



# Visitors' Experiences and Preferences at Lost Lake in Clatsop State Forest, Oregon

## Final Report

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Although several people assisted with this project, any errors, omissions, or typographical inconsistencies in this final report are the sole responsibility of the author. Opinions, conclusions, and recommendations in this report represent views of the author and do not necessarily represent views of Oregon Department of Forestry.

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## **EXECUTIVE SUMMARY**

### **Objectives**

Lost Lake is a 15-acre lake south of Highway 26 and Elsie in Clatsop State Forest that attracts over 4,000 recreationists annually. Visitation is increasing at Lost Lake and Oregon Department of Forestry recently designed plans for developing primitive campsite facilities and expanding the day use area to ensure that the lake accommodates use without compromising environmental conditions and / or visitor experiences. Before proceeding with development, however, it was necessary to understand visitors' preferences and experiences at Lost Lake, and their attitudes toward proposed development plans. Objectives of this project were to describe visitors':

- overall satisfaction with their visit and satisfaction with current on-site conditions;
- perceptions of crowding and reported encounters with other visitors;
- maximum acceptance limits for development and social and environmental impacts;
- reactions to and acceptance of possible management strategies;
- beliefs and attitudes toward the recently proposed development plans; and
- trip characteristics, past visitation, and socio-demographic characteristics.

This report addresses these objectives by summarizing visitor responses to surveys at Lost Lake.

### **Methods**

Data were obtained from surveys administered on-site to visitors at Lost Lake from July to October, 2006. Low weekday visitation and forestry operations on the access roads limited visitation during sampling. As a result, only 74 surveys were completed. Given this sample size, data only allow generalizations about the population of Lost Lake visitors at the 95% confidence level with a margin of error of  $\pm 11\%$ ; results may not represent all Lost Lake visitors.

### **Results Summary**

- Most respondents participated in fishing, especially from the shore; had previously visited Lost Lake at least once before; were visiting in groups of at least 2 people; would return to Lost Lake in the future; and were not staying or camping at Henry Rierson Spruce Run Campground during their trip.
- Respondents tended to be males between 30 and 39 years old (average = 39 years) who lived in Oregon, especially in cities and towns in Washington, Clatsop, and Multnomah Counties such as Portland, Astoria, Forest Grove, Hillsboro, Seaside, and Beaverton.
- Overall satisfaction of respondents was high and they were satisfied with most aspects of their experience and conditions at the lake, especially paying no fee, the opportunity to escape crowds and experience solitude, the ability to recreate in an unspoiled natural environment, and hearing no noise from vehicles and visitors.
- Respondents were least satisfied with parking availability for vehicles and boat trailers, litter, campfire scars, information signs about regulations, and road access to the lake.

- The majority of respondents rated almost all aspects of their experience and conditions at the lake as important, especially opportunities to escape crowds and experience solitude, encounter no litter, recreate in a natural environment, and pay no fee. Respondents rated boat trailer parking, opportunities to hear no noise from dogs, and presence of rangers / personnel as the least important characteristics at Lost Lake.
- On average, respondents rated all aspects of their experience and conditions as important and were satisfied with these aspects, suggesting that managers should “keep up the good work” in their current management of Lost Lake.
- During their visit, respondents encountered an average of approximately 12 other visitors in total at Lost Lake (approximately 3 visitors in parking area, 4 on the lake, and 6 on shore), 2 boats on the lake, and 5 vehicles in the parking area.
- Visitor use levels are not a current problem at all locations at Lost Lake (i.e., shore, parking area, on lake) because almost all respondents encountered fewer people than the maximum that they would accept encountering at each location.
- Boating use levels are not a current problem at Lost Lake because almost all respondents encountered fewer than the maximum that they would accept encountering.
- Crowding is not a current problem at all locations at Lost Lake, but a large proportion of respondents reported that the vehicle parking area was crowded.
- Campfire conditions are a current problem at Lost Lake because the largest proportion of visitors encountered campfires without rings (i.e., fire scars), which were rated as unacceptable. Rock fire rings, metal fire pits, and no campfires were acceptable.
- Designated campsites with bare ground between 20 ft.<sup>2</sup> and 40 ft.<sup>2</sup> in size with or without metal fire pits and picnic tables were rated as acceptable for Lost Lake.
- Respondents were most supportive of providing garbage containers, prohibiting gas powered motors, providing informational signage, improving education about appropriate visitor behavior, providing campfire pits, improving road access, increasing the amount of vehicle parking, and providing primitive campsites at Lost Lake.
- Respondents were divided in their support for requiring dogs be kept on leash, charging fees to camp at the lake, increasing the number of boat launch / landing areas, providing sheds with campfire wood for sale, providing cooking grills, and restricting the number of visitors allowed at the lake.
- There was strong opposition toward prohibiting overnight camping, charging day use fees, and prohibiting campfires at the lake.
- Most respondents supported all of the currently proposed development plans (e.g., 8 primitive campsites, day use area, new parking area and access road, vault toilets) except construction of sheds with campfire wood for sale.
- The majority of respondents agreed that the proposed development plans would provide more recreation opportunities at the lake, allow the area to accommodate more visitors, and improve recreation conditions at Lost Lake. Respondents also believed, however,

that the proposed development plans would not protect the environment against visitor impacts or improve environmental conditions at Lost Lake.

- Most respondents agreed that the proposed development plans make sense, are good, will be beneficial, and should be done as soon as possible.

### **Recommendations**

- Monitor conditions to ensure that visitor satisfaction does not decline in the future.
- Consider increasing the amount of parking, providing bear proof garbage containers, restoring areas where campfire scars are located, installing designated fire pits, providing informational and educational signage, and improving road access to Lost Lake.
- Monitor visitor use levels to ensure that they do not frequently exceed approximately 13 visitors in the parking area, 15 visitors on the lake, 18 visitors on shore, and 27 visitors in total at Lost Lake at the same time.
- Monitor number of boats / watercraft to ensure that it does not exceed approximately 6 boats on half of Lost Lake (approximately 13 boats for entire lake) at the same time.
- Monitor parking to ensure that no more than approximately 10 vehicles are encountered at the same time, or consider increasing parking to disperse vehicle crowding.
- Restore areas where campfire scars are located. If campfires will be allowed at the lake, rock fire rings or metal fire pits should be installed and appropriate information (e.g., signs, brochures) should be provided to encourage visitors to use these facilities.
- Providing some facilities and services that respondents supported (e.g., garbage containers, informational signage, campfire pits, primitive campsites) may increase visitor satisfaction and possibly minimize environmental impacts in the future.
- Campsites should be 20 – 40 ft.<sup>2</sup> in size and with or without fire pits and picnic tables.
- If any strategies for which respondents were divided (e.g., dogs on leash, fees to camp, more boat launches, sheds with firewood, cooking grills, restrict use) are implemented: (a) be aware that many visitors could be unhappy and may not return, and (b) provide informational materials (e.g., brochures, signs) discussing the rationale for these actions.
- Unless deemed absolutely necessary, camping and campfires should not be prohibited and day use fees should not be charged at the lake.
- Although least supported by visitors, sheds with campfire wood should be provided if campsites and campfire pits are constructed. This should minimize visitors damaging and removing vegetation around the lake to use for campfires.
- Given that respondents believed that the proposed development changes would improve recreation conditions but not environmental conditions at Lost Lake, education and interpretation materials (e.g., signs, brochures, personnel, websites) should discuss the rationale for new facilities and services at Lost Lake. Information should focus on how site hardening strategies may accommodate increasing use and reduce negative impacts to environmental conditions and visitor experiences.

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## **INTRODUCTION AND OBJECTIVES**

Lost Lake is a 15-acre natural forest lake nestled in the mountains south of Highway 26 and Elsie in Clatsop State Forest. This lake can be accessed from Lost Lake Road near the entrance to Henry Rierson Spruce Run Campground and from Quartz Creek Forest Road off Highway 26 at milepost 27. Lost Lake was recently acquired by Oregon Department of Forestry (ODF) in a land exchange and has become a popular recreation area for over 4,000 annual visitors who participate in activities such as angling, boating, and picnicking at the lake. Developed facilities at the lake are limited to a primitive boat launch, trail around the lake, information kiosk, gravel parking area, and portable toilets. Lost Lake is suited to non-motorized boats / watercraft and is stocked with fish by Oregon Department of Fish and Wildlife. There are no fees to visit the lake.

Given that annual use is increasing at Lost Lake, ODF recently designed plans for developing primitive campsite facilities (e.g., tent areas with fire pits, wood sheds, vault toilets) and expanding the day use area (e.g., widen road and parking facilities) to ensure that the lake can continue to accommodate increasing use levels without deteriorating biophysical conditions and / or visitors' experiences. Before proceeding with this development, however, it was necessary to understand current visitors' preferences and experiences at Lost Lake, as well as their attitudes toward proposed site development plans. This project addressed these research needs. Primary objectives of this project were to describe current visitors':

- overall satisfaction with their visit and satisfaction with current on-site conditions (e.g., parking, toilets, campfire scars, litter, trail conditions, noise, informational signage);
- perceptions of crowding and reported encounters with other visitors at various locations (e.g., parking area, on the lake, on the shore);
- maximum acceptance limits for development and social and biophysical impacts (e.g., encountering other visitors, campsite size and structure, fire ring size and structure);
- reactions to and acceptance of possible management strategies;
- beliefs and attitudes toward the recently proposed site development plans; and
- trip characteristics, past visitation, and socio-demographic characteristics (e.g., activity participation, prior visitation, group size, age, residence).

This information can be used to help inform:

- recommendations for management strategies related to recreation use and social and biophysical impacts,
- decision-making regarding implementation of proposed site development plans, and
- future decision-making and management at Lost Lake.

This project report summarizes results from on-site surveys completed by individuals who visited Lost Lake in 2006.

## **METHODS**

Data were obtained from an 8-page survey (see Appendix A) administered on-site to visitors at Lost Lake from July to October, 2006. Initially, effort was made to conduct surveys on every day of the week. Given that visitation was minimal (i.e., fewer than 5 visitors per day) on Mondays through Thursdays during the first few weeks of data collection, however, it was decided to administer surveys primarily on weekends (i.e., Fridays through Sundays). Low weekday visitation coupled with forestry operations (e.g., logging trucks) and grading work on the gravel access roads limited visitation during the sampling period. As a result, only 74 surveys were completed. Given this relatively small sample size, data only allow generalizations about the population of Lost Lake visitors at approximately the 95% confidence level with a margin of error of  $\pm 11\%$ ; results may not be representative of all Lost Lake visitors.

## **RESULTS**

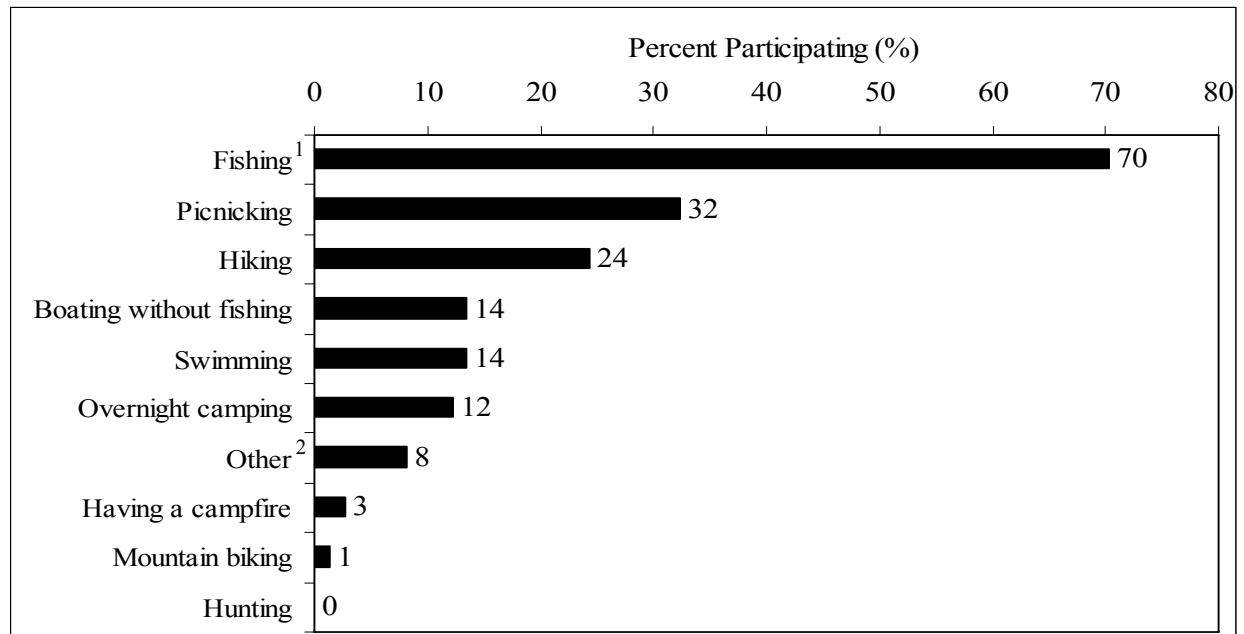
The following results are presented in several major sections: (a) visitors' activities and trip characteristics; (b) satisfaction with current conditions and experiences; (c) importance of current conditions and experiences; (d) encounters and perceived crowding; (e) maximum acceptability of use levels, campfire conditions, and campsite conditions; (f) support and opposition toward potential management strategies; (g) support and opposition toward proposed development plans; and (h) socio-demographic characteristics. To highlight findings, data were recoded into major response categories (e.g., agree, disagree; support, oppose) for purposes of this project report; uncollapsed frequency distributions (e.g., strongly, slightly agree; very, somewhat unacceptable) are provided in Appendix A.

### **Activities and Trip Characteristics**

The largest proportion (70%) of survey respondents spent their time fishing at Lost Lake (Figure 1). In total, 76% of these anglers fished from shore, 15% fished from a boat / watercraft, and 9% fished from both the shore and a boat. Other popular activities at the lake included picnicking (32%) and hiking (24%). Less than 15% of respondents participated in swimming, boating (without fishing), and camping at Lost Lake. Few respondents (less than 8%) participated in other activities at the lake such as mountain biking, having a campfire, and hunting.

In total, 66% of respondents had previously visited Lost Lake (Figure 2). The remaining 34% of respondents were visiting the lake for the first time when they completed the survey. Figure 3 shows that the largest proportion (30%) of repeat visitors had visited Lost Lake only once before (i.e., 1 previous trip); 23% had visited 2 – 5 times before and 21% had made 6 – 10 previous trips to Lost Lake. Fewer respondents had visited 21 – 30 times (7%) or more than 30 times (7%) before. On average (i.e., mean), previous visitors made 11 trips to Lost Lake and the median (i.e., middle point where 50% of responses fall above and below) number of trips was 5.

Figure 1. Visitor participation in each activity at Lost Lake



<sup>1</sup> 76% of anglers fish from shore, 15% from boat / watercraft, and 9% from both shore and boat / watercraft.

<sup>2</sup> Other: enjoying scenery (3%), relaxing (3%), exploring (1%), fly tying (1%).

Figure 2. Visitors who had been to Lost Lake before their current trip

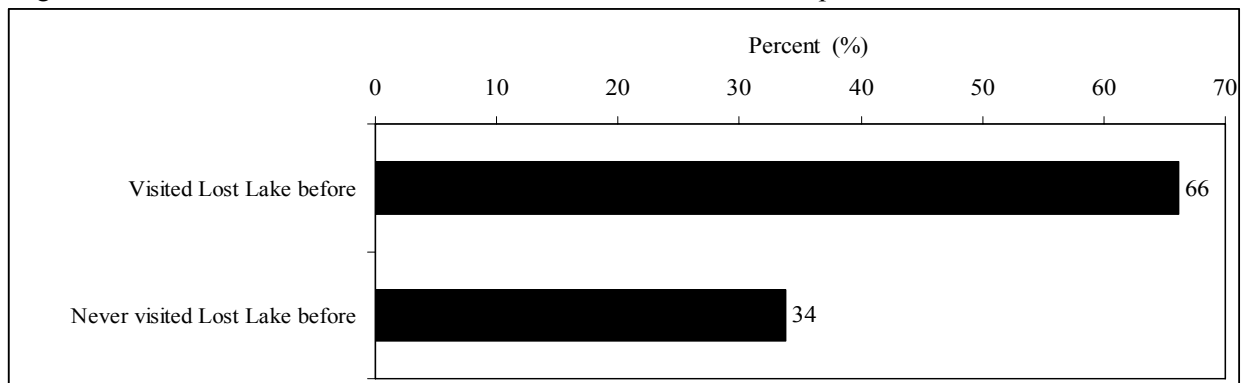
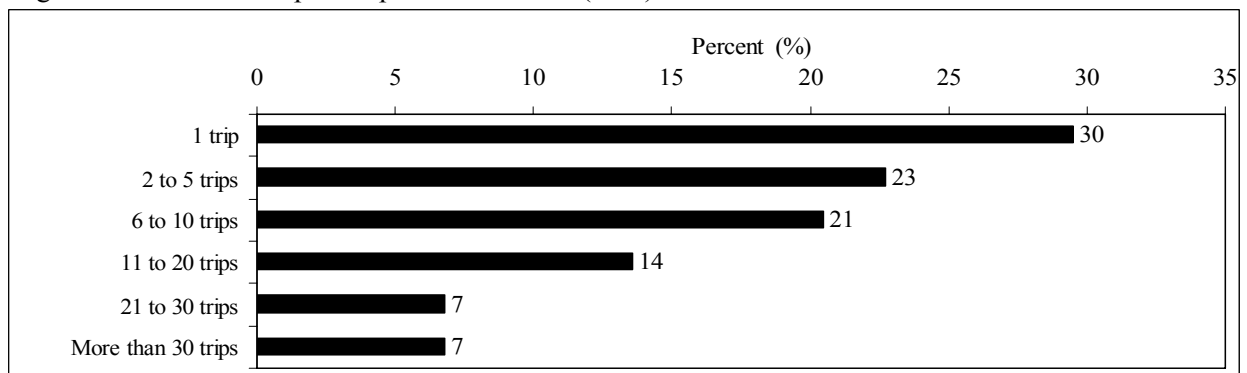
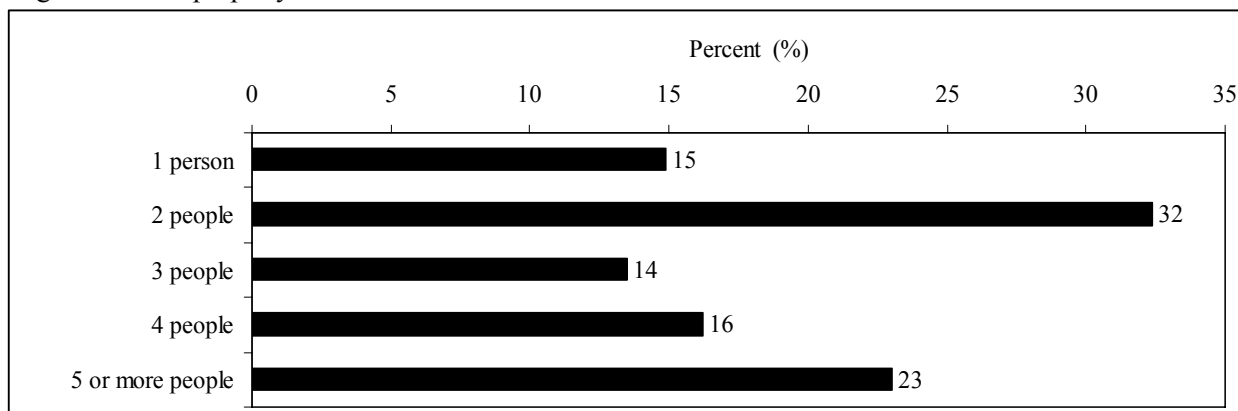


Figure 3. Number of trips that previous visitors (66%) took to Lost Lake<sup>1</sup>



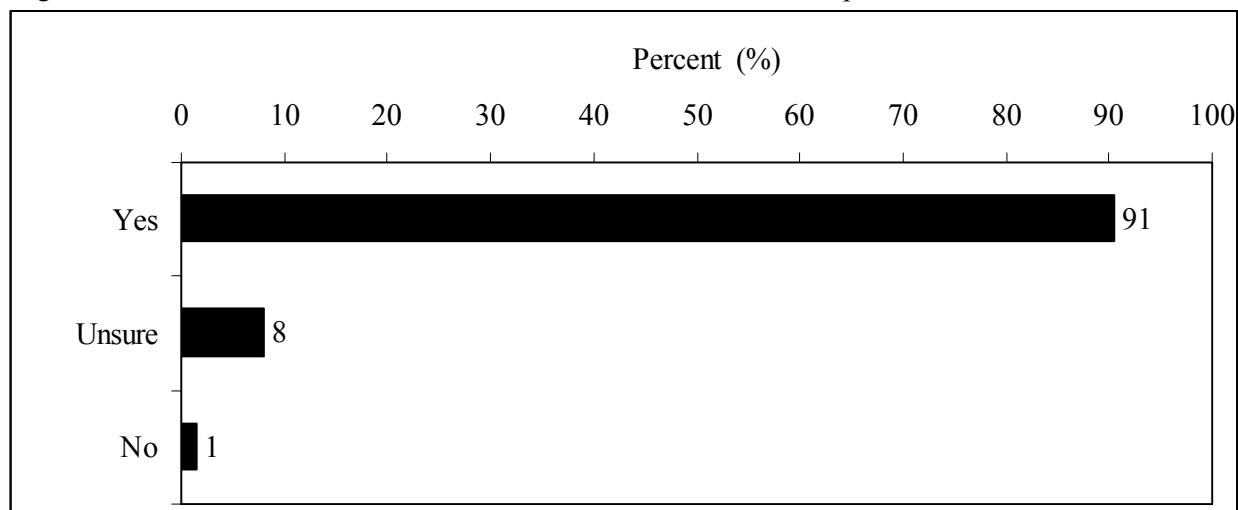
<sup>1</sup> Average (mean) = 11 trips, standard deviation = 14 trips, median = 5 trips, mode = 1 trip.

Figure 4. Group / party size of Lost Lake visitors <sup>1</sup>

<sup>1</sup> Average (mean) = 3 people, standard deviation = 2 people, median = 3 people, mode = 2 people.

Respondents were asked to indicate how many people, including themselves, were accompanying them on their visit to Lost Lake. The largest proportion of groups (32%) consisted of 2 people, 14% were comprised of 3 people, and 16% of groups consisted of 4 individuals (Figure 4). A large number of groups (23%) consisted of 5 or more people, whereas 15% of respondents visited on their own. The average group size was approximately 3 people.

Figure 5. Visitors' intentions to come back to Lost Lake on another trip in the future



Almost all respondents (91%) indicated that they would come back to Lost Lake on another trip in the future (Figure 5). Approximately 8% of respondents were unsure about whether they would return to the lake. Only 1% of respondents reported that they would not come back to Lost Lake on another trip in the future.

Figure 6. Lost Lake visitors who stayed at Henry Rierson Spruce Run Campground

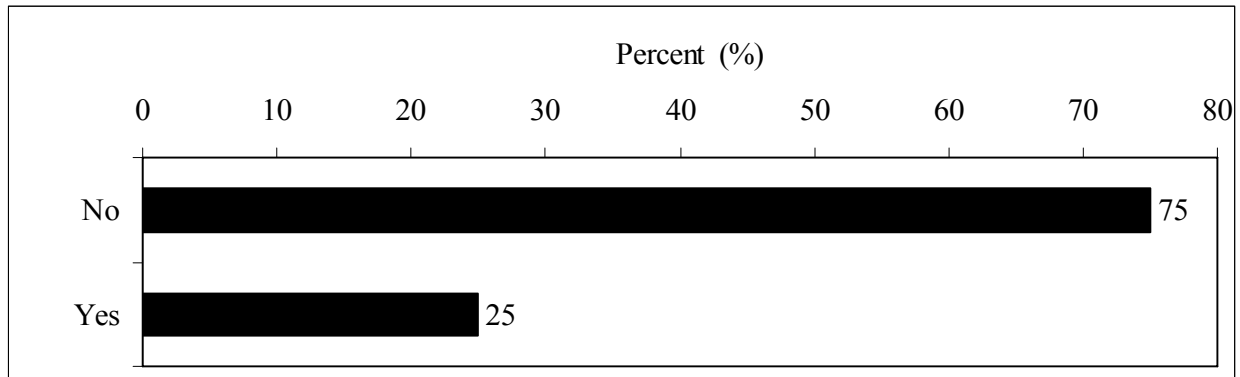


Figure 6 shows that three-quarters (i.e., 75%) of visitors surveyed at Lost Lake were not staying or camping at Henry Rierson Spruce Run Campground on their current trip. The remaining 25% of respondents were staying / camping at this campground.

**Section Summary:** Taken together, most visitors surveyed at Lost Lake:

- were participating in fishing, especially from shore;
- had previously visited Lost Lake at least once before;
- were visiting the lake in groups of at least 2 people;
- indicated that they would come back to Lost Lake on another trip in the future; and
- were not staying or camping at Henry Rierson Spruce Run Campground during their trip.

## Satisfaction with Conditions and Experiences

In the survey, Lost Lake visitors were asked “overall, how satisfied were you with your visit to Lost Lake today?” Overall satisfaction of respondents was high, as 90% were satisfied with their visit (Figure 7). Few respondents (3%) were dissatisfied with their visit.

Figure 7. Overall respondent satisfaction with their visit to Lost Lake

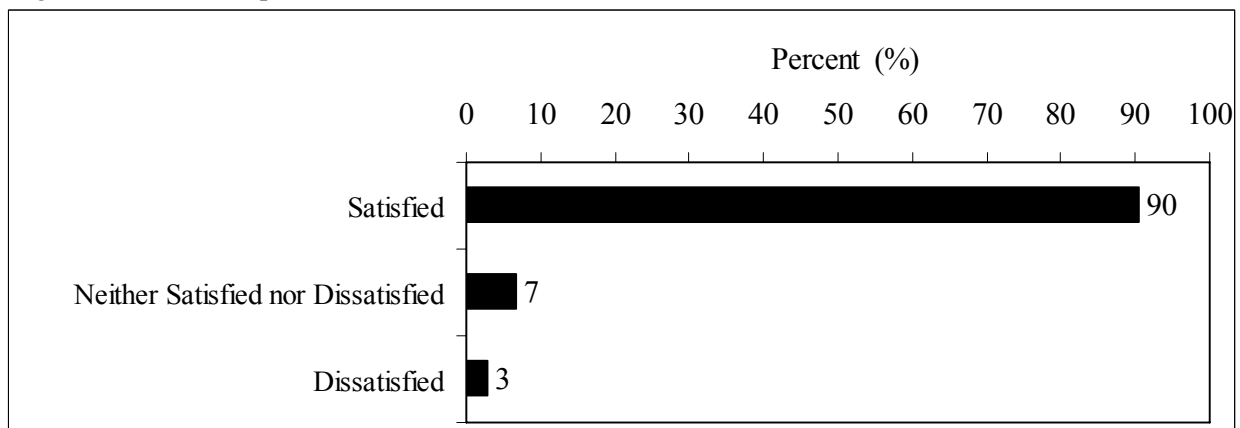
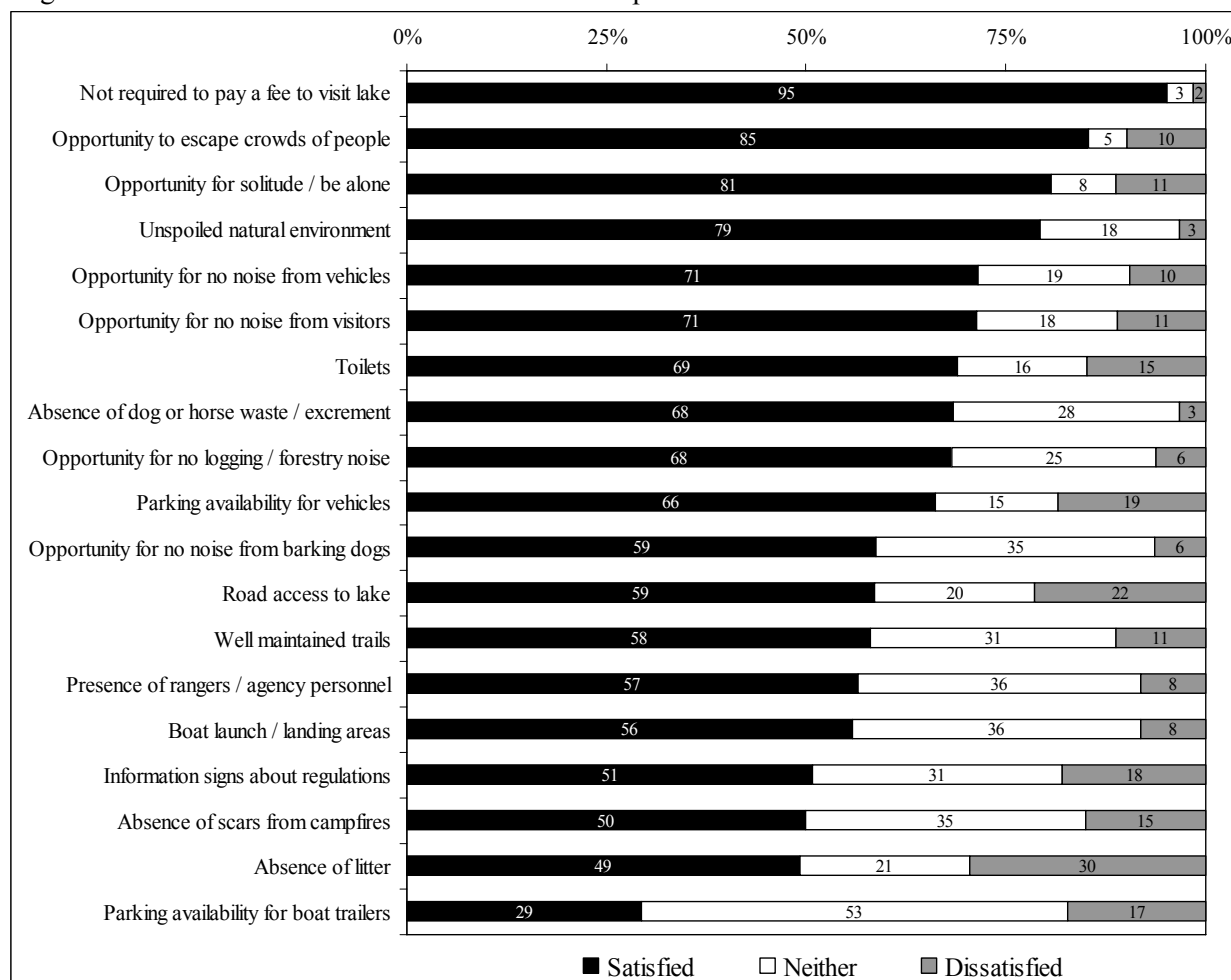


Figure 8. Visitor satisfaction with conditions and experiences at Lost Lake



Although almost all respondents were satisfied with their overall visit to Lost Lake (Figure 7), this does not indicate that visitors were satisfied with every aspect of their experience or conditions at the lake. In fact, uniformly high levels of overall visitor satisfaction have been common in recreation research, thus are of only limited usefulness for managers.

Figure 8 shows that the largest proportion (95%) of visitors surveyed at Lost Lake were satisfied with not having to pay a fee to visit the lake. Many respondents were also satisfied with opportunities that Lost Lake provides for escaping crowds of people (85%), experiencing solitude (81%), recreating in an unspoiled natural environment (79%), and not hearing noise caused by vehicles or other visitors (71%). The majority of respondents were also satisfied with the toilets (69%), absence of dog and horse waste / excrement (68%), and opportunities for hearing no noise from forestry operations (68%) at the lake.

Although the majority of respondents were satisfied with most aspects of their experience and conditions at Lost Lake, they were least satisfied with parking availability for boat trailers (29% satisfied), absence of litter (49%), and absence of scars from campfires (50%). In total, 30% of respondents were dissatisfied with litter at the lake, 22% were dissatisfied with road access to the lake, and 19% were dissatisfied with parking availability for vehicles at the lake.

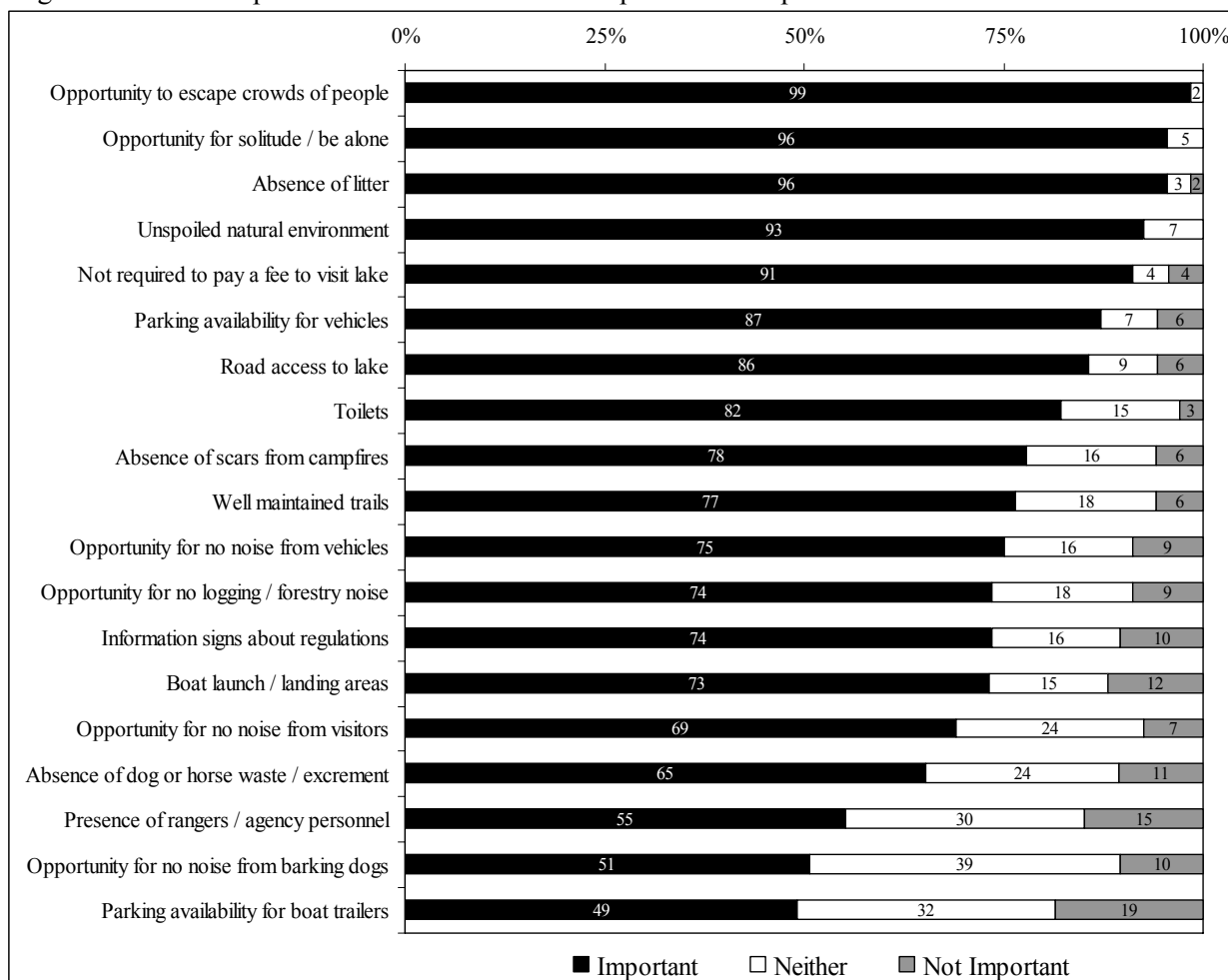
**Section Summary:** Taken together, most visitors surveyed at Lost Lake were:

- satisfied with their overall visit to Lost Lake;
- satisfied with most aspects of their experience and conditions at the lake, especially paying no fee, opportunity to escape crowds and experience solitude, ability to recreate in an unspoiled environment, and hearing no noise from vehicles and visitors; and
- least satisfied with parking availability for boat trailers and vehicles, litter, campfire scars, information signs about regulations / guidelines, and road access to the lake.

### Importance of Conditions and Experiences

Research has demonstrated that although recreationists may be satisfied with a particular aspect of the setting or their experience, it may not be important to them that the characteristic is actually provided. For example, visitors may be satisfied with trail signage, but feel that signs are not an important characteristic of good recreation settings or experiences.

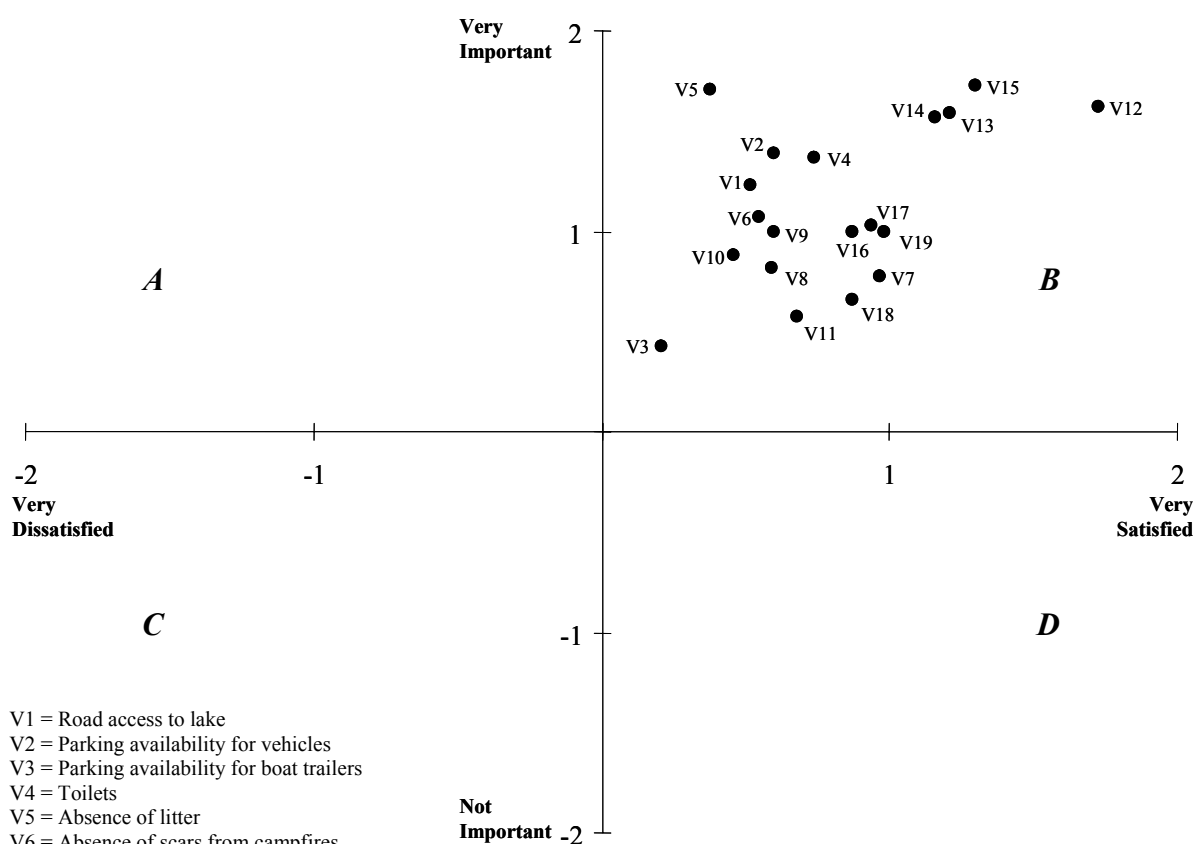
Figure 9. Visitor importance that conditions and experiences are provided at Lost Lake



The majority of visitors surveyed at Lost Lake believed that it was important to provide almost all of the characteristics listed in Figure 9 at the lake. Opportunities to escape crowds and experience solitude, encounter no litter, recreate in an unspoiled environment, and pay no fees were rated as important characteristics by over 90% of respondents (Figure 9). Parking, road access, toilets, maintained trails, informational signage, boat launch areas, no campfire scars, and no noise from vehicles and forestry operations were also important for over 70% of respondents.

Least important characteristics were available parking for boat trailers (49% important, 19% unimportant), opportunities to hear no barking dogs (51% important, 10% unimportant), and presence of rangers / personnel (55% important, 15% unimportant) at the lake (Figure 9).

Figure 10. Average (mean) importance and satisfaction with conditions and experiences



- V1 = Road access to lake
- V2 = Parking availability for vehicles
- V3 = Parking availability for boat trailers
- V4 = Toilets
- V5 = Absence of litter
- V6 = Absence of scars from campfires
- V7 = Absence of dog or horse waste / excrement
- V8 = Boat launch / landing areas
- V9 = Well maintained trails
- V10 = Information signs about regulations
- V11 = Presence of rangers / agency personnel
- V12 = Not required to pay a fee to visit lake
- V13 = Unspoiled natural environment
- V14 = Opportunity for solitude / be alone
- V15 = Opportunity to escape crowds of people
- V16 = Opportunity for no noise from visitors
- V17 = Opportunity for no noise from vehicles
- V18 = Opportunity for no noise from barking dogs
- V19 = Opportunity for no logging / forestry noise



Given that recreationists can be satisfied with a characteristic of the setting or experience, but feel that it is not important that the characteristic is actually provided, it is important to understand relationships between importance and performance (i.e., satisfaction) measures. Management can be informed by combining these two measures, which allows for creation of a matrix that offers a visual understanding of relationships between them (Figure 10). Importance is represented on the vertical axis (i.e., y-axis) with average ratings (i.e., means) from -2 “not important” to +2 “very important.” Average performance ratings (i.e., satisfaction) are measured on the horizontal axis (i.e., x-axis) ranging from -2 “very dissatisfied” to +2 “very satisfied.” When combined, these importance and performance axes intersect and produce a matrix of 4 quadrants, which are interpreted as “concentrate here” (high importance and low satisfaction; quadrant A), “keep up the good work” (high importance and satisfaction; quadrant B), “low priority” (low importance and satisfaction; quadrant C), and “possible overkill” (low importance and high satisfaction; quadrant D). This matrix provides managers with an easily understandable picture of the status of their services, facilities, and conditions as perceived by visitors.

Figure 10 shows that, on average, respondents rated all characteristics (i.e., experiences, conditions) as important at Lost Lake. Respondents were also satisfied with all of the characteristics at the lake. These findings suggest that managers of Lost Lake should “keep up the good work” in their current management of all characteristics at the lake. Closer inspection of results displayed in Figure 10, however, suggests that some characteristics could become problematic in the future. Parking availability for boat trailers, absence of litter and campfire scars, road access, and information signs about regulations / guidelines were important to respondents, but respondents were least satisfied with these characteristics. It is recommended that these issues be monitored to ensure that satisfaction does not decline in the future.

**Section Summary:** Taken together, findings showed that:

- the majority of visitors surveyed at Lost Lake rated almost all aspects of their experience and conditions at the lake as important, especially opportunities to escape crowds and experience solitude, encounter no litter, recreate in a natural environment, and pay no fee;
- the majority of respondents rated boat trailer parking, opportunities to hear no noise from dogs, and presence of rangers / personnel as least important characteristics at Lost Lake;
- visitors surveyed at Lost Lake rated, on average, all aspects of their experience and conditions as important and were satisfied with these aspects, suggesting that managers of Lost Lake should “keep up the good work” in their management of the lake; and
- to ensure that satisfaction does not decline in the future, these conditions should be monitored, especially parking availability for boat trailers, absence of litter and campfire scars, road access, and information signs about regulations and guidelines.

## **Encounters, Maximum Acceptability, and Perceived Crowding**

The concepts of reported encounters, perceived crowding, and norms (i.e., maximum acceptability) have received considerable attention in the recreation literature. *Reported encounters* describe a subjective count of the number of other people that an individual

remembers observing in a setting. *Perceived crowding* refers to a subjective and negative evaluation that this reported number of encounters or people observed in an area is too many. Understanding visitors' reported encounters and perceived crowding, however, may not reveal maximum acceptable or tolerable use levels or an understanding of how use should be managed and monitored. *Norms* (i.e., maximum acceptability) offer a theoretical and applied basis to help address these issues. Norms are standards that individuals use for evaluating activities, environments, or management strategies as good or bad, better or worse; they help to clarify what people believe conditions or behavior *should be*. Research suggests that when visitors perceived an area to be crowded, they likely encountered more than their maximum acceptance (i.e., norm) of conditions and impacts (e.g., use levels) for the setting.

### ***Reported Encounters***

Table 1 shows that the largest proportion of visitors surveyed at Lost Lake encountered 5 to 9 vehicles in the parking area (38%) and other people on shore (31%), 1 or 2 boats on the lake (42%), and no other visitors in the parking area and on the lake (37% and 31%, respectively). On average, respondents encountered approximately 5 vehicles in the parking area, 2 boats on the lake, 3 other visitors in the parking area, 4 visitors on the lake, and 6 other visitors on shore during their visit. In total, respondents encountered an average of 12 other people at Lost Lake.

Table 1. Reported encounters with vehicles, boats, and other visitors at various sites

Visitors' reported encounters with ...	Reported encounters <sup>1</sup>						Average (mean)	Standard deviation	Median	Mode
	0	1 – 2	3 – 4	5 – 9	10 – 19	20+				
Vehicles in parking area	7	23	23	38	7	2	5.0 vehicles	4.6 vehicles	4 vehicles	3, 7 vehicles
Boats / watercraft on lake	28	42	17	12	0	2	2.2 boats	3.1 boats	1 boat	1 boat
Visitors in total at lake	7	7	17	25	27	18	11.6 visitors	12.6 visitors	8 visitors	15 visitors
Visitors in parking area	37	20	23	15	5	0	2.8 visitors	3.4 visitors	2 visitors	0 visitors
Visitors on lake	31	29	19	9	12	2	3.5 visitors	5.5 visitors	2 visitors	0 visitors
Visitors on shore	29	10	10	31	14	7	5.5 visitors	6.4 visitors	5 visitors	0 visitors

<sup>1</sup> Cell entries are percentages (%).

### ***Maximum Acceptability for Encountering Other Visitors***

Respondents were asked to report the maximum number of other visitors that they would accept encountering / seeing (i.e., their norm) at various Lost Lake locations. Respondents were presented with a list of numbers ranging from 0 to 100+ other visitors (see Appendix A). Table 2 shows that the largest percentage of respondents would accept encountering a maximum of 20 to 29 other visitors on the lake (32%) and 10 to 19 other visitors in the parking area (51%) and

on shore (48%). In total, 34% of respondents would accept encountering a maximum of 10 to 19 other visitors at Lost Lake during their trip, 25% would accept 20 to 29 other visitors, and 37% would accept more than 30 other visitors. On average, respondents would accept encountering a maximum of approximately 13 other visitors in the parking area, 15 people on the lake, and 18 other visitors on shore. On average, respondents would accept encountering a maximum of approximately 27 other visitors in total at Lost Lake during their visit.

Table 2. Maximum number of other visitors that respondents would accept encountering

	Maximum number of other visitors acceptable <sup>1</sup>						Average (mean)	Standard deviation	Median	Mode
	0 – 4	5 – 9	10 – 19	20 – 29	30 – 49	50+				
In parking area	9	27	51	9	0	4	13.1 visitors	15.2 visitors	10 visitors	10 visitors
On lake	17	19	28	32	4	2	15.0 visitors	14.4 visitors	10 visitors	20 visitors
On shore	7	6	48	26	9	4	18.2 visitors	15.8 visitors	15 visitors	10 visitors
In total at lake	4	0	34	25	21	16	27.4 visitors	17.9 visitors	25 visitors	15 visitors

<sup>1</sup> Cell entries are percentages (%).

### ***Maximum Acceptability for Encountering Boats, Vehicles, Campfires, and Campsite Conditions***

Respondents were also asked to report the maximum number of boats / watercraft and vehicles that they would accept seeing / encountering (i.e., their norm) at Lost Lake. Visitors were presented with a list of numbers ranging from 0 boats (or vehicles) to 50+ boats (or vehicles) (see Appendix A). Table 3 shows that the largest proportion of respondents would accept encountering a maximum of 5 or 6 boats / watercraft on Lost Lake (27%) and 10 to 19 vehicles in the parking area at the lake (45%). On average, respondents would accept encountering a maximum of approximately 8 boats and 10 vehicles at Lost Lake during their visit.

Table 3. Maximum number of boats and vehicles respondents would accept encountering

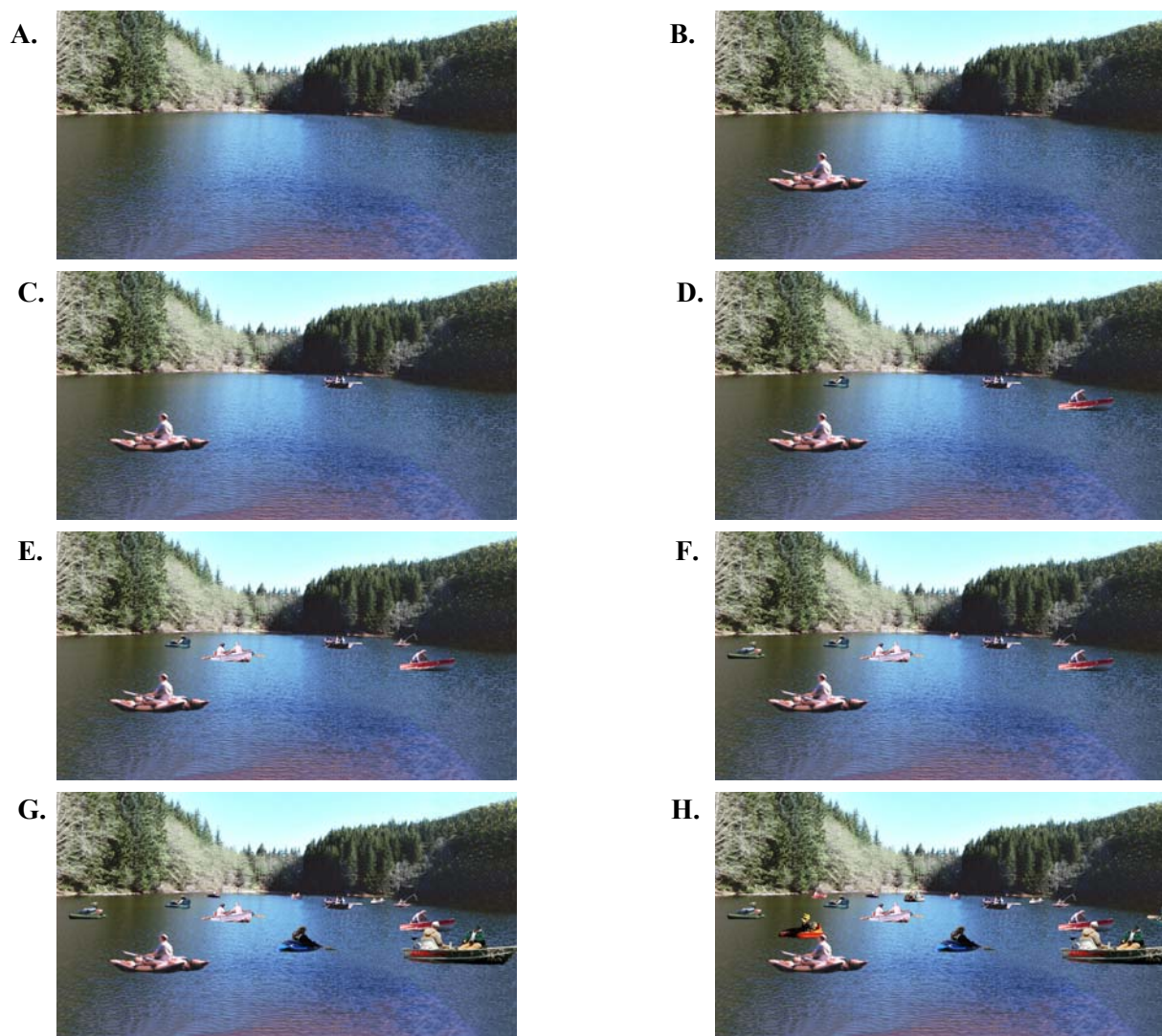
	Maximum number acceptable <sup>1</sup>						Average (mean)	Standard deviation	Median	Mode
	0 – 2	3 – 4	5 – 6	7 – 9	10 – 19	20+				
Boats / watercraft on lake	5	21	27	14	23	9	8.2 boats	5.3 boats	6 boats	4, 5 boats
Vehicles in parking area	0	13	14	21	45	7	9.6 vehicles	4.6 vehicles	10 vehicles	10 vehicles

<sup>1</sup> Cell entries are percentages (%).

Although substantial research has asked recreationists to report their maximum acceptable or tolerable number of encounters with other visitors (i.e., their norm) by simply circling a number

from a list of numbers on a survey, as done here (e.g., 0 to 100+ other visitors), recent studies have demonstrated that it may be unrealistic to expect respondents to accurately ascertain from these written descriptions or lists what would be acceptable or unacceptable. For example, it may be difficult for respondents to visualize what 45 other boats on Lost Lake would look like.

Figure 11. Photographs for measuring maximum acceptance of boats on Lost Lake



Therefore, researchers have started using image capture technology (ICT) to measure visitors' acceptance of conditions such as encounters and use levels. ICT involves using software to manipulate and create visuals. Visuals provide a realistic and cognitively easy assessment of impacts and conditions, as they allow respondents to see what conditions would be like. Respondents rate their acceptance of several photographs depicting impacts and conditions (e.g., use levels) varied from low to high. These average (i.e., mean) acceptability ratings can then be plotted on an *impact acceptability curve* to provide a mechanism for devising *standards of quality*, or thresholds at which conditions (e.g., use levels) reach unacceptable levels. An impact acceptability curve represents amount of change to conditions increasing from left to right along

the horizontal axis (Figure 14). The vertical axis represents evaluative responses with the most positive evaluation at the top of the axis, the most negative on the bottom, and a neutral category in between. Most studies have used acceptability as the evaluative response. Impact acceptability curves can be analyzed for various characteristics including the *minimum acceptable condition*, which is the point where the curve crosses the neutral line and conditions become, on average, unacceptable. This point often represents the standard of quality or norm.

Figure 12. Photographs for measuring maximum acceptance of campfire conditions

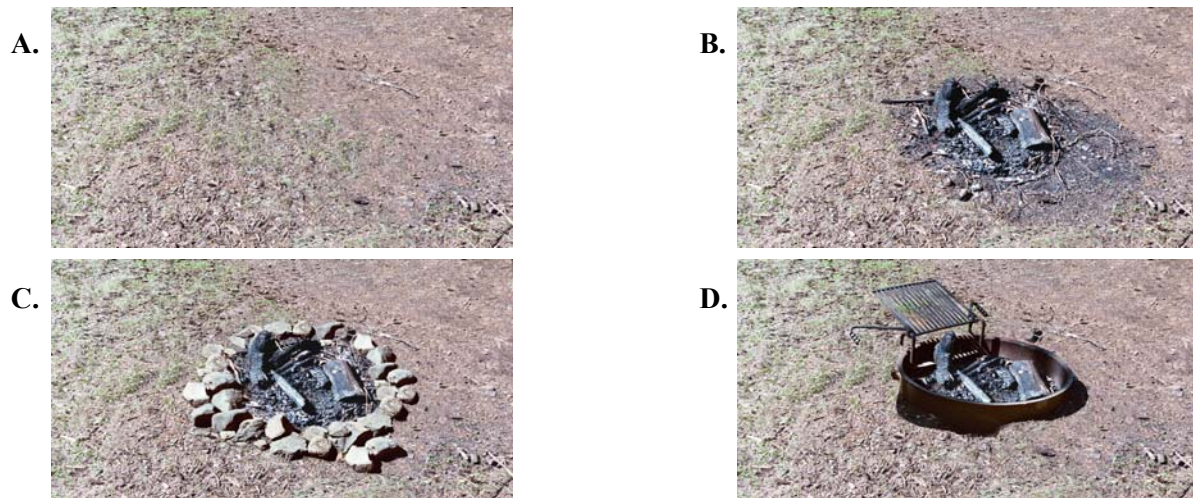
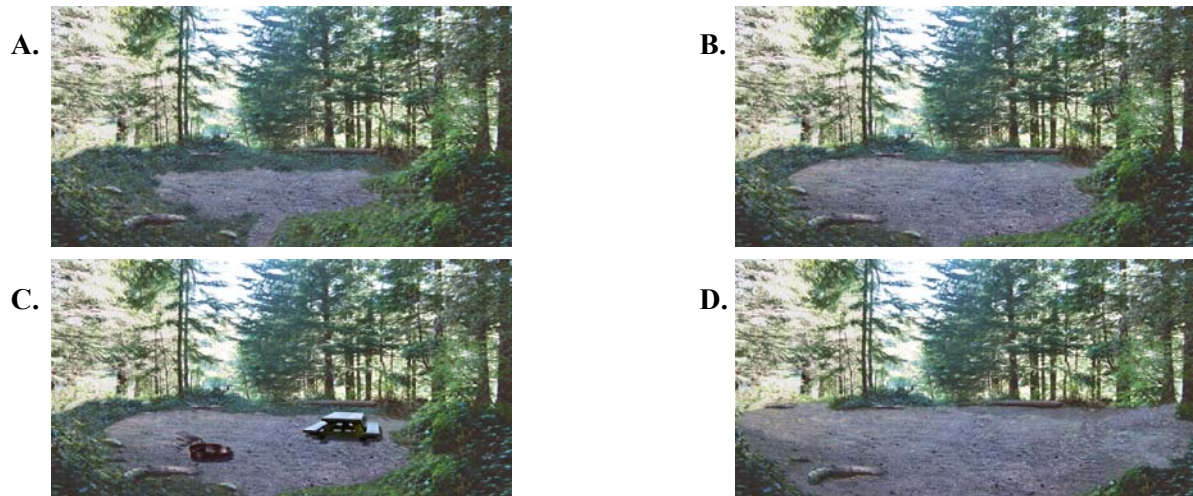


Figure 13. Photographs for measuring maximum acceptance of campsite conditions

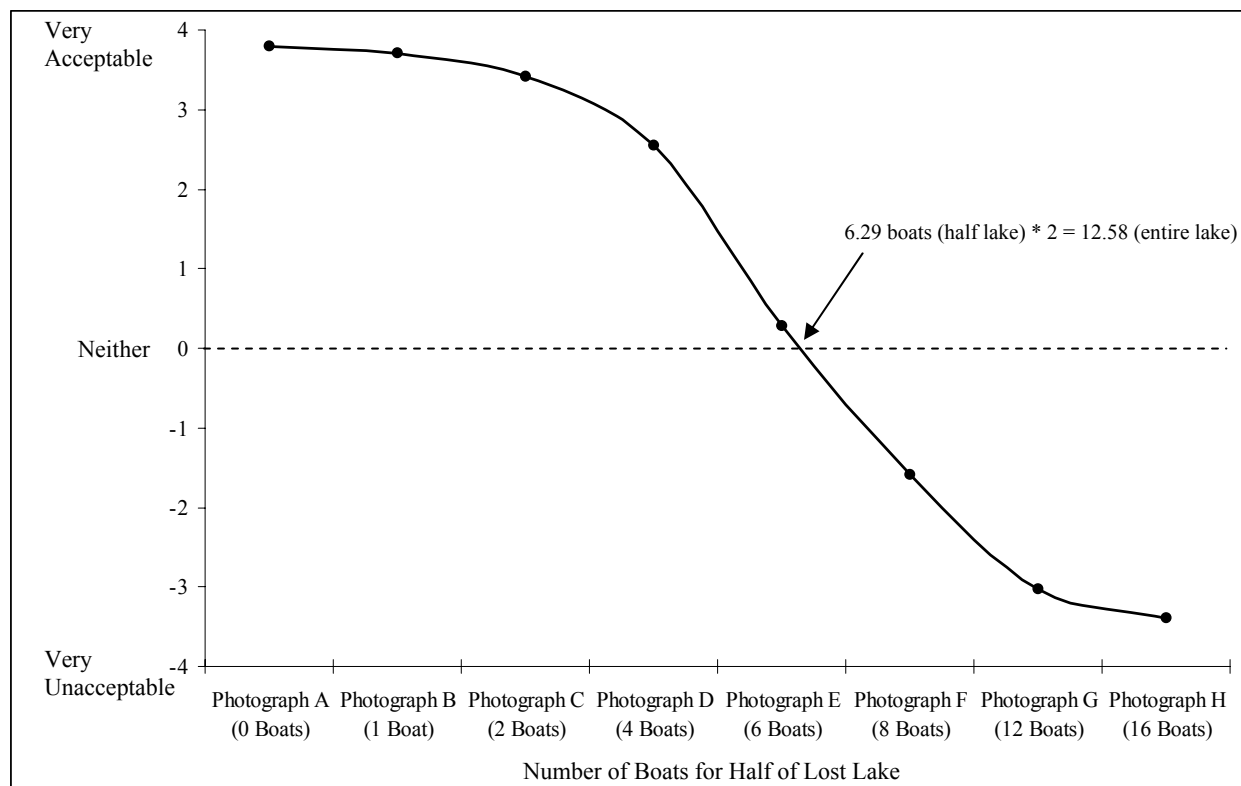


In this study, sets of photographs were embedded within the survey and used for measuring respondents' acceptance of encountering: (a) increasing numbers of boats / watercraft, (b) campfire conditions and structures, and (c) campsite conditions (e.g., bare ground, picnic tables, fire pits) at Lost Lake. *Increasing numbers of boats / watercraft* were measured with 8 photographs depicting 0 to 16 boats on half of Lost Lake (Figure 11). Photographs showed 0, 1, 2, 4, 6, 8, 12, and 16 boats. Using Adobe Photoshop 5.5 software, the photograph of 16 boats was created first and boats were randomly removed to create 7 other visuals of different use



levels. The background photograph was taken in the middle of Lost Lake so each image represents a boating use level for half of Lost Lake's area. *Campfire conditions / structures* were measured with 4 photographs depicting: (a) no fire or fire ring, (b) a fire scar with no fire ring, (c) rock fire ring, and (d) metal fire pit (Figure 12). *Campsite conditions* were measured with 4 photographs of: (a) 20 ft.<sup>2</sup> of bare ground; (b) 30 ft.<sup>2</sup> of bare ground; (c) 30 ft.<sup>2</sup> of bare ground, a picnic table, and metal fire pit; and (d) 40 ft.<sup>2</sup> of bare ground (Figure 13). Respondents rated conditions in each visual on a 9-point scale of -4 "very unacceptable" to +4 "very acceptable."

Figure 14. Impact acceptability curve for number of boats / watercraft on Lost Lake <sup>1</sup>



<sup>1</sup> Visitors were also asked which photograph represents what they saw most often during their visit: 31% chose photograph A (0 boats), 33% chose photograph B (1 boat), 26% chose photograph C (2 boats), 7% chose photograph D (4 boats), 2% chose photograph E (6 boats), and 2% chose photograph F (8 boats).

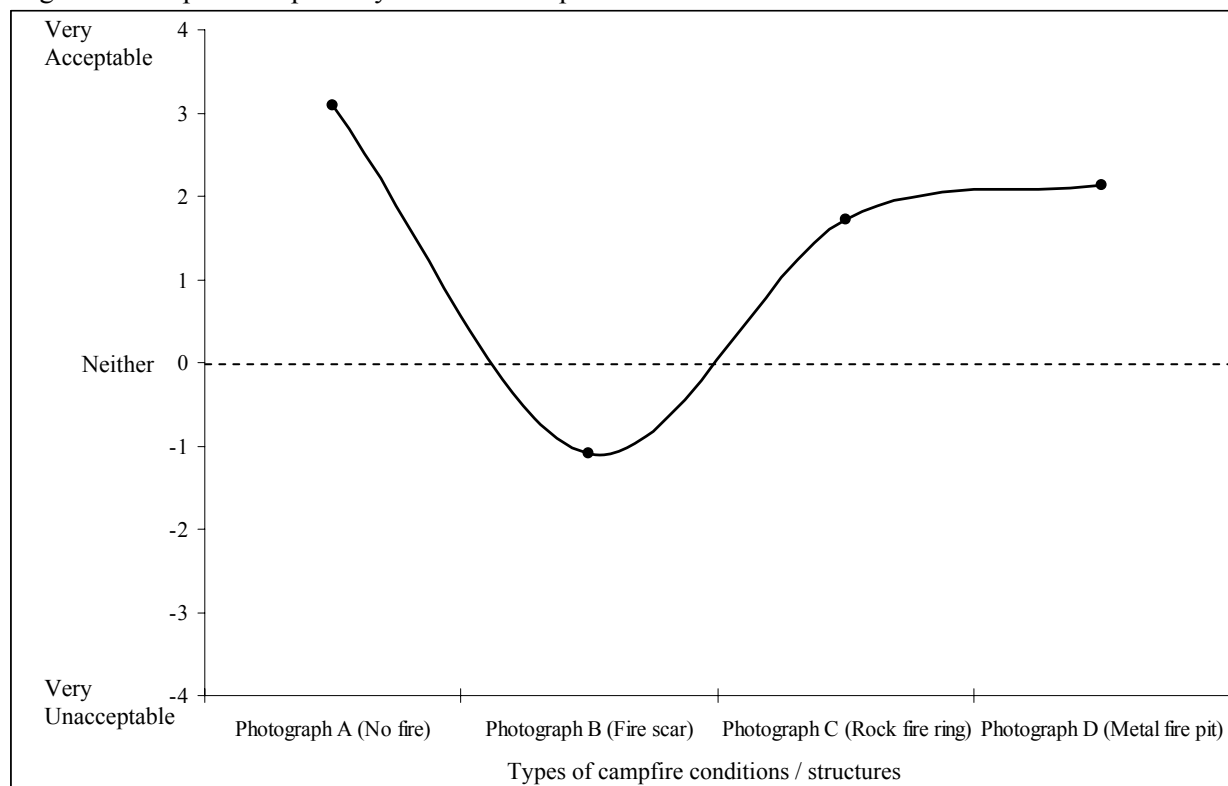
Figure 14 shows the impact acceptability curve for number of boats / watercraft on Lost Lake. On average, respondents rated photographs containing 0, 1, 2, and 4 boats as highly acceptable. Conversely, respondents considered 8, 12, and 16 boats to be unacceptable. The point where the curve crosses the neutral line was 6.29 boats. This represents the standard of quality, or maximum acceptable use level before conditions deteriorate. Given that photographs represent half of Lost Lake's area, it can be estimated that the maximum acceptable number of boats on Lost Lake at the same time is approximately 13 boats (6.29 \* 2 half of lake = 12.58 boats).

Respondents were also asked in the survey to specify which photograph most accurately depicted conditions that they saw / experienced most often during their visit to Lost Lake. In total, 64% of respondents encountered no boats or 1 boat, 26% saw 2 boats, and 7% encountered 4 boats.

Taken together, almost all (98%) respondents encountered 6 or fewer boats at Lost Lake. These results suggest that:

- boating use levels should not exceed a standard of approximately 6 boats on half of Lost Lake (13 boats for entire lake) at the same time, and
- current boating use levels at Lost Lake are not a problem because almost all respondents encountered fewer than this standard during their visit.

Figure 15. Impact acceptability curve for campfire conditions / structures at Lost Lake <sup>1</sup>



<sup>1</sup> Visitors were also asked which photograph represents what they saw most often during their visit: 44% chose photograph A (No fire / bare ground), 46% chose photograph B (Fire scar / no ring), 5% chose photograph C (Rock fire ring), and 5% chose photograph D (Metal fire pit).

Figure 15 shows the impact acceptability curve for campfire conditions and structures. On average, respondents rated the photograph containing no fire or fire ring as the most acceptable for Lost Lake. The metal fire pit was rated as the second most acceptable condition and the rock fire ring was also considered to be acceptable. Conversely, respondents rated the photograph showing a fire scar with no fire ring (photograph B) as unacceptable for Lost Lake. The largest proportion of respondents (46%) also reported that this photograph (i.e., fire scar with no fire ring, photograph B) most accurately depicted conditions they saw / experienced most often at Lost Lake during their visit. An additional 44% of respondents stated that the image containing no fire or fire ring represented the conditions they experienced. Few (5%) respondents saw rock fire rings or metal fire pits. Taken together, these results suggest that:

- rock fire rings, metal fire pits, and no campfires are all acceptable at Lost Lake;
- campfires without a fire ring (i.e., fire scars) are unacceptable at Lost Lake; and
- current campfire conditions at Lost Lake are a problem because the largest proportion of visitors encountered campfires without rings (i.e., fire scars), which are unacceptable.

Figure 16. Impact acceptability curve for campsite conditions at Lost Lake

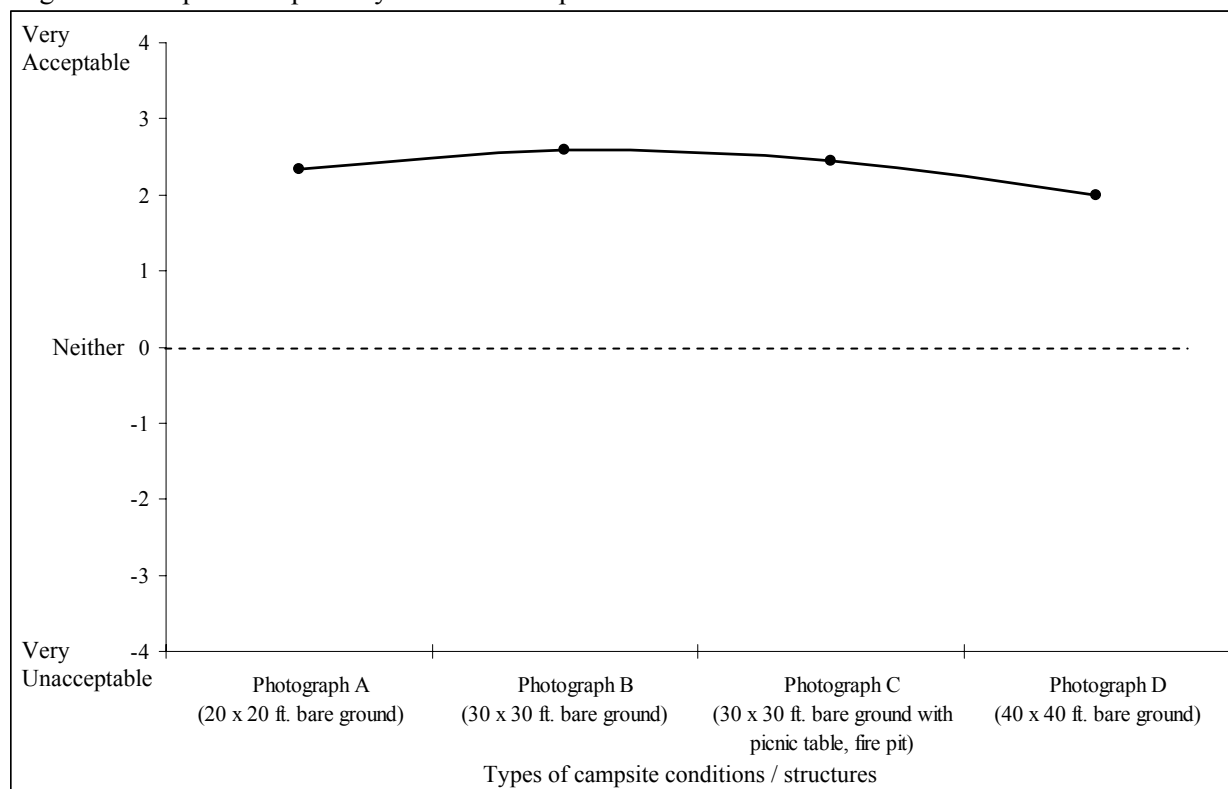


Figure 16 shows the impact acceptability curve for campsite conditions. Although there are no formally designated campsites or related facilities (e.g., fire pits, picnic tables) at Lost Lake, respondents rated all of the photographs as acceptable for Lost Lake. This suggests that:

- designated campsites that are between 20 ft.<sup>2</sup> and 40 ft.<sup>2</sup> in size and either include or do not include metal fire pits and picnic tables would be acceptable for Lost Lake.

### ***Perceived Crowding***

In the survey, visitors were asked to report the extent to which they felt crowded by the following activities at different locations at Lost Lake: (a) number of other visitors in the parking area, (b) number of vehicles in the parking area, (c) number of other visitors on the lake, (d) number of boats / watercraft on the lake, (e) number of other visitors on shore, and (f) total amount of use at Lost Lake. Consistent with most research on perceived crowding, responses were measured on a 9-point scale of 1 “not at all crowded” to 9 “extremely crowded.”



Table 4. Perceived crowding with vehicles, boats, and other visitors

	Visitors crowded at site <sup>1</sup>		Average (mean) <sup>2</sup>	Standard deviation <sup>2</sup>	Median <sup>2</sup>	Mode <sup>2</sup>
	No	Yes				
Vehicles in parking area	59	41	2.9	2.3	2.0	1.0
Boats / watercraft on lake	78	22	2.0	1.6	1.0	1.0
Visitors in parking area	67	33	2.4	1.8	2.0	1.0
Visitors on lake	78	22	2.0	1.6	1.0	1.0
Visitors on shore	77	23	2.1	1.6	2.0	1.0
Total amount of use at lake	71	29	2.4	1.8	2.0	1.0

<sup>1</sup> Cell entries are percentages (%) of respondents who do not feel crowded (1-2 on scale) and do feel crowded (3-9).

<sup>2</sup> Cell entries on 9-point scale of: 1-2 = not at all crowded, 3-4 = slightly crowded, 5-7 = moderately crowded, 8-9 = extremely crowded.

On average, the majority of respondents (59% to 78%) did not feel crowded by any activities or visitors in the parking area, on shore, and on the lake (Table 4). Average crowding scores ranged from 2.0 (not at all crowded) to 2.9 (slightly crowded). The activities and locations for which respondents reported the least crowding were boats and visitors on the lake (78% did not feel crowded; average crowding scores were 2 “not at all crowded”). The activity / location for which surveyed visitors reported the most crowding was vehicles in the parking area. In total, 41% of respondents reported that the vehicle parking area was crowded, with an average crowding rating of 2.9 (slightly crowded). This suggests that:

- crowding is currently not a problem at Lost Lake, but given that many respondents reported that vehicle parking was crowded, this should be monitored in the future.

### ***Relationships among Encounters, Acceptability, and Crowding***

Research has shown that when encounters exceed a visitor's maximum acceptance / tolerance limit (i.e., norm), perceived crowding is higher compared to those who encounter less than they would accept. Table 5 shows relationships among encounters, crowding, and maximum acceptability at Lost Lake. For all locations (i.e., shore, parking area, on lake) and activities (i.e., boats, vehicles, other visitors), almost all respondents (84% to 98%) reported fewer encounters than the maximum that they would accept. Crowding scores were higher for visitors reporting more encounters than they would accept (4.5 to 8.0 versus 2.0 to 2.3). Findings suggest that:

- perceived crowding was highest for visitors who reported more encounters than they would accept, but
- current use levels are not a problem at Lost Lake because almost all respondents encountered fewer than the maximum that they would accept encountering.

Table 5. Relationships among encounters, acceptability, and perceived crowding

	Reported encounters compared to acceptance <sup>1</sup>		Average crowding scores <sup>2</sup>		<i>t</i> -value	<i>p</i> -value	Effect size ( <i>r</i> <sub>pb</sub> )
	% Fewer encounters	% More encounters	Fewer than accept	More than accept			
Vehicles in parking area	84	16	2.26	7.25	7.58	< .001	.74
Boats / watercraft on lake	96	4	2.02	6.50	3.93	< .001	.49
Visitors in total at lake	98	2	2.33	8.00	3.16	.003	.43
Visitors in parking area	94	6	2.31	4.67	2.08	.043	.29
Visitors on lake	94	6	2.00	4.67	2.73	.009	.38
Visitors on shore	96	4	2.20	4.50	1.88	.067	.27

<sup>1</sup> Percent of visitors who encountered either fewer than or more than their maximum acceptance level.

<sup>2</sup> Average (mean) perceived crowding scores based on a 9-point scale from 1 = not at all crowded to 9 = extremely crowded.

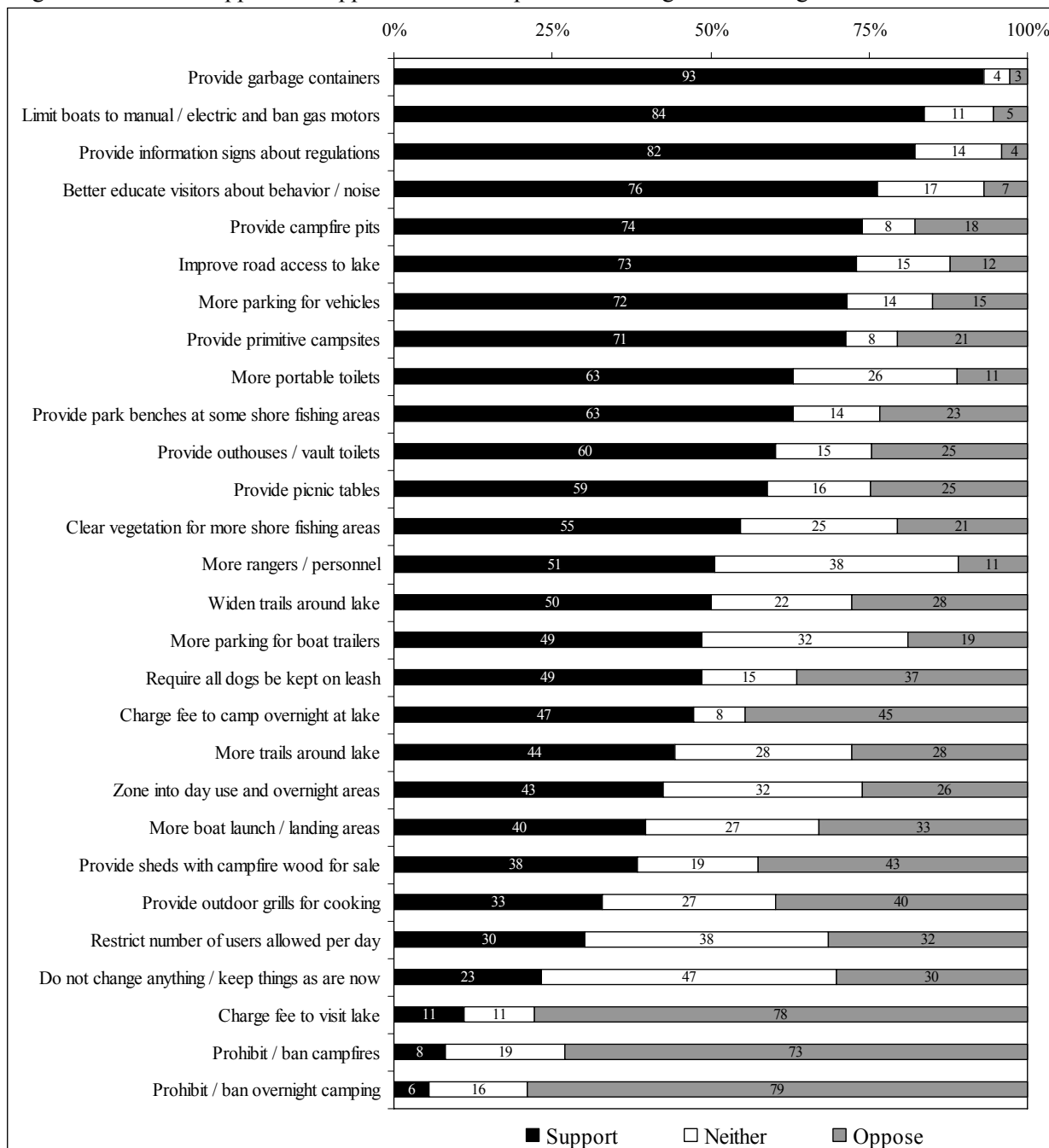
**Section Summary:** Taken together, findings presented in this section show that:

- during their visit, respondents encountered an average of approximately 12 other visitors in total at Lost Lake (approximately 3 visitors in parking area, 4 on the lake, and 6 on shore), 2 boats on the lake, and 5 vehicles in the parking area;
- visitor use levels should not exceed approximately 13 visitors in the parking area, 15 visitors on the lake, 18 visitors on shore, and 27 visitors in total at Lost Lake;
- visitor use levels are not a current problem at all locations at Lost Lake (i.e., shore, parking area, on lake) because almost all respondents encountered fewer people than the maximum that they would accept encountering at each location;
- boating use levels should not exceed 6 boats on half of Lost Lake (approximately 13 boats for entire lake) at the same time and because almost all respondents saw fewer than this number, boating use levels are not a current problem at Lost Lake;
- crowding is not a current problem at all locations at Lost Lake (i.e., shore, parking area, on lake), but many respondents reported that the vehicle parking area was crowded so this should be carefully monitored to ensure that no more than 10 vehicles are encountered at the same time;
- rock fire rings, metal fire pits, and no campfires are all acceptable for Lost Lake; campfires without a fire ring (i.e., fire scars) are unacceptable and because the largest proportion of visitors encountered campfires without rings (i.e., fire scars), campfire conditions are a current problem at Lost Lake; and
- designated campsites with bare ground between 20 ft.<sup>2</sup> and 40 ft.<sup>2</sup> in size with or without metal fire pits and picnic tables would be acceptable for Lost Lake.

### Support and Opposition for Potential Management Strategies

In the survey, visitors were asked to report the extent to which they opposed or supported various possible management strategies at Lost Lake. Figure 17 shows that the largest proportion of respondents supported providing garbage containers (93%), limiting boats / watercraft on the lake to only manual (e.g., paddle / oar, float tube) and electric motors by prohibiting gas powered motors (84%), and providing informational signage about regulations and guidelines (82%).

Figure 17. Visitor support and opposition toward potential management strategies



Improving education about appropriate visitor behavior (76%), providing campfire pits (74%), improving road access to the lake (73%), increasing the amount of vehicle parking (72%), and providing primitive campsites (71%) were supported by over 70% of respondents. The majority of visitors surveyed also supported increasing the number of portable toilets (63%), providing benches at shore fishing areas (63%), building permanent outhouses (i.e., vault toilets) (60%), providing picnic tables (59%), clearing vegetation for more shore fishing sites (55%), increasing the presence of rangers / agency personnel (51%), and widening trails around Lost Lake (50%).

Respondents were somewhat divided in their support for requiring dogs be kept on leash (49% support, 37% oppose), charging a fee for people to camp overnight at the lake (47% support, 45% oppose), increasing the number of boat launch / landing areas (40% support, 33% oppose), providing wood sheds with campfire wood for sale (38% support, 43% oppose), providing outdoor grills for cooking (33% support, 40% oppose), and restricting the number of visitors allowed per day at the lake (30% support, 32% oppose).

Conversely, respondents strongly opposed prohibiting overnight camping (79% oppose, 6% support), charging a day use fee for people to visit the lake (78% oppose, 11% support), and prohibiting campfires (73% oppose, 8% support) at Lost Lake.

**Section Summary:** Taken together, most visitors surveyed at Lost Lake:

- supported providing garbage containers, prohibiting gas powered motors, providing informational signage about regulations / guidelines, improving education about appropriate visitor behavior, providing campfire pits, improving road access, increasing the amount of vehicle parking, and providing primitive campsites at the lake;
- were divided in their support for requiring dogs be kept on leash, charging fees to camp at the lake, increasing the number of boat launch / landing areas, providing wood sheds with campfire wood for sale, providing outdoor cooking grills, and restricting the number of visitors allowed at the lake; and
- strongly opposed prohibiting campfires and overnight camping, and charging day use fees at the lake.

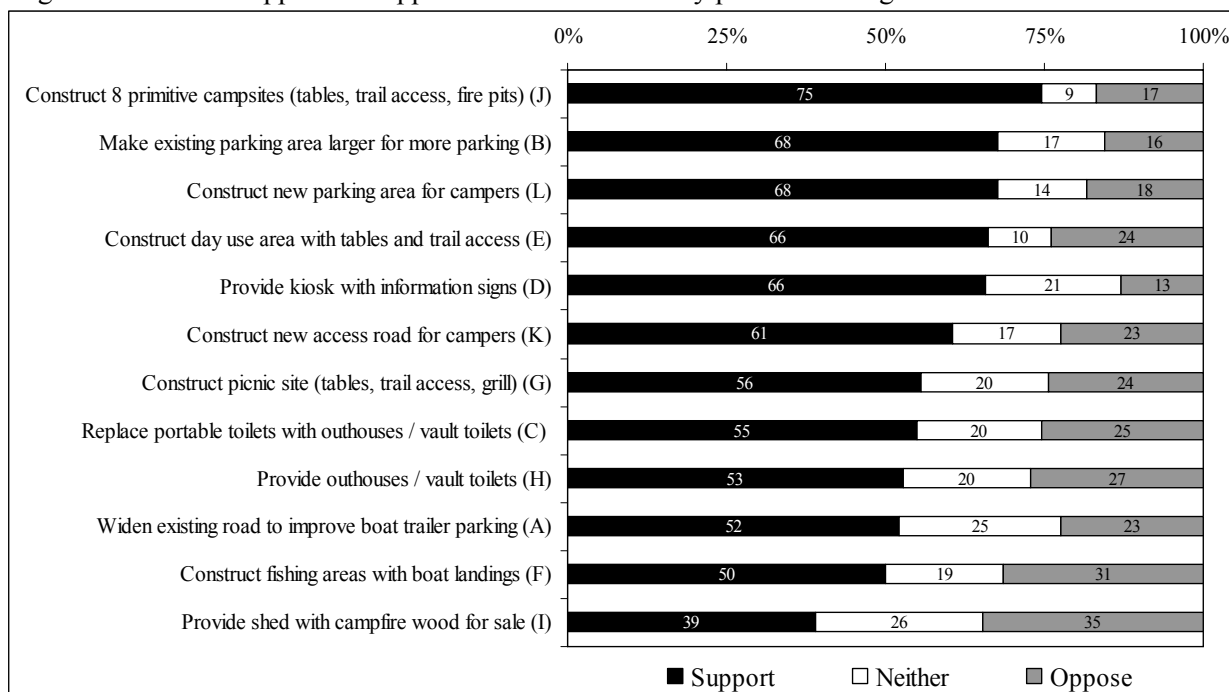
## Support and Opposition for Proposed Development Plans

ODF recently designed plans for developing primitive campsite facilities (e.g., tent areas with fire pits, wood sheds, vault toilets) and expanding the day use area (e.g., widen road and parking facilities) to ensure that the lake can continue to accommodate increasing use levels without deteriorating biophysical conditions and visitors' experiences. In the survey, visitors were asked to view a map of these proposed development plans (see Appendix B) and report the extent to which they opposed or supported each of the proposed changes at the locations on the map.

Figure 18 shows that the majority of respondents (50% to 75%) were supportive of all proposed changes except providing wood sheds with campfire wood for sale (39% support, 35% oppose). Respondents were most supportive of constructing 8 primitive campsites (75%), enlarging the existing parking area to allow more vehicle parking (68%), creating a new parking area for

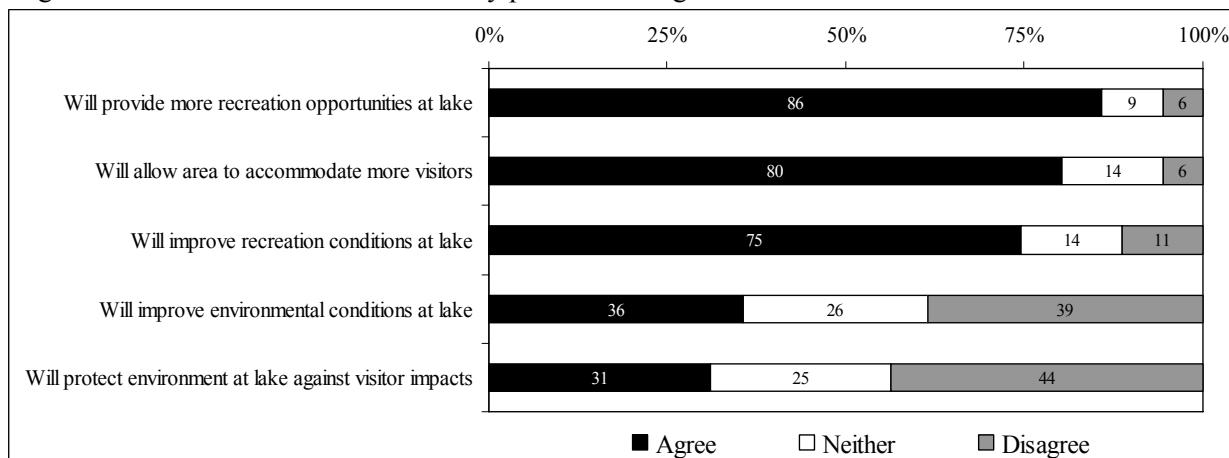
people who are camping (68%), constructing a day use area with picnic tables (66%), and providing an information kiosk with signs near the existing parking area (66%).

Figure 18. Visitor support and opposition toward currently planned management actions <sup>1</sup>



<sup>1</sup> Letters correspond to locations shown on map (see Appendix B).

Figure 19. Visitor beliefs about currently planned management actions at Lost Lake



Most respondents *agreed* that the proposed development plans would provide more recreation opportunities at the lake (86%), allow the area to accommodate more visitors (80%), and improve recreation conditions at Lost Lake (75%, Figure 19). Conversely, the largest proportion of respondents *disagreed* that development would protect the environment at Lost Lake against visitor impacts (44%) and improve environmental conditions at the lake (39%). Respondents believed that the proposed development changes would only improve recreation conditions, but

not biophysical conditions at Lost Lake. ODF, however, proposed these changes partially in response to current impacts (e.g., fire scars, trail erosion, litter) from increasing visitation. The proposed development plans include several site hardening strategies (e.g., designated campsites and fire pits, garbage containers, permanent outhouses) designed to minimize dispersed impacts. Education and interpretation materials (e.g., signage, brochures), therefore, should discuss the rationale for new facilities and services at Lost Lake. This information should focus on how these changes will accommodate increasing use and reduce negative impacts to environmental conditions and visitor experiences.

Figure 20. Visitor attitudes toward currently planned management actions at Lost Lake

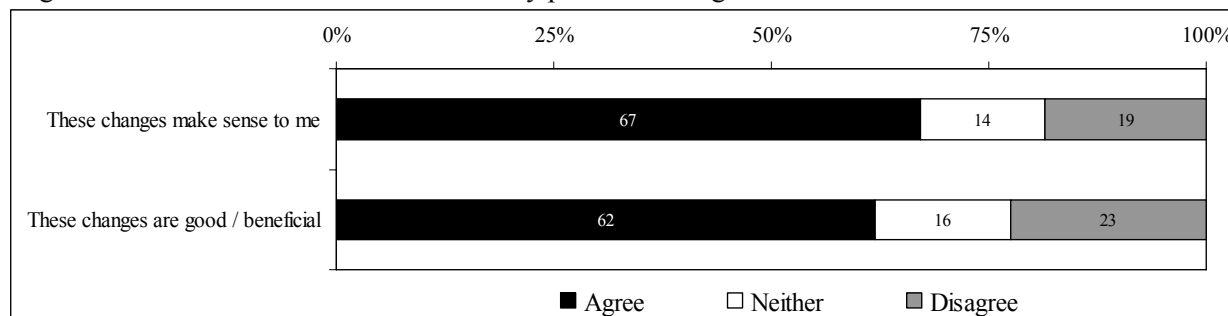


Figure 21. Visitor beliefs about if / when currently planned actions should be implemented

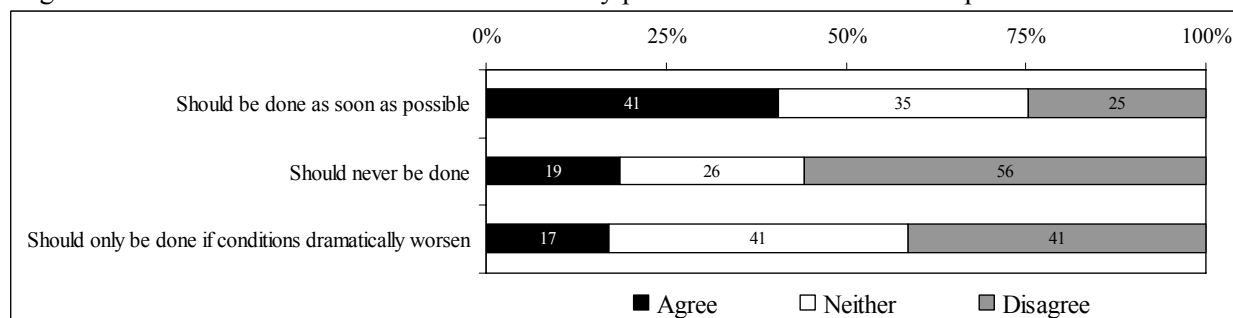


Figure 20 shows that over 60% of respondents agreed that the proposed development plans make sense (67%) and are good / beneficial (62%). The largest proportion of respondents (41%) believed that the proposed new facilities and services should be provided as soon possible (Figure 21). Many respondents disagreed that these changes should never be done (56%) or should only be done if conditions at the lake dramatically worsen in the future (41%).

**Section Summary:** Taken together, findings suggest that most respondents:

- supported all of the currently proposed development plans for new facilities and services (e.g., primitive campsites, day use area, new parking area and access road, outhouses) except construction of wood sheds with campfire wood for sale;
- agreed that these currently proposed development plans would provide more recreation opportunities at the lake, allow the area to accommodate more visitors, and improve recreation conditions at Lost Lake;

- believed that the proposed development plans would not protect the environment at Lost Lake against visitor impacts or improve environmental conditions at the lake, suggesting that informational materials (e.g., signage, brochures) should discuss the rationale for new facilities and services at Lost Lake, and how these site hardening strategies may reduce negative impacts to biophysical conditions; and
- agreed that the proposed development plans make sense, are good, will be beneficial, and should be done as soon as possible.

## Visitor Demographics

Most of the visitors surveyed at Lost Lake were male (85%); only 15% were female (Table 6). Over 55% of respondents were under 40 years old and the largest proportion was 30 to 39 years old (32%). In total, 22% of respondents were 40 to 49 years old, 14% were 50 to 59, and only 9% were over 60 years old. The average (i.e., mean) age of respondents was 39 years old.

Table 6. Visitors' demographic characteristics

	Percent (%)
Sex	
Male	85
Female	15
Age <sup>1</sup>	
Under 20 years old	4
20 – 29 years old	19
30 – 39 years old	32
40 – 49 years old	22
50 – 59 years old	14
60 + years old	9

<sup>1</sup> Average (mean) = 39 years, standard deviation = 13 years, median = 38 years, mode = 41 years.

Table 7 shows that all of the visitors surveyed at Lost Lake resided in Oregon (100%). The largest proportion of respondents lived in Washington County (43%) and Clatsop County (36%). An additional 18% of respondents resided in Multnomah County. Few respondents (4%) lived in other counties in Oregon.

The largest percentage of visitors surveyed at Lost Lake (18%) resided in Portland (Table 7). Several respondents were also from Astoria (13%), Forest Grove (13%), Hillsboro (13%), and Seaside (12%). An additional 8% of respondents lived in Beaverton. The remaining 23% of respondents resided in various other cities and towns such as Hammond, Warrenton, Banks, Cornelius, Gearhart, Gresham, Jewell, North Plains, and Vernonia.

Table 7. Visitors' location of residence

	Percent (%)
State	
Oregon	100
County	
Washington	43
Clatsop	36
Multnomah	18
Benton	2
Columbia	2
City / town	
Portland (Multnomah County)	18
Astoria (Clatsop County)	13
Forest Grove (Washington County)	13
Hillsboro (Washington County)	13
Seaside (Clatsop County)	12
Beaverton (Washington County)	8
Hammond (Clatsop County)	3
Warrenton (Clatsop County)	3
Aloha (Washington County)	2
Banks (Washington County)	2
Cornelius (Washington County)	2
Corvallis (Benton County)	2
Gearhart (Clatsop County)	2
Gresham (Multnomah County)	2
Jewell (Clatsop County)	2
Knappa (Clatsop County)	2
North Plains (Washington County)	2
Vernonia (Columbia County)	2

**Section Summary:** Taken together, most visitors surveyed at Lost Lake were:

- males between 30 and 39 years old (average = 39 years old) who lived in Oregon, especially in cities and towns in Washington, Clatsop, and Multnomah Counties such as Portland, Astoria, Forest Grove, Hillsboro, Seaside, and Beaverton.

## RECOMMENDATIONS

Based on results from this survey of Lost Lake visitors, the following recommendations are proposed for management of the lake:



- Respondents were satisfied with most aspects of their experience and conditions at the lake, especially paying no fee, the opportunity to escape crowds and experience solitude, the ability to recreate in an unspoiled environment, and hearing no noise from vehicles and other visitors. These and other conditions should be monitored to ensure that visitor satisfaction does not decline in the future.
- On average, visitors surveyed at Lost Lake rated all aspects of their experience and conditions as important and were satisfied with these aspects, suggesting that managers of Lost Lake should “keep up the good work” in their current management of the lake.
- Respondents, however, were least satisfied with parking availability for vehicles and boat trailers, litter, campfire scars, information signs about regulations / guidelines, and road access to the lake. These conditions should be monitored to ensure that satisfaction does not decline in the future. It may be useful, however, to consider increasing the amount of parking, providing bear proof garbage containers, restoring areas where campfire scars are located, installing designated fire pits, providing informational / educational signage, and improving road access to Lost Lake. These strategies were supported by most respondents and should increase visitor satisfaction in the future.
- Although visitor use levels are not a current problem at Lost Lake because almost all respondents encountered fewer people than the maximum they would accept encountering, use levels should be monitored to ensure that they do not frequently exceed approximately 13 visitors in the parking area, 15 visitors on the lake, 18 visitors on shore, and 27 visitors in total at Lost Lake at the same time.
- Although boating use levels are not a current problem at Lost Lake because respondents encountered fewer boats / watercraft than the maximum they would accept encountering, boating use levels should be monitored to ensure that they do not frequently exceed 6 boats on half of Lost Lake (approximately 13 boats for entire lake) at the same time.
- Crowding is not a current problem at all locations at Lost Lake, but many respondents reported that the vehicle parking area was crowded so this should be monitored to ensure that no more than approximately 10 vehicles are encountered at the same time. It may be useful, however, to increase the amount of parking to disperse vehicle crowding. This strategy was supported by visitors and should increase satisfaction in the future.
- Campfire conditions are a current problem at Lost Lake because the largest proportion of visitors encountered campfires without rings (i.e., fire scars), which were unacceptable. Areas where campfire scars are located should be restored. If campfires are allowed at the lake, rock fire rings or metal fire pits should be installed and appropriate information (e.g., signs, brochures) should be provided to encourage visitors to use these facilities.
- Respondents strongly supported providing garbage containers, prohibiting gas powered motors, providing informational signage about regulations / guidelines, improving education about appropriate visitor behavior, providing campfire pits, improving road access, increasing the amount of vehicle parking, and providing primitive campsites at

Lost Lake. Providing these facilities and services may increase visitor satisfaction and possibly minimize environmental impacts in the future.

- If campsites are developed at Lost Lake, it is recommended that they are between 20 ft.<sup>2</sup> and 40 ft.<sup>2</sup> of bare ground in size with or without metal fire pits and picnic tables.
- Visitors surveyed at Lost Lake were divided in their support for requiring dogs be kept on leash, charging fees to camp at the lake, increasing the number of boat launch / landing areas, providing wood sheds with campfire wood for sale, providing outdoor cooking grills, and restricting the number of visitors allowed at the lake. If any of these strategies are implemented, it is important to: (a) be aware that a large proportion of visitors may be unhappy and may not return, and (b) provide informational materials (e.g., brochures, signs) discussing the rationale for these actions.
- Respondents strongly opposed prohibiting overnight camping, charging day use fees, and prohibiting campfires at the lake. Unless deemed absolutely necessary, camping and campfires should not be prohibited at the lake and day use fees should not be charged.
- The majority of respondents were supportive of all changes in the proposed development plans except providing wood sheds with campfire wood for sale. Respondents were most supportive of constructing primitive campsites, enlarging the parking area, creating a new parking area for people who are camping, constructing a day use area with picnic tables, and providing an information kiosk with signs near the existing parking area. Visitors are likely to support management if the development plans proceed and are implemented. Although respondents were least supportive of providing sheds with campfire wood for sale, it is recommended that wood sheds be provided if campsites and campfire pits are constructed. This should minimize visitors damaging and removing vegetation around the lake to use for campfires.
- Respondents believed that the proposed development changes would improve recreation conditions at Lost Lake, but not environmental conditions at the lake. Education and interpretation materials, therefore, should discuss the rationale for new facilities and services at Lost Lake. This information should focus on how site hardening strategies may accommodate increasing use and reduce negative impacts to environmental conditions and visitor experiences. Information and education materials should be disseminated through various outlets such as internet websites, newspapers, off-site and on-site brochures, on-site signage, and visitor contact with rangers / agency personnel.

# APPENDIX A: SURVEY INSTRUMENT AND UNCOLLAPSED FREQUENCIES

## Visitors' Experiences and Preferences at Lost Lake

### Important Questions for Lost Lake Visitors



**Please Complete this Survey and Return to the Field Researcher**

Participation is Voluntary and Responses are Anonymous and Confidential

Thank You for Your Cooperation

A Study Conducted Cooperatively by:



We are conducting this survey to understand your experiences at Lost Lake and opinions about how the lake should be managed. Your input is important and will assist management of the lake. Please answer *all* survey questions and return to the researcher.

1. **Prior to today**, had you ever visited Lost Lake before? (**check ONE**)  
 34% No  
 64% Yes → if yes, how many previous trips have you made to Lost Lake? (**write response**) mean = 10.95 trips

2. Are you fishing at Lost Lake today? (**check ONE**)  
 30% No → if no, skip to question 9 on next page  
 70% Yes

3. In total, about how many *years* have you fished *in your life*? (**write response**) mean = 25.66 years

4. In total, about how many *days* have you fished *in the last 12 months*? (**write response**) mean = 19.25 days

5. To what extent do you disagree or agree with each of the following statements related to your involvement in fishing? (**circle one number for each statement that most closely matches your response**)

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
If I stopped fishing, an important part of my life would be missing	2%	10%	25%	22%	41%
I would rather go fishing than do most anything else	2	18	31	39	10
Participation in fishing is a large part of my life	0	22	31	31	16
Most other recreation activities do not interest me as much as fishing	2	39	22	33	4
In general, fishing is becoming a more central part of my life each year	2	27	33	37	2
Given the fishing skills that I have developed over the years, it is important that I continue to participate in fishing	0	6	27	51	16
I feel that I am more skilled in fishing than other anglers in general	2	18	49	27	4
Testing my fishing skills is very important to me	2	18	37	37	6
In general, I am becoming more skilled in fishing each year	0	12	39	35	14
Over the years, I have accumulated a lot of fishing equipment	0	8	22	53	16
Over the years, I have invested a lot of money in fishing equipment	0	14	27	37	22
I feel that I have more fishing equipment than other anglers in general	6	25	43	20	6
I often spend time learning about newest fishing equipment available	10	37	33	20	0
In general, I am obtaining more fishing equipment each year	0	20	31	43	6
In general, I am spending more time fishing each year	0	22	39	33	6

6. How would you describe your skill level in fishing? (**check ONE**)  
 9% Beginner      9% Novice      45% Intermediate      34% Advanced      2% Expert

7. As an angler, which ONE of the following *best* describes you? (**check ONE**)  
 36% Fishing is an enjoyable, but infrequent activity that is incidental to other travel and outdoor interests. I am not highly skilled in fishing, rarely read fishing articles, and do not own much fishing equipment beyond the basic necessities.  
 51% Fishing is an important, but not exclusive outdoor activity. I occasionally read fishing articles and purchase additional equipment to aid in fishing, my participation in fishing is inconsistent, and I am moderately skilled in fishing.  
 13% Fishing is my primary outdoor activity. I purchase ever-increasing amounts of equipment to aid in fishing, go fishing every chance that I get, consider myself to be highly skilled in fishing, and frequently read fishing articles.

8. Are you fishing from the shore or a boat / watercraft at Lost Lake today? (**check ONE**)  
 76% Shore      15% Boat / watercraft      9% Both shore *and* boat / watercraft

9. What other activities are you participating in *at Lost Lake today?* (**check ALL THAT APPLY**)  
 32% Picnicking      3% Having a campfire      1% Mountain biking  
 24% Hiking      14% Boating without fishing      0% Hunting  
 12% Overnight camping      14% Swimming      8% Other (write response) \_\_\_\_\_

10. Overall, how satisfied are you with your visit to Lost Lake today? (**check ONE**)  
 1% Very Dissatisfied      1% Dissatisfied      7% Neither      69% Satisfied      22% Very Satisfied

11. Listed below are several characteristics. On the left, please rate how *important* it is to you that each characteristic is currently provided at Lost Lake. Then, on the right, please rate how *satisfied* you are with each characteristic at Lost Lake. **Please answer both the importance (on left) and satisfaction (on right) questions for each characteristic by circling numbers for each item that most closely match your responses.**

<i>Importance</i> characteristic is provided					<i>Satisfaction</i> with characteristic				
Not Important	Neither	Very Important	Characteristics at Lost Lake		Very Dissatisfied	Neither	Very Satisfied		
1%	4%	9%	41%	44%	3%	19%	20%	40%	19%
0	6	7	30	57					
15	3	32	23	26	5	19	15	50	17
0	3	15	25	57					
0	2	3	19	76	0	15	16	49	20
3	3	16	40	38	3	26	21	28	21
6	5	24	36	29	3	12	35	27	23
5	8	15	48	25	0	3	28	37	32
2	4	18	46	31	2	7	36	43	13
6	4	16	43	31	0	3	28	37	32
5	10	30	34	21	2	10	31	44	15
2	3	14	15	77	2	16	31	36	15
0	0	7	27	66	2	7	36	36	21
0	0	7	27	66	2	0	3	14	81
0	0	5	34	61	2	3	18	35	44
0	0	5	34	61	0	3	18	35	44
0	0	2	24	74	2	10	8	32	48
0	0	2	24	74	2	10	8	32	48
2	6	24	31	38	3	7	5	28	57
2	6	24	31	38	3	7	5	28	57
4	4	16	34	41	3	8	18	41	30
4	4	16	34	41	3	8	18	41	30
5	6	39	21	30	0	10	19	40	32
5	6	39	21	30	0	10	19	40	32
6	3	18	32	41	0	6	35	24	35
6	3	18	32	41	0	6	35	24	35
6	3	18	32	41	3	3	25	29	40
6	3	18	32	41	3	3	25	29	40

12. How many of *each* of the following did you see at Lost Lake today? (**write responses for EACH item**)

I saw about: mean = 11.60 other visitors in total at Lost Lake  
mean = 2.78 other visitors in the parking area  
mean = 5.02 vehicles in the parking area  
mean = 3.49 other visitors on the lake  
mean = 2.15 boats / watercraft on the lake  
mean = 5.54 other visitors on the shore

13. To what extent did you feel crowded by each of the following at Lost Lake today? (**circle one number for each item**)

	Not at all Crowded	Slightly Crowded	Moderately Crowded	Extremely Crowded
Number of other visitors in the parking area	46%	20%	13%	9%
Number of vehicles in the parking area	4%	3%	4%	3%
Number of other visitors on the lake	0%	1%	3%	0%
Number of boats / watercraft on the lake	0%	2%	2%	0%
Number of other visitors on the shore	0%	0%	3%	0%
Total amount of use at Lost Lake	4%	3%	4%	2%

14. What is the *maximum* number of *OTHER VISITORS* that you would accept seeing at *each* of the following locations at Lost Lake? (**circle one number for each location OR check one of the other two options**)

	Maximum number of <i>visitors</i> I would accept seeing at location (circle <i>one</i> number)																		I can't specify a number	Doesn't matter to me	
	0	1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	50	60			70
<i>In the parking area</i> , it is OK to see as many as:	0	1	1	4	10	11	28	11	4	3	0	0	0	0	1	0	0	1%	16%	7%	
<i>On lake</i> , OK to see as many as:	0	2	4	6	8	10	15	20	25	30	40	50	60	70	80	90	100+	16	7		
<i>On shore</i> , OK to see as many as:	0	2	4	6	8	10	15	20	25	30	40	50	60	70	80	90	100+	17	7		
<i>In total at Lost Lake</i> , OK to see as many as:	0	2	4	6	8	10	15	20	25	30	40	50	60	70	80	90	100+	11	10		

15. What is the *maximum* number of *BOATS / WATERCRAFT* that you would accept seeing *on the lake?*

It is OK to see as many as: (**circle one number OR check one of the other two options**)  
 0 1 2 3 4 5 6 7 8 9 10 15 20 25 30 35 40 45 50+  
 0 1 3 4 13 13 9 3 4 4 9 10 7 0 0 0 0 0 0%  
**OR** 14% I can't specify a number      7% It doesn't matter to me

16. What is the *maximum* number of *VEHICLES* that you would accept seeing *in the parking area?*

It is OK to see as many as: (**circle one number OR check one of the other two options**)  
 0 1 2 3 4 5 6 7 8 9 10 15 20 25 30 35 40 45 50+  
 0 0 0 3 7 9 3 7 9 1 21 14 6 0 0 0 0 0 0%  
**OR** 16% I can't specify a number      6% It doesn't matter to me



17. We are interested in the **number of boats / watercraft** you are willing to encounter at Lost Lake. Focusing on the number of boats / watercraft, please rate the acceptability of **EACH** photograph below. (circle one number for each photograph)

	Very Unacceptable		Unacceptable		Neither		Acceptable		Very Acceptable		Which <b>ONE</b> photograph is like what you saw <b>most often</b> today?
Photograph A	2%	0%	0%	0%	2%	0%	2%	0%	96%		31%
Photograph B	0	0	0	0	2	0	6	15	79		33
Photograph C	0	0	0	0	2	3	13	18	65		26
Photograph D	3	1	0	1	1	17	17	14	44		7
Photograph E	15	6	3	12	15	13	13	8	15		2
Photograph F	30	15	10	13	12	6	9	3	2		2
Photograph G	61	17	8	6	3	2	5	0	0		0
Photograph H	76	9	5	5	3	2	2	0	0		0



18. We are interested in types of **campfire conditions / structures** you are willing to see at Lost Lake. Focusing on campfire conditions / structures, please rate the acceptability of **EACH** photograph below. (circle one number for each photograph)

	Very Unacceptable		Unacceptable		Neither		Acceptable		Very Acceptable		Which <b>ONE</b> photograph is like what you saw <b>most often</b> today?
Photograph A	6%	0%	0%	1%	4%	6%	1%	1%	80%		44%
Photograph B	32	12	13	10	0	10	6	1	16		46
Photograph C	9	0	1	7	9	15	13	9	38		5
Photograph D	11	3	0	4	1	8	8	10	54		5



19. We are interested in types of **campsite conditions (size of bare ground, tables, fire pits)** you are willing to see at Lost Lake. Focusing on campsite size / facilities, rate the acceptability of **each** photograph below. (circle one number for each photo)

	Very Unacceptable		Unacceptable		Neither		Acceptable		Very Acceptable		Which <b>ONE</b> photograph is like what you saw <b>most often</b> today?
Photograph A	3%	0%	4%	3%	10%	17%	1%	10%	51%		47%
Photograph B	1	3	0	1	7	16	10	6	56		14
Photograph C	7	3	0	3	4	10	6	12	56		9
Photograph D	3	7	6	3	7	10	3	16	46		30



20. To what extent do you oppose or support each of the following possible management actions at Lost Lake?

(circle one number for each possible management action)

	Strongly Oppose	Oppose	Neither	Support	Strongly Support
Improve road access to lake	5%	7%	15%	53%	20%
Increase amount of parking for vehicles	7	8	14	46	26
Increase amount of parking for boat trailers	10	10	32	34	15
Provide more designated boat launch / landing areas on shore	10	23	27	27	12
Provide garbage containers	0	3	4	48	45
Increase number of portable toilets	4	7	26	40	23
Provide permanent outhouses / vault toilets	8	16	15	40	21
Better educate visitors about appropriate behavior / noise	6	1	17	50	26
Provide information signs about regulations / guidelines	4	0	14	52	30
Increase presence of rangers / agency personnel	4	7	38	37	14
Provide park benches at some shore fishing locations	8	15	14	49	14
Clear some vegetation to provide more shore fishing locations	8	12	25	33	22
Provide picnic tables	8	16	16	44	15
Provide designated primitive campsites	11	10	8	43	29
Provide designated campfire pits	7	11	8	45	29
Provide wood sheds with campfire wood for sale	15	27	19	34	4
Provide outdoor grills for cooking	18	22	27	26	7
Widen trails around lake	8	19	22	35	15
Increase number of trails around lake	10	18	28	28	17
Restrict number of visitors allowed at lake per day	15	16	38	25	6
Zone area into two zones: one for day use and one for overnight use	10	16	32	33	10
Charge a fee for people to visit the lake	56	18	11	8	3
Charge a fee for people to camp overnight at the lake	35	10	8	24	23
Prohibit / ban overnight camping at the lake	55	24	16	3	3
Prohibit / ban campfires at the lake	45	28	19	1	7
Limit boats / watercraft to only manual (paddle / oar, float tube) and electric motors by prohibiting / banning gas powered motors	3	3	11	34	50
Require that all dogs be kept on leash	15	22	15	26	23
Do not change anything at the lake / keep things as they are now	3	27	47	10	14

21. **Including yourself**, how many people are accompanying you at Lost Lake today? (write response) mean = 3.32 people

22. Do you intend to come back to Lost Lake on another trip in the future? (check ONE) 1% No 91% Yes 8% Unsure

23. Are you staying / camping at Henry Rierson Spruce Run Campground on this trip? (check ONE) 75% No 25% Yes

24. Are you: (check ONE) 85% Male 15% Female

25. How old are you? (write response) mean = 38.74 years old

26. Where do you live? (write responses) City / town see report County see report State see report

**Please turn over to the back cover to complete the final few questions of this survey. Thank you!**

Oregon Department of Forestry is considering changes to facilities / services at Lost Lake, which are diagramed on a map. The researcher who gave you this survey has a copy of the map. **Please look at the map when answering the following questions.**

27. To what extent do you oppose or support each of the following possible changes at the locations shown on the map? Changes and locations correspond with letters on the map. (circle one number for each possible change)

Letter on map corresponding to possible change and location	Strongly Oppose	Oppose	Neither	Support	Strongly Support
A. Widen road to allow improved parking for boat trailers	13%	10%	25%	38%	14%
B. Make parking area larger to allow more vehicle parking	9	7	17	51	17
C. Replace portable toilets with permanent outhouses / vault toilets	13	13	20	45	10
D. Provide kiosk with information signs	7	6	21	49	17
E. Construct day use area with picnic tables and trail access	14	10	10	55	11
F. Construct fishing areas with boat landings	11	20	19	37	13
G. Construct picnic site with tables, trail access, and cooking grill	16	9	20	44	11
H. Provide permanent outhouses / vault toilets	13	14	20	43	10
I. Provide wood shed with campfire wood for sale	13	22	26	30	9
J. Construct eight primitive campsites with picnic tables, fire pits, and trail access	13	4	9	44	31
K. Construct new access road	14	9	17	42	18
L. Construct new parking area for people who are camping	10	9	14	44	24

28. Finally, thinking about all of these possible changes at Lost Lake taken together, please specify the extent to which you disagree or agree with each of the following statements. (circle one number for each statement)

In general, these possible changes at Lost Lake ...	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
... will allow the area to accommodate more visitors	1%	4%	14%	45%	35%
... will provide more recreation opportunities at the lake	1	4	9	49	37
... will improve recreation conditions at the lake	6	6	14	47	28
... will improve environmental conditions at the lake	21	17	26	31	4
... will protect the environment at the lake against more visitor impacts	20	24	25	23	9
... are good / beneficial	14	9	16	47	16
... make sense to me	13	6	14	50	17
... should be done as soon as possible	17	7	35	28	13
... should only be done if conditions at the lake dramatically worsen	21	20	41	11	6
... should never be done	29	27	26	9	10

Thank you for completing this survey; your input is important! **Please return this survey to the field researcher immediately.**

Office Use Only: Day: \_\_\_\_\_ Month: \_\_\_\_\_ Time: \_\_\_\_\_  
 Location:  Lost Lake  Spruce Run  Clatsop County Fair

# APPENDIX B: MAP FOR SURVEY INSTRUMENT

For Question 27, please look at each change on the map (indicated by a letter) and then answer the item in Question 27 that corresponds to each letter. For example, look at change "A" on the map and then respond in the survey by circling the extent to which you oppose or support this change where it states "A. Widen road to allow improved parking for boat trailers" in the survey. Please repeat this process for changes "B" through "L."

