

public perceptions of the  
impacts, use, and future  
of minnesota lakes

results of the 1998  
minnesota lakes survey

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summary report



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***Appendix A is not included in this Summary Report, but is available in the full report.***

Appendix A: Survey Methodology and Tables of Survey Responses  
    Methodology  
    Reading the Tables  
    Organization of Remainder of Appendix  
    Guide to Tables (survey instrument)  
    Tables of Survey Responses (46 pages in length)

## EXECUTIVE SUMMARY

### INTRODUCTION

Lakes are one of the hallmark resources of the State of Minnesota. Minnesotans enjoy lakes for many reasons, including recreation, scenery, solitude, and homes. All of these uses combine to create pressures on lake resources. With lakeshore development comes impacts, and these impacts are especially evident if development is poorly managed. Impacts are apparent as changes in water quality and aesthetics, and in aquatic and riparian habitat.

The University of Minnesota Sea Grant Program and the Minnesota Department of Natural Resources designed a survey to learn about the public's perceptions of the condition of Minnesota lakes. Lakes are a public resource, owned in common by all Minnesotans. As such, Minnesotans play a central role in setting the future direction for "their" lakes. This survey offered Minnesotans an opportunity to provide input into public policy discussions about the future management of lake resources. Management programs require public support to be successful. One way to gather that support is to ensure the public has opportunities to affect the design and implementation of the management programs.

### LAKE IMPORTANCE

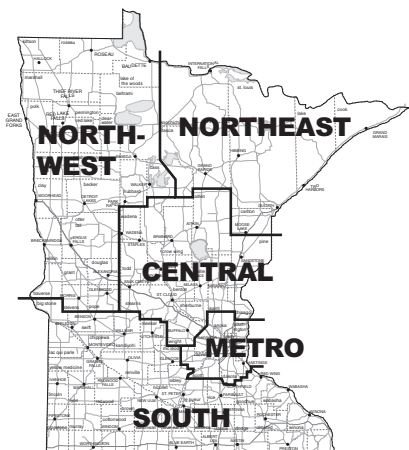
Lakes, and other natural resources, can be valued in a wide variety of ways, including ways related to the current use of the resource for outdoor recreation, aesthetics, ecological (life support) functions, and contributions to local economies. They can also be valued for their future uses, and for their existence, irrespective of uses. Survey responses indicate that a majority of the Minnesota population, including those who do not use lakes, value lakes in each of these ways.

That lakes are seen as important in many different ways by large portions of the population is the major reason lake management is so complicated and difficult. Unless all of these values are addressed together in a comprehensive fashion, management plans will likely be opposed by a large number of people who feel their values are being ignored.

### LAKE USE

Most Minnesotans (77%) who responded to the survey used lakes at least one time in the last year for "any on-water activity like fishing, boating or any other activity that is enhanced by the presence of lakes, such as camping, sightseeing, or living in a shoreland home." Of those who use lakes, the median number of days of use per year is 20 and the mean is 55.

When asked in what region they use lakes the most, the central region came out on top (26% of lake users), followed by the



metro region (23%) , south region (21%), northwest region (16%), and northeast region (14%).

The leading reason for selecting the most-used lake has to do with convenience (‘close to home’). Other reasons reported by over 40 percent of lake users include ‘scenic,’ ‘good fishing,’ ‘quiet’ and tradition (‘have gone for years’).

The top-ranked activity categories are—in declining order—fishing, socializing, appreciating aesthetics/nature, non-fishing boating, and swimming. If non-fishing boating is combined with fishing from boats, the general category ‘boating’ would be the highest-ranked activity category.

## STATUS AND TRENDS OF LAKE CONDITIONS

Minnesota lake users were asked their perceptions of conditions and trends of the lake they use most and, presumably, with which they are the most familiar. The survey made every attempt to tap into lake users’ history of direct experience, and have them evaluate the lakes they know well. Specifically, lake users were asked about 18 lake and shoreland characteristics, which were developed for four theme areas: overall conditions; water recreation; fish, wildlife and other aquatic resources; and shoreland conditions.

When analyzing responses to these 18 lake and shoreland characteristics, a general pattern emerged. Most lake users judge current conditions as being pretty good (but not ‘excellent’) on their highest-use lake, and judge the trend in conditions as ‘remained about the same’ or little change. When they note a change, more users indicate a trend to poorer conditions than to better conditions. In addition, examining responses by region of use and riparian property ownership leads to only a small number of differences that are noteworthy.

An example illustrates this general pattern of responses. Lake users mainly give positive ratings (70% ‘good’ to ‘excellent’) to the current overall condition of the lake they use most often (see table). Very few give clearly negative ratings (3% ‘poor’). Ratings are higher for users of the northern regions, especially the north-east region, where 80 percent of users give positive ratings. Riparian property owners perceive current conditions about the same as lake users who do not own shoreland.

Overall condition of lake and shoreland areas of most-used lake			
Current condition	Percent of Responses	Trend	Percent of Responses
Excellent	6	Improved	12
Good	64	Remained about the same	63
Fair	26	Worsened	21
Poor	3		
Don't know	2	Don't know	5
Total percent	100	Total percent	100

Since beginning their history on their most-used lake, nearly two-thirds of lake users (63%) have experienced little change (‘remained about the same’) (see table). For those who reported a trend, more reported worsening conditions (21%) than improving conditions (12%). Differences in trend responses by region of use are not large. Riparian property owners are more likely to report worsened conditions (32%) than other lake users.

## OUTLOOK FOR LAKES

The outlook of lake users on water quality and scenic beauty has a lot in common with their perception of recent trends. In their outlooks—as with their perceptions of recent trends—the largest group of lake users expects conditions to remain the same. For lake users who expect conditions to change, more expect conditions to ‘worsen’ than ‘improve.’ The outlooks are a little more optimistic than perceptions of recent history, as judged by the gap between ‘worsen’ and ‘improve’ responses.

Few regional distinctions are worth noting for water quality history or outlook, or for scenic beauty history or outlook. Lake users who owned riparian property have views similar to other lake users.

## IMPACTS ON LAKE WATER QUALITY AND SCENIC BEAUTY

Lake users were asked to identify the major factors that contribute to changes in water and scenic quality on the lakes they use most. The leading factors associated with worsening water quality are runoff from lawns, fields, and urban surfaces. Septic systems and exotic species are also leading factors. Exhaust and fuel leakage from motorized watercraft is frequently identified as having at least a ‘moderate impact,’ but is less frequently identified as having a ‘great’ impact. Far down on the list of frequent impact identifications are wastewater discharges from commercial, industrial or municipal sources, and vegetation removal (shoreline, aquatic plant and timber harvest).

Lake users who own riparian property are in agreement with other lake users on the impacts associated with declining water quality. Regionally, however, there is much less consensus among lake users, mainly because the landscapes are so different. In agricultural regions (northwest and especially the south), agricultural factors become more important. In the metro region, urban factors are more important, and on-site septic systems (not that common in the metro region) are less important. Exotic species rank high in the metro region. In the northeast, central and northwest, which have high numbers of shoreland homes, septic systems are the leading factor. In the northeast, timber harvesting becomes a top-ranked factor.

In contrast to water quality, the ranking of factors associated with declining scenic quality is more widely shared among regions. There is also agreement between lake users who own riparian property and those who do not. The top factor—identified by those 25 percent of lake users who perceived a decline in scenic quality on the lake they use most—is clearly shoreland home construction. Over half identified cabin or home development as having a ‘great’ impact on declining scenic quality. Next in importance are other types of shoreland development: installation of large shoreline structures (such as docks and boat lifts) and road construction near shore. Vegetation (tree and shrub) removal in shoreland areas is the third most frequently mentioned factor impacting scenic quality. Commercial and industrial developments, including resorts and marinas, are not frequently identified as having major impacts.

## POSSIBLE SOLUTIONS TO LAKE PROBLEMS

Lake users were asked whether they support or oppose each of 17 solutions to address problems on their most-used lake. The 17 solutions were selected to represent four broad categories of solutions: education, management, regulation/enforcement, and incentives.

In general, there is much statewide support (most above 50%) and little opposition (most below 10%) for proposed solutions regarding lakes in Minnesota. None of the four categories of solutions (education, management, regulation/enforcement, and incentives) appears to be clearly preferable in the public's mind. The finding that regulatory solutions receive about the same level of support as the other categories is consistent with another finding in the survey. Lake users did not feel that the current regulatory environment for lakes and lakeshore is overly restrictive. Few (10%) feel that laws and regulations have 'gone too far.' By far most either feel the current situation is 'about right' or that laws and regulations have 'not gone far enough.' These views of the current regulatory environment are shared widely by riparian property owners and across the state.

Support for specific regulatory solutions—from top to bottom—is: stricter controls for exotic species (72% supporting), stricter septic system regulations to improve water quality (68%), motorboat size and speed limits (66%), more enforcement of existing shoreland protection laws (60%), stricter zoning regulations for shoreline development to maintain natural shoreline character (58%), stricter regulations to protect shoreland trees and shrubs (57%), and increasing minimum lot size requirements (35%).

There is much support for educational programs that address shoreline property owners (79% supporting) and farmers (69%) about their potential impacts on water quality. A majority also supports more educational programs targeting loggers and foresters (54%).

Management techniques are well supported statewide, although support varied depending upon the technique. Increased protection for fish habitat had the largest degree of support (68% supporting). More management for game populations (48%) and more public land purchases (47%) had lower levels of support.

For solutions involving incentive programs, a majority (53% to 61%) of all lake users support: awards programs for shoreland property owners who minimize their impacts, development of financial incentives for environmentally-sound shoreland management, and more erosion control assistance for property owners.

Regionally, there are no significant differences in support or opposition for solutions, except for in the northeast, where users are slightly more opposed to some of the regulatory and management solutions. Riparian property owners have significantly less support for more public land purchases to protect shoreland areas than other lake users. Riparian property owners also differed, to a lesser degree, on support and opposition to three regulatory and one incentive solution.

## INTRODUCTION

Lakes are one of the hallmark resources of the State of Minnesota. Minnesotans use lakes for recreational activities such as camping, fishing, boating and water sports. In addition, lakes are valued as places of scenic beauty and solitude. The lakeshores in Minnesota are also used for second home (cabin) development and permanent home sites. In studies of lakeshore development in Itasca County in northeastern Minnesota, lakeshore housing grew at high rates from 1967 to 1982 (103.4 %). Interestingly, the growth has slowed somewhat between the years of 1982 and 1998 to a 31 percent increase in lakeshore housing<sup>1</sup>. This trend may be well be reflected in the rest of northeastern Minnesota (Carlton, Itasca, Koochiching, St. Louis, Lake, and Cook counties). Although the rate of shoreland housing has slowed from the high rates of the 1970s, the impacts of housing growth are still being felt regionally and statewide. People's idea of a lakeshore "cabin" has changed drastically over the years from a one-room bunkhouse to sprawling lakeshore estates. With the regional economy in the late 1990s booming, the amount of disposable income for people is providing fuel for skyrocketing lakeshore real estate values.

All these factors combine to create pressures on lake resources. With human lakeshore development comes impacts, especially evident if development is inadequately managed. Impacts are manifested as changes in water quality, aesthetics, and aquatic and riparian habitat. However, the impacts are difficult to document because of cumulative long-term effects of continued development.

The University of Minnesota Sea Grant Program and the Minnesota Department of Natural Resources (DNR) designed a survey in 1998 to ascertain the public's perceptions of Minnesota lakes. The project was initiated by the Northeast Region of the Minnesota DNR. Concerns expressed by resource managers within the DNR and other agencies about the declining trend in resource quality spurred a discussion about what can be done. One of the first questions asked was, "Do northeastern Minnesotans have the same concerns?" After further discussions about the intent of the survey, the decision was made to focus not only upon northeastern Minnesota but the state as a whole.

The main goal of the survey was to examine how Minnesotans perceive lakes and related shorelands in Minnesota. Lakes are a public resource, owned in common by all Minnesotans. As such, Minnesotans play a central role in setting the future direction for "their" lakes. This survey offered Minnesotans an opportunity to provide input into public policy discussions about the future management of lake resources. Management programs require public support to be successful. One way to gather that support is to ensure the public has opportunities to affect the design and implementation of the management programs.

The survey is divided into sections, each section addressing a fundamental question about the lake resource. Everyone receiving the survey was asked about the values they ascribe to lakes. However, only those who use lakes, as defined in the survey, were asked to fill out the subsequent

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<sup>1</sup> Tim Kelly and Joe Stinchfield. Lakeshore Development Patterns in Northeast Minnesota: Status and Trends. Minnesota Department of Natural Resources, Office of Management and Budget Services. July 1998.



sections about the lakes with which they were most familiar: reasons for choosing their most-used lake, lake activities, status and trends of lake conditions, impacts on water quality and scenic quality, and possible solutions to lake problems. A concluding section on demographics and other respondent characteristics was completed by all respondents.

## SURVEY METHODS

The survey was mailed to 2,000 individuals in Minnesota. Half of the surveys (1,000) were sent to residents of northeastern Minnesota (Carlton, Itasca, Koochiching, St. Louis, Lake, and Cook counties). The other 1,000 surveys were sent to residents outside the northeast region. The names and addresses for the survey were purchased from Survey Sampling Inc., of Fairfield, Connecticut.

The survey was mailed in April 1998. Up to three follow-up mailings were made to nonrespondents at three-week intervals. A response rate of 49 percent was obtained by the end of the survey period in July 1998.

Because the survey response rate was not higher, a bias check (completed in September 1998) was done in order to determine if non-respondents' answers differed from respondents'. This involved calling non-respondents to ask them a few key questions. In the mail survey responses the major source of bias was interest in the survey topic—a usual source of bias. Lake users were more likely to return the survey than non-lake users. To account for this source of bias, survey results were differentially weighted by frequency of lake use.

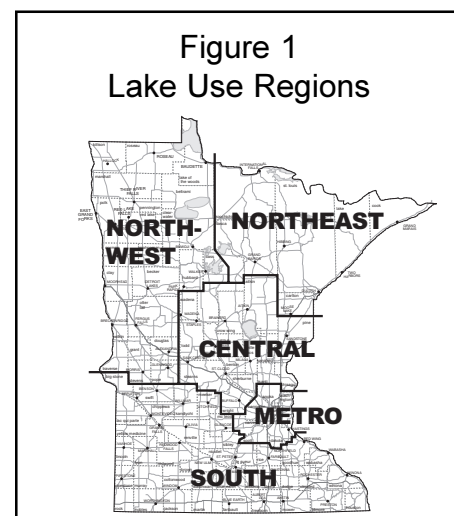
Details of the survey methodology are located in Appendix A.

## DISCUSSION OF RESULTS

This report is a summary description of results obtained from the survey. Results are split into six sections:

- Lake importance
- Lake use
- Status and trends of lake conditions
- Outlook for lakes
- Impacts on lake water quality and scenic beauty
- Possible solution to lake problems.

Most of the discussion focuses on statewide results, although significant differences among lake use regions (Figure 1) are highlighted, as are differences between riparian property owners and other lake users. Differences are highlighted—as a rule—when responses from a region or property owner group differ from the statewide response by at least 10 percent, a large



enough difference to be both meaningful and unlikely due to chance. For more details, see methodological discussion and survey results in Appendix A.

## LAKE IMPORTANCE

Lakes, and other natural resources, can be valued in a wide variety of ways (Table 1). Some of the ways are related to the current use of the resource, including uses for outdoor recreation, aesthetics, ecological (life support) functions, and contributions to local economies. Retaining the option to use lakes in the future is an additional way lakes are valued. Lakes can also be valued regardless of their use; that is, lakes can be viewed as important by an individual whether or not the individual uses them. The survey attempted to gauge all of these preceding values by asking Minnesotans whether they agree or disagree with statements designed to elicit the existence of value in the respondent.

Table 1  
Value Categories

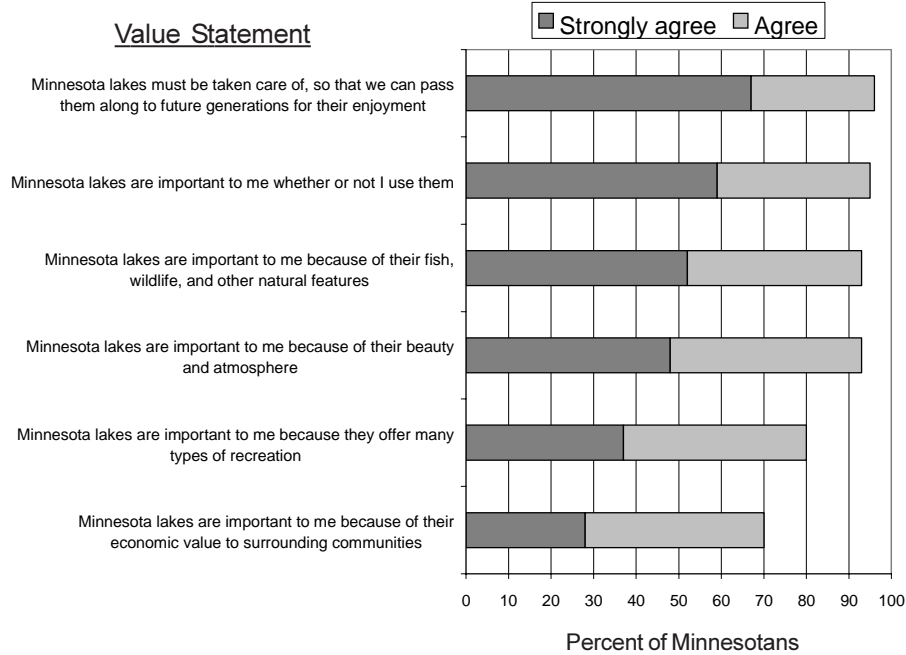
Value Category	Value as stated in survey
Present use	
Aesthetic	Minnesota lakes are important to me because of their beauty and atmosphere
Ecological	Minnesota lakes are important to me because of their fish, wildlife, and other natural features
Economic	Minnesota lakes are important to me because of their economic value to surrounding communities
Recreational	Minnesota lakes are important to me because they offer many types of recreation
Future use	Minnesota lakes must be taken care of, so that we can pass them along to future generations for their enjoyment
Non-use	Minnesota lakes are important to me whether or not I use them

Large portions of the Minnesota population, including those who do not use lakes, value lakes in each of the ways offered in the survey (Figure 2). The most commonly held values by Minnesotans are those dealing with ensuring options for future use (‘Minnesota lakes must be taken care of so that we can pass them along to future generations for their enjoyment’) and the importance of lakes irrespective of use (‘Minnesota lakes are important to me, whether or not I use them’). In terms of present use values, aesthetics and natural features are valued by the most people, and economics by the fewest people. Minnesotans who are regular lake users (including riparian residents), are more likely to hold each value than people who use lakes infrequently or not at all. For example, take the most commonly held value on options for future use. The percent of respondents strongly agreeing that ‘Minnesota lakes must be taken care of so that we can pass them along to future generations for their enjoyment’ increases from 60 percent for those who do not use lakes to 79 percent for those who use lakes a lot (over 30 days each year). In contrast to quantity of use, the region of lake use has little effect on values.

That lakes are seen as important in many different ways by large portions of the population is the major reason lake management is so complicated and difficult. Unless all of these values are addressed together in a comprehensive fashion, management plans will likely be opposed by a

Figure 2

Importance of Lakes to Minnesotans  
(percent who 'strongly agree' or 'agree' with each value statement)



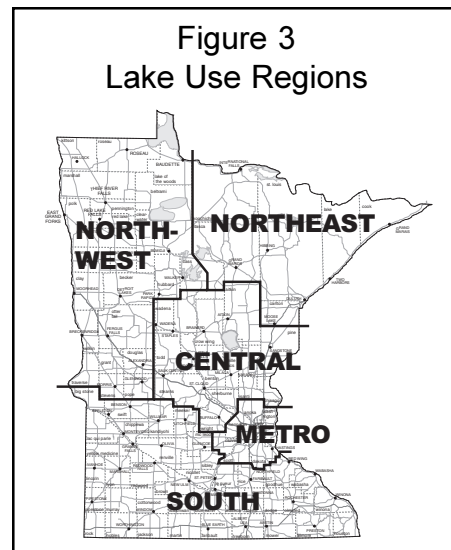
large number of people who feel their values are being ignored. Similarly, to un-complicate or simplify management plans by stressing one value at the expense of another is likely to encounter stiff opposition from those whose values are being compromised or overlooked.

### LAKE USE

Most Minnesotans (77%) who responded to the survey used lakes at least one time in the last year. Lake use is defined in the survey as, “any on-water activity like fishing, boating or any other activity that is enhanced by the presence of lakes, such as camping, sightseeing, or living in a shoreland home.” Of those who use lakes, the median number of days of use per year is 20 and the mean is 55. Riparian property owners, not surprisingly, have higher rates of use: a median of 60 days and a mean of 135 days per year.

Lake users were asked to specify the Minnesota region they use most. The top-ranked region is the central region (26% of lake users reported this region as their top-use region, see Figure 3). The central region includes the Brainerd lakes

Figure 3  
Lake Use Regions



area, a very popular water-recreation destination. The remaining regions in declining order are: metro region (23 percent of lake users), southern region (21 percent), north-west region (16 percent), and northeast region (14 percent).

Within their *most-used lake region*, respondents were asked to identify their *most-used lake* and to indicate why they chose this particular lake. The leading reason for selecting the most-used lake has to do with convenience ('close to home', see Table 2). Other reasons reported by over 40 percent of lake users include 'scenic,' 'good fishing,' 'quiet' and tradition ('have gone for years').

**Table 2**

What are your reasons for choosing to visit the lake you use most?  
(reasons given by more than 25% of lake users from a list of 30 reasons)

Reason	Percent Choosing Reason
Close to home	69
Scenic	54
Good fishing	45
Quiet	45
Have gone for years	40
Good boat access	39
Inexpensive place to recreate	36
Good road access	36
Good water quality	32
Wildlife in area	31
Small lake	29
Friends on lake	28
Few people	27
Large lake	27
Good swimming	27

Reasons people select their most-used lake are tied to the values they hold for lakes. Selecting a lake for scenery and quiet are a manifestation of the strongly held value that lakes are important for their beauty and atmosphere. Likewise, good fishing and good boat access are linked to the importance of lakes for recreation. Good fishing probably overlaps with the value of lakes for their life-support functions ('fish, wildlife and other natural features').

Reasons for choosing a most-used lake are shared widely among regions of the state. The metro region differs in a few regards, although metro lake users share the top two reasons with lake users statewide. Metro lake users give higher rankings to reasons of 'cheap to recreate,' 'good swimming,' and 'good beaches;' and lower rankings to reasons of 'good fishing,' 'quiet,' 'have gone for years,' 'good water quality,' and 'wildlife in area.'

Riparian property owners—with the exception of the specific reason 'have property'—share the top reasons for choosing a lake with lake users statewide.

Lakes are settings for a wide variety of activities, which, as noted above, are important factors in the selection of lakes to use. The top-ranked activity category is fishing (73% of lake users participated in one of the four types of fishing, see Table 3). It is followed by socializing, appreciating aesthetics/nature, non-fishing boating, and swimming. If non-fishing boating is combined with fishing from boats, the general category 'boating' (not shown on the table) would be the

highest-ranked activity (81% would participate in ‘boating’).

Of the specific activities, ‘enjoying lake or river scenery’ is participated in the most (64% of lake users). This is followed by fishing from motorized boats (57%), socializing with friends and family (54%), and swimming or wading (49%). The prevalence of activity participation does not differ greatly from region to region in the state, except in the metro region where fishing is less prevalent (46% of metro lake users fish). Nor does participation differ greatly between those who own riparian property and those who do not, except for those activities directly related to home/cabin ownership.

Table 3

Activity Participation In and Around the Lake Used Most

Activity Category	Specific Activity	Percent Participating
<b>Fishing</b>		<b>73</b>
	Fishing from motorized boats	57
	Fishing from shore	42
	Ice fishing	30
	Fishing from non-motorized boats	14
<b>Socializing</b>		<b>70</b>
	Socializing with friends and family	54
	Picnicking/camping on lakeshore	32
	Enjoying bonfires along shore	25
	Attending water front events	8
<b>Appreciating Aesthetics/Nature</b>		<b>67</b>
	Enjoying lake or river scenery	64
	Bird watching or studying nature	29
	Painting or photography	8
<b>Non-Fishing Boating</b>		<b>57</b>
	Pleasure boating (motorized)	40
	Canoeing/kayaking/paddleboating	21
	Water skiing, kneeboarding, etc.	18
	Operating personal watercraft (Jet Skis™)	5
	Sailing	4
	Windsurfing	2
<b>Swimming</b>		<b>49</b>
	Swimming/wading	49
	SCUBA diving	2
<b>Home/Cabin</b>		<b>33</b>
	Spending time at lakeshore home or cabin	33
<b>Trail Use</b>		<b>25</b>
	Using trails along shore for hiking, skiing, or mountain biking	21
	Using trails along shore for riding ATV's or snowmobiling	5
<b>Rock Picking/Collecting</b>		<b>21</b>
	Skipping rocks	17
	Collecting rocks or shells	13
<b>Snowmobiling</b>		<b>12</b>
	Snowmobiling on lakes/rivers	12

## STATUS AND TRENDS OF LAKE CONDITIONS

The survey explored people’s perceptions about the conditions of lakes. The intent was to have Minnesotans answer two general questions about lakes with which they are familiar: (1) What is the condition of Minnesota lakes and their immediate environs? and (2) Are these conditions getting better or worse?

To get answers to these general questions, specific survey questions were developed within four theme areas. The theme areas were selected to represent the broad dimensions of potential concerns about the lake resource. Not all aspects of potential lake-related concerns can be assessed in a single survey, because the list of possible topics is quite large. But, enough can be assessed to get a good sense of the level of concern people have about important dimensions of the lake resource.

The first theme deals with ‘big picture’ aspects of the lake resource: water quality, scenic quality and the overall condition of lake and shoreland areas (Table 4). These assessments of general (or overall) conditions form an effective context for evaluating more specific topics. The next theme is water recreation. The emphasis in this theme is on water recreation topics that are linked closely to resource conditions (as opposed to social or managerial conditions): water quality and the lake fishery. Topics dealing with fish and wildlife resources constitute the third theme. The fourth theme focuses on shoreland conditions, and probes the conditions of the riparian zone and its use for shoreland housing.

Theme	Indicator Item in Survey
Overall conditions	Overall condition of lake and shoreland areas Water quality Scenic quality of lake and shoreland areas
Water recreation	Fishing Keeper-size pan and game fish Level of fish contamination Motorized watercraft
Fish, wildlife & other aquatic resources	Diversity of birds and wildlife Fish habitat Rooted vegetation near shore Floating algae and/or scum on the surface Presence of exotic species (such as Eurasian watermilfoil, purple loosestrife, etc.) Loons
Shoreland conditions	Shoreland housing Natural shoreline vegetation (trees and shrubs) Condition of land area close to the shoreline (0-100 ft. from shore) Condition of land away from the shoreline (100-1000 ft. from shore)

It is important when reading this section to keep in mind ‘who’ is responding about ‘what.’ The ‘who’ is Minnesota lake users (non-users are excluded) and the ‘what’ are the specific lakes they use most. Lake users are not being asked to comment about lakes with which they have no direct experience. Rather, they are explicitly being asked to assess the lakes with which they have a history of use, and presumably, with which they have a large degree of familiarity. Results indi-

cate that the length of this history of use is, on average, relatively long: a mean of 19 years and a median of 16 years. In other words, the survey makes every attempt to tap into lake users' history of direct experience, and have them evaluate the lakes they know well.

Overall Conditions

Lake users mainly give positive ratings (70% 'good' to 'excellent') to the overall condition of the lake they use most often (Table 5). Very few (3%) give clearly negative ratings, while 26 percent give 'fair' ratings. Ratings are higher for users of the northern regions, especially the northeast region, where 80 percent of users give positive ratings. Riparian property owners perceive conditions about the same as other lake users.

Since beginning their history on their most-used lake, nearly two-thirds of lake users (63%) have experienced little change in overall conditions ('remained about the same'). For those who report a trend, more report worsening conditions (21%) than improving conditions (12%). Differences in trend responses by region of use are not large. Riparian property owners are more likely to report worsened conditions (32%) than other lake users.

Water quality is given lower ratings than the preceding overall lake-shoreland conditions. There are fewer positive ratings ('good' to 'excellent' responses), and more 'fair' to 'poor' ratings. Water quality is judged better in the northern regions, especially the northeast region, where positive ratings reach 71 percent of all responses. In the metro area, water quality receives the fewest positive responses (42% or responses), but poor ratings in the

**Table 5**  
**Theme: Overall Conditions**

Overall condition of lake and shoreland areas			
Current condition	Percent of Responses	Trend	Percent of Responses
Excellent	6	Improved	12
Good	64	Remained about the same	63
Fair	26	Worsened	21
Poor	3		
Don't know	2	Don't know	5
Total percent	100	Total percent	100

Water quality			
Current condition	Percent of Responses	Trend	Percent of Responses
Excellent	9	Improved	11
Good	47	Remained about the same	56
Fair	33	Worsened	24
Poor	8		
Don't know	3	Don't know	9
Total percent	100	Total percent	100

Scenic quality of lake and shoreland areas			
Current condition	Percent of Responses	Trend	Percent of Responses
Excellent	17	Improved	9
Good	56	Remained about the same	67
Fair	25	Worsened	18
Poor	2		
Don't know	4	Don't know	6
Total percent	100	Total percent	100

metro are largely the same as elsewhere. Riparian property ownership has little effect on responses.

Trends in water quality follow the same pattern as that reported above for the trend in overall lake and shoreland conditions: the majority of lake users see little change (56%). For those who see a change, worsened conditions (24%) predominate over improved conditions (11%). Differences in trend perceptions do not vary substantially by riparian ownership status or region of use. The only notable difference existed for users of the northeast region, where more users (67% of responses) report conditions ‘remained about the same.’

Scenic quality is rated the highest in this overall theme group. Nearly three-fourths (73%) of lake users rate scenic quality for the lake they use most as ‘good’ to ‘excellent.’ Users of lakes in the northeast give the highest ratings (84 % ‘good’ to ‘excellent’), while users in the metro area give the lowest ratings (59% ‘good’ to ‘excellent’). ‘Poor’ ratings are still rare in the metro area, however, and comprise only 6 percent of responses. Riparian property ownership has little effect on responses.

The most frequently reported trend for scenic quality is ‘remained about the same’ or little change. Once again, for those indicating a change, reports of worsening conditions are more frequent than reports of improved conditions. Perceived trends are largely the same from region to region and by riparian ownership status.

### Water Recreation

The water recreation items are those that are most closely connected to the lake resource: water quality and the lake fishery. Other recreation concerns (such as recreation facility adequacy) were not addressed in the survey. For all the recreation survey items, responses are given for *all* lake users and for *anglers*, because most of the recreation items are fishing related. Lake users who did not fish are far more likely to respond ‘don’t know’ to these questions, indicating a lack of experience with the queried items. Except for the ‘don’t know’ responses, differences between anglers and all lake users are not substantial for the survey items. Anglers represent 68 percent of all lake users, and are identified by answers to question 6 in the survey on lake-related recreation activities (any type of ice or open water fishing identified a respondent as an angler).

Most anglers (89% of responses) give ‘fair’ to ‘good’ ratings to fishing on the lake they use most (Table 6). Few report either ‘poor’ (5%) or ‘excellent’ (5%) conditions. This response pattern is similar to that for water quality above. Riparian property owners who fish are slightly more likely to give lower ratings than other anglers. Anglers whose most-used lakes are in the central region responded with higher positive (‘good’ to ‘excellent’) ratings (60% of responses), and those whose most-used lake is in southern Minnesota responded with lower positive ratings (33% of responses).

With respect to fishing trends, a slight majority of anglers (56%) report no change. A fairly large portion (30%) indicate worsened conditions, and 8 percent indicate improved conditions. Re-



**Table 6**  
**Theme: Water Recreation**

<b>Fishing</b>					
<b>Current condition</b>	<b>Percent of All Responses</b>	<b>Percent of Angler Responses</b>	<b>Trend</b>	<b>Percent of All Responses</b>	<b>Percent of Angler Responses</b>
Excellent	3	5	Improved	7	8
Good	36	46	Remained about the same	45	56
Fair	37	43	Worsened	26	30
Poor	6	5			
Don't know	18	2	Don't know	22	6
Total percent	100	100	Total percent	100	100

<b>Keeper-size pan and game fish</b>					
<b>Current condition</b>	<b>Percent of All Responses</b>	<b>Percent of Angler Responses</b>	<b>Trend</b>	<b>Percent of All Responses</b>	<b>Percent of Angler Responses</b>
Too much	0	0	Increased	2	3
About right	43	55	Remained about the same	43	54
Too little	32	38	Decreased	27	32
Don't know	25	7	Don't know	29	11
Total	100	100	Total	100	100

<b>Level of fish contamination</b>					
<b>Current condition</b>	<b>Percent of All Responses</b>	<b>Percent of Angler Responses</b>	<b>Trend</b>	<b>Percent of All Responses</b>	<b>Percent of Angler Responses</b>
Major problem	6	7	Increased	20	21
Moderate problem	14	16	Remained about the same	36	45
Minimal problem	27	34	Decreased	3	4
Not a problem	15	18			
Don't know	38	25	Don't know	41	29
Total	100	100	Total	100	100

<b>Motorized watercraft</b>					
<b>Current condition</b>	<b>Percent of All Responses</b>	<b>Percent of Angler Responses</b>	<b>Trend</b>	<b>Percent of All Responses</b>	<b>Percent of Angler Responses</b>
Too much	29	29	Increased	52	58
About right	59	65	Remained about the same	34	34
Too little	1	1	Decreased	1	1
Don't know	10	5	Don't know	13	7
Total	100	100	Total	100	100

gional differences are slight with respect to trend perceptions. Riparian property owners who fish are more likely to report ‘worsened’ fishing (43% of responses) than other anglers.

Concerning keeper-size pan and game fish, a fairly large portion of anglers (38%) report ‘too few,’ although a slight majority (55%) report about the right number of keepers. A similar majority (54%) report a trend of ‘remained about the same.’ Almost a third of anglers (32%) indicate a decrease in keeper-size fish; few indicate an increase. Neither perception of trends nor current conditions vary significantly by region of use. Riparian property owners who fish, however, are more likely to report ‘too little’ for the abundance of keeper-size fish (53% of responses) than other anglers, and are more likely to report a decrease over time (45% of responses).

Fish contamination levels are a ‘major’ or ‘moderate’ problem to 23 percent of anglers. They are a slight or nonexistent problem to a majority of anglers (52 %). One-fourth of anglers ‘don’t know’ enough about this topic to comment. A similar fraction (29%) did not know enough about trends to indicate direction over time. For those who felt confident enough to indicate a trend, most report ‘remained about the same’ (45%), and most of the others report an increase (21%).

Riparian property ownership has little effect on fish-contamination responses. Some regions did stand out as being different from the state as a whole. Anglers who fish in the metro area, are more likely to judge contamination levels as a ‘major’ or ‘moderate’ problem (44 % of metro anglers). And anglers who use southern lakes are more likely to indicate (38% of responses) that contamination levels increased on the lake they use most.

Motorized watercraft are judged to be ‘about right’ in terms of numbers by nearly two-thirds of anglers (most anglers fish from motorized boats) and nearly 60 percent of all lake users. The other third, however, report ‘too much,’ while almost no one reports ‘too little.’ With respect to trends, there is little doubt about the perceived direction: nearly 60 percent of anglers report an increase, and nearly everyone else reports no change.

Perceptions of motorized watercraft use are not significantly affected by region of lake use or riparian property ownership.

### Fish, Wildlife and Other Aquatic Resources

Response patterns described above basically apply, with varying intensities, to the items in this theme (Table 7 & 8). The pattern is for most lake users to judge current conditions on the lake they use most as ‘about’ right, and to judge the trend in conditions as ‘remained about the same’ or little change. When they note a change, more users indicate a trend to poorer conditions than to better conditions. In addition, examining responses by region of use and riparian property ownership leads to only a small number of differences that are noteworthy.

A high proportion of lake users (69%) view the diversity of birds and wildlife on the lake they use most as ‘about right’, and nearly as many perceive conditions as having ‘remained about the same’ (68%). Northwest and northeast lake users respond with a higher proportion of ‘about right’

**Table 7**  
**Theme: Fish, Wildlife and Other Aquatic Resources**

<b>Diversity of birds and wildlife</b>			
<b>Current condition</b>	<b>Percent of Responses</b>	<b>Trend</b>	<b>Percent of Responses</b>
Too much	2	Increased	4
About right	69	Remained about the same	68
Too little	17	Decreased	11
Don't know	13	Don't know	17
Total percent	100	Total percent	100

<b>Fish habitat</b>					
<b>Current condition</b>	<b>Percent of All Responses</b>	<b>Percent of Angler Responses</b>	<b>Trend</b>	<b>Percent of All Responses</b>	<b>Percent of Angler Responses</b>
Too much	0	0	Increased	2	2
About right	56	68	Remained about the same	51	63
Too little	18	21	Decreased	18	21
Don't know	26	11	Don't know	29	14
Total percent	100	100	Total percent	100	100

<b>Rooted vegetation near shore</b>			
<b>Current condition</b>	<b>Percent of Responses</b>	<b>Trend</b>	<b>Percent of Responses</b>
Too much	17	Increased	19
About right	60	Remained about the same	56
Too little	9	Decreased	9
Don't know	15	Don't know	15
Total percent	100	Total percent	100

<b>Floating algae and/or scum on the surface</b>			
<b>Current condition</b>	<b>Percent of Responses</b>	<b>Trend</b>	<b>Percent of Responses</b>
Too much	38	Increased	34
About right	45	Remained about the same	46
Too little	2	Decreased	5
Don't know	16	Don't know	15
Total percent	100	Total percent	100

responses (80% to 84%), while metro users respond with a lower portion of ‘about right’ (50%) and a higher proportion of ‘too little’ (25%). Riparian property owners also respond with a high fraction of ‘about right’ responses (85%). With respect to trends, neither region of use nor riparian property ownership has any substantial effect on responses.

Fish habitat evaluations are given for all lake users and anglers, because (as above with fishing-related recreation), non-anglers are less confident in their assessments of fishing items, as evidenced by their large number of ‘don’t know’ responses. Responses by anglers for fish habitat are nearly the same as the responses in the preceding paragraph about diversity of birds and wildlife: nearly 70 percent think conditions are ‘about right’ on the lake they use most, and nearly two-thirds report ‘remained about the same’ for the change they personally experienced on their most-used lake. Once again, for those who reported a trend, worsening conditions (in this case ‘decreased’ fish habitat) are reported by more anglers (21%) than improved conditions (2%).

Region-of-use differences are not sizable for either the current condition or trends in fish habitat. Riparian owners who fish, however, do perceive some differences from other anglers. Riparian owners more frequently see ‘too little’ fish habitat (37%), and more see ‘decreased’ habitat over time (37%). This same group—as presented above—gave lower ratings to the condition of the recreational fishery, and more saw a worsening trend than other anglers.

Rooted aquatic vegetation abundance is more likely to be judged as ‘about right’ than floating algae, which has a relatively high proportion of ‘too much’ responses (38%). The trend for algae is skewed toward ‘increase’ abundance, much more so than for rooted aquatics. Algae is seen as particularly high in the south; it is judged ‘too much’ by 61 percent of lake users in southern Minnesota. These same southern lake users are much more likely to report an ‘increased’ trend in algae (50% of responses). In contrast, users of lakes in the northern and central regions give far lower ‘too much’ algae responses (24% to 28% of responses), and are less likely to indicate an increase in algae (23%).

**Table 8**  
Theme: Fish, Wildlife and Other Aquatic Resources (continued)

Presence of exotic species (such as Eurasian watermilfoil, purple loosestrife etc.)			
Current condition	Percent of Responses	Trend	Percent of Responses
Major problem	11	Increased	25
Moderate problem	11	Remained about the same	25
Minimal problem	19	Decreased	2
Not a problem	21		
Don't know	38	Don't know	48
Total percent	100	Total percent	100

Loons			
Current condition	Percent of Responses	Trend	Percent of Responses
Too much	1	Increased	4
About right	45	Remained about the same	56
Too little	38	Decreased	16
Don't know	16	Don't know	25
Total percent	100	Total percent	100

Response differences due to riparian ownership are minor for algae and rooted aquatics, and regional differences are minor for rooted aquatics.

Exotic species are viewed as a ‘major’ or ‘moderate’ problem by 22 percent of lake users. Many lake users (38%) did not know enough about exotics to feel confident in answering the question. A similarly large percent responded ‘don’t know’ to the trend in exotics on the lake they use most. In terms of trends, more lake users indicate an increase than a decrease.

Metro lake users are the most likely to judge exotics as a ‘major’ or ‘moderate’ problem (38%), perhaps because of the number of metro lakes with infestations of Eurasian watermilfoil. They are also the most likely to indicate an increase in the problem (38%). The reverse is true for lake users in the northwest and northeast. There, the level of the problem is viewed as less (10% to 12% ‘major’ or ‘moderate’ problem), and the frequency of ‘increase’ responses is lower (12% to 13%). Riparian property owners are less likely to say they do not know about the current exotics situation than other lake users, and more likely to indicate that exotics are not a problem (34% of responses). Riparian property owners are no different in their view of trends, however.

Loons—indicative of solitude and little human impact on natural lake habitat—are seen as ‘too little’ in terms of abundance by 38 percent of all lake users. In the northwest and northeast, where loons have historically been common, a high portion of lake users give ‘about right’ responses (70% to 71%), fewer give ‘too little’ responses (19% to 25%), and about two-thirds (63% to 70%) indicate ‘remained about the same’ for the change on the lake they use most. Users of the central region are also more likely than lake users statewide to give ‘about right’ responses to current conditions (58%). Riparian property owners, too, are more likely to give ‘about right’ responses (61% of responses), which is not surprising since most riparian property owners have their most-used lake in the northern and central regions.

### Shoreland Conditions

Responses for shoreland items are presented for all lake users as well as riparian property owners, because riparian property owners have a large interest in, and direct effect on, shoreland areas.

The conditions of the natural shoreline vegetation, condition of land near the shore, and condition of land away from the shore are judged as being in pretty good shape by lake users for the lake they use most (Table 9). Nearly 80 percent perceive natural shoreline vegetation as ‘about right’ and some 60 percent see the condition of land near and away from shore as ‘good’ to ‘excellent’. Few see the land near and away from shore as ‘poor.’ With respect to trends for these items, 60 to 70 percent of lake users see conditions as having ‘remained about the same.’ For those who perceive a trend, the typical pattern emerges: more see worsening conditions than improved conditions. Region of lake use and riparian property ownership do not substantially affect responses to current conditions or trends for these shoreland items.

There is a good deal of statewide consensus on shoreland housing. A slim majority sees current conditions as ‘about right,’ while most of the rest see ‘too much’ housing. The trend is decidedly

**Table 9**  
**Theme: Shoreland Conditions**

<b>Natural shoreline vegetation (trees and shrubs)</b>					
<b>Current condition</b>	<b>Percent of All Responses</b>	<b>Percent of Riparian Owner Responses</b>	<b>Trend</b>	<b>Percent of All Responses</b>	<b>Percent of Riparian Owner Responses</b>
Too much	2	3	Increased	5	2
About right	74	79	Remained about the same	64	69
Too little	16	15	Decreased	18	25
Don't know	7	3	Don't know	14	4
Total	100	100	Total	100	100

<b>Condition of land area close to shoreline (0-100 ft. from shore)</b>					
<b>Current condition</b>	<b>Percent of All Responses</b>	<b>Percent of Riparian Owner Responses</b>	<b>Trend</b>	<b>Percent of All Responses</b>	<b>Percent of Riparian Owner Responses</b>
Excellent	7	3	Improved	8	3
Good	55	58	Remained about the same	63	62
Fair	28	29	Worsened	18	28
Poor	5	6	Don't know	11	7
Don't know	5	4	Total	100	100
Total	100	100			

<b>Condition of land area away from shoreline (100-1000 ft. from shore)</b>					
<b>Current condition</b>	<b>Percent of All Responses</b>	<b>Percent of Riparian Owner Responses</b>	<b>Trend</b>	<b>Percent of All Responses</b>	<b>Percent of Riparian Owner Responses</b>
Excellent	8	7	Improved	8	0
Good	55	56	Remained about the same	67	71
Fair	25	24	Worsened	10	18
Poor	2	4	Don't know	15	11
Don't know	10	9	Total	100	100
Total	100	100			

<b>Shoreland housing</b>					
<b>Current condition</b>	<b>Percent of All Responses</b>	<b>Percent of Riparian Owner Responses</b>	<b>Trend</b>	<b>Percent of All Responses</b>	<b>Percent of Riparian Owner Responses</b>
Too much	36	39	Increased	51	59
About right	50	53	Remained about the same	35	36
Too little	2	3	Decreased	1	0
Don't know	12	5	Don't know	13	5
Total percent	100	100	Total percent	100	100

skewed toward ‘increased’ housing. Riparian property owners are in general agreement with other lake users on shoreland housing. Most region of use differences are minor, too. The only notable difference is for the northwest, where lake users give fewer ‘too much’ responses (19%) and more ‘about right’ responses (63%).

## OUTLOOK FOR LAKES

The preceding section describes lake users’ views of current conditions and recent trends. This section examines their future prospects for the lake resource. Their outlook is examined for lake water quality and scenic beauty on the lakes in the region they use most.

The outlook of lake users has a lot in common with their perception of recent trends. In their outlooks, the largest group of lake users still expects conditions to remain the same (Table 10). More users, however, when compared with their perception of recent history, either expect conditions to improve or worsen. For water quality, the portion that expects improvements is nearly as large as the portion that expects conditions to worsen. For scenic beauty, the portion expecting improvements is smaller than that expecting worse conditions.

		Responses (percent)				
		----- Improve(d)	... Remain(ed) about the same	----- Worsen(ed)	Don't Know	Total Percent
<b>WATER QUALITY</b>						
History:	In general, <b>over the last ten years</b> , lake water quality in the region I use most has ...	13	51	22	14	100
Outlook:	In general, <b>over the next ten years</b> , I expect lake water quality in the region I use most to ...	26	40	28	7	100
<b>SCENIC QUALITY</b>						
History:	In general, <b>over the last ten years</b> , scenic beauty of lakes in the region I use most has ...	12	59	22	7	100
Outlook:	In general, <b>over the next ten years</b> , I expect lake scenic beauty in the region I use most to ...	18	50	26	5	100

There are few regional distinctions worth noting for water quality history or outlook, or for scenic beauty history or outlook. And lake users who owned riparian property have basically the same views on all of these questions as other lake users.

Only metro region lake users have a slightly different perspective on one topic: outlook on water quality. Metro lake users are more polarized than those in other regions: more users expect improvements (36%), more expect conditions to worsen (38%), and fewer expect conditions to

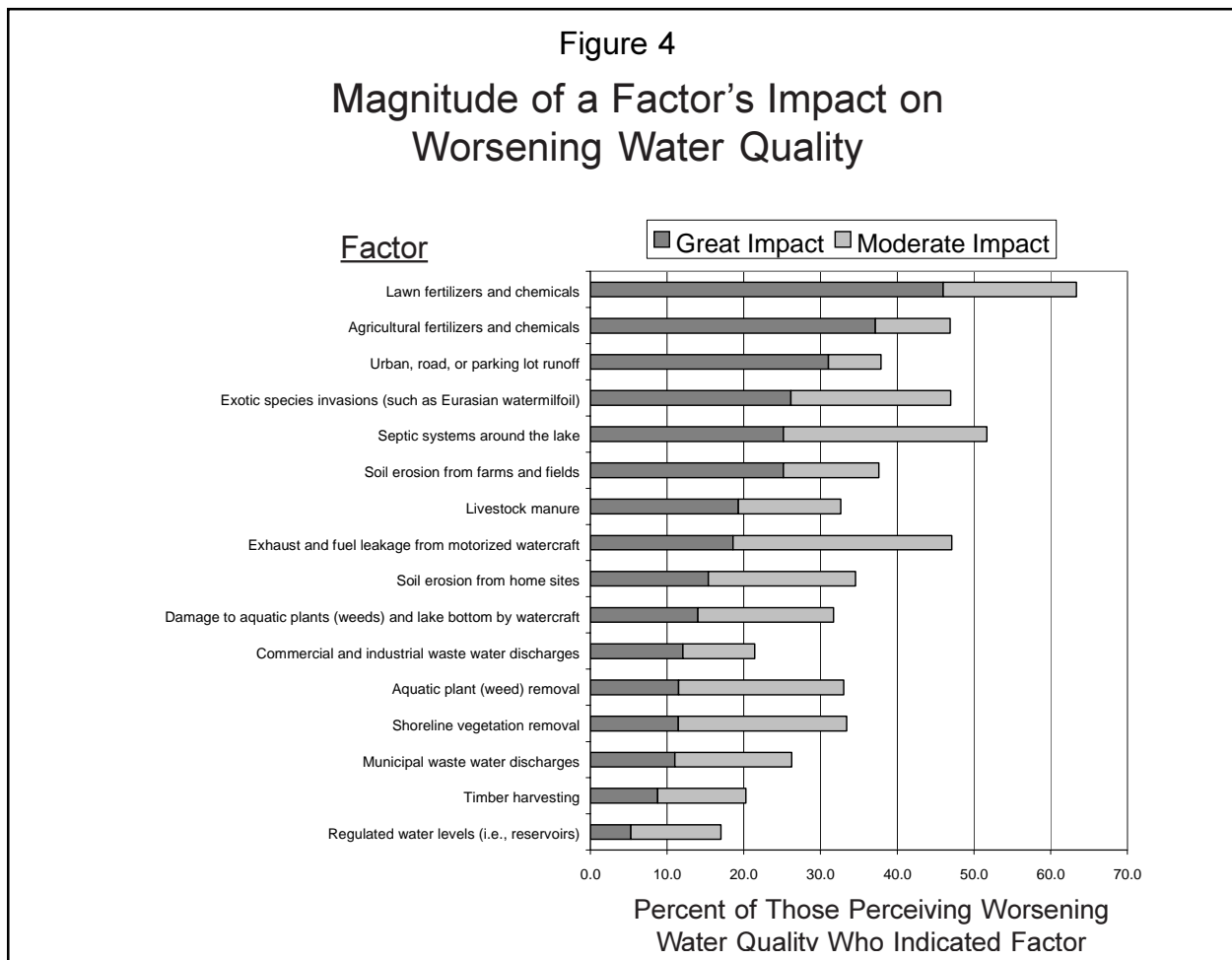
remain about the same (23%).

The outlooks are a little more optimistic than perceptions of recent history, as judged by the gap between ‘worsen’ and ‘improve’ responses. But worsen responses still exceed (albeit by narrower margins) improve responses, and the largest response category is for conditions to remain the same. Improvement, overall, is not expected, even though there is room for improvement in the perceptions of current water and scenic quality (as indicated in a previous section). Neither water nor scenic quality is seen by many lake users as predominately ‘excellent,’ although both are seen as in pretty good shape (mainly ‘good’ to ‘excellent’).

## IMPACTS ON LAKE WATER QUALITY AND SCENIC BEAUTY

Lake users were asked to identify the major factors that contribute to changes in water and scenic quality on the lakes they use most. Specifically, lake users were asked to evaluate each factor according to its degree of impact: great, moderate, slight and none.

For the one-third of lake users who indicated a worsening in water quality of the lake they use





most, the leading factors associated with that change are related to runoff from lawns, fields and urban surfaces (Figure 4). Septic systems are also a leading factor associated with declining water quality: about one-quarter identify septic systems as a ‘great’ impact and another quarter identify it as a ‘moderate’ impact. Far down on the list of frequent impact identifications are wastewater discharges from commercial, industrial or municipal sources. Exotic species are nearly equivalent to septic systems, a leading factor. Vegetation removal (shoreline, aquatic plant and timber harvest) are all identified infrequently as significant impacts. Exhaust and fuel leakage from motorized watercraft is frequently identified as having at least a ‘moderate impact,’ but is less frequently identified as having a ‘great’ impact.

Lake users who own riparian property are in good agreement with other lake users on the impacts associated with declining water quality. Regionally, however, there is much less consensus among lake users, mainly because the regional landscapes are so different. In agricultural regions (northwest and especially the south), agricultural factors become more important (Table 11). In the metro region, urban factors are more important, and on-site septic systems (not that common in the metro region) are less important. Exotic species rank high in the metro region, perhaps because of the number of metro lakes with infestations of Eurasian watermilfoil. In the northeast and central and northwest, which have high numbers of shoreland homes, septic systems are the leading factor. In the northeast, timber harvesting becomes a top-ranked factor.

**Table 11**  
**Top-Ranked Factors Impacting Water Quality by Region**  
 (factors ranked on the percent of ‘great’ plus ‘moderate’ impact responses)

<b>Northwest Region</b>		<b>Northeast Region</b>	
Rank	Factor	Rank	Factor
1	Septic systems around the lake	1	Septic systems around the lake
2	Agricultural fertilizers and chemicals	2	Lawn fertilizers and chemicals
3	Exhaust and fuel leakage from motorized watercraft	3	Exhaust and fuel leakage from motorized watercraft
4	Lawn fertilizers and chemicals	4	Timber harvesting
5	Soil erosion from farms and fields	5	Urban, road, or parking lot runoff

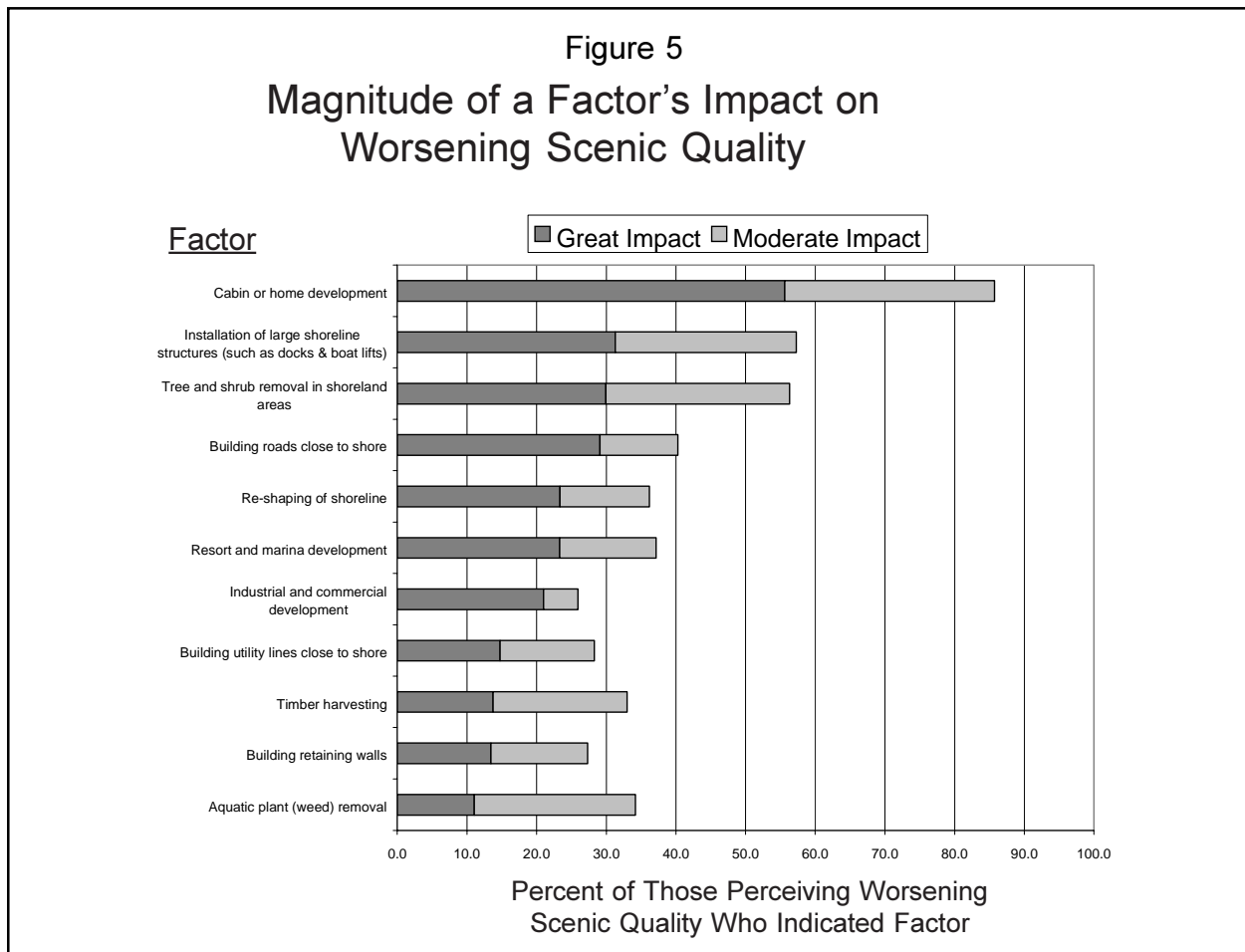
  

<b>South Region</b>		<b>Central Region</b>	
Rank	Factor	Rank	Factor
1	Agricultural fertilizers and chemicals	1	Septic systems around the lake
2	Lawn fertilizers and chemicals	2	Lawn fertilizers and chemicals
3	Septic systems around the lake	3	Exhaust and fuel leakage from motorized watercraft
4	Soil erosion from farms and fields	4	Aquatic plant (weed) removal
5	Livestock manure	5	Shoreline vegetation removal

<b>Metro Region</b>	
Rank	Factor
1	Lawn fertilizers and chemicals
2	Urban, road, or parking lot runoff
3	Exhaust and fuel leakage from motorized watercraft
4	Exotic species invasions (such as Eurasian watermilfoil)
5	Soil erosion from home sites

In contrast to water quality, the ranking of factors associated with declining scenic quality is far more widely shared among the regions. There is also agreement between lake users who own riparian property and those who do not. The top factor—identified by those 25 percent of lake users who perceived a decline in scenic quality on the lake they use most—is clearly shoreland home construction (Figure 5). Over half identified cabin or home development as having a ‘great’ impact on declining scenic quality. Next in importance are other types of shoreland development: installation of large shoreline structures (such as docks and boat lifts) and road construction near shore. Vegetation (tree and shrub) removal in shoreland areas is the third most frequently mentioned factor impacting scenic quality. Commercial and industrial developments, including resorts and marinas, are not regularly identified as having major impacts.



## POSSIBLE SOLUTIONS TO LAKE PROBLEMS

The survey explored peoples' opinions about possible solutions to problems they identified for the lake they use most. Specifically, lake users were asked whether they support or oppose each of 17 solutions to address problems on their most-used lake. The 17 solutions were selected to represent four broad categories of solutions: education, management, regulation/enforcement, and incentives (Table 12). The intent is to examine support for solutions not only on an item-by-item basis, but also by category, to see if certain categories are clearly preferable in the public's mind to others. For example, does the public believe that regulation is preferable to education or incentives to solve practical problems? Or, is education the alternative with the most support?

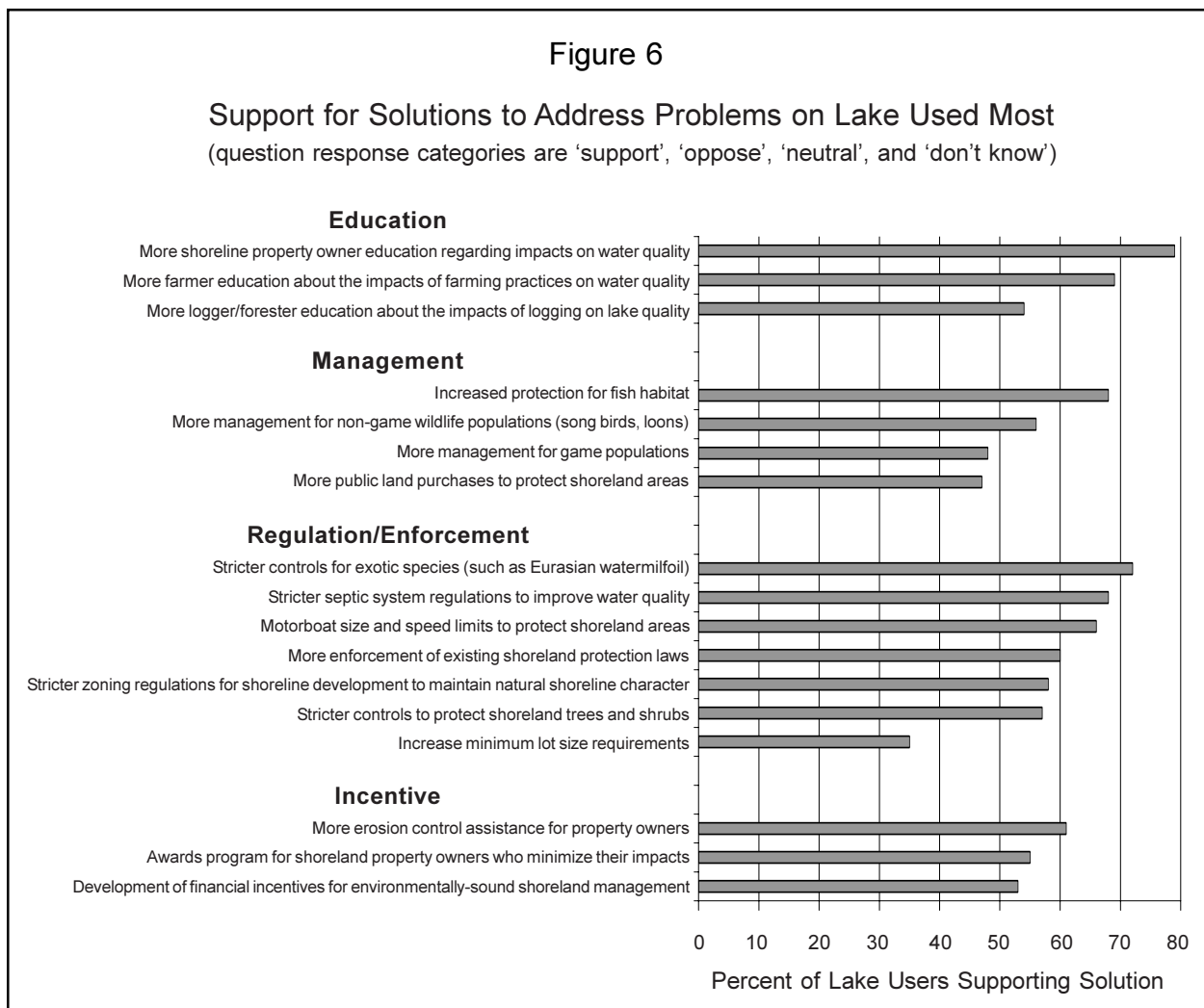
Category	Possible Solution
<b>Education:</b>	<ul style="list-style-type: none"> <li>More shoreline property owner education regarding impacts on water quality</li> <li>More farmer education about the impacts of farming practices on water quality</li> <li>More logger/forester education about the impacts of logging on lake quality</li> </ul>
<b>Management:</b>	<ul style="list-style-type: none"> <li>Increased protection for fish habitat</li> <li>More management for non-game wildlife populations (song birds, loons)</li> <li>More management for game populations</li> <li>More public land purchases to protect shoreland areas</li> </ul>
<b>Regulation/Enforcement:</b>	<ul style="list-style-type: none"> <li>Stricter controls for exotic species (such as Eurasian watermilfoil)</li> <li>Stricter septic system regulations to improve water quality</li> <li>Motorboat size and speed limits to protect shoreland areas</li> <li>More enforcement of existing shoreland protection laws</li> <li>Stricter zoning regulations for shoreline development to maintain natural shoreline character</li> <li>Stricter controls to protect shoreland trees and shrubs</li> <li>Increase minimum lot size requirements</li> </ul>
<b>Incentive:</b>	<ul style="list-style-type: none"> <li>More erosion control assistance for property owners</li> <li>Awards program for shoreland property owners who minimize their impacts</li> <li>Development of financial incentives for environmentally-sound shoreland management</li> </ul>

The educational category of solutions deals with the supply of information to shoreland property owners, farmers, and loggers about their impacts on the lake resource. The management category deals with techniques that can be carried out by agencies charged to administer natural resource management programs. It includes fish habitat protection, management for game and nongame populations, and public land purchases.

The regulation and enforcement category focuses mainly on lessening the impacts of shoreland development through stricter controls or more enforcement of existing controls. The final category is incentive programs, which are another way to encourage people to reduce their impacts

on the lake environment. Incentives included awards for sound shoreland management and erosion control assistance.

In general, there is statewide support for proposed solutions regarding lakes in Minnesota (Figure 6). Although there are differences in support for each solution, generally the level of support was high for all four categories of solutions (most above 50% supporting); education, management, regulation, and incentives. None of the categories appears to be clearly preferable in the public’s mind. The level of opposition for solutions regarding lakes is low and ranged from 1 to 17 percent with most opposition below 10 percent.



### Educational Solutions

Statewide, there is much support for educational programs that address shoreline property owners and farmers about their potential impacts on water quality (79% and 69% supporting, respec-

tively). Slightly fewer people (54%) support more educational programs targeting loggers' and foresters' impacts on lake quality. More people are neutral or don't know about logger or forester education as compared with shoreline property owner or farmer education. Overall, 5 percent or fewer oppose educational programs, with only 1 percent opposing education for shoreland property owners. Regionally, the support and opposition to education programs does not differ significantly from that of the statewide responses.

Riparian property owners have a high level of support for all education programs (61% to 84%) and compare well with statewide responses. A very high percentage (84%) support education for themselves and others like them about their impacts on water quality. Only 1 percent oppose such a solution. In fact, education for shoreline property owners receives the most support of all the proposed solutions among riparian property owners.

### Management Solutions

Management techniques are well-supported statewide, although support varied depending upon the particular management technique. Increased protection for fish habitat has the largest support, with 68 percent supporting and only 4 percent opposing. More management for game populations and more public land purchases have lower levels of support with 48 percent and 47 percent supporting, respectively. But, the opposition to these management techniques is still low (8% opposed game management and 14% opposed more public land). More management for non-game wildlife came in at the middle, with 56 percent supporting and 7 percent opposing this solution. The only difference between statewide lake users, regional users, and riparian property owners is in support and opposition to more public land.

In comparison to the users statewide, the northern regions have relatively low support (around one-third versus one-half supporting) and higher opposition (around one-fourth versus one-eighth opposing) to more public land purchases to protect shoreland areas (Table 13). Other regions of

Response	All Lake Users (percent)	Riparian Property Owners (percent)	----- Region of Lake Use -----				
			Northwest (percent)	Northeast (percent)	Central (percent)	South (percent)	Metro (percent)
Support	47	30	33	34	51	51	53
Neutral	30	44	36	33	27	29	32
Oppose	14	21	21	28	15	6	8
Don't Know	9	5	10	5	7	14	7
Total Percent	100	100	100	100	100	100	100

the state do not differ significantly when compared to the statewide results.

Riparian ownership responses exhibit a similar pattern to that of the statewide data except for support of more public land purchases to protect shoreland areas. Only 30 percent supported more public land. More riparian owners are neutral (44%) about more public land than lake users as a whole with similar low percentages of riparian property owners opposing more public land.

### Regulatory Solutions

Regulatory solutions, as noted above, do not appear to receive greater or lesser support than the other categories of possible solutions to lake problems. This finding is consistent with another finding in the survey concerning the public’s assessment of the current degree of regulation of lakes and lakeshore in Minnesota.

Lake users, in general, do not feel that the current regulatory environment for lakes and lakeshore is overly restrictive (Table 14). Few (10%) feel that laws and regulations have ‘gone too far.’ Most either feel the current situation has ‘struck about the right balance’ (41%) or that laws and regulations have ‘not gone far enough’ (30%). These views of the current regulatory environment are shared widely by riparian property owners and across the state.

Response	All Lake Users (percent)	Riparian Prop-erty Owners (percent)	----- Region of Lake Use -----				
			Northwest (percent)	Northeast (percent)	Central (percent)	South (percent)	Metro (percent)
Gone too far	10	12	10	13	11	2	11
Struck about the right balance	41	46	45	42	40	42	35
Not gone far enough	30	29	24	34	29	35	29
Don't know	20	14	21	11	20	21	25
Total percent	100	100	100	100	100	100	100

Statewide, support for specific regulatory solutions range from 72 percent for stricter controls for exotic species to 35 percent for increasing the minimum lot size. Ranked in order from most support to least is: stricter controls for exotic species (72%), stricter septic system regulations to

improve water quality (68%), motorboat size and speed limits (66%), more enforcement of existing shoreland protection laws (60%), stricter zoning regulations for shoreline development to maintain natural shoreline character (58%), stricter regulations to protect shoreland trees and shrubs (57%), and increasing minimum lot size requirements (35%). In general, statewide opposition is very low for the regulatory solutions presented in the survey, ranging from 2 to 11 percent for all the solutions, except for increasing the minimum lot size. More people oppose (17%) or are neutral (36%) for increasing minimum lot size requirements when compared with other regulatory or enforcement solutions.

Responses to specific regulatory solutions do not vary greatly by region. There are some evident differences, however, in the northeast region on three of the seven items. Lake users of the northeast region are more opposed (18%) to more enforcement of existing shoreland protection laws than users statewide (7%). Again, more users of the northeast are opposed (21%) to stricter regulations to protect shoreland trees and shrubs than users statewide (10%). On the flip side, more northeast users (48%) support increasing the minimum lot size than do users of the state as a whole (35%).

Riparian owners generally agree with other lake users in the state on the specific regulations. Some notable differences, however, exist on three of the seven items. More lake users statewide (60%) support more enforcement of existing shoreland protection laws than do riparian owners (50%). Again, more people statewide (57%) support stricter regulations to protect shoreland trees and shrubs than do riparian property owners (46%). Conversely, more riparian property owners (47%) support increasing the minimum lot size than do people statewide (35%).

### Incentive Solutions

Statewide, incentive programs have a moderate level of support with little opposition. A majority (53% to 61%) of all lake users support: awards programs for shoreland property owners who minimize their impacts, development of financial incentives for environmentally-sound shoreland management, and more erosion control assistance for property owners. Only 4 to 9 percent oppose such programs. Support or opposition to incentive programs does not vary significantly when comparing the regional lake users to users statewide.

Riparian property owners, when compared with the users statewide, exhibit less support (43% compared with 55%) but are more neutral (40% compared with 29%) for awards programs for shoreland property owners who minimize their impacts. For the other incentives there is no difference between the users statewide and riparian property owners.



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