling at Waldo Lake.

Bald Eagle Nest Sites: The proposed action would reduce potential disturbances to nesting birds by prohibiting internal combustion motor boating around the lakeshore as well as the use of chainsaws and generators at dispersed camps. Removing these potential disturbances would be most beneficial during the critical nesting season (Jan. 1 – August 31) for the bald eagle.

Other human activities at established dispersed sites and within 500 feet of known and occupied nest sites would be mitigated by closing these sites during the critical nesting season or until site monitoring has demonstrated that human activities are not disturbing nesting birds. This mitigation is currently required by the Forest Plan under all alternatives and would prevent physical habitat modifications that could lead toward a downward trend in the viability of Bald eagles.

Bald eagles have demonstrated varying degrees of acclimation to human behavior. Frequent and disruptive human activities, such as boat traffic or camping activities, near nest sites could affect nesting success by scaring adults off their nest and thereby causing fledglings to become neglected. The potential for nest site disturbance is more acute for birds sensitive to human disturbance and at nest locations in close proximity to camp sites.

Further discussion of this issue can be found in the Wildlife Biological Evaluation (Appendix F). This issue will not be discussed further in this document.

Protected and Native Fish Species: Prior to the state's fish stocking program, native fish species were not documented in Waldo Lake. Natural barriers in the North Fork of the Middle Fork of the Willamette River prevented anadromous fish species from entering Waldo Lake. Currently the dominant fish species living in Waldo Lake is non-native brook trout. Other introduced fish species that may reside in the lake in limited numbers include Kokanee salmon and rainbow trout. The proposed action and its alternatives will have no effect on current fish stocks in the lake, and would not affect downstream habitat serving the life needs of protected fish species. This issue will not be discussed further in this document.

Noxious Weeds: This proposed action would create little ground-disturbing activity, principally from the placement of regulatory signs near existing roads or developed sites, and is not expected to contribute to the spread of noxious weeds around Waldo Lake. This issue will not be discussed further in this analysis document.

Risk Potential for Boating Visitors: This proposed action does not create or increase physical hazards on the landscape that could change public safety on or around Waldo Lake. Additionally, the proposed action does maintain administrative use of boat motors on Waldo Lake for responding to public safety issues, such as wildfire. Therefore, this issue will not be discussed further in this document.

Motorized boats give some visitors a greater sense of security by providing quicker response to and greater control during rough lake surface conditions. Large boat owners

have stated in their public comments that electric motors will not offer the same response or control capabilities as internal combustion motors; therefore, electric motors should be considered distinct from internal combustion motor options for this issue. Operators of large sailboats (greater than 18 feet) have expressed concern about their capability to safely maneuver around shallow bays and boat launches without the use of an auxiliary internal combustion motor.

Because motorized boats are often larger and wider than nonmotorized boats, they can create a perception of greater safety for boaters. Indirectly, motorized boats also can be more effective than other boats at helping other boaters in distress.

The Oregon State Marine Board (OSMB) tracks boater accidents and mortality rates in Oregon (*www.marinebd.osmb.state.or.us/safety/accidents.html*) and recently reported 8 and 15 fatalities boater fatalities in 2004 and 2005, respectively. Annual boater fatality rates since 1990 have averaged 15 per year. Thirty-two (22 percent) of the 144 fatalities reported state-wide by OSMB for the 1997-2005 period occurred on lakes or reservoirs. Eighteen (56 percent) of these thirty-two flat-water fatalities occurred while operating a motorized boat. Only four of the thirty-two accident victims for this period were wearing a personal floatation device (PFD). Oregon State Marine Board believes most boating fatalities result more often when boaters are not wearing a PFD. The last boating fatality at Waldo Lake occurred in October 1999 when a canoeist overturned his craft while trying to help a capsized kayaker. The canoeist was not wearing a PFD.

These state boating accident statistics do not substantiate a clear or consistent link between boater safety on lakes and proposed boat motor restrictions on Waldo Lake. The dominance of nonmotorized boats on Waldo Lake, however, is tangible evidence that most Waldo Lake boaters are able to safely boat this lake without a motor. The lack of compelling evidence connecting boater safety to their access to boat motors suggests that this safety issue is speculative and not tangible enough to analyze for this proposed action.

Loss of Snag Habitat around the Lakeshore: The proposed action could have an indirect benefit to large diameter (greater than 18 inches) snag habitat used by pileated woodpeckers and other cavity nesters. The proposed action would prohibit the public's use of chainsaws at dispersed sites. Campers with chainsaws are more likely to cut down large diameter snags than campers with hand saws or axes. Fortunately, very few dispersed campers are thought to use chainsaws for creating camp firewood based on the field discovery of freshly cut stumps around dispersed sites. Most of these campers are fall hunters and such used is concentrated around a small number of well-used sites. The total effect of snag habitat loss from chainsaw use is small when assessed within the lake's riparian reserve, and insignificant when viewed at the subwatershed level. This issue will not be discussed further in this analysis document.

Alternatives, including the Proposed Action

This chapter describes alternatives to the proposed action for managing recreation to promote a *Semiprimitive Nonmotorized* experience on the shoreline of Waldo Lake. This chapter also summarizes alternatives considered but not developed further for this analysis and explains the rationale for not fully analyzing them. **Table 1** compares each alternative analyzed using key design items and the identified Needs for Action. **Table 2** displays the effects on key resource issues under each alternative analyzed.

Alternative 1 (No Action)

The No Action alternative is required by the Council of Environmental Quality regulations (40 CFR 1502.14(d)). This No Action alternative proposes no management changes at Waldo Lake. With respect to this proposed action, current management consists primarily of these components:

- All boat motors are allowed on the lake. Current Oregon State law prohibits open water boat speeds above 10 mph and wake zone boat speeds above 5 mph.
- Floatplanes are allowed access to the lake surface under current Federal Aviation Administration and Oregon State boating regulations.
- Public use of chainsaws and generators at dispersed campsites around the lakeshore is allowed in the Dispersed Recreation, Semiprimitive Nonmotorized area (MA 10e) around Waldo Lake with consideration for seasonal fire restrictions.

Alternative 2

This alternative would restrict the use of internal combustion motors and floatplanes at Waldo Lake in the following ways:

- Internal combustion boat motor use would be restricted to 4-stroke models only. The 10 mph and 5 mph boat speed limits would remain in effect.
- Motor restrictions on Waldo Lake would take effect two years after a decision is finalized, to educate boaters about the management change.
- The lake surface would remain open to floatplanes under current regulations.
- Public use of chainsaws and generators would be permitted at sites in the Dispersed Recreation, Semiprimitive Nonmotorized management area (MA 10e) around Waldo Lake with consideration for seasonal fire restrictions.

Alternative 3

This alternative would prohibit the use of internal combustion motors at Waldo Lake during the peak summer season in the following ways:

- Internal combustion boat motor use would be prohibited for approximately 60 days (July 15th until the first Monday after Labor Day, inclusive).

  - Administrative exceptions (such as search and rescue, law enforcement, fire suppression, research/science monitoring, or trail maintenance) during the 60-day motor closure period could be approved by the Forest Supervisor.
- Internal combustion boat motor use would be restricted to 4-stroke models for the remaining 90 days (prior to July 15th, and after the Monday following Labor Day) of the summer/fall seasons. The 10 mph and 5 mph speed limits would remain in effect.
- Boat motor restrictions would take effect two years after a decision is finalized to educate visitors about the management change.
- The surface of Waldo Lake would be closed to floatplanes year-round.
- Public use of chainsaws and generators in the Dispersed Recreation, Semiprimitive Nonmotorized management area (MA10e) around Waldo Lake would be prohibited during the 60-day boat motor closure period and whenever seasonal fire restrictions are imposed in the area.

These restrictions would be implemented by amending the Forest Plan with two new standards worded in the following way.

  - **FW- 323 Public use of all internal combustion boat motors on the surface of Waldo Lake shall be prohibited between July 15 and the Monday following Labor Day. Floatplane use on the surface of Waldo Lake shall be prohibited year-round.** Public use of 4-cycle boat motors outside the restriction period is allowed. Public use of electric boat motors is allowed year-round. Administrative use (including search and rescue, law enforcement, fire suppression, authorized research, or trail maintenance) of internal combustion motors may be allowed on Waldo Lake when approved in writing by the Forest Supervisor.

  - **MA-10e-17 Public use of internal combustion devices (such as chainsaws and generators) on lands immediately surrounding Waldo Lake shall be prohibited between July 15 and the Monday following Labor Day.** Administrative use (including search and rescue, law enforcement, fire suppression, authorized research, or trail maintenance) of such devices may be allowed when approved in writing by the Forest Supervisor.

Alternative 4 (Proposed Action)

This alternative would prohibit the use of internal combustion motors at Waldo Lake in the following ways:

- Internal combustion boat motor use would be prohibited year-round.
  - Administrative exceptions to boat motor use, described in Alternative 3, could be approved in writing by the Forest Supervisor.
- Electric boat motor use would be allowed. The 10 mph and 5 mph speed limits would remain in effect.
- Boat motor restrictions would begin two years after the decision is finalized to educate visitors about this management change.

- The surface of Waldo Lake would be closed to floatplanes year-round.
- Public use of chainsaws and generators in the Dispersed Recreation, Semiprimitive Nonmotorized Management Area (MA 10e) around the lake would be prohibited year-round.

These restrictions would be implemented by amending the Forest Plan with two new standards worded in the following way.

- **FW- 323 Public use of all internal combustion boat motors and floatplanes on the surface of Waldo Lake shall be prohibited year-round.** Public use of electric boat motors on Waldo Lake is allowed. Administrative use (including search and rescue, law enforcement, fire suppression, authorized research, or trail maintenance) of internal combustion motors may be allowed on Waldo Lake when approved in writing by the Forest Supervisor.

- **MA-10e-17 Public use of internal combustion devices (such as chainsaws and generators) on lands immediately surrounding Waldo Lake shall be prohibited year-round.** Administrative use (including search and rescue, law enforcement, fire suppression, authorized research, or trail maintenance) of such devices may be allowed when approved in writing by the Forest Supervisor.

Alternative 5

This alternative would prohibit use of boat motors and floatplanes on Waldo Lake, and the use of chainsaws and generators at dispersed sites, in the following ways.

- No boat motor use, internal combustion or electric, would be allowed on Waldo Lake year-round.
  - Administrative exceptions to motor use described in Alternative 3 could be allowed with Forest Supervisor approval.
- Motor restrictions would begin the first summer after the decision is finalized.
- The surface of Waldo Lake would be closed to floatplanes year-round.
- Public use of chainsaws and generators in the Dispersed Recreation, Semiprimitive Nonmotorized Management Area (MA 10e) around the lake would be prohibited year-round.

These restrictions would be implemented by amending the Forest Plan with two new standards worded in the following way.

- **FW- 323 Public use of all boat motors and floatplanes on the surface of Waldo Lake shall be prohibited year-round.** Administrative use (including search and rescue, law enforcement, fire suppression, authorized research, or trail maintenance) of internal combustion motors may be allowed on Waldo Lake when approved in writing by the Forest Supervisor.

- **MA-10e-17 Public use of internal combustion devices (such as chainsaws and generators) on lands immediately surrounding Waldo Lake shall be prohibited year-round.** Administrative use (including search and rescue, law

enforcement, fire suppression, authorized research, or trail maintenance) of such devices may be allowed when approved in writing by the Forest Supervisor.

Alternatives Considered but not Analyzed in Detail

Designate Waldo Lake as Wilderness: Public comments have advocated for the inclusion of Waldo Lake and its shoreline into the Waldo Wilderness. While this management option would address the purpose and needs for action, only Congress has the authority to designate public lands as wilderness.

Modify or Close Developed Campgrounds: This proposal was also suggested in public comments. Suggested campground modifications were primarily directed at separating different kinds of campground visitors from each other. These suggestions did not directly address the purpose or needs for action under this proposed action and therefore were considered outside the scope of this analysis.

Zone the Lake Surface for Different Boating Uses: The Interdisciplinary Team (IDT) discussed zoning the lake for different types of boating experiences. This option was also discussed during the Waldo Subcommittee scoping process (Appendix D), as well as suggested in public comments. The IDT even looked at creating small motorized zones around boat launches to facilitate access issues for larger boats.

Dividing the lake into activity zones for different boat uses does not sufficiently address the stated needs for action of matching lake surface activities with the recreation experience objectives for the shoreline management area, and promoting a nonmotorized recreation opportunity on a large lake. The ability to perceive sound and sight disturbances for long distances across water bodies like Waldo Lake made the success of spatial zoning options questionable. Spatially dividing the lake for different uses would simply move the transition between different management objectives off the shoreline and onto the lake surface, without truly addressing the core need of having the same recreation experience objectives for the lake and its shoreline.

Zoning the lake into seasons of use for different activities was also discussed by the IDT, the Waldo Subcommittee, and mentioned in public comments. This option is currently represented in Alternative 3, which restricts internal combustion motor use during a 60 day period.

Change the Recreation Objectives for the Shoreline Area: The IDT considered changing the management objectives for the lakeshore to make them compatible with current recreation objectives for the lake surface and the three campgrounds. This option would meet the Forest Plan management objectives for the undeveloped shoreline, by managing the lakeshore and lake surface similarly. This option would not be promoting a nonmotorized boating experience on a large lake.

This option also would not meet prevailing public expectations for a *Semiprimitive, Nonmotorized* experience on the undeveloped shoreline of Waldo Lake. Public comments over the last ten years have voiced clear support for an undeveloped recreation setting around Waldo Lake, rather than a setting described by *Roaded Natural* management objectives. Additionally, the Forest Service is committed to maintaining an undeveloped landscape around Waldo Lake, except for the three existing campgrounds.

Other Options Raised in Public Comments: Public comments suggesting options for managing recreation use at Waldo Lake are summarized in the Public Involvement section above. Many of these options are represented in the existing set of action alternatives. Other suggestions were discussed above in this section. Some suggestions (e.g. prohibit long-term sailboat mooring, limit length of stay) have already been covered by existing Forest Service administrative regulations.

Many public suggestions focused on activities within the three developed campgrounds and did not address the proposed action's purpose of managing dispersed recreation on the lake and its Dispersed Recreation, Semiprimitive Nonmotorized management area. A few public suggestions dealt with mountain bike or horse use on the Waldo Lake trail system, and snowmobile and ATV use in the basin. These options were also seen as not directly connected to activities on lake or its shoreline. The Waldo Lake trail is set back from the shoreline for much of its length and trail users do not often interact with shoreline visitors. Therefore, trail uses and winter recreation activities were not included in this analysis.

An option to limit boat motor size (horsepower) was considered as an alternative to the proposed action by the IDT, but eventually dropped from further development. The IDT felt a limit on boat motor size (e.g. restricting motors to 10 hp or less) was redundant with existing alternatives, and more difficult to successfully administer. The IDT also concluded that existing alternatives to the proposed action would be more effective at meeting the identified needs for action than simply limiting boat motor size. Additionally, the size of a boat motor is not directly correlated to the setting impacts created by motorized recreation uses near the Dispersed Recreation, Semiprimitive Nonmotorized shoreline. District staff experience at Waldo Lake has found that smaller motors can be just as disturbing to shoreline visitors as larger motors. Therefore, a motor size limit would not fully meet the purpose and needs for action.

Table 1: Summary of Alternatives by Key Design Items and Needs for Action

Key Items	Alternative 1 (*No Action*)	Alternative 2	Alternative 3	Alternative 4 (*Proposed Action*)	Alternative 5
Boat Motor Use	Allow All Boat Motors 10 mph speed limit	Allow 4-Cycle internal combustion & Electric Motors 10 mph speed limit 2-year transition**	Allow 4-Cycle internal combustion & Electric Motors outside of restricted season* 10 mph speed limit 2-year transition**	Allow only Electric Motors 10 mph speed limit 2-year transition**	Prohibit all Motors No transition
Float plane Access	Allow Access	Allow Access	Prohibit Access	Prohibit Access	Prohibit Access
Chainsaw & Generator use at Dispersed Sites	Allow Use	Allow Use	Allow use outside of restricted season*	Prohibit Use	Prohibit Use
<u>Need for Action #1</u> Consistent with Allocated Shoreline Setting Objectives (*number of days*)	Inconsistent for 150 days	Inconsistent for 150 days	Consistent for 60 days Inconsistent for 90 days	Consistent for 150 days	Consistent for 150 days
<u>Need for Action #2</u> Promotes a Nonmotorized Large Lake Setting (*number of days*)	Does not promote	Does not promote, but improves setting conditions for 150 days	Promotes for 60 days, and improves setting conditions for the other 90 days	Promotes for 150 days	Promotes for 150 days

***** Internal combustion motors prohibited from July 15th to the first Monday after Labor Day, inclusive.

****** Restrictions on public use of boat motors would be delayed for 2 years to give boaters time to transition to new motor technology.

Table 2: Comparison of Environmental Consequences by Alternative and Issue

Issue/Criteria			Alternative 1 (No Action)		Alternative 2		Alternative 3		Alternative 4 (Preferred)		Alternative 5	
			Sites*	Days*	Sites*	Days*	Sites*	Days*	Sites*	Days*	Sites*	Days*
Motorized Disturbances to Semiprimitive Shoreline Site Visitors	Visual	Boat Motor - 2 cycle	51	150	0	0	0	0	0	0	0	0
		Boat Motor - 4 cycle	51	150	51	150	51	90	0	0	0	0
		Boat Motor -Electric	51	150	51	150	51	150	51	150	0	0
		Generators/Chainsaws	51	150	51	150	51	90	0	0	0	0
		Float planes	51	150	51	150	0	0	0	0	0	0
	Auditory	Boat Motor- 2 cycle	51	150	0	0	0	0	0	0	0	0
		Boat Motor- 4 cycle	51	150	51	150	51	90	0	0	0	0
		Boat Motor - Electric	0	150	0	150	0	150	0	150	0	0
		Generators/Chainsaws	51	150	51	150	51	90	0	0	0	0
		Float planes	51	150	51	150	0	0	0	0	0	0
Lake Access for Motorized Boaters and Floatplane Operators			No Change		No Change		Only Electric Motors for 60 days; 4-cycle and Electric Motors for 90 remaining days No Floatplanes		Only Electric Motors for 150 days; No Floatplanes		No Motors for 150 days; No Floatplanes	
Annual Forest Service Costs			$5,600		$15,100		$21,100		$19,100		$18,100	
Boater Owner Costs (worst case scenario)	2- cycle Motors		No Costs		$2200	251 boaters	$2200	251 boaters	$2300	251 boaters	No Costs	
	4- cycle Motors		No Costs		No Costs		No Costs		$2300	99 boaters	No Costs	

- Number of sites that could be affected by motorized traffic by type on any given day, and the number of days that each disturbance is allowed at lake.
- Disturbance sources listed above are only those being directly affected by the one or more alternatives. Other motor sources will be discussed in the environmental consequences section of this analysis document.

Environmental Consequences

Table 2 at the end of the previous section summarizes the environmental consequences by significant issue for each alternative. Environmental consequences include the direct and indirect effects of an alternative, as well as a disclosure of an alternative's cumulative effects. Cumulative effects for the proposed action and other action alternatives are primarily based on their connection to similar effects from past, present, and reasonably foreseeable future actions. Individual effects of past actions have not been listed or analyzed and are not necessary to describe the cumulative effects of this proposal or the alternatives. (CEQ Memorandum, Guidance on the Consideration of Past Actions in Cumulative Effects Analysis, June 24, 2005).

Major past actions over the last 30-35 years should be recognized for their influence on current setting conditions, visitor attitudes, and the ability to meet setting objectives for the Semiprimitive shoreline. These past actions are being highlighted now because they contribute to the cumulative effects of proposed management changes. These major past actions include:

- construction of three developed campgrounds on the eastern lakeshore in 1971, including their paved access roads and boat ramps,
- imposing a 10-mph boat speed limit for Waldo Lake by the Oregon State Marine Board in 1973, and a no-wake speed zone within 300 feet of the shoreline in 1986,
- designating the Waldo Lake Wilderness around the north, west and south sides of the lake in 1984, and
- discontinuing the annual stocking of hatchery fish in Waldo Lake by the Oregon Department of Fish and Wildlife (ODFW) in 1991.

Facility developments have substantially increased the number of recreation visitors to Waldo Lake with most overnight visitors staying in the three developed campgrounds. Improved road access and boat ramps also have increased the number and variety of recreational boats on Waldo Lake. Conversely, imposing a boat speed limit and discontinuing the fish stocking program have likely reduced the number and variety of motorized boats at Waldo Lake over time. Finally, designating the Waldo Wilderness has influenced recreation management objectives around the lake, and possibly has helped to shape the public's expectations for recreation experiences on the Semiprimitive shoreline. Further discussions of the influence of these past actions can be found under individual issues and alternatives.

All action alternatives are designed to reduce the effects that motorized recreation has on visitor experiences on the Semiprimitive shoreline around Waldo Lake. Proposed restrictions on motorized uses at Waldo Lake would create minimal ground disturbance (e.g. placement of regulatory and information signs at boat launches/trailheads) and would not affect activities within the three developed campgrounds. This proposed action does not change recreation facilities, except signage, in the developed campgrounds on the eastern shores of Waldo Lake. This proposed action also does not change recreation trails or visitor activities on trails within the Waldo Lake subwatershed.

Significant Issues

Motorized Disturbances to Semiprimitive Shoreline Visitors

Affected Environment of Motorized Disturbances to Semiprimitive Shoreline Visitors

The surface of Waldo Lake is currently designated a *Roaded Natural* setting. *Roaded Natural* settings are common in the central Cascade Mountains and are characterized by road and trail access, and visitor conveniences (e.g. improved access, directional signing, toilets, campgrounds, potable water). *Roaded Natural* settings also possess on-site visitor management (e.g. regulatory signs and posters, staff patrols) and show evidence of human modification to vegetation. In exchange for easy access and visitor conveniences, visitors in *Roaded Natural* settings can expect to share the area with others. Visitors to these settings would not expect to apply technical outdoor skills or to assume high levels of personal risk during their trips. Waldo Lake's three campgrounds are appropriately designated *Roaded Natural* settings by the Forest Plan.

Most of Waldo Lake's shoreline is designated as a *Semiprimitive Nonmotorized* recreation setting. *Semiprimitive (Nonmotorized or Motorized)* settings are intended to provide visitors with a backcountry escape from concentrated human activity. *Semiprimitive Nonmotorized* settings lack visitor conveniences, improved access, and designed landscape modifications. In optimal *Semiprimitive* settings visitors have few interactions with people outside their group and experience a sense of solitude and remoteness. These *Semiprimitive* settings do require visitors to apply their technical outdoor skills and to assume the personal risks of isolation and remoteness. **Table 3** describes ROS criteria standards for the lake surface and shoreline management areas to highlight differences in setting objectives under current management conditions. More detailed descriptions of these criteria can be found in Appendix A of this document.

Table 3: Criteria Standards for Current ROS Settings at Waldo Lake

	Lake Surface	Shoreline
ROS Class	Roaded Natural	Semi-Primitive Nonmotorized
Access	Motorized travel	Non-Motorized travel
Remoteness	Of little relevance	Distant sights & sounds of human activity; >1/2 hour walk from motorized travel ways

Access norms for a *Semiprimitive Nonmotorized* setting are nonmotorized trails or cross-country travel. Unfortunately, motorized boats traveling along the shoreline of Waldo Lake create setting conditions similar to a motorized roadway. In this sense, motorized boats on Waldo Lake are inconsistent with ROS Access standards intended for a Waldo Lake shoreline experience. Visitors seeking to remove themselves from developed site conveniences and the distractions of motors can be negatively affected by both the sights and sounds of nearby motorized travel. While backcountry visitors may react more strongly to hearing a motorized vehicle than seeing it, the simple sight of a motorized vehicle can contrast with the experience these shoreline visitors are expecting.

Remoteness criteria for *Semiprimitive Nonmotorized* settings specify that visitors should experience only the "distant sights and sounds of human activity" and lists "a half-hour walking distance from motorized travel ways" as a physical gauge for describing this setting. Current motorized activities near the Dispersed Recreation, Semiprimitive Nonmotorized shoreline are inconsistent with these ROS Remoteness criteria particularly during the busy days of late summer when boat traffic is higher. Motorized boaters introduce visual and auditory distractions that conflict with the solitude and remoteness intended for the *Semiprimitive Nonmotorized* experience assigned to the shoreline of Waldo Lake. Motorized boats also increase the potential for social encounters between boaters and visitors at shoreline sites by increasing the travel range of boaters. The ease with which human sights and sounds can carry across lake surfaces helps disturbance from motorized activities to compromise the remote experience of a *Semiprimitive* setting. This is particularly true around popular shoreline areas where the density of dispersed sites is higher.

Currently, shoreline visitors are less likely to experience a sense of solitude and remoteness at the 21 dispersed sites within one mile of the three developed campgrounds, due to the number of social encounters with passing boaters and motorized disturbances coming from the campgrounds. Visitors at the 29 more distant shoreline sites on Waldo Lake have a greater potential to offer visitors the solitude and remoteness of a *Semiprimitive* setting. However, the travel range of motorized boats can introduce motorized disturbance to visitors at these distant shoreline sites. Occasionally, a party of dispersed campers will use a generator or chainsaw at their shoreline site to meet their comfort needs and consequently their use will disturb neighboring sites. Disturbance from these mechanical devices can extend out a mile to influence a number of neighboring sites.

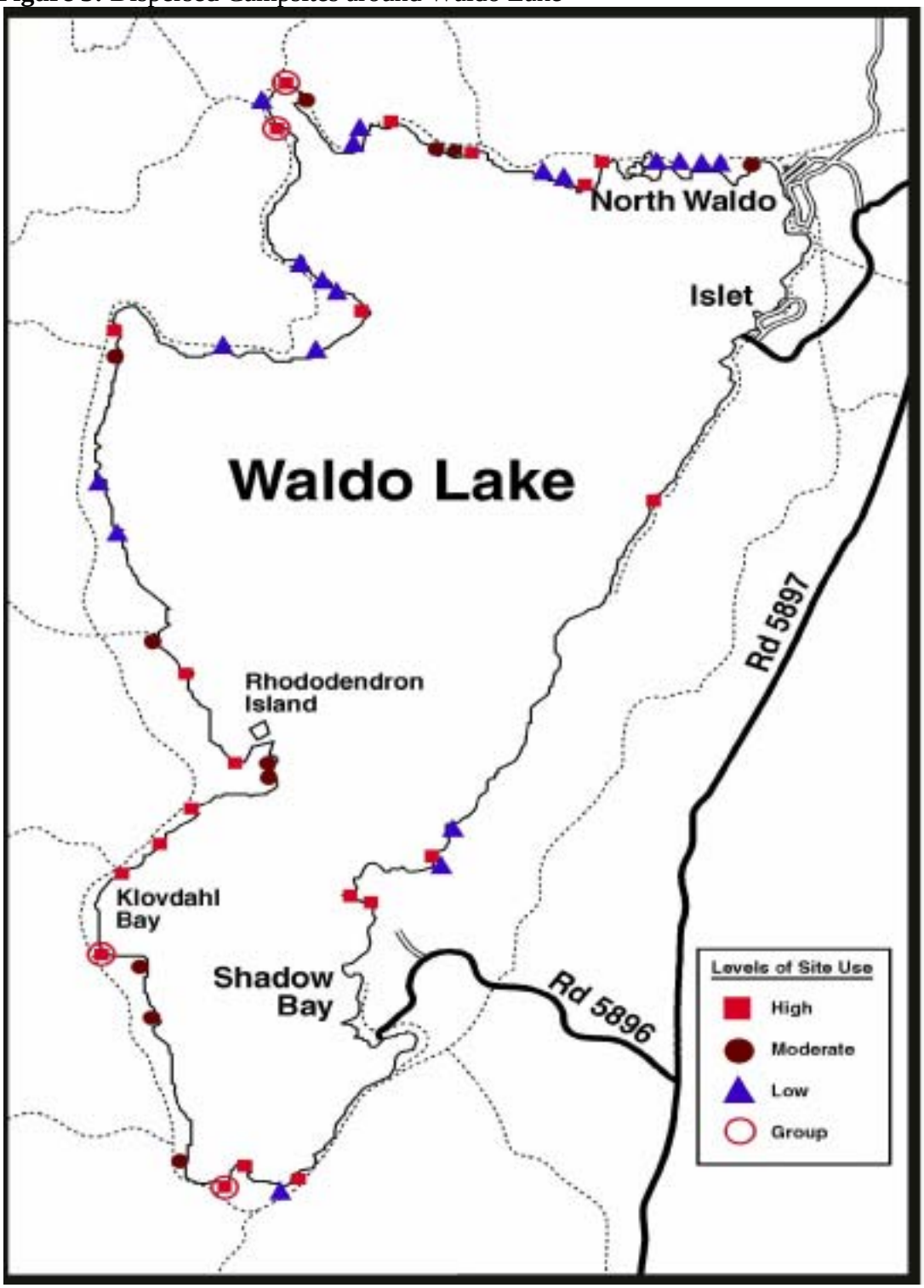
For this analysis, geographic extents for motorized disturbances are defined to help assess the potential that a given alternative has in meeting recreation experience objectives for the *Semiprimitive Nonmotorized* setting around Waldo Lake. Motorized disturbances are separated into visual and auditory elements for various devices that have been experienced annually by shoreline visitors.

Table 4 summarizes the geographic extent of motorized devices influencing the shoreline setting. Distances assigned to each device are based on agency experience at Waldo Lake and the ROS criteria of "½ -hour walk from a motorized travelway". In this analysis, a "½ -hour walk" is assumed to equal a one-mile walking distance on a trail.

Disturbances from overhead aircraft and trains near Highway 58 are excluded from this analysis because they are far enough away to be considered part of the "distant sights and sounds of human activity" used to define a *Semiprimitive Nonmotorized* setting. Other human disturbances (e.g. human voices, dogs, and loud music) can also influence the experiences of shoreline visitors but will not change between alternatives in this analysis. This proposed action only changes motorized activities on Waldo Lake and its *Semiprimitive* shoreline.

For this analysis, the *Semiprimitive* shoreline area will be represented by 51 established dispersed sites scattered around Waldo Lake to help show differences between alternatives. While most dispersed campers stay at one of these established sites, visitors are free to camp anywhere around the lake with a few exceptions. Camping closures exist for the islands, for areas too close to a developed campground, and for the Charlton burn area along the northern shore of Waldo Lake. For this analysis, the burn area closure was established for safety reasons and is assumed to be temporary. Therefore shoreline sites within the burn area will be included in the shoreline area analyzed. **Figure 3** shows the approximate location of these 51 dispersed sites around Waldo Lake.

Figure 3: Dispersed Campsites around Waldo Lake

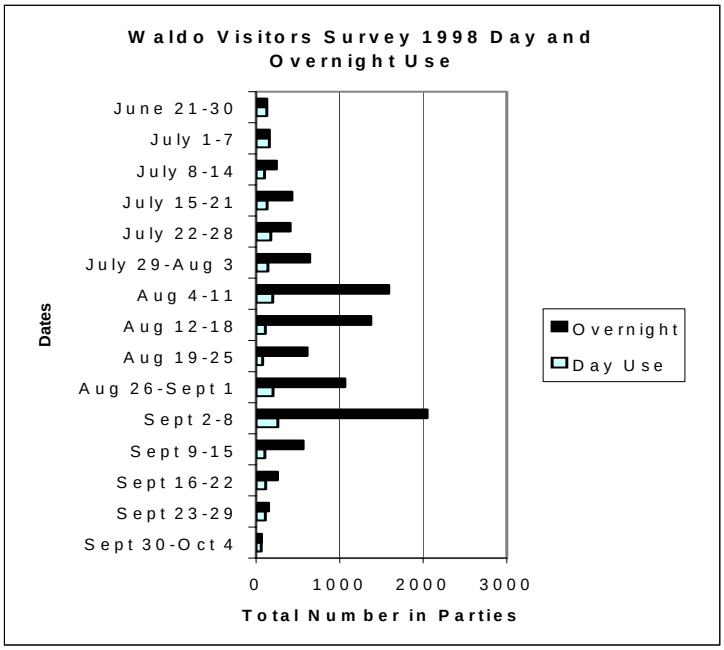


This analysis also defines the summer/fall recreation season as being 150 days long. The actual length of the summer/fall season will vary from year to year based on weather conditions, but is rarely more than 150 days long. A listed effect of 150 days for a motorized device is meant to infer that the device's effects could be experienced at any time during the summer/fall recreation season.

Table 4: Geographic Extents of Disturbance from Motorized Devices on Waldo Lake Shoreline Sites.

Motorized Device	Visual Extent	Auditory Extent
Boat Motor – 2-cycle	Up to 1 mile	Up to 1 mile
Boat Motor – 4-cycle	Up to 1 mile	Up to ¼ mile
Boat Motor – Electric	Up to 1 mile	Up to 100 feet
Chainsaws, Generators	Up to 500 feet	Up to 1 mile
Floatplanes, helicopters	Entire lake surface	Entire lake surface
Motors in Campgrounds	Up to ¼ mile	Up to 1 mile

Figure 4: Visitor Days by Week at Waldo Lake in 1998



Footnote: A drop in 1998 use levels during week of August 19-25 demonstrates how bad weather can influence summer visitation levels

Direct and Indirect Effects of Motorized Disturbances to Semiprimitive Shoreline Visitors

Table 5 below summarizes, by alternative, the number of shoreline sites that potentially could be influenced by motorized devices and how many days of the season that these devices would be allowed to operate on or around Waldo Lake's undeveloped shoreline.

Table 5: Effects of Motorized Influences on Semiprimitive Shoreline Visitors around Waldo Lake by Type of Influence and Alternative

Types of Motorized Influences		Alternative 1 (No Action)		Alternative 2		Alternative 3		Alternative 4 (Preferred)		Alternative 5	
		# Sites [1]	# Days [1]	# Sites	# Days	# Sites	# Days	# Sites	# Days	# Sites	# Days
Visual	Boat Motor - 2 cycle	51	150	0	0	0	0	0	0	0	0
	Boat Motor - 4 cycle	51	150	51	150	51	90	0	0	0	0
	Boat Motor -Electric	51	150	51	150	51	150	51	150	0	0
	Generators/Chainsaws [2]	51	150	51	150	51	90	0	0	0	0
	Landing Floatplanes	51	150	51	150	0	0	0	0	0	0
Auditory	Boat Motor- 2 cycle	51	150	0	0	0	0	0	0	0	0
	Boat Motor- 4 cycle	51	150	51	150	51	90	0	0	0	0
	Boat Motor - Electric	0	150	0	150	0	150	0	150	0	0
	Generators/Chainsaws[2]	51	150	51	150	51	90	0	0	0	0
	Landing Floatplanes	51	150	51	150	0	0	0	0	0	0

[1] Describes the number of shoreline sites that are susceptible to this type of motorized influence, and the number of days that such influences are allowed to occur at Waldo Lake.

[2] Refers to the operation of these devices by visitors at dispersed sites along the shoreline of Waldo Lake.

Access - Alternative 1 (No Action) would continue motorized boat and floatplane access on Waldo Lake. These activities would continue to influence the recreation experiences of dispersed site visitors with motorized disturbance (sight and sound) that does not meet *Semiprimitive Nonmotorized* setting standards. Motorized lake traffic is more frequent and has greater potential to affect shoreline visitor experiences during a 60-day peak-use period between Mid-July and Mid-September. **Figure 4** shows peak use in 1998 occurring from early August to Labor Day weekend.

Even during the months of June and late September when visitor use is lower, a motorized boat traveling along the shoreline or a floatplane touching down and leaving the lake surface can easily influence visitor experiences at a number of shoreline sites. Boaters on Waldo Lake often travel within ½ mile of the shoreline either to satisfy their sightseeing curiosity or to avoid adverse wind and wave action. This travel pattern allows a small number motorized boats to influence many shoreline sites on any given day of the season.

With the current use patterns of motorized boats (Appendix B) and the occasional floatplane, Alternative 1 would continue recreation activities that cause shoreline visitors to experience the sights and sounds of motorized access. These activities have the potential to influence visitor experiences at any of the 51 dispersed sites around the lake on any day during the 150-day recreation season. Again, the potential for motorized disturbance is highest during the 60-day peak summer season, and varies by shoreline location.

At four dispersed sites close to Shadow Bay campground, visitors are almost guaranteed of seeing and/or hearing vehicle traffic in this campground. Visitors at another 18 sites located within one mile of these campgrounds have a good chance of hearing motorized disturbance from the nearest campground, though they may never see this traffic. Additionally, visitors to these 22 close-in sites

have a greater chance of experiencing motorized boat traffic than other shoreline visitors because these sites lie along common travel routes for boaters leaving a boat launch and heading for a distant site or day cruising about the lake. Visitors to the 29 more distant sites have a lower potential of being affected by any motorized traffic, though they still remain vulnerable to experiencing motorized disturbance under Alternative 1.

Visitors seeking a *Semiprimitive* experience at Waldo Lake under Alternative 1 would do best to avoid the 60-day peak summer recreation season, especially on the weekends (Friday through Monday) when recreation use is highest. The remaining 90 days of the recreation season offer them a greater potential to escape motorized traffic. However, Alternative 1 would offer no guarantee on any day that visitors will experience a shoreline setting that is free of the visual or auditory disturbance of motorized traffic near the lake.

All action alternatives generally bring shoreline setting conditions closer to ROS Access standards for a *Semiprimitive* setting, but to varying degrees. Alternative 2 makes the least change from current conditions by removing only 2-cycle boat motors from Waldo Lake. Alternative 2 would continue to allow the presence of other motorized traffic (4-cycle and electric boat motors, floatplanes) to influence the recreation experiences of shoreline visitors. By doing so, Alternative 2 does not improve setting conditions to fully meet ROS Access standards and offer visitors a *Semiprimitive Nonmotorized* setting experience on the shoreline.

Alternative 2 would improve a shoreline visitor's chances of escaping motorized traffic by taking the loudest and most common type of boat motor off the lake. The 1998 visitor survey found 2-cycle motors were used on 65.1 percent of motorized boats. By removing 2-cycle boat motors, Alternative 2 could reduce total motorized boat traffic, provided that boaters with 2-cycle motors choose not to reinvest in a 4-cycle or electric boat motor. Our 2003 recreation survey found 75 percent of interviewed visitors were repeat visitors and many had long histories at Waldo Lake. This survey result suggests a strong visitor connection with Waldo Lake and consequently a likelihood that many boaters with 2-cycle motors would not hesitate to reinvest in a new motor. Therefore, Alternative 2 may only create a short-term (2-3 years) reduction in total motorized boat traffic on Waldo Lake.

By removing the more noticeable 2-cycle boat motors, Alternative 2 would lower the potential for shoreline visitors to notice motorized vehicles during their trip, and therefore could increase visitor perceptions of a motor-free setting. In this sense, shoreline visitors are likely to only take auditory notice of those motorized boats (4-cycle) traveling within ¼ mile of their shoreline location. Alternative 2 would retain the same visual reminders of motorized traffic that shoreline visitors currently experience. That is the sight of a motorized boat may create an unwelcome reminder of motorized traffic for some visitors, though they may not hear the boat.

Alternative 2 would also allow floatplanes to continue visiting Waldo Lake. While floatplanes are uncommon on Waldo Lake, their potential influence on shoreline visitors can be greater than a motorized boat over a similar length of time. Floatplanes are capable of creating a visual and auditory presence that is hard to ignore at Waldo Lake, and their visits would influence a larger geographic area than most motorized boats restricted to 10 mph.

Alternative 3 also would improve the chances for *Semiprimitive* shoreline visitors to escape motorized traffic during the 60-day peak-use period. Alternative 3 would remove all internal combustion motors from the lake surface during this 60-day period, thereby offering visitors more potential to realize a nonmotorized experience at one of the shoreline sites. Visitors to the 22 close-in sites would find setting conditions during the 60-day peak-use period improved by Alternative 3, because the intrusions from passing boaters with internal combustion motors would be gone.

Visitors at the 29 more remote sites would be offered a high potential to experience a setting free of motorized traffic during the 60 day peak-use period. Visitors to all 51 shoreline sites would still have to experience passing boats powered by electric motors under Alternative 3 over the entire 150 day season.

Electric motors are expected to offer most boat owners a sufficient travel range over a day's travel to pass by and influence several shoreline sites. Therefore, Alternative 3 would not technically meet ROS Access standards for the Semiprimitive Nonmotorized shoreline during the 60-day peak summer period. Electric-powered boats would generally need to travel quite close to the shoreline before they would be noticed by shoreline visitors and subsequently identified as motorized traffic. The extent of negative setting influence created by an electric motor boat would most likely depend on the nature of the boat being propelled. For example, a 16-foot canoe or v-hull boat pushed by an electric motor may not create the same image of intrusive motorized access as a 20-foot ski boat propelled by an electric motor. Large boats (> 18 feet) can also have a greater visual effect than smaller boats. In this sense, Alternative 3 retains the potential presence, though with a reduced influence, of motorized boat traffic on Waldo Lake during the 60-day peak-use period by continuing to permit the use of electric boat motors.

For the remaining 90 days of the recreation season, Alternative 3 offers shoreline visitors the same potential to escape motorized traffic as Alternative 2 with one exception. Alternative 3 would prohibit all floatplane access to Waldo Lake over the 150-day summer season. An indirect consequence of prohibiting internal combustion boat motors during a 60-day peak-use period could be more motorized boat traffic during the remaining 90 days than current conditions. Changes in motorized boat use under Alternative 3 would likely be most evident during the week directly prior to and after the 60-day peak-use period when weather conditions are most similar to the peak-use period. Some displaced boaters with internal combustion motors may favor reinvesting in electric motors instead of shifting their trip schedules to early summer or fall.

Alternative 4 would offer shoreline visitors an opportunity to escape motorized traffic for the entire 150-day season by prohibiting all internal combustion motors (boats and floatplanes) on Waldo Lake. On any given day of the summer/fall season, visitors would be free of experiencing most motorized boat traffic by others. Alternative 4 would continue to allow the use of electric boat motors throughout the 150-day season, and thus would retain some motorized influence on shoreline visitor experiences. All in all, Alternative 4 offers a recreation setting containing the same motorized access for 150 days that Alternative 3 offers during the 60-day peak-use period. The continued presence of electric-powered boats technically prevents Alternative 4 from completely meeting ROS Access standards and offering visitors a *Semiprimitive Nonmotorized* setting experience.

Alternative 5 would create the most comprehensive change toward a *Semiprimitive Nonmotorized* recreation experience on Waldo Lake by prohibiting all motorized boats and floatplanes for the entire 150-day recreation season. Alternative 5 would improve setting conditions for all site visitors by removing all motorized boat traffic by other visitors. Visitors to the 22 close-in sites may still be influenced by motorized traffic in the campgrounds. Under Alternative 5, shoreline visitors to the 29 more remote sites on Waldo Lake would find a recreation setting free of the presence of motorized traffic within a mile of their site. Alternative 5 most successfully meets ROS Access standards and offers shoreline visitors a *Semiprimitive Nonmotorized* experience.

Remoteness – Table 5 lists the number of shoreline sites potentially affected by motor sources and the number days that these sources are allowed to operate at Waldo Lake over the 150-day summer/fall season. Information in **Table 5** shows the potential of each alternative to offer shoreline

visitors the remoteness and solitude of a *Semiprimitive* setting by restricting motorized disturbances. Remoteness tracks closely with the ROS Access criteria with respect to mechanical influences on visitor experiences, but Remoteness is a different setting descriptor. Remoteness describes the extent of human disturbances perceived by shoreline visitors and these disturbances are not just confined to methods of travel. Access describes only the types of travel allowed in the recreation setting, and indirectly the potential for these travel methods to influence visitor experiences. This proposed action would improve recreation experiences only by changing motorized activities near the undeveloped shoreline of Waldo Lake. Therefore the following discussion of direct and indirect effects will focus on how each alternative affects motorized disturbances on the Remoteness character of the shoreline. A more inclusive discussion of human disturbances on the shoreline setting will occur under the cumulative effects section of this issue.

Alternative 1 would continue to allow the use of motorized devices (boats, floatplanes, generators and chainsaws) around Waldo Lake to influence the recreation experiences of shoreline visitors. Motorized intrusion from such devices could potentially affect any of the 51 sites around Waldo Lake throughout the 150-day summer/fall season. Visitors to the 22 close-in sites would find it especially difficult to escape the motorized travel of others due to more interactions with boaters traveling by on day trips or to more distant shoreline sites. In general, visitors using one of these 22 sites may find it difficult to completely escape the motorized sights or sounds of others. Motorized intrusions into the 22 close-in sites are most common during the 60-day peak-use season and less frequent during the remaining 90 days based on survey data collected in 1998.

Alternative 1 would continue to allow motorized activities around Waldo Lake that could also influence visitors at the 29 more remote shoreline sites. While visitors to these 29 sites have a better chance of finding solitude from the motorized activities of others, they remain vulnerable to disturbance from motor boaters traveling along the shoreline, the use of a generator or chainsaw at nearby sites, and the occasional lake visit by a floatplane.

The frequency of motor disturbances experienced by shoreline visitors is dependent on when visitors schedule their trip. The highest potential for motor disturbances to shoreline visitors occurs on weekends (Friday-Sunday) during the 60-day peak-use period. During these periods of high use, shoreline visitors must select one of a dozen remote sites on the western shoreline if they hope to experience the remoteness and solitude of a Semiprimitive setting. Shoreline visitors have a better chance of avoiding motor disturbances at the 29 distant sites on Waldo Lake by scheduling trips outside the peak-use period and on non-holiday weekdays outside of August and early September. However, even when making such scheduling precautions, Alternative 1 offers no guarantee that visitors to the 29 more remote shoreline sites can avoid motor disturbances. Motorized boats have the capability of bringing such disturbance to any site around the lake on any of the 150 days of the season.

Alternative 2 would improve a visitor's potential to enjoy a remote experience on Waldo Lake by eliminating 2-cycle boat motors for the entire 150-day season. Because 2-cycle motors are a common motor type on Waldo Lake and have the greatest geographic extent for disturbance of all boat motors, Alternative 2 would reduce the potential for motorized boats to affect shoreline visitors. Therefore Alternative 2 would improve a shoreline visitor's likelihood of realizing peace and solitude at his or her site. Using the geographic extents in **Table 4**, Alternative 2 would reduce the average auditory influence of motorized boats from 1 mile to ¼ mile off shore and consequently would reduce the frequency that a motor boat could influence shoreline visitors. Alternative 2 would not change the visual extent that motorized boats have or the potential for their visual presence to influence the experiences of shoreline visitors.

Alternative 2 would not change disturbances produced by floatplanes, or the public's use of chainsaws and generators, and therefore would continue the influence of these sources of motorized intrusions on all 51 shoreline sites during the 150-day season. Alternative 2 also would continue to allow the use of 4-cycle boat motors, which helps to extend the number of interactions that boaters can have with shoreline visitors during a day's travel. As such, the continued presence of internal combustion boat motors under Alternative 2 limits the potential for shoreline visitors to find a remote recreation experience around Waldo Lake, particularly during the 60-day peak-use period.

By allowing the use internal combustion boat motors to continue over the 150-day season, Alternative 2 would not change the potential of individual shoreline sites to offer visitors a sense of remoteness and solitude. Such boat motors offer an ease and range of lake travel that allows boaters to interact with a number of shoreline visitors even those at the most remote sites. Removing 2-cycle boat motors would not alter this travel pattern around the lake, though it may reduce the total number of motorized boats along with their frequency of interactions with shoreline visitors for a short period. Based on the emotional connection that visitors have expressed in their public comments, the Forest assumes that many of the boaters with 2-cycle motors will transition to a 4-cycle boat motor within the first 2-3 years of motor restrictions in order to maintain their boating access to Waldo Lake. Under this assumption, Alternative 2 would not substantially reduce total motor boat traffic or its influence on the remoteness character of shoreline sites over the long term.

Alternative 3 would improve a shoreline visitor's potential to experience remoteness and solitude on Waldo Lake by eliminating most motor disturbances during a 60-day period. During this 60-day peak-use period, Alternative 3 would allow only electric boat motors to operate on Waldo Lake. It would also remove public use of chainsaws and generators at shoreline sites, and the infrequent floatplane visit. Within this 60-day peak-use period, shoreline visitors to the 29 more distant shoreline sites on Waldo Lake would have an increased potential of finding solitude and remoteness. A visitor's potential to experience solitude and remoteness would also improve, but to a lesser extent, at the 22 shoreline sites within one mile of a campground. Visitors at these 22 close-in sites would still remain vulnerable to motor disturbances from campgrounds.

In contrast to Alternative 2, Alternative 3 would change the potential of individual shoreline sites to offer a remote setting experience during the 60-day peak-use period by reducing the interactions between motor boaters and shoreline visitors. Reduced interactions by motorized boaters would result from a lower daily travel range for boaters with electric motors and possibly fewer motorized boats during this 60-day peak-use period. The Forest assumes that boaters with an internal combustion motor may be less willing to transition to an electric motor, than to trade-in a 2-cycle for a 4-cycle motor. This assumption is supported by public comments from motorized boaters expressing their concerns about the ability of electric motors to meet their needs. Given this assumption, Alternative 3 would not only remove disturbance from internal combustion motors over the 60-day period, but reduce the total number of interactions with any motorized boat during this period. Visitors at the 29 more distant sites would benefit the most from a lower number of motorized boaters and a reduced travel range for the motorized boats present. Visitors at the 22 close-in sites would also experience improved setting conditions during the 60-day period.

For the remaining 90 days of the summer/fall season, Alternative 3 would offer visitors the same opportunities for remoteness available under Alternative 2. On these days, shoreline visitors would still remain vulnerable to disturbance from 4-cycle and electric motor boat traffic, as well as the use of chainsaws and generators at neighboring shoreline sites. Alternative 3 would remove the few disturbing visits from floatplanes over the entire 150 day season, which is a notable improvement considering the number of shoreline visitors that can be affected during a single plane visit.

By banning internal combustion motors during the 60-day peak-use period, Alternative 3 could indirectly increase motorized boat traffic during the remaining 90 days of the season. Any increase in motorized boat traffic during these days would create more motor disturbances for shoreline visitors and reduced opportunities experiencing remoteness around Waldo Lake than current conditions offer.

Alternative 3 could also indirectly increase the number of interactions experienced by visitors at the 22 close-in sites during the 60-day peak-use period. When denied the use of internal combustion motors, dispersed site boaters may be more inclined to select a close-in site. This change in dispersed site selection would concentrate more use around the 22 close-in sites during the 60-day period, and reduce the potential for visitors to find remoteness at these sites. The 1998 visitor survey found only 20 percent of dispersed site campers used boat motors; therefore an increase in camper densities around the 22 close-in sites during the 60-day peak-use period under Alternative 3 may not be substantial.

Alternative 4 would improve a shoreline visitor's potential to experience remoteness at Waldo Lake by eliminating most disturbances from motorized boats, floatplanes, chainsaws and generators on the shoreline during the 150-day season. Alternative 4 would not change disturbances created by campground activities. However, by removing motor disturbance sources, except electric motor boats, from operating near shoreline sites, Alternative 4 would improve setting conditions for visitors at all 52 sites over the 150-day season. Alternative 4 would retain public use of electric boat motors, and thereby would retain the potential for motorized boat traffic to influence the experiences of shoreline visitors.

Alternative 4 would also improve the potential of individual shoreline sites to offer a remote setting experience during the 150-day season by reducing the daily travel range of motorized boaters and possibly by lowering the total number of motorized boats on the lake. A lower travel range for motorized boaters translates into less motorized boat traffic for the 29 more distant shoreline sites than for the 22 sites within one mile of the campgrounds.

As to lower overall motorized boats on the lake, the Forest assumes that boaters with internal combustion motors may be less enthusiastic about transitioning to an electric motor, than transitioning from a 2-cycle to a 4-cycle boat motor. This assumption is based on the perception that boaters have less confidence in the ability of electric motors to meet their boating needs. If this boater hesitation produces lower numbers of motorized boats on the lake, Alternative 4 would offer shoreline visitors, particularly at the 29 more distant sites, a reduced exposure to motor disturbances and an improved potential to experience remoteness during their trip.

Indirectly, Alternative 4 could create a similar change in the distribution of shoreline campers as described under Alternative 3 for the 60-day peak-use period, but over the entire 150-day season. Any increased concentration of shoreline campers around the 22 close-in sites due to boat motor restrictions under Alternative 4 is again not expected to be substantially greater than current conditions.

Alternative 4 would also improve remoteness conditions for shoreline visitors by eliminating the public's use of generators and chainsaws around the shoreline throughout the 150-day season. Visitors using the 22 close-in sites would still remain vulnerable to motor disturbances from use of these motorized tools in the campgrounds. Visitors at the 29 more remote sites would likely perceive campground activities only as "the distant sounds of human activity".

Alternative 5 would similarly increase the potential for shoreline visitors to experience remoteness and solitude as Alternative 4 with one exception. Alternative 5 would also prohibit the use of

electric boat motors throughout the 150-day season. For the entire 150 day season, Alternative 5 would remove the influences that motorized boat traffic, floatplane visits, or the public's use of chainsaws or generators on *Semiprimitive* shoreline visitors. In doing so, Alternative 5 would offer visitors to the 29 more distant shoreline sites a recreation setting that would be essentially free of nearby motor disturbances. Alternative 5 would also improve setting conditions for visitors to the 22 close-in sites by removing the same motorized disturbances, but existing conditions in neighboring campgrounds could still influence their visit.

Alternative 5 could also create the same indirect effect of concentrating campers around the 22 sites within one mile of the boat launches that was described above for Alternatives 3 and 4. Again, this change in camping behavior would involved less than 20% of dispersed campers who used a motorized boat to access their camp site.

Cumulative Effects of Motorized Disturbances to Semiprimitive Shoreline Visitors

The geographic scope for assessing the cumulative effects of this issue is the Waldo Lake watershed. Past and recent management actions at and around Waldo Lake have influenced the cumulative effects of motorized activities on recreation setting around Waldo Lake's *Semiprimitive* shoreline. Past road and facility developments on the Lake's eastern have cumulatively encouraged motorized activities on Waldo Lake and near its eastern shoreline. Campground facilities and improved roadways have also attracted more visitors to Waldo Lake and consequently may have increased the frequency of motorized disturbances to shoreline visitors. Increased recreation use encouraged by facility developments has cumulatively shifted shoreline setting conditions from a *Primitive* to a *Roaded Natural* recreation experience for visitors at the 22 close-in sites. This shift in setting conditions is most notable on weekends during the 60-day peak-use period. Increased recreation use encouraged by facility developments have gradually shifted shoreline setting conditions at the 29 more distant sites from a *Primitive* to a *Semiprimitive Motorized* experience. Again this shift in setting experiences is most evident during the 60-day peak-use period.

The State of Oregon's cancellation of its fish stocking program has indirectly reduced the number of visitors with motorized boats at Waldo Lake. The State's imposition of a 10-mph boat speed limit has also indirectly suppressed the total number of motorized boaters visiting Waldo Lake. Both regulatory actions have reduced the cumulative effects that motorized boating has on the experiences of visitors at *Semiprimitive* shoreline sites of Waldo Lake. The speed limit has been most effective at moderating motorized boats numbers and maintaining *Semiprimitive* shoreline setting closer to a *Semiprimitive* experience during the 150-day summer season, despite the negative influence that increased recreation use has had over the last 20 years.

Camping closures on islands and in the Charlton fire area have reduced the number of established shoreline sites available for dispersed campers and possibly have increased visitor competition for the remaining sites. Increased site competition could be causing more crowding along the *Semiprimitive* shoreline on the busiest weekends of the peak summer season. These area closures have incrementally shifted setting conditions in the closure areas more toward a *Semiprimitive* experience for day visitors by reducing traffic, and slightly more toward a *Roaded Natural* experience for the remaining shoreline areas that have more crowding. Again, any incremental shift in setting conditions for these affected sites will be most evident during the 60-day peak summer period. The future reopening of the Charlton fire area for shoreline camping within the next 5-10 years would redistribute dispersed campers at Waldo Lake somewhat back toward pre-fire conditions. About half of the fire area sites are within a mile of North Waldo campground (**Figure 3**) and many of the fire closure sites have historically experienced high to moderate use levels.

In addition to the public's use of motors around Waldo Lake, *Semiprimitive* shoreline visitors currently may experience the visual and auditory effects from agency use of chainsaws on the Waldo Lake trail. The Forest estimates trail clearing work with chainsaws requires 3 to 10-days each year depending on the extent of winter storm damage. Trail clearing generally is complete by mid-July, the start of the 60-day peak-use period. About half of these trail maintenance days may also involve the shuttling of trail crews with a 4-cycle motorized boat to western shoreline areas. Because trail work can occur anywhere around Waldo Lake, agency use of chainsaws has the potential to create auditory influences on any of the 51 sites in early summer. Considering the proximity of the Waldo Lake trail to shoreline sites, about 16 sites could potentially subject visitors to visual influences from agency chainsaw use.

The 1998 survey data suggests that less than 20 percent of shoreline visitors are using shoreline sites on Waldo Lake prior to mid-July, when chainsaw use for trail clearing is occurring. Agency use of generators outside of the Waldo Lake campgrounds is uncommon (2-3 times over a 10-year period) and often connected with trail construction projects or repairs to the South Waldo shelter. Agency use of chainsaws and generators on the Waldo Lake trail will continue to have an auditory influence on shoreline visitors whenever it occurs within one mile of occupied shoreline sites. Shoreline visitors affected by agency use of chainsaws and generators on the trail would experience a lower sense of remoteness and solitude that is characteristic of a *Semiprimitive* experience.

Shoreline visitors in August and September are also vulnerable to motor disturbances created by wildfire suppression activities involving chainsaws, helicopters, and possibly 4-cycle motorized boats. During fiscal year 2006, approximately 17 fires were suppressed around Waldo Lake. Seven of these 2006 fires were located within a mile of the Waldo Lake shoreline. Chainsaws were used by fire crews at two of the seven fires for a total of four days in July and August. Chainsaws used for fire suppression within a mile of the shoreline would have the same auditory effects on shoreline visitors as agency trail clearing with chainsaws. Helicopters were used on four fires for a total of 11 days in July and August. Having a similar geographic extent as a floatplane, helicopters would be capable of to influencing (visual and auditory) many shoreline visitors during each day of operation. Assuming 2006 is a typical year, motor disturbances from fire suppression activities can be expected each year to disturb at least 12 shoreline sites for 11 days during the 60-day peak-use period. Use of motors for fire suppression would create shoreline conditions more typical of a Roaded Natural setting during their operation.

Shoreline visitors are also annually exposed to the use of motorized boats for water monitoring trips on Waldo Lake. The Forest estimates that a 4-cycle motorized boat is used by various research groups during as many as 5-10 monitoring trips on Waldo Lake each year. Monitoring trips are typically scheduled on weekdays and can take 1-3 days to complete. **Table 4** shows the visual extent of a 4-cycle motorized boat to be greater than its auditory extent. Similar to all public use of motorized boats, these monitoring trips would have more influence on the 22 close-in sites than on the 29 more distant sites. However, disturbance from monitoring trips has the potential to influence any of the 51 shoreline sites if this boat use travels close enough to them.

The Forest does not know of any additional future actions over the next 10 years within the Waldo Lake watershed that would change auditory or visual effects of motor use on *Semiprimitive* shoreline visitors. When considering the above past, present and future actions, Alternative 1 (No Action) would not change current motorized uses or their influence on shoreline setting conditions. Shoreline visitors under Alternative 1 would remain susceptible to disturbance from public and agency use of boats motors, generators, chainsaws, helicopters and floatplanes. Additionally,

visitors to the 22 close-in sites could feel disturbed by motorized uses coming from a nearby campground.

Under Alternative 1, visitors at the 22 close-in sites would experience motorized traffic and disturbance comparable to a *Roaded Natural* setting during the 60-day peak-use period, and similar to a *Semiprimitive Motorized* setting during the remaining 90 days of the season. Visitors at the 29 more remote sites would experience motorized traffic and disturbance comparable to a *Semiprimitive Motorized* setting for much of the 150-day season.

Over the next 20 years, recreation use levels are likely to increase at Waldo Lake in tandem with predicted population growth in Willamette Valley and Central Oregon communities (SCORP 2003). Increases in recreation use under Alternative 1 could produce an incremental shift in motorized disturbance toward a *Roaded Natural* experience at more shoreline sites and over more days of the season. The result of more visitors to Waldo Lake over the next 20 years under Alternative 1 would be a reduced potential for shoreline visitors to experience a *Semiprimitive Nonmotorized* experience at Waldo Lake.

Alternative 2 would reduce the cumulative influences of motor uses on shoreline visitors by prohibiting the loudest boat motors and floatplane visits. Visitors at all 51 dispersed sites would remain influenced by public and agency use of motors during the 150-day season. Alternative 2 would offer the potential for agency use of motors to become more regulated and thereby reduce the effects of this use on shoreline visitors. Alternative 2 would not guarantee that visitors could escape from motor disturbances at their *Semiprimitive* shoreline setting, but would remove two of the most noticeable sources of motor disturbance. Under Alternative 2, visitors could improve their chances of avoiding motorized uses by scheduling their trip outside the 60-day peak-use period and by selecting one of the 29 more distant sites. Projected increases in motorized use over the next 20 years through population growth would gradually shift setting conditions toward a *Roaded Natural* setting at all 51 sites and more frequently compromise the experiences of *Semiprimitive* shoreline visitors.

Alternative 3 would reduce the cumulative influences of motorized uses on shoreline visitors and offer an improved potential of experiencing a *Semiprimitive Nonmotorized* setting compared to current conditions. This improved potential would be most realized during the 60-day peak-use period when the public's use of all internal combustion motors is prohibited. Visitors during this period could still be influenced by the agency's use of boat motors, chainsaws, generators, and helicopters for purposes described above.

Under Alternative 3, visitors to the 22 close-in sites would remain susceptible to motor disturbances from nearby campgrounds throughout the 150-day season. Visitors to all 51 sites would experience less overall disturbance from the public use of internal combustion boat motors during the 60-day peak-use period and shoreline conditions closer to a *Semiprimitive Nonmotorized* setting. Visitors to the 29 more remote sites would notice more incremental change in setting conditions during the 60-day peak period. For the remaining 90 days of the season, Alternative 3 would offer shoreline visitors the same potential to avoid the cumulative disturbances from motor uses described under Alternative 2. Shoreline visitors would remain vulnerable to disturbance from any approved agency use of motors during the 150-day season. Increases in recreation use expected over the next 20 years would create a slower shift in setting conditions during the 60-day peak-use period than expected under current conditions, but a similar rate of change described under Alternative 2 for the remaining 90 days.

Alternative 4 would reduce the cumulative influences of motor uses on shoreline visitors by removing the public's use of internal combustion motors for the entire 150-day season. Visitors would have more days under Alternative 4 than current conditions to seek out the remoteness and solitude of a *Semiprimitive Nonmotorized* setting. Visitors to the 22 close-in sites would remain susceptible to motorized activities in nearby campgrounds, and all site visitors would retain the same disturbance potential created by any approved agency use of motors described under Alternative 3. Visitors to the 29 more remote sites would experience less cumulatively motor disturbance throughout the 150 day season. Alternative 4 would offer shoreline visitors a higher cumulative potential to enjoy a *Semiprimitive Nonmotorized* experience than current conditions offer. Projected increases in recreation use over the next 20 years would have less negative influence on shoreline setting conditions and visitors throughout the 150-day season than expected under current conditions.

Finally, Alternative 5 would offer shoreline visitors the most comprehensive reduction in motor disturbances by removing all public use of motors on Waldo Lake and its *Semiprimitive* shoreline for the entire 150-day season. By also removing the public use of electric boat motors, Alternative 5 would be promoting *Semiprimitive Nonmotorized* setting conditions for shoreline visitors. Shoreline visitors under Alternative 5 would still remain vulnerable to the same disturbances from any approved agency use of motors described for Alternatives 3 and 4. Under Alternative 5, projected increases in recreation use over the next 20 years would have less negative influence on shoreline setting conditions and visitors throughout the 150-day season than under current conditions or other action alternatives.

In conclusion, the potential to offer a *Semiprimitive Nonmotorized* experience to shoreline visitors at Waldo Lake would be improved by all action alternatives compared to current conditions. The largest incremental improvement to this potential across the 150-day season is offered by Alternatives 4 and 5. Alternative 3 offers a similar potential for improving shoreline setting conditions, but only during the 60-day peak-use period. When recognizing that more than 80 percent of the visitation occurs during the 60-day peak-use period, the absolute differences by Alternatives 3 and 4 in creating the setting benefits for shoreline visitors may not be substantial.

Public Access to Waldo Lake

Affected Environment of Public Access

Beyond the travel convenience they provide boaters, boat motors offer access opportunities for some Waldo Lake visitors. Visitors with mobility constraints related to age or disability rely on boat motors to recreate on water bodies like Waldo Lake. Owners of large boats (greater than 18 feet) also rely on a boat motor(s) to travel on Waldo Lake. Even owners of large sailboats have expressed a need for auxiliary motor power to maneuver in and out of boat launches at Waldo Lake. Finally, floatplane operators occasionally use Waldo Lake as a recreation destination. **Table 6** summarizes proposed changes to public lake access with motors by alternative.

Direct and Indirect Effects to Public Access

Alternative 1 (No Action) creates no change in the public's use of motors to recreate on Waldo Lake. Visitors would retain existing freedoms to use any boat motor they preferred within the confines of the current boat speed limit. Floatplane operators would also be free to land on and take off from Waldo Lake within the limits of FAA regulations.

Table 6: Lake Access (number of days) for Motorized Boaters and Floatplane Operators by and Alternative.

Visitor Type	Alt 1 (No Action)	Alt 2	Alt 3	Alt (Preferred)	Alt 5
2-cycle Motor Boaters	150	0	0	0	0
4-cycle Motor Boaters	150	150	90	0	0
Electric Motor Boaters	150	150	150	150	0
Floatplane Operators	150	150	0	0	0

Alternative 2 introduces only one new motor restriction: a ban on 2-cycle internal combustion motors throughout the 150-day summer season for boating visitors to Waldo Lake. Motorized boaters would be restricted to 4-cycle or electric boat motors on Waldo Lake, in addition to having to obey the current speed limit. With this new motor restriction, Alternative 2 would likely not change the types of boat access available to visitors on Waldo Lake. The 1998 user survey results suggest a 2-cycle motor restriction would affect 65.1 percent of motorized boaters at Waldo Lake. These boaters could retain their lake access by investing in a 4-cycle or electric motor. As such, Alternative 2 could reduce lake access only for boaters with 2-cycle motors that felt they could not afford to purchase a 4-cycle internal combustion or electric motor. Further discussion of this subset of visitors can be found in the Financial Costs for Motorized Boaters and the Environmental Justice for Minority Populations and Low Income Populations issue sections.

Alternative 3 changes public access options on Waldo Lake by prohibiting all internal combustion boat motors, as well as the use of generators at dispersed sites, during a 60-day peak-use period in late summer. Alternative 3 would allow visitors to use 4-cycle or electric boat motors, as well as generators at dispersed sites, during the remaining 90 days of the summer season. Alternative 3 basically retains the same boat motor options as Alternative 2, but restricts the use season for internal combustion motors to 90 days. Boaters with internal combustion motors could retain their season of use under Alternative 3 by investing in an electric motor in order to visit during this peak summer period. The 1998 visitor survey showed that less than five percent of boaters with internal combustion motors already possessed electric motors.

Alternative 3 could also indirectly restrict dispersed site selection during the 60-day peak summer period for boaters with electric motors by prohibiting their use of generators for recharging batteries at shoreline sites. During this 60-day peak summer period, boaters with electric motors would need a solar panel at their shoreline site or to return to a boat launch for recharging their battery. This constraint during the peak-use period could compel these boaters to select shoreline sites closer to a boat launch than previously. The 1998 visitor survey found only 20 percent of dispersed site campers used a motorized boat. While the 1998 visitor survey showed only 9.3 percent of motorized boaters used electric motors, Alternative 3 would likely increase the use of electric boat motors on Waldo Lake over time.

Alternative 3 would also eliminate year-round access to Waldo Lake for floatplane operators. District experience over the past ten years suggests that floatplane visits to Waldo Lake during the summer season are uncommon (2-3 events per summer) but notable when they occur.

Alternative 4 would reduce public access options for a variety of Waldo Lake visitors by prohibiting all internal combustion motors over the entire 150-day recreation season. Through its motor restrictions, Alternative 4 would reduce independent boating access for visitors with physical limitations, who would need to rely of others (friends, family, and outfitter/guides) to travel on Waldo Lake. Alternative 4 would also require owners of large boats (greater than 18 feet) who felt that electric boat motors could not serve their boating needs to change their boating options. Owners of large sailboats particularly have expressed this concern over the adequacy of electric motors. The 1998 visitor survey found sailboaters represented 32.5 percent of motorized boaters and 4.9 percent of all boaters (Appendix B). Most sailboats in the 1998 survey (90.3 percent) were equipped with an auxiliary motor.

By restricting use of generators at dispersed sites for the entire 150-day season, Alternative 4 could also change access to some shoreline camp sites for visitors using electric boat motors and needing to recharge their marine batteries. Such visitors would either have to stay in a campground or return to a boat launch to recharge their batteries. Other boaters with electric motors could transition to solar panels as a recharging option for their batteries. Finally, Alternative 4 would remove floatplane access to Waldo Lake year-round.

Alternative 5 creates the greatest change to lake access by restricting public's use of all boat motors for the entire 150-day summer season. Lake visitors would be required to travel on Waldo Lake in nonmotorized craft. This change would affect travel options for 13.4 percent of the current boating population. Visitors with physical limitations that preclude nonmotorized travel would have to rely on others for traveling on Waldo Lake. Most owners of large boats would lose lake access with their boats. Most owners of large sailboats would likely not sail on Waldo Lake with their boats rather than attempt to navigate the boat launches and shallow bays without an auxiliary motor. Similar to Alternatives 3 and 4, Alternative 5 would also eliminate lake access for floatplane operators throughout the year.

Cumulative Effects to Public Access

The geographic scope for assessing the cumulative effects of this issue is Waldo Lake. Past and present improvements to roads and facilities have increased public access to a previously remote and unregulated dispersed setting. The boat speed limits indirectly reduced access for some boaters (e.g. water skiers, jet skis, and speed boaters) by removing their incentives for visiting this lake. The recent EPA regulation on air emissions from internal combustion engines will eventually reduce consumer access to conventional 2-cycle boat motors. Alternative 1 (No Action) does not change boating access or travel options for visitors at Waldo Lake. Alternative 2 also does not change boating access for lake visitors, though it reduces the types of boat motors allowed.

Alternatives 3, 4 and 5 all further reduce motorized boater and floatplane access to Waldo Lake by either prohibiting the types of boat motors allowed or by reducing the season of access. Such incremental changes to boater access stand in contrast to the recreation facilities first constructed in 1971 and recently upgraded in 2004. However, reduced access under these alternatives are compatible with the boat speed limit imposed by the State of Oregon in 1973, the designation of most of the shoreline as a Dispersed Recreation, Semiprimitive Nonmotorized management area in 1990, and the 1996 EPA regulations on boat motors to reduce air emissions from recreational motors.

Costs for New Management Strategies

Affected Environment of Costs for New Management Strategies

The Forest Service costs for implementing new motor restrictions proposed by the action alternatives are not expected to be high in absolute terms, but could represent 8- 14 percent of anticipated recreation funding at the Middle Fork Ranger District for recreation programs. In fiscal year 2005, the Middle Fork Ranger District was allocated $114,000 for recreation programs, $41,000 for wilderness programs and another $37,000 for trail maintenance. Within the 2005 recreation program, the Middle Fork Ranger District allocated approximately $33,000 for managing dispersed recreation across the District.

This proposed action would not create new funding sources for implementing changes at Waldo Lake, but would require the District to direct more existing funding toward Waldo Lake and away from other dispersed recreation sites on the District. This proposed action would not affect funding directed at managing campgrounds, wilderness areas, or trails.

Direct and Indirect Effects to Costs for New Management Strategies

Alternative 1 (No Action) continues existing visitor education and dispersed site maintenance and monitoring around Waldo Lake. This workload costs the District approximately $5600 every year. Historically the Middle Fork Ranger District has assigned two seasonal employees to periodically clean dispersed sites around the lake from July 15th to September 30th. During these site visits field patrols may talk with visitors who are engaged in non-compliant activities. Such compliance checks are most frequent during late summer fire closures. Field patrols also evaluate the physical condition of known dispersed sites every three to five years. The cost of site maintenance and monitoring work is approximately $3600 per year. Under Alternative 1 (No Action), visitor education efforts focus on appropriate camping behavior and the uniqueness of Waldo Lake. This public outreach costs approximately $2000 per year. Enforcement of the existing 10 mph speed limit on Waldo Lake is assigned to the Lane County Sheriff through funding by the Oregon State Marine Board.

Table 7 describes estimates for new regulations on boat motors, generators and chainsaws under each action alternative. Cost estimates would likely reduce after the third year of implementation when start-up costs are expected to disappear. After five years of implementing new regulations, enforcement costs could also decline for some alternatives as the public comes to understand and accept the new use regulations. The 2003 visitor survey (Appendix H) found almost 75 percent of surveyed visitors at Waldo Lake were repeat visitors. A high proportion of repeat visitors should improve the District's efforts to educate visitors about new regulations.

Table 7: Increases in Annual Dispersed Recreation Management Costs for Waldo Lake by Alternative

Cost Elements	Alt 1 (No Action)	Alt 2	Alt 3	Alt (Preferred)	Alt 5
Admin/Maintenance	$3600	$ 4600	$ 5600	$ 5600	$ 5600
Education	$2000	3000	3000	3000	3000
Start-up*	0	6500	8500	7500	7500
Enforcement	0	1000	4000	3000	2000
Total	$5600	$15,100	$21,100	$19,100	$18,100

***** Includes costs for sign prep and installation, and public relations efforts to initiate changes.

All action alternatives would increase administrative workload and operating costs to implement new management strategies regarding motorized boats. The District also would incur more costs under Alternatives 3, 4 and 5 to educate visitors about restrictions on chainsaw and generator use at dispersed sites. Additional costs for implementing restrictions on floatplane access to the lake are not expected to be notable, primarily involving the publishing of the new regulation with the Federal Aviation Administration (FAA) and sending notices to regional associations of floatplane operators.

Cost estimates assume low levels of vandalism on regulatory signing at boat launches due to the presence of campground hosts. Signing about boat motor restrictions placed near the junction of Forest Road 5897 and State Highway 58 would be most vulnerable to vandalism. In general, new motor restrictions would initially cost $9,500-$15,500 per year more than current costs (Alternative 1) depending on alternative selected.

Alternative 2 is the least expensive action alternative because it creates fewer restrictions on Waldo Lake visitors. The main management focus for this alternative would be educating boaters and installing signs about the prohibition of 2-cycle boat motors. For the first three years, Alternative 2 would increase management costs at Waldo Lake by $9500. After the third year of new restrictions start-up costs disappear, and Alternative 2 would add only $3000 per year to dispersed recreation management costs.

Alternative 3 proposes the most expensive motor restriction strategy due to the complexity of managing a seasonal restriction. Even after a two-year transition period to educate the public about these changes, Alternative 3 is most likely to cause confusion among visitors and to create a greater need for enforcement action during the first five years of implementation. Even after five years of implementation, Alternative 3 enforcement costs would likely remain high.

Alternatives 4 and 5 create similar costs for implementing a complete ban on internal combustion motors throughout the 150-day recreation season. A total ban on internal combustion boat motors should be easier to communicate with visitors and enforce than a seasonal motor ban. Alternatives 4 and 5 would still increase administration and law enforcement costs from current conditions, because they impose total bans on internal combustion boat motors on the lake, as well as generators and chainsaws at dispersed sites. By allowing public use of electric boat motors, Alternative 4 would likely increase enforcement costs slightly more than enforcing a total motor ban, because it would allow boats with both electric and internal combustion motors to travel on Waldo Lake (under electric power) and give these boaters potential opportunities to violate the motor restriction.

Alternatives 2, 3 and 4 should produce few enforcement problems with proposed motor restrictions during the first five years by giving boaters two years to transition to 4-cycle or electric motor technology. By contrast, Alternative 5 has potential to create more boater non-compliance by implementing motor restrictions immediately. The small number of dispersed site campers using chainsaws or generators (estimated at less than 10 percent) suggests that enforcement costs for restricting these motors at dispersed sites would be negligible after the first three years of implementation.

Additional management costs under any of the action alternatives represent less than 15 percent of the District's total recreation budget, and therefore would have limited effect on recreation services or facilities across the District over the next 10 years. All action alternatives could indirectly influence the District's recreation program by rescheduling its work force in order to maintain a greater staff presence at Waldo Lake. Any personnel shift to Waldo Lake would create small reductions in facility maintenance and enforcement efforts at other locations. Such changes in personnel presence would only affect recreation sites managed by the Forest Service, not sites

managed under a concessionaire contractor. Funding and personnel shifts would be most apparent during the two year phase-in period for motor restrictions, when start-up expenditures are incurred.

Cumulative Effects of Costs for New Management Strategies

The scope of cumulative effects for this issue is the recreation program budget for the Middle Fork Ranger District. Budgets allocated to each of the ranger districts on the Willamette National Forest are based on a complex formula that considers such criteria as acres to manage, numbers of facilities, numbers of recreation visitors, and special designation areas. The proposed action would not change these criteria in any substantive way and therefore would not change the distribution of funding among the ranger districts. For this reason, the scope of cumulative effects for this issue will be limited to the Middle Fork Ranger District.

Over the past three to four years, federal funding for recreation programs has declined on the Willamette National Forest by as much as 20-30 percent annually. This budget trend is expected to continue. Within the next five years, the Middle Fork Ranger District expects to decommission developed sites or reduce services at low occupancy developed sites to help mitigate lower budgets and to shift funding to deferred (backlog) facility maintenance at its high occupancy sites.

Cumulatively, the increased management costs of implementing the action alternatives at Waldo Lake would not change the District's total expenditures on recreation programs. As stated above, increased management costs at Waldo Lake would simply reduce services and staffing at other recreation sites on the District. The consequence of redirecting funding to Waldo Lake would be a commensurate increase in total deferred maintenance at other recreation sites across the District. No other cumulative effects for this issue are anticipated.

Equipment Costs for Motorized Boaters

Affected Environment of Equipment Costs for Motorized Boaters

Table 8 summarizes cost estimates for new equipment that motorized boaters may have to invest in under the proposed action (or its alternatives) in order to continue their boating activities on Waldo Lake. New 4-stroke gas motors can range in price from $1200 to $2200 *msrp* for models in the 5 to 15 horsepower range (sources: www.iboat.com, 2006 Cabela's catalog). New electric motors with sufficient thrust (2 to 9 hp equivalents) for the range of boats that typically visit Waldo Lake would cost $450 to $1800. A triple-motor electric model offering 165 lbs thrust (11 hp) was recently listed for $1800 (Cabela's 2006 catalog) and rated for boats up to 8000 lbs (approx. 16-24 foot lengths). A more uniquely designed electric motor intended for pushing large boats for extended periods was listed at $4600 (www.rayeo.com).

Marine batteries for electric motors range from $150 to $250 depending on amperage and reserve capacity. Some motorized boaters already have marine batteries. Boaters choosing to use an electric boat motor may also want to invest in a battery charger ($65-120) or a portable generator ($500-$750) to recharge batteries during multi-day visits. Finally, solar chargers for marine batteries are available as an alternative to generators and list for less than $200 per panel.

Table 8: Cost Comparison of New Boating Equipment for Boaters by Alternative

Equipment	Alt 1 (No Action)	Alt 2	Alt 3	Alt 4 (Preferred)	Alt 5
4-cycle Motor (2-15 hp)	$ 0	$ 1200-2200	$ 1200-2200	$ 0	$ 0
Electric Motor (55-165 lbs)	$ 0	$ 450-1800	$ 450-1800	$ 450-1800	$ 0
Marine Battery (24 volt)	$ 0	$ 150-250	$ 150-250	$ 150-250	$ 0
Battery Charger (portable)	$ 0	$ 65-120	$ 65-120	$ 65-120	$ 0
Gas-Powered Generator	$ 0	$ 500-750	$ 500-750	$ 500-750	$ 0

Direct and Indirect Effects to Equipment Costs for Motorized Boaters

Alternative 1 (No Action) creates no new financial costs for motorized boaters using Waldo Lake. Boaters would continue using Waldo Lake without incurring additional equipment costs required by new restrictions.

Alternatives 2 and 3 would require boaters with 2-cycle motors to purchase another motor technology if they wished to travel by motor on Waldo Lake and did not already have this equipment. Purchasing a new 4-cycle motor is estimated to cost between $1200 and $2200 *msrp* for sizes ranging from five to 15 horsepower (hp). Used boat motors are also available and cheaper. This cost for a 4-cycle motor would be slightly offset over time by the increased fuel efficiency of 4-cycle technology compared to most 2-cycle motors. Motorized boaters under Alternatives 2 and 3 could also invest in electric motor technology to replace their 2-cycle motors. Electric motors with a marine battery would cost between $600 and $1050. These boaters may also choose portable equipment for recharging their battery(s) which could cost an extra $500-$750.

The 1998 visitor survey found that boaters using 2-cycle gas motors comprised about 8.8 percent of all surveyed boaters, and boaters were 40 percent of the total Waldo Lake survey population. An more accurate understanding of the scale of financial costs created by banning 2-cycle gas motors was determined by estimating the number of boaters in the survey population visiting Waldo Lake more than once a year. Road counters on the Waldo Lake road registered 9925 vehicles in 1998 from June 21st to October 4th. Assuming maintenance and non-lake vehicle traffic represented 12 percent of total traffic counts in 1998, and knowing that the survey showed 81 percent of Waldo Lake visitors made only one trip that year, the 1998 survey data suggests about 251 different boaters used a 2-cycle internal combustion motor on Waldo Lake in 1998. These are boaters that could need to invest in 4-cycle or electric boat motor technology in order to continue motorized boating on Waldo Lake under Alternatives 2 and 3.

Alternative 4 restricts motorized boating on Waldo Lake to electric motors only. The 1998 survey data showed only 3.5 percent of surveyed boaters used 4-cycle internal combustion motors. Using

the same assumptions made above for Alternatives 2 and 3, Alternative 4 would require as many as 99 different boaters with 4-cycle motors to invest in an electric motor to continue motorized boating on Waldo Lake. These boaters would be in addition to the 251 boaters with 2-cycle motors that Alternative 4 also forces to consider an electric motor investment. The 1998 survey found less than 5 percent of boaters with internal combustion motors already had electric auxiliary motors on their boats, therefore Alternative 4 would cause at least of 333 boaters to consider an investment decision for an electric motor.

Electric motors can cost from $450-$1800 for 2- to 9-hp power equivalents. Boaters choosing an electric motor option may also need a recharging system (a portable generator or solar panel) if they plan to run their boat motors for extended periods (more than one day) on Waldo Lake. Recharging devices would cost as much as $750 for a portable generator or $200 for a small solar panel.

Alternative 5 would not create additional financial costs for boaters to invest in new motor technology or power sources, because it would prohibit all boat motors on Waldo Lake.

Cumulative Effects of Equipment Costs for Motorized Boaters

Cumulative effects for this issue are assessed within the population of motorized boaters using Waldo Lake. Motorized boaters incur operating costs in the form of annual state registration fees (less than $120 for boats less than 40 feet), boat insurance (varies by boat size and type), fuel (currently over $3 per gallon), personal floatation equipment ($100-250 for 4 people), and the initial purchase price of their boat, motor(s) and trailer ($2000-30,000).

Additional costs incurred by boaters at Waldo Lake include campground fees ($15 per day) or Northwest Forest Pass parking fees ($5.00 per day) at boat launch parking areas. These site fees are similarly charged to visitors at many other lakes or reservoirs in the region and will likely increase slightly over the next ten years.

Alternatives 1 (No Action) and 5 create no new financial obligations to change the cumulative financial costs for Waldo Lake visitors wishing to continue their boating activities.

Alternatives 2, 3 and 4 would increase the cumulative costs for visitors wishing to continue their motorized boating activities at Waldo Lake. The incremental cost increase could be as high as $2200 for a new 10hp four-cycle motor and as low as $600 for an electric motor with a solar panel and battery. Such transitional motor costs would be one time expenses that would be amortized over 10 years of recreation. For a visitor that spends two long weekends at Waldo Lake each year, the cumulative costs incurred by Waldo Lake regulations over 10 years under the action alternatives could be as high as $2380 ($2200 for new motor plus $180 for camping fees) or $238 per year.

The new EPA air emissions standards will influence future purchases in new motors for visitors looking to replace their old 2-cycle boat motors. Such visitors will soon find it necessary to purchase a more expensive 4-cycle or fuel-injected 2-cycle motor, because manufacturers will no longer offer standard 2-cycle boat motors. For these boaters, Alternatives 2, and 3 may simply accelerate the economic cost of they would incur over the next ten years.

Other Issues

Local Communities and Economies

Affected Environment of Local Communities and Economies

Regardless of their trip plans, travelers on State Highway 58 contribute to the economies of local communities (e.g. Oakridge and Crescent Lake) near southern end of the Willamette National Forest. Waldo Lake is a major recreation attraction along the Highway 58 corridor, despite its short use season, low fish populations, and current 10 mph speed limit for boaters. But Waldo Lake is still only one of many public recreation opportunities along the Highway 58 corridor, and National Forest recreation is only one of the reasons people travel through these local communities on Highway 58.

Direct and Indirect Effects to Local Communities and Economies

Action alternatives could have some influence on the types of visitor activities at Waldo Lake due to their proposed restrictions on boat motors, floatplanes, generators and chainsaws. These proposed restrictions however, are not likely to create a substantial change to the total number of visitors at Waldo Lake or to the total flow of travelers contributing to the economies of local communities along the Highway 58 corridor.

Motorized boaters at Waldo Lake, approximately 13.6 percent of surveyed boaters and 5.4 percent of all surveyed lake visitors in 1998, would be most affected by proposed restrictions under the action alternatives. Action alternatives would directly displace some motorized boaters to other locations by imposing seasonal or year-round restrictions on boat motors. Estimates from 1998 survey results suggest that fewer than 300 boaters used motors as their power source while visiting Waldo Lake. Minimally, Alternatives 2 and 3 could displace those motorized boaters unwilling to transition from their 2-cycle motors to 4-cycle or electric motors. Some of these boaters would simply choose other water bodies off of Highway 58 (e.g. Crescent Lake, Odell Lake) or in the central Cascade Mountains.

By imposing a seasonal motor restriction at Waldo Lake, Alternative 3 could shift boaters with 4-cycle motors to days outside the 60-day peak-use period (July 15 to early September) or displace them to other water bodies.

Alternatives 4 would displace most motorized boat use from Waldo Lake by prohibiting all internal combustion boat motors for the entire 150-day recreation season. Affected boaters could chose to use an electric motor to continue their recreation behavior at Waldo Lake, or recreate at another water body. By also restricting electric motors, Alternative 5 would displace all boaters with motors to other lakes or force them to use paddle boats on Waldo Lake.

Action alternatives are not expected to substantially change the total number of annual visitors at Waldo Lake or to impact local economies due to a displacement of boaters. Action alternatives would change the types of boats at Waldo Lake, but not the total number of boaters or overall visitors during a typical recreation season. It's important to remember that the 1998 survey showed motorized boats represented about 13.6 percent of all boaters and only 5.4 percent of total surveyed visitors to Waldo Lake.

In summary, any visitor displacement caused by action alternatives would likely affect a fraction of the total recreation traffic along the Highway 58 corridor, and therefore would have little effect on the economies of local communities along this highway corridor. Finally, the recreation setting and opportunities around Waldo Lake can be expected to consistently pull in a high number of visitors each year regardless of the motor restrictions proposed by this proposed action. Many of these visitors will be traveling through one of the Highway 58 communities.

Cumulative Effects to Local Communities and Economies

The geographic scope for assessing the cumulative effects of this issue is the Highway 58 corridor within 100 miles of Waldo Lake. A combination of population growth in the Willamette Valley and Central Oregon, tourism industry growth, and Highway 58 improvements have combined to increase recreation traffic traveling through local communities around Waldo Lake. Highway improvements have also made Highway 58 a major commercial travel corridor over the Central Cascade Mountains. These past and present changes in traffic patterns have provided an economic base for communities like Oakridge. Future population increases forecast for the Willamette Valley and Central Oregon should create more commercial and recreational traffic through these rural communities on Highway 58.

Motorized restrictions proposed by the action alternatives would create only small changes in total recreation traffic at Waldo Lake, because affected visitors (i.e. motorized boaters, floatplane pilots, and users of generators/chainsaws) represent a small percent of total Waldo Lake traffic and Waldo Lake traffic is a minor component of total highway traffic. Therefore implementing one of the action alternatives would have no measurable effect on Highway 58 traffic over an average summer season. In summary, motor restrictions under the action alternatives would not change how Waldo Lake recreation traffic contributes to the cumulative economies of local communities near Waldo Lake.

Environmental Justice for Minority and/or Low Income Populations

Affected Environment of Environmental Justice

Executive Order 12898 (February 11, 1994) requires an analysis of federal actions to determine if there is a "disproportionately high and adverse effect" on minorities (Asian Americans, African Americans, Hispanics), low-income populations, American Indians or subsistence users. The principle behind environmental justice is that minority and low-income citizens should not experience a disproportionate level of adverse impacts or derive fewer benefits, relative to the dominant segments of society, from federal actions.

The 1998 visitor survey at Waldo Lake demonstrated that a majority of lake visitors come from Lane and Deschutes Counties, which have minority populations of 9.4 percent and 5.2 percent, respectively. Waldo Lake is located near the Cities of Oakridge and Westfir in Lane County, Oregon; Crescent Lake, Crescent, and Gilchrist in Klamath County; and La Pine in Deschutes County. These Lane County communities have minority populations of seven percent and less than one percent, respectively. Communities in the southern Deschutes County possess minority populations averaging 4.3 percent. The above Klamath County communities have minority populations of 5.8 percent and minorities represent 12.7 percent for the entire county population (U.S. Census Bureau, 2000).

Approximately 14.5 and 12.2 percent of the Oakridge and Westfir populations, respectively, are at or below the poverty level (U. S. Census Bureau, 2000), which compares to 15.6 percent for the greater

Eugene-Springfield area. Similarly, northern Klamath County communities have 14.0 percent of their populations with incomes at or below the poverty level. Comparatively, Bend and La Pine in Deschutes County have 9.9 percent and 13.2 percent, respectively, of their populations with incomes at or below the poverty level. (U.S. Census Bureau, 2000).

Subsistence and cultural use levels in the Waldo Lake watershed are difficult to quantify and differential patterns of subsistence consumption between population subgroups are unknown at this time. However, the Forest historically has provided public access to firewood near roads, mushrooms and other consumables through a personal-use permit system. Middle Fork Ranger District records for 2002 show permits were awarded for: 829 cords of firewood; 2,057 Christmas trees; and 490 personal-use mushroom gathering (per Gary Marsh, Middle Fork Ranger District employee). For such forest products, the Waldo Lake watershed has not received a high level of interest from the public. A recent exception might be mushroom gathering for morels within the Charlton fire area.

As stated previously, the Willamette National Forest has government-to-government relationships with four tribal organizations through Memorandums of Understanding (see Public Involvement section). These relationships provide an avenue for tribal governments to express concerns to the Forest about any effects on traditional cultural properties and prehistoric resources.

Direct and Indirect Effects to Environmental Justice

Action alternatives would not affect the distribution of minority and low-income community members living within watersheds or communities around Waldo Lake. Action alternatives also would not preclude minority or low-income community members from recreating at Waldo Lake, and would apply proposed recreation restrictions equally to all visitors at Waldo Lake.

Boat motor restrictions proposed by Alternatives 2, 3 and 4 could disproportionately affect local, low-income people wishing to operate 2-cycle motorized boats on Waldo Lake. These residents would likely have more difficulty reinvesting in a 4-cycle or electric motor, and such an investment can be expected to economically affect low-income residents more than others (see Financial Costs of Boaters section). Low-income residents with motorized boats are also more likely to own a 2-cycle boat motor because these models are less expensive.

The Forest does not know what percent of annual boaters at Waldo Lake have incomes at or below the poverty levels. The remoteness of Waldo Lake and associated travel costs coupled with access to other boating options near the surrounding communities help support the District's belief that low-income residents make up a small percent of Waldo Lake visitors. There are many large lake recreation options within 100 miles of Waldo Lake that are close to the local communities mentioned above in surrounding counties. Large lake and reservoir options in Lane County include Fern Ridge, Fall Creek, Blue River, Cougar, Dexter, Lookout Point, Hills Creek, Dorena, and Cottage Grove Reservoirs. Similar options in Klamath County include Odell, Diamond, Crescent and Klamath Lakes. Similar options in Deschutes County include Crane Prairie and Lake Billy Chinook reservoirs, as well as the smaller Davis Lake. These water bodies offer opportunities for residents of these three counties to operate 2-cycle internal combustion motor boats without requiring them to reinvest in new motor technology.

No action alternative would not affect Native American/Indian rights (e.g. hunting, gathering, religious) recognized by the Federal government, and would not reduce access to known areas used by Native Americans for their traditional cultural properties. Action alternatives would not

disproportionately affect subsistence users foraging or hunting around Waldo Lake more than other visitors to the watershed.

Cumulative Effects to Environmental Justice

The cumulative effects of this issue would be considered for the residents from counties immediately surrounding Waldo Lake. Cumulative effects from the proposed action on low-income, minority, and Native American residents, as well as on subsistence users would be the same as those direct and indirect effects described above. In summary, the cumulative effects on these subsets of the population would be the added costs assumed by boaters that choose to purchase newer boat motor technologies in order to comply with new motor restrictions.

Issues Required by Regulation

Proposed, Endangered, Threatened, or Sensitive Plant Species (PETS)

Effects to PETS plant species have been assessed and are described in the Botanical Biological Evaluation (Appendix I). A number of sensitive species are known to exist within the Waldo Lake watershed; however, few known sites have direct contact with visitors Waldo Lake's shoreline.

A population of northern bog club moss (*Lycopodiella inundata L.*) has been found at the north end of Waldo Lake near a popular dispersed campsite (Dam Camp) and part of the Waldo Lake shoreline trail. Habitat for this club moss is located in wet meadows near the lakeshore and small ponds within the watershed. The known population near Dam Camp is vigorous and does not appear to show trampling impacts from recreation use. Current mitigation at this site includes instructing groups using Dam Camp under special use permit how to avoid this known population site. Annual monitoring at the site will help determine the need for further mitigating measures against demonstrated visitor impacts. These species will not be discussed further in this analysis document.

A nonvascular moss (*Schistostega pennata*) has also been located in wet sites southeast of Waldo Lake. Two of these sites are adjacent to the Waldo Lake trail, but no sites have been found near any 51 shoreline dispersed sites. Similar habitat for this species can be found elsewhere within the watershed. This species will not be discussed further in this document.

Two coral fungi species (*Ramaria amyloidea and R. aurantiisiccescens*) have been located in mixed conifer habitat on the west side of the lake. Fungal species can be affected by localized soil compaction and the felling of trees that are mycorrhizal host species. These species have not been located near dispersed campsites or other areas of concentrated use; however potential habitat is currently being used for camping and hiking around Waldo Lake. These species will not be discussed further in this analysis document.

A rare aquatic liverwort (*Jamsoniella autumnalis* var. *Heterostipa*) is known to grow abundantly within deep-water mats of liverworts and mosses on the lake floor. These bryophytes are specifically adapted to growing in conditions of low light, low nutrient concentrations, and cold water temperatures. While not on the protected species (PETS) list, this species has attracted interest from scientists to study these deep-water mats in Waldo Lake. Recreation use around and on Waldo Lake could influence water clarity and ultimately decrease light penetrating to these deep water colonies. To date, water quality sampling in Waldo Lake has not found a connection between human use in the subwatershed and variations in water clarity samples. Water sampling results for

2004 were higher than results from previous sample years and have demonstrated water clarity conditions comparable to Crater Lake. This species will not be discussed further in this analysis.

None of the species identified above will be impacted by the management changes being considered in this analysis.

Survey and Manage Species

This proposed action does not include any ground-disturbing activities that would affect habitat for Survey and Manage species in the Waldo Lake basin (Appendix F) and is therefore in compliance with the 2001 Record of Decision for Survey and Manage Species (USDA 2001). This proposed action could indirectly reduce visitor impacts to suitable habitat for some Survey and Manage species by restricting the public's use of chainsaws at dispersed recreation sites around Waldo Lake. These potential effects on snag habitat will be discussed separately.

A semi-aquatic liverwort (*Marsupella emarginata* var. *aquatica*) is a Survey and Manage species found in the outlet channel near Dam Camp at Waldo Lake. It has been found growing on submerged rocks intermittently in the first two miles of the outlet stream, particularly in fast-moving stream reaches. Monitoring of this *M. emarginata v. aquatica* site has not found signs of substantial impacts from recreation visitors. Water pollution and unrestricted recreation use around this site could threaten this population in the future. Monitoring of this population will be continued into the future to determine the need to divert recreation use away from the outlet channel site. This species will not be discussed further in this analysis document.

Because this proposed action would not affect habitat for Survey and Manage Species beyond potential benefits caused by prohibiting public use of chainsaws on the shoreline, this issue will not be discussed further in this document.

Heritage Resources

Based on conversations with local tribal organizations conducted for previous projects on the Middle Fork Ranger District, the Forest consulted with four tribal organizations whose member tribes could have historic ties to the Waldo Lake Basin to understand their issues and concerns around this proposed action. These tribes were also invited to participate in the Waldo Subcommittee process in 2000-01. From these contacts, tribal representatives from the four tribal organizations raised no issues regarding potential effects to prehistoric use or traditional cultural properties.

This proposed action would not affect the availability of or access to traditional cultural properties within the Waldo watershed by tribal members. A 2005 letter of concurrence with the Oregon State Historic Preservation Office (Appendix G) is filed in the analysis records at the Middle Fork Ranger District. This issue will not be discussed further in this analysis document.

Management Indicator Species

Implementation regulations for the National Forest Management Act of 1976 (NFMA) require the management of wildlife habitat to "maintain viable populations of existing native and desired non-native vertebrate species in the planning area" (page III-68, USDA. 1990a).

Management Indicator Species (MIS) identified in the Forest Plan to facilitate management of wildlife habitat are summarized in the FEIS (page III-69, USDA. 1990a) for the Forest Plan. The

analysis area does not contain winter range habitat for deer and elk, cliff habitat for peregrine falcons, or potential water habitat for anadromous fish species. Anadromous fish and resident fish species are discussed separately under the "Protected and Native Fish Species" issue.

Habitat features for northern spotted owls, pileated woodpeckers, pine martens, cavity excavators, and bald eagles were found to occur within the analysis area. Bald eagles are discussed under the "Bald Eagle Nest Sites" issue. This proposed action does not create any direct effects on old growth snag habitat features important to northern spotted owls, pine martin, pileated woodpecker, and other cavity excavators. This proposed action could indirectly affect snag habitat used by these species by prohibiting the public's use of chainsaws around the lake shore. Effects on snag habitat are discussed as a separate issue. Management Indicator Species will not be discussed further in this analysis document.

Proposed Action Monitoring

Monitoring elements specific to this proposed action will only be designed to determine visitor compliance with selected motor restrictions. Compliance monitoring would most often occur at boat launches and during routine recreation patrols around the shoreline by field staff visiting dispersed campsites.

Ongoing monitoring efforts unrelated to this proposed action but connected with Forest Plan management objectives for protected species (e.g. Bald eagle nest sites, known sensitive plant sites) will continue to occur at Waldo Lake. Periodically, field staff will also make assessments of visitor impacts at shoreline dispersed campsites to determine the effects that visitors are having on vegetation and soil, and to document where new campsites have been established.

Other unrelated monitoring efforts will be on-going at Waldo Lake to collect scientific data (e.g. water quality, climate). A coalition of resource specialists from various agencies has designed long-term monitoring for physical and chemical characteristics in the watershed. Resource specialists will also conduct periodic assessments of known sensitive plant species sites and survey for noxious weed sites as part of their normal program of work. These monitoring efforts will prove valuable for guiding future management decisions and protecting Waldo Lake, but are not directly connected to this proposed action.

Consistency with Direction and Regulations

***Willamette Forest Plan*:** This proposed action tiers to the Environmental Impact Statement for the Willamette National Forest Land and Resource Management Plan (USDA, 1990a) and those environmental impact statements (USDA 1994, 2001, 2004) that have subsequently amended this plan. The 1990 Willamette National Forest Land and Resource Management Plan, as amended, assigns management areas (MA) to all acres of the Forest to direct management activities and public uses (USDA. 1990b). Forest Plan management areas around Waldo Lake are displayed in Figure 2.

Waldo Lake is classified by the Forest Plan as a Riparian Reserve, (MA 15) and is predominantly surrounded by a Dispersed Recreation, Semiprimitive Nonmotorized management area (MA 10e). Just outside MA 10e on three sides of Waldo Lake and in some places close to the shoreline is the Waldo Wilderness (MA 1a). The three campgrounds on the lake's eastern shore are designated Developed Recreation Sites (MA 12a). Corridors around access roads to the three campgrounds are assigned Dispersed Recreation, Semiprimitive Motorized management areas (MA 10c).

Two other management areas close to Waldo Lake play minor roles in recreation use around the lake. These management areas are the Wild and Scenic River management area (MA 6f) along the North Fork of the Middle Fork Willamette River and the Research Natural Area (MA 4) to the northeast of North Waldo campground.

The Forest Plan defines a recreation setting emphasis and experience objectives through the Recreation Opportunity Spectrum (ROS**)** for each management area (MA), along with the human uses and facility development levels that are consistent with those objectives. Planning tools like ROS help the Forest consistently manage similar settings across the forest landscape. The ROS system recognizes three interrelated components of recreation: the experience, the physical setting, and types of activities. By considering these components together, managers can match facility development and visitor activities to the recreation setting emphasis and experience objectives assigned to each management area on the Forest. Components of the ROS system are described in greater detail in Appendix A.

Forest Plan amendment under the proposed action (and its action alternatives) would direct some recreation uses at Waldo Lake to be more consistent with resource goals and management direction contained in the Willamette National Forests Land and Resource Management Plan. The proposed action (and its action alternatives) creates environmental consequences that do not compromise the long-term productivity of land resources and protect water resources, while attempting to meet recreation experience objectives for undeveloped sections of Waldo Lake and its shoreline.

Endangered Species Act: The proposed action and its alternatives are consistent with Endangered Species Act direction. This determination is supported by the Wildlife BE (Appendix F).

Executive Order 12962, Recreational Fisheries: Recreational fisheries in Waldo Lake are limited by the lake's ultra-oligotrophic nature and State of Oregon's decision to stop its fish stocking program at Waldo Lake. The proposed action (and its action alternatives) would not have any effect on existing populations of introduced fish in Waldo Lake.

Executive Orders 11988 and 11990: The proposed action (and its action alternatives) would have no impact on floodplains or wetlands as described in these executive orders.

State Historic Preservation Office (SHPO): The proposed action (and its action alternatives) would have no impact on known historic or prehistoric sites around Waldo Lake. A letter of compliance with SHPO direction is included with this document as Appendix G.

Irreversible and Irretrievable Commitments of Resources

No irreversible or irretrievable commitments of resources are expected to occur under this proposed action or any of the action alternatives.

Significance of Proposed Amendments to the Forest Plan

The following factors have been evaluated to determine whether the proposed Forest Plan amendment #44 creates significant changes to the Willamette Forest Plan.

Timing: The Willamette Forest Plan was implemented in August 1990 and has been in place for about 16 years. The current agency schedule is for a forest plan revision to begin in the fall of 2008 and be completed by 2011. While it is not possible to predict what issues will or will not be

considered in the upcoming forest plan revision, it is likely that all land allocations and recreational uses will be reviewed for possible changes.

Size and location: The proposed forest-wide S&G of this amendment is limited to Waldo Lake and would not apply to recreational boat use on other lakes or rivers. Because Waldo Lake is the largest natural lake on the Forest, the proposed amendment would affect a high percentage of natural lake acres on the Forest. However, when viewed in terms of the actual amount of recreational boating use, this amendment would affect less than 5 percent of the annual boating use estimated to occur across the Forest.

Likewise, the proposed management area S&G of this amendment applies only to motorized use within a portion of MA-10e immediately adjacent to Waldo Lake and representing approximately 2072 acres. The total acres on the Forest classified as MA 10e is 49,600, so this proposed amendment would affect slightly more than 4% of the all acres currently allocated as MA 10e.

Goals, Objectives, Outputs: The proposed amendments would alter the long-term relationship between motorized and non motorized opportunities and potential user days at Waldo Lake. At the Forest level, the change or shift in long-term recreational opportunities between motorized and non motorized boating would be minimal. The other large lakes and reservoirs on the Forest offer a large amount of motorized boating opportunities and these uses/opportunities are not affected by the proposed amendment. The amount of motorized use at Waldo is small in comparison to the use/opportunities on these other lakes and reservoirs, so changes in the ratio or relative amounts of motorized and non motorized opportunities across the Forest would be minimal.

Management Prescription: The proposed S&G's are specific to the surface of Waldo Lake and the Dispersed Recreation, Semiprimitive Nonmotorized management area immediately around the lake. They would not set a precedent for future management decisions on the Forest primarily because Waldo Lake and its surrounding area offer unique recreational settings and opportunities. The type of management changes proposed for Waldo simply would not fit the existing social and physical environments of other large lakes and reservoirs on the Willamette National Forest.

Consultation and Coordination

Through public scoping, including meetings of the Waldo Subcommittee of the Willamette Province Advisory Council, the Willamette National Forest has sought input on this proposed action from the following organizations:

- Oregon Department of Fish and Wildlife
- Oregon State Marine Board
- Oregon Department of Parks and Recreation
- Oregon Department of Environmental Quality
- Oregon State Historic Preservation Office
- Portland State University, Center for Lakes and Reservoirs
- USDI Fish and Wildlife Service
- Willamette Provincial Advisory Council
- Confederated Tribes of Grand Ronde Tribal Council
- Confederated Tribes of Siletz Indians
- Confederated Tribes of Warm Springs Reservation
- The Klamath Tribes

Internal scoping also occurred among resource specialists on the Middle Fork Ranger District and with Willamette National Forest staff. Members of the Interdisciplinary Team for this proposed action included:

- Sheri Cameron, Recreation, Operations & Maintenance
- Chris Jensen, Recreation, Operations & Maintenance (retired)
- Al Johnson, Limnologist
- Cathy Lindberg, Forest Archeologist
- Kim McMahon, Botanist
- Brian McGinley, Recreation Planner
- Deborah Quintana-Coyer, Wildlife Biologist
- Rick Scott, Former District Ranger (retired)
- Nikki Swanson, Fisheries Biologist
- Dennis Sullivan, Fire Management
- Chip Weber, District Ranger
- Jim Williams, Recreation, Lands, and Minerals Staff (now retired)
- Carol Winkler, Archeologist

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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, Roaded 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					

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	Remote-ness 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					

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

<table>
<tr><th></th><th>6 or less Parties Met per Day; Less than 3 Campsites Visible</th><th>6-15 Parties per Day; 6 or less Campsites Visible</th><th>Mod. to High Contact on Roads; Mod. to Low Contact on Trails and in Campsites</th><th>Moderate to High Contact on Roads, Trails and Campsites</th><th>High Contacts on Roads, Trails, and in Campsites</th></tr>
<tr><td>Primitive</td><td>Norm</td><td>Inconsistent</td><td colspan="3">Unacceptable</td></tr>
<tr><td>Semi-Primitive Non-Motorized</td><td rowspan="2">Fully Compati-ble</td><td rowspan="2">Norm</td><td rowspan="2">Inconsistent</td><td colspan="2" rowspan="2">Unacceptable</td></tr>
<tr><td>Semi-Primitive Motorized</td></tr>
<tr><td>Roaded Natural</td><td colspan="2">Fully Compatible</td><td>Norm</td><td>Inconsistent</td><td>Unacceptable</td></tr>
<tr><td>Rural</td><td colspan="3">Fully Compatible</td><td>Norm</td><td>Inconsistent</td></tr>
<tr><td>Urban</td><td colspan="4">Fully Compatible</td><td>Norm</td></tr>
</table>

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

<table>
<tr><th></th><th>Unnoticeable Impacts, No Site Hardening</th><th>Subordinate Impacts, No Site Hardening</th><th>Subordinate Impacts, Limited Site Hardening</th><th>Subtle Site Hardening</th><th>Site Hardening May be Dominant, but in Harmony</th></tr>
<tr><td>Primitive</td><td>Norm</td><td>Inconsistent</td><td colspan="3">Unacceptable</td></tr>
<tr><td>Semi-Primitive Non-Motorized</td><td>Fully</td><td>Norm</td><td>Inconsistent</td><td colspan="2">Unacceptable</td></tr>
<tr><td>Semi-Primitive Motorized</td><td colspan="2">Compatible</td><td>Norm</td><td>Inconsistent</td><td>Unacceptable</td></tr>
<tr><td>Roaded Natural</td><td colspan="3">Fully Compatible</td><td>Norm</td><td>Inconsistent</td></tr>
<tr><td>Rural</td><td colspan="4" rowspan="2">Fully Compatible</td><td>Norm</td></tr>
<tr><td>Urban</td><td>Fully</td></tr>
</table>

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

<table>
<tr><th></th><th>No On-Site Controls or Information Facilities</th><th>Subtle On-Site Controls & Limited Information Facilities</th><th>Noticeable On-Site Controls & Facilities, but Simple in Design</th><th>Obvious & Numerous On-Site Controls & Facilities, but Harmonize w/ Setting</th><th>Obvious & Numerous On-Site Controls & Facilities; Sophisticated in Design</th></tr>
<tr><td>Primitive</td><td>Norm</td><td>Inconsistent</td><td colspan="3">Unacceptable</td></tr>
<tr><td>Semi-Primitive Non-Motorized</td><td rowspan="2">Fully Compatible</td><td rowspan="2">Norm</td><td rowspan="2">Inconsistent</td><td colspan="2" rowspan="2">Unacceptable</td></tr>
<tr><td>Semi-Primitive Motorized</td></tr>
<tr><td>Roaded Natural</td><td colspan="2">Fully Compatible</td><td>Norm</td><td>Inconsistent</td><td>Unacceptable</td></tr>
<tr><td>Rural</td><td colspan="3">Fully Compatible</td><td>Norm</td><td>Inconsistent</td></tr>
<tr><td>Urban</td><td colspan="4">Fully Compatible</td><td>Norm</td></tr>
</table>

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.

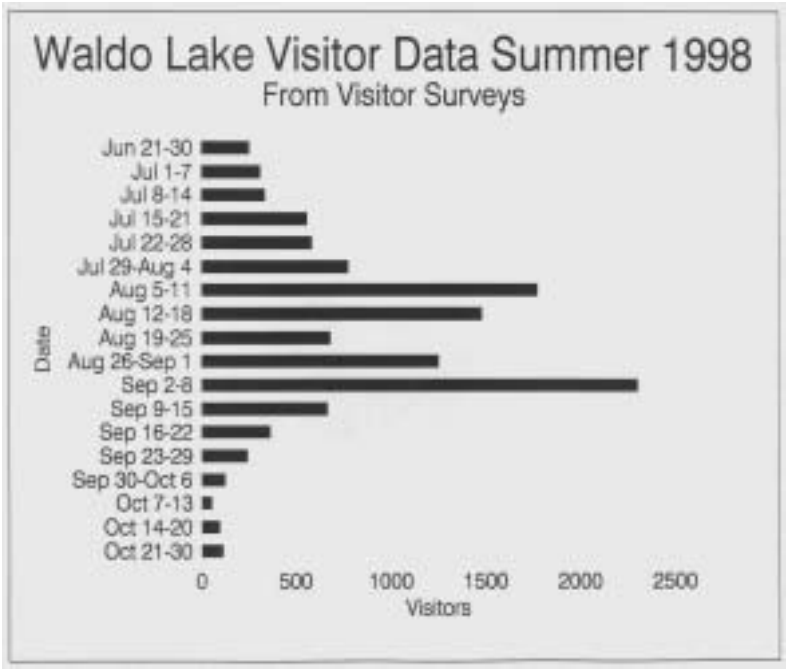
Season of Visitation – Visitation to Waldo Lake peaked in August and early September, with visitation higher in July than June or October use. The following table shows the distribution of survey responses across the recreation season. Poor weather conditions and the number of days when the lake is snow 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 dev eloped 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, ethlybenzene, 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 levels[1] (MCL) for VOCs including the BTEX compounds[2]. Oregon Administrative Rules for water quality list benzene, toluene, and ethylbenzene as priority water pollutants[3] (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 rings[4] 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 (Mosich 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 (Helifrich 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 Concentrations[5] (TEC) and Probable Effect Concentrations[6] (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 wastes[7] or gray water[8] 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. Lifflf 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.

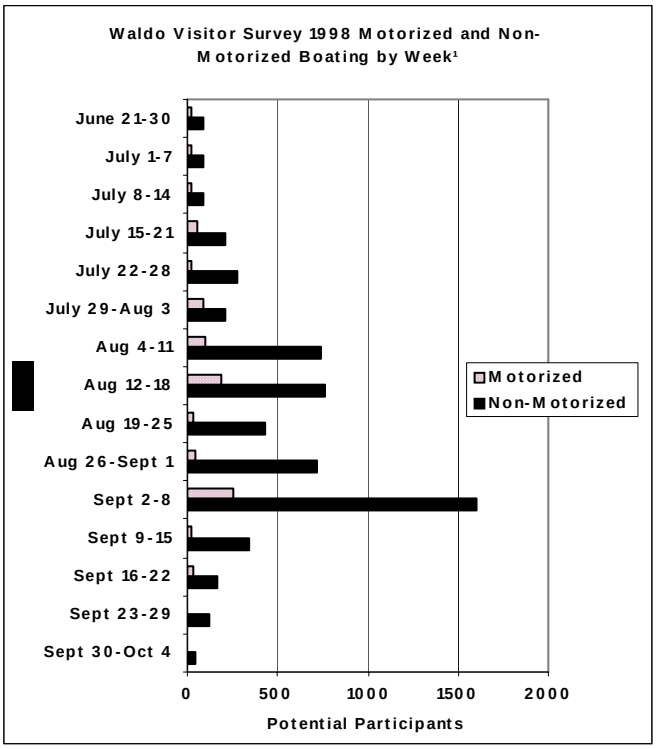
Improper disposal of wastes from humans or their animals has the potential to introduce pathogenic microorganisms (i.e. *Cryptosporidium* spp. and *Giardia* spp.) into adjacent water bodies. However, pathogenic microorganisms have been found in water in watersheds where recreation is prohibited (USDA 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 verses 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 (µg/kg dry weight)

	Sample Location and Site Number							
Analyte (PAH)	**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 phosphorous 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 affects 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 Vallev 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) **TheWillamette 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 it's 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 pursing 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 sees 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 S*emi-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 R*oaded Natural* ROS.

- Generally, most of the lake surface currently meets a S*emi-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 S*emi-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 S*emi-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 too 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 abandon 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 *PreField Review* **Habitat Present**	**STEP 2** *Field Recon.* **Species Survey?**	**STEP 3** *Conflict Determination* **Species Present?**	**STEP 4** *Analysis of Significance* **Conflict?**	**STEP 6** *FWS Review* **Consultation**
Spotted Owl *Strix occidentalis caurina*	**no**	**no**	**no**	**no**	**no-n/a**
Bald Eagle *Haliaeetus leucocephalus*	**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 *Lynx canadensis*	**no**	**n/a**	**no**	**no**	**no**
Least Bittern *Ixobrychus exilis*	**no**	**n/a**	**no**	**no**	
Bufflehead *Bucephala albeola*	**no**	**n/a**	**no**	**no**	
Harlequin Duck *Histrionicus histrionicus*	**no**	**n/a**	**no**	**no**	
American Peregrine Falcon ***Falcon peregrinus anatum***	**no**	**no**	**no**	**no**	
Yellow Rail ***Coturnicops noveboracensis***	**no**	**n/a**	**no**	**no**	
Black Swift ***Cypseloides niger***	**no**	**n/a**	**no**	**no**	
Tricolored Blackbird ***Agelaius tricolor***	**no**	**n/a**	**no**	**no**	
Baird's Shrew ***Sorex bairdii permiliensis***	**yes**	**no***	**unknown**	**no**	
Pacific Shrew ***Sorex pacificus cascadensis***	**yes**	**no***	**unknown**	**no**	
California wolverine ***Gulo gulo***	**no**	**n/a**	**no**	**no**	
Pacific Fisher ***Martes pennanti***	**potential**	**n/a**	**no**	**no**	
Pacific Fringe-tailed Bat ***M. thysanodes vespertinu***	**yes**	**no***	**unknown**	**no**	
OR Slender Salamander ***Batrachoseps wrighti***	**yes**	**no***	**unknown**	**no**	
Cascade Torrent Salamander ***Rhyacotriton cascadae***	**yes**	**no***	**unknown**	**no**	
Foothill Yellow-legged Frog ***Rana boylii***	**no**	**n/a**	**no**	**no**	
Oregon Spotted Frog ***Rana pretiosa***	**no**	**n/a**	**no**	**no**	
Northwestern Pond Turtle ***C. marmorata marmorata***	**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 boylii)

Range: Coastal and Cascade mountains

Habitat: Found in permanent slow flowing steams 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 Houstan 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

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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 no 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			
	First		Repeat	Total
Motorized boating has no 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 no 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			
Zoning the waters to provide for specific uses at specific places	First		Repeat	Total
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			
Zoning the waters to provide for specific uses at specific places	Land-based	Motorized Watercraft	Non-Motorized Watercraft	Total
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			
	Male	Female		Total
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)

	Type of User			
Did motorized sounds interfere with your:	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

Within the past few years, do you think the amount of boating use has been:	Increasing	Not changing very much	Decreasing	Don't know
	----------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)

	Type of User			
Within the past few years, do you think the amount of boating use has been:	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.

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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 Siskyou	2
Mccredie Hot Springs	2
Mt. Fugi	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
29.3 Electric charger on site
4.9 Gas powered charger on your vessel
9.8 Solar charger
17.1 Other (generator, car charge)

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**
(*If agree or strongly agree with above statement*) How did other people's behavior reduce your enjoyment?						

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 no 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
30.0 Motorboats
34.8 Dogs
15.7 Cars/trucks/planes (circle all that apply)
19.3 Loud music
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
Agoseris elata	habitat present	Level A, dry to mesic meadows/open woods	unknown, comprehensive surveys not done
Arabis hastatula	habitat not present		
Arnica viscosa	habitat present	Level A, rocky places, skree	unknown, comprehensive surveys not done
Asplenium septentrionale	habitat not present		
Aster gormanii	habitat not present		
Botrychium minganense	habitat not present		
Botrychium montanum	habitat not present		
Botrychium pumicola	habitat not present		
Bridgeoporus nobillisimus	habitat present	Level A, true fir forest	unknown, comprehensive surveys not done
Calamagrostis breweri	habitat present	Level A, wet/mesic meadows, lake edges	unknown, comprehensive surveys not done
Carex livida	habitat not present		

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

Nephroma occultum	habitat present	Level A, moist forest	unknown, comprehensive surveys not done
Ophioglossum pusillum	habitat not present		
Pannaria rubiginosa	habitat not present		
Pellaea andromedaefolia	habitat not present		
Peltigera neckeri	habitat present	Level A, forest	unknown, comprehensive surveys not done
Peltigera pacifica	habitat not present		
Pilophorus nigricaulis	habitat present	Level A, talus, rock outcrops, large boulders	unknown, comprehensive surveys not done
Polystichum californicum	habitat not present		
Potentilla villosa	habitat not present		
Pseudocyphellaria rainierensis	habitat not present		
Ramalina pollinaria	habitat not present		
Rhizomnium nudum	habitat adjacent	Level A, moist forest	unknown, comprehensive surveys not done
Romanzoffia thompsonii	habitat not present		
Scheuchzeria palustris var. americana	habitat present	Level A, and B Sphagnum bogs/ meadows, pond/lake edges	unknown, comprehensive surveys not done
Schistostega pennata	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
Scirpus subterminalis	habitat present	Level A, wet shoreline edges	unknown, comprehensive surveys not done
Scouleria marginata	habitat present	Level A riparian aquatic	unknown, comprehensive surveys not done
Sisyrinchium sarmentosum	habitat present	Level A, streams, meadow margins near lake	unknown, comprehensive surveys not done

Tetraphis geniculata	habitat adjacent	Level A, moist forest/downed wood	unknown, comprehensive surveys not done
Thorluna disimilis	habitat not present		
Usnea longissima	habitat not present		
Utricularia minor	habitat present	Level A, and B Sphagnum bogs/ meadows, pond/lake edges	unknown, comprehensive surveys not done
Wolffia borealis	habitat present	Level A, and B Sphagnum bogs meadows, pond/lake edges	unknown, comprehensive surveys not done
Wolffia columbiana	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	*Boletus pulcherrimus*	habitat present/presence unknown
	Cortinarius barlowensis	habitat present /presence unknown
	Gomphus kaufmanii	habitat present /presence unknown
	Leucogaster citrinus	habitat present /presence unknown
	Phaecollybia attenuata	habitat present /presence unknown
	Phaeocollybia dissiliens	habitat present /presence unknown
	Phaeocollybia pseudofestiva	habitat present /presence unknown
	Phaeocollybia sipei	habitat present /presence unknown
	Ramaria amyloidea	habitat present **/present**
	Ramaria aurantiisiccescens	habitat present **/present**
	Ramaria gelatiniaurantia	habitat present /presence unknown
	Ramaria largentii	habitat present /presence unknown
Saprophytic on Litter Fungi		
	Cudonia monticola	habitat present /presence unknown
	Sowerbyella rhenana	habitat present /presence unknown
Saprophytic on Wood	*Gyromitra californica*	habitat present /presence unknown
Parasitic Fungi	*Cordyceps capitata*	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	Alternative1 (No Action)	Alternative 2	Alternative 3	Alternative 4 (Proposed Action)	Alternative 5
Arnica viscosa	MIIH	MIIH	MIIH	MIIH	MIIH
Bridgeoporus nobillisimus	MIIH	MIIH	MIIH	MIIH	MIIH
Calamagrostis breweri	MIIH	MIIH	MIIH	MIIH	MIIH
Coptis trifolia	MIIH	MIIH	MIIH	MIIH	MIIH
Dermatocarpon luridum	MIIH	MIIH	MIIH	MIIH	MIIH
Gentiana newberryi	MIIH	MIIH	MIIH	MIIH	MIIH
Hypogymnia duplicata	MIIH	MIIH	MIIH	MIIH	MIIH
Leptigium cyanescens	MIIH	MIIH	MIIH	MIIH	MIIH
Leptogium burnetiae	MIIH	MIIH	MIIH	MIIH	MIIH
Lobaria linita	MIIH	MIIH	MIIH	MIIH	MIIH
Lycopodiella inundata	MIIH	MIIH	MIIH	MIIH	MIIH
Lycopodium complanatum	MIIH	MIIH	MIIH	MIIH	MIIH
Mycorrhizal Fungi	MIIH	MIIH	MIIH	MIIH	MIIH
Nephroma occultum	MIIH	MIIH	MIIH	MIIH	MIIH
Peltigera neckeri	MIIH	MIIH	MIIH	MIIH	MIIH
Peltigera pacifica	MIIH	MIIH	MIIH	MIIH	MIIH

Pilophorus nigricaulis	MIIH	MIIH	MIIH	MIIH	MIIH
Rhizomnium nudum	MIIH	MIIH	MIIH	MIIH	MIIH
Saprophytic on Litter	MIIH	MIIH	MIIH	MIIH	MIIH
Saprophytic on Wood	MIIH	MIIH	MIIH	MIIH	MIIH
Scheuchzeria palustris var. americana	MIIH	MIIH	MIIH	MIIH	MIIH
Schistostega pennata	MIIH	MIIH	MIIH	MIIH	MIIH
Scirpus subterminalis	MIIH	MIIH	MIIH	MIIH	MIIH
Scouleria marginata	MIIH	MIIH	MIIH	MIIH	MIIH
Sisyrinchium sarmentosum	MIIH	MIIH	MIIH	MIIH	MIIH
Tetraphis geniculata	MIIH	MIIH	MIIH	MIIH	MIIH
Utricularia minor	MIIH	MIIH	MIIH	MIIH	MIIH
Wolffia borealis	MIIH	MIIH	MIIH	MIIH	MIIH
Wolffia columbiana	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
Agoseris elata	S	2			MM, DM
Arabis hastatula	D	1		SofC	RO
Arnica viscosa	S	2			RS
Asplenium septentrionale	S	2			RO
Aster gormanii	D	1			RS
Boletus pulcherrimus	D	1			CF
Botrychium minganense	D	2			RZ, CF
Botrychium montanum	D	2			RZ, CF
Botrychium pumicola	S	1	LT		HV
Bridgeoporus nobilissimus	D	1			CF
Calamagrostis breweri	D	2			MM, RZ
Carex livida	S	2			WM
Carex scirpoidea var. stenochlaena	D	2			RO
Castilleja rupicola	D	2			RO
Chaenotheca subroscida	D	3			CF
Cimicifuga elata	D	1	C		CF
Coptis trifolia	S	2			WM, CF
Cordyceps capitata	D	unlisted			CF
Corydalis aqua-gelidae	D	1	C		RZ, CF
Cudonia monticola	D	not listed			CF
Dermatocarpon luridum	S	3			RZ on rock
Eucephalis (Aster) vialis	S	1	LT	SofC	CF
Frasera umpquaensis	D	1	C		MM
Gentiana newberryi	D	2			MM
Gomphus kaufmanii	D	3			CF
Gyromitra californica	D	2			CF
Hypogymnia duplicata	S	3			CF
Iliamna latibracteata	S	2			CF, RZ
Leptogium burnetiae var. hirsutum	S	3			CF
Leptogium cyanescens	D	3			CF
Leucogaster citrinus	D	3			CF
Lewisia columbiana var. *columbiana*	D	2			RS
Lobaria linita	D	2			RO
Lupinus sulphureus var. kincaidii	S	1	LT	LT	MM, DM
Lycopodiella inundata	D	2			WM

Species	Occurrence on WNF	ONHP Status	State Status	Federal Status	Habitat Types
Lycopodium complanatum	D	2			CF
Montia howellii	D	4	C		RZ
Mycenia monticola	D	not listed			CF
Nephroma occultum	D	4			CF
Ophioglossum pusillum	D	2			WM
Pannaria rubiginosa	D	2			CF
Pellaea andromedaefolia	S	2			RO
Peltigera neckeri	D	not listed			CF
Peltigera pacifica	D	not listed			CF
Phaeocollybia attenuata	D	4			CF
P. dissiliens	D	3			CF
P. pseudofestiva	D	3			CF
P. sipei	D	3			CF
Pilophorus nigricaulis	D	2			RO
Polystichum californicum	D	2			RO
Potentilla villosa	D	2			RS, RO
Pseudocyphellaria rainierensis	D	4			CF, RZ
Ramalina pollinaria	D	2			CF, RZ
Ramaria amyloidea	D	2			CF
R. aurantiisiccescens	D	4			CF
R. gelatiniaurantia	D	3			CF
R. largentii	D	3			CF
Rhizomnium nudum	D	2			CF
Romanzoffia thompsonii	D	1			RS
Scheuchzeria palustris var. americana	D	2			WM
Schistostega pennata	D	2			CF
Scirpus subterminalis	D	2			SW
Scouleria marginata	S	3			RZ
Sisyrinchium sarmentosum	S	1	C	S of C	MM, DM
Sowerbyella rhenana	D	3			CF
Tetraphis geniculata	S	2			CF
Thorluna disimilis	D	2			CF
Usnea longissima	D	3			CF, RZ
Utricularia minor	D	2			SW
Wolffia borealis	S	2			SW
Wolffia columbiana	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
WM = Wet meadows
DM = Dry meadows
RZ = Riparian zones, floodplains
CF = Coniferous forest
RS = Rocky slopes, scree
RO = Rock outcrops, cliffs
DW = Dry open woods
HV = High volcanic areas
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

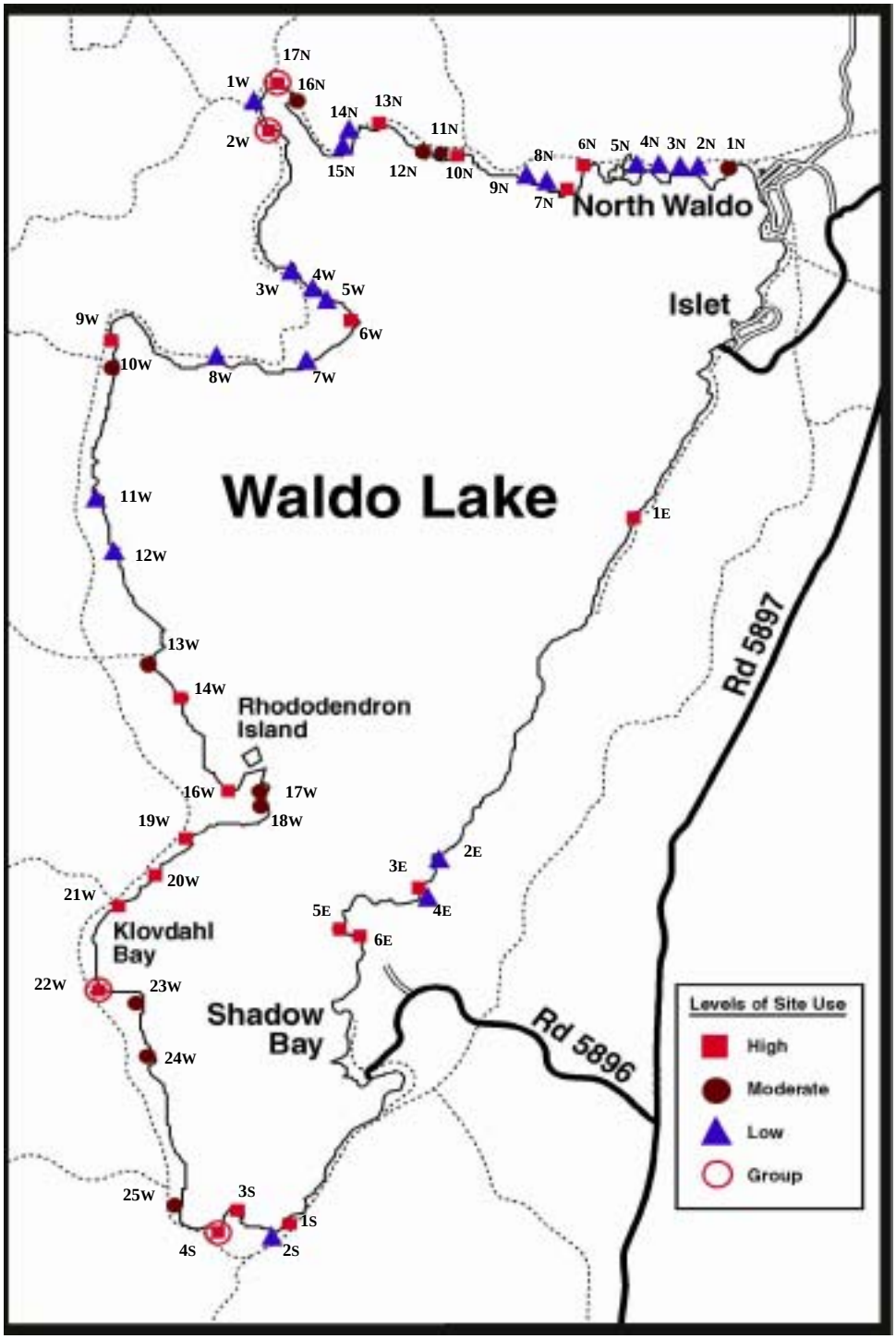

Table J1: Dispersed Site types around Waldo Lake based on distance from campgrounds

Site Types	Number of Sites	Site Numbers
w/in ¼ mile of Camprounds	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