THE ECONOMIC IMPACT OF POTENTIAL DECLINE IN NEW HAMPSHIRE WATER QUALITY:
THE LINK BETWEEN VISITOR PERCEPTIONS, USAGE AND SPENDING

MAY 2007

PREPARED FOR:
THE NEW HAMPSHIRE LAKES, RIVERS, STREAMS AND PONDS PARTNERSHIP

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EXECUTIVE SUMMARY

The goal of this research is to describe the economic value that the multiple uses of New Hampshire freshwaters bring to the state, and how that value might be affected by the quality of water resources, as perceived by the visitors who use them. The motivation for this study was to answer the question: "*How would the New Hampshire economy be affected if resident and non-resident recreationalists who fish, boat and swim perceive any negative changes to the water quality in the areas where they recreate?*" To answer this question recreationalists' current satisfaction and usage of freshwater recreation sites in New Hampshire was compared to a hypothetical "what-if" scenario. This comparison determined how the usage patterns of anglers, boaters and swimmers would change if they perceived a decline in water resource quality; how the usage change in turn would affect spending; and the subsequent rippling economic impact throughout the New Hampshire economy.

This study collected primary data from resident and non-resident recreationalists who fish, boat and swim in New Hampshire lakes, ponds, rivers and streams. This is the final phase of a series of studies that have described the economic and social impact of freshwater in New Hampshire[1].

There are more than 400 public and quasi-public access points to the approximately 1000 lakes, ponds and 12,000 miles of rivers and streams in New Hampshire. This research commenced by selecting a random sample of access points, stratified by the seven designated tourism regions in New Hampshire, to represent all access points in New Hampshire. A total of 75 sites throughout the state were identified as data collection points. Data collection consisted of a four-page questionnaire administered on-site to recreationalists who were angling, boating or swimming. Data collection took place from Memorial Day weekend through Labor Day weekend, 2006--- during an unusually cold and rainy summer in New Hampshire[2].

The findings from this study confirm that freshwater fishing, boating and swimming bring significant revenue to the New Hampshire economy. About $379 million in total sales is generated by those who are fishing, boating or swimming in New Hampshire freshwaters (Table 1), or about 26% of all summer spending in New Hampshire.[3] This revenue figure

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[1] Estimates of Select Economic Values of New Hampshire Lakes, Rivers, Streams and Ponds Phase II Report. (June 2003).

Public Opinion Poll Results in the Study of Select Economic Values of New Hampshire Rivers, Streams and Ponds Phase III Report. (December, 2004).

[2] The National Oceanic and Atmospheric Administration (NOAA) reports that New Hampshire recorded the rainiest May through August ever in summer 2006, since records were first kept in 1895.

[3] In Fiscal Year 2006 total spending by travelers and tourists was estimated to be $4.179 billion dollars, $1.479 billion of which is spent during the summer months. (New Hampshire Travel Barometer, Summary for Fiscal Year 2006. Institute for New Hampshire Studies. Plymouth State University).

would be considerably higher if *ocean* fishing, boating and swimming were included in the study.

The $379 million total sales contributed to the New Hampshire economy by fishing, boating and swimming exceeds that of many other revenue makers in New Hampshire, including Laconia's Bike Week, two annual NASCAR events, Off-Highway Vehicle spending and spending at agricultural fairs. Fishing, boating and swimming have about the same economic impact as Downhill skiing, Cross-country skiing, snowmobiling and ice-fishing combined[4].

TOTAL ECONOMIC IMPACTS FROM FRESHWATER FISHING, BOATING SWIMMING

	Total Sales	Household Income	Jobs
Fishing	$49,072,267	$17,566,682	791
Boating	$143,211,366	$50,670,624	2,235
Swimming	$186,553,957	$66,013,336	2,965
TOTAL	**$378,837,590**	**$134,250,642**	**5,991**

TABLE 1.1

Recreational anglers, boaters and swimmers were asked their about their annual usage of New Hampshire waters and how that usage might be affected if they perceived changes for the worse in water quality. Four areas of water quality were deemed most well-known and important for the purpose of this research, and to provide continuity with the earlier phases of the research: crowding; natural beauty and scenery; water clarity and purity (algae, mercury, milfoil, other invasives); and water levels and flows. The results from this study reveal that the majority of recreationalists who fish, boat and swim in New Hampshire waters gives the highest rating of "good" to the overall water quality at their site, and to each of the four areas: water clarity and purity, water levels and flows, natural beauty and scenery, and crowding. As was found in an earlier phase of this project, the vast majority of visitors also report being "satisfied" or "very satisfied" with the overall quality of New Hampshire freshwaters, as well as with the clarity and purity, water levels and flows, natural beauty and scenery and crowding levels (Graph 1.1).

Nonetheless, almost half to two-thirds of swimmers, boaters and anglers say they would decrease or cease their visits to a particular freshwater site if they perceived any degradation

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[4] Impact of the Nextel Cup races and Bike Week on the New Hampshire Economy. RKM Research and Communication, Portsmouth NH. (2004).

The Economic Impact of the 2002 Agricultural Fairs in New Hampshire. Institute for New Hampshire Studies, Plymouth State University.

The Impact of Spending by ATV/Trail Bike Travel Parties on New Hampshire's Economy During July 2002 to June 2003. Institute for New Hampshire Studies, Plymouth State University

Winter Recreation and Climate Variability in New Hampshire: 1984-2006. Wake, C., Burakowski, E. and Goss, L. (2006).

to the resource. More than two-thirds (69%) responded they would decrease the number of intended visits they make to a particular site if they perceived a change in water clarity and purity; 56% would decrease visits if natural beauty and scenery declined; 46% would decrease visits if crowding became and issue; and 43% would decrease visits if water levels or flows became less than adequate (Graph 1.2).

Rating and Satisfaction: Water Quality Attributes

Attribute	Satisfaction*	"Good" Rating
Overall Water Quality	85%	74%
Water Clarity and Purity	79%	65%
Uncrowded	91%	60%
Natural Views Scenery	94%	91%
Adequate Levels/Flows	90%	66%

*Percent **Satisfied** and **Very Satisfied**

GRAPH 1.1

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Percent Who Would Decrease Visiting Days
If Conditions Worsened in the Next 12 Months

- Water Level Flows: 43%
- Crowding: 46%
- Natural Beauty: 56%
- Water Clarity Purity: 69%

GRAPH 1.2

The economic impact of recreationalists decreasing their visits because of perceived changes to water quality would have a significant negative effect on the New Hampshire economy. It is important to note that the four issues selected for this study are not independent of one another. That is, an increase in flows might result in a decrease in water clarity or crowding. Similarly a decrease in natural beauty or scenery might be connected to an increase in crowding. Thus the artificial separation of these issues for the purpose of the research will result in a probable under-estimation of the economic costs of changing water quality.

Summer travelers and visitors to New Hampshire who fish, boat or swim report that they are most likely to leave the state or the tourism region if issues pertaining to water clarity and purity grow worse than they are now. Water clarity and purity is comprised of three components for the purpose of this study: milfoil or other invasives; mercury; and algae. As perceived by recreationalists, an increase of these problems would have the largest negative economic impact on New Hampshire revenues (Table 1.2).

ECONOMIC LOSSES BY ISSUE

	Total Sales	Household Income	Jobs
TOTAL LOSS due to decreased water clarity and purity	($50,918,583)	($18,035,890)	(811)
TOTAL LOSS due to changes in levels or flows	($28,984,074)	($10,257,723)	(462)
TOTAL LOSS due to	($27,656,559)	($9,784,700)	(442)

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changing natural views and scenery			
TOTAL LOSS due to increased crowding	($19,042,972)	($6,732,941)	(305)

TABLE 1.2

In terms of economic impact for the seven separate tourism regions of New Hampshire, not surprisingly fishing, boating and swimming generate the most revenue and jobs in the Lakes Region (Table 1.6, Page 11). These types of recreational revenue are very significant for the region, given that the Lakes Region ranks about 4th in overall traveler visitor days and overall spending. The Dartmouth-Sunapee region receives the least economic benefit from anglers, boaters and swimmers, and also ranks 6th among the seven tourism regions for traveler spending and visitor days[5].

As with New Hampshire as a whole, the economy of each region would be most negatively affected by a perceived decline in water clarity and purity. The Merrimack Valley region, the Seacoast region and the White Mountain region would lose the greatest percentage of revenue: each potentially losing nearly 20% of their fishing, boating and swimming sales, income and jobs if visitors perceived a decline in water clarity and purity (Graph 1.3).

Percent of Sales, Income and Jobs Lost
If *Water Clarity and Purity* Decline

Region	Percent
All Regions	-14%
GNW	-7%
WM	-18%
LR	-12%
DS	-12%
MON	-7%
MV	-19%
SC	-18%

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[5] New Hampshire Fiscal Year 2004 Tourism Satellite Account. Institute for New Hampshire Studies, Plymouth State University. Prepared by Laurence E. Goss, Ph.D.

GRAPH 1.3

- GNW - Great North Woods	- WM - White Mountains	- LR - Lakes Region	- DS - Dartmouth-Sunapee	- MON - Monadnock	- MV - Merrimack Valley	- SC - Seacoast

Tourism Regions of New Hampshire

In terms of absolute dollar loss, the Lakes region would be the most negatively affected by perceived declines in water clarity and purity; changes in water levels or flows, natural views and scenery; and increases in crowding (Tables 1.3-1.5).

May 2007

TOTAL SALES LOST IF CONDITIONS ARE PERCEIVED TO DECLINE: BY REGION   TABLE 1.3

	WATER CLARITY AND PURITY	WATER LEVELS AND FLOWS	NATURAL VIEWS AND SCENERY	CROWDING
GNW	($1,807,634)	($1,420,222)	($967,979)	($783,141)
WM	($11,841,792)	($5,738,846)	($5,807,877)	($4,309,958)
LR	($24,964,837)	($15,361,559)	($14,381,410)	($9,457,087)
DS	($873,727)	($579,681)	($553,131)	($334,058)
MON	($509,448)	($521,713)	($442,505)	($215,918)
MV	($8,290,851)	($4,057,770)	($4,148,483)	($2,988,725)
SC	($2,630,294)	($1,304,283)	($1,355,174)	($954,085)
TOTAL	($50,918,583)	($28,984,074)	($27,656,559)	($19,042,972)

TOTAL HOUSEHOLD INCOME LOST IF CONDITIONS ARE PERCEIVED TO DECLINE: BY REGION   TABLE 1.4

	WATER CLARITY AND PURITY	WATER LEVELS AND FLOWS	NATURAL VIEWS AND SCENERY	CROWDING
GNW	($642,723)	($477,723)	($347,529)	($278,217)
WM	($4,192,965)	($2,034,195)	($2,070,954)	($1,523,806)
LR	($8,843,580)	($5,532,192)	($5,137,644)	($3,342,828)
DS	($309,625)	($188,265)	($172,005)	($118,173)
MON	($180,845)	($164,870)	($129,957)	($76,433)
MV	($2,934,907)	($1,408,204)	($1,463,102)	($1,056,228)
SC	($931,245)	($452,274)	($463,509)	($337,256)
TOTAL	($18,035,890)	($10,257,723)	($9,784,700)	($6,732,941)

TOTAL JOBS LOST IF CONDITIONS ARE PERCEIVED TO DECLINE: BY REGION   TABLE 1.5

	WATER CLARITY AND PURITY	WATER LEVELS AND FLOWS	NATURAL VIEWS AND SCENERY	CROWDING
GNW	(29)	(21)	(15)	(12)
WM	(189)	(93)	(94)	(71)
LR	(396)	(247)	(231)	(149)
DS	(14)	(9)	(9)	(6)
MON	(9)	(8)	(7)	(4)
MV	(131)	(63)	(65)	(47)
SC	(43)	(21)	(21)	(16)

| TOTAL | (811) | (462) | (442) | (305) |

This study provides tangible evidence of how real-time users of freshwater resources in New Hampshire will react if they perceive conditions to deteriorate, and the extent to which the tourism-based economy of New Hampshire would be affected by a decline in water quality.

Visitors and residents who fish, boat and swim in New Hampshire do so because of the unique and attractive qualities of its waters. They spend hundreds of millions of dollars pursuing these activities, a significant portion of the state's summer visitor spending. The New Hampshire economy is heavily dependent on traveler and tourism revenue, and is one of the top ten states in the nation in terms of the contribution of tourism to the economy[6]. The efforts to protect waters are widespread and ongoing in New Hampshire, but protecting water for the sake of water is not always a compelling argument in itself. The results from this study should make it possible to discuss surface waters issues from a perspective of benefits to the economic bottom line, as well as from a perspective of environmental quality and public health.

Notable findings from this study include:

The total annual visitor days made by anglers, boaters and swimmers is 14.9 million; about 29% of the 51.4 million visitor days for the entire year in New Hampshire.

The total sales generated by anglers, boaters and swimmers combined is nearly **$400 million**, or 26% of summer spending in New Hampshire.

The total household income generated from these sales is about **$134 million**.

Just under **6,000 jobs** (full-time and part-time) are generated by fishing, boating, and swimming visits to New Hampshire.

A range of **79% to 94%** of recreationalists report high levels of satisfaction with the water quality, clarity and purity, natural views and scenery, crowding levels and water levels and flows.

Half to two-thirds of visitors would decrease or cease their visiting days to a particular site if they perceived a decline in water clarity and purity, natural views and scenery, crowding levels and water levels and flows.

Overall, perceived degradation to water clarity and purity will result in the greatest economic loss to New Hampshire. Perceived declines in water clarity and purity would result in about **$51 million of lost sales, $18 million in lost income and more than 800 lost jobs statewide.**

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[6] Ibid

The Lakes Region generates the most revenue from summer recreation, and would also suffer the greatest absolute loss if water clarity and purity were perceived to decline. A perceived decrease in water clarity and purity in the Lakes Region would result in **a loss of almost 400 jobs, over $8 million in personal income and approximately $23 million in business sales.**

In all regions the greatest economic losses would be suffered if anglers, boaters and swimmers perceive a decline in water clarity and purity. Perceived increases in crowding produce the least negative economic consequences in every region.
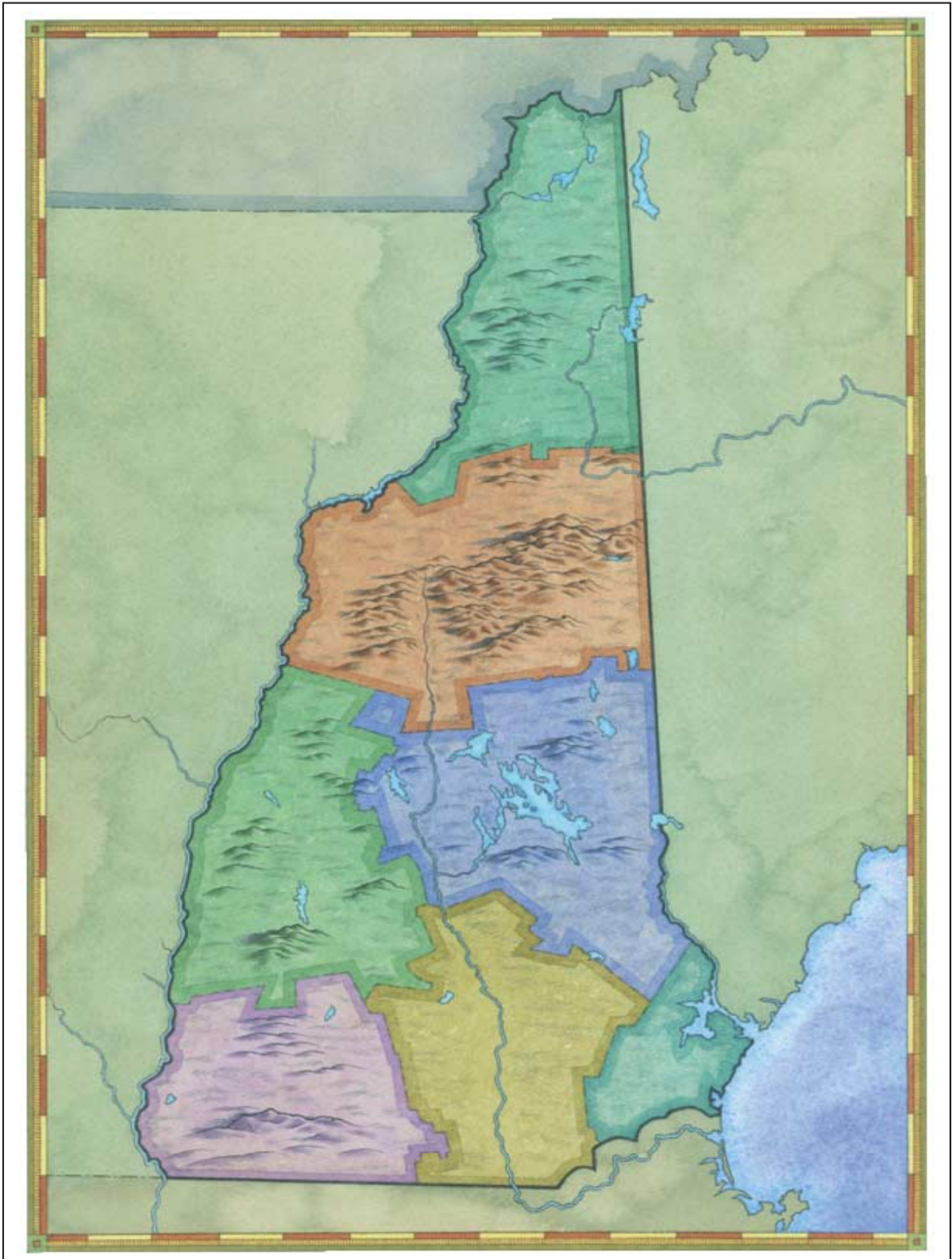
This report is dedicated to all those businesses and individuals who rely on summer tourism income, as well as policy-makers, legislators, activists and citizens who understand that the health of the economy and the environment are inextricably entwined.

TOTAL ECONOMIC IMPACTS: BY REGION   TABLE 1.6

LAKES	Total Sales	Household Income	Jobs
Fishing	$7,135,503	$2,554,337	115
Boating	$122,853,218	$43,467,564	1,916
Swimming	$80,652,485	$28,539,409	1,282
TOTAL	**$210,641,206**	**$74,561,310**	**3,313**

WHITE MOUNTAINS			
Fishing	$13.476,720	$4,824,339	217
Boating	$2,533,216	$896,295	40
Swimming	$51,641,979	$18,273,852	821
TOTAL	**$67,651,915**	**$23,994,486**	**1,078**

GREAT NORTH WOODS			
Fishing	$20,497,409	$7,337,575	330
Boating	$3,083,915	$1,091,142	48
Swimming	$2,557,134	$904,859	41
TOTAL	**$26,138,458**	**$9,333,576**	**419**

DARTMOUTH-SUNAPEE			
Fishing	$1,661,281	$594,698	27
Boating	$2,982,110	$1,055,121	47
Swimming	$2,849,174	$1,008,199	45
TOTAL	**$7,492,565**	**$2,658,018**	**119**

MONADNOCK			
Fishing	$1,356,852	$485,720	22
Boating	$6,126,155	$2,167,538	96
Swimming	$315,452	$111,625	5
TOTAL	**$7,798,459**	**$2,764,883**	**123**

MERRIMACK VALLEY			
Fishing	$2,911,839	$1,042,368	47
Boating	$4,442,206	$1,571,728	69
Swimming	$37,008,450	$13,095,682	588
TOTAL	**$44,362,495**	**$15,709,778**	**704**

SEACOAST			
Fishing	$2,032,663	$727,644	33
Boating	$1,190,546	$421,235	19
Swimming	$11,529,283	$4,079,712	183
TOTAL	**$14,752,492**	**$5,228,591**	**235**

TOURISM REGIONS OF NEW HAMPSHIRE

ACKNOWLEDGEMENTS

INTRODUCTION

This introduction summarizes the goals of the project; discusses the background of the study and the unique approach of the research methodology; defines the measures used in the study; outlines the use and availability of the raw data for other researchers; and presents the structure of the report.

Goals of the project

The primary goal of this work is to describe the economic value that select multiple uses of New Hampshire surface waters bring to the state, and how that value is affected by the quality of water resources. While the approximate annual value of five major uses (fishing, boating, swimming, waterfront taxes and drinking water) is known, as is New Hampshire resident users' perceptions about quality and access to surface waters, it is still not known how the economic impact of these uses would be affected if resident and non-resident users altered their behaviors because of perceived degradation to the water resources in New Hampshire. This study provides the link between user perceptions about the quality and quantity of water available for recreational purposes in New Hampshire and the extent to which negative perceptions might affect visitation and spending patterns.

The subsequent goal of this project is to create useful information that can be shared with decision-makers and concerned parties at the state and local levels so they can work together to address the issues that affect New Hampshire surface waters. There is an immediate and ongoing need to collaboratively and systematically manage: the increasing demand for recreational access; the increasing development pressures; and the declining quality of public water bodies and their watersheds. "Sound" and "reliable" science needs to be completed and disseminated in a timely fashion, before it is too late and the resource exceeds its recreational and/or ecological carrying capacity. The best management plans will consider the economic value of a public water resource as inherently dependent upon and connected to its aesthetic and recreational appeal and ecological health, not just its development potential.

Another purpose of this work is to provide a context for water users and decision-makers that emphasizes the connection between their behaviors and the quality of water, quality of recreation and quality of life they experience. Individual, group, private, public, government and business actions all have an effect on the watershed and these actions cannot be pursued out of the context of the health of the watershed without negative consequences. The results of this study should help to provide common ground for all interested parties – such as day users and lake residents, or developers and state agencies, or conservation boards and shoreline property owners, or business, media and lawmakers - as they work on water issues in New Hampshire.

The final goal of this project is to promote "big-picture" thinking at all levels when working to protect water quality – to arrive at shared and public understanding that it is possible to balance fair access with carrying capacity, balance carrying capacity with economic sustainability, and ultimately to overcome the widely held misperception that New Hampshire must have *either* economic growth *or* vital public waters.

Background of the current study

The purpose of this research is to compare recreationalists' current satisfaction and usage of freshwater recreation sites in New Hampshire to a hypothetical "what-if" scenario. This comparison determines how the usage patterns of anglers, boaters and swimmers would change if they perceive a decline in water resource quality; how the usage change in turn affects spending; and the subsequent rippling economic impact throughout the New Hampshire economy.

This research was commissioned by the Lakes, Rivers, Streams, and Ponds Partnership[7], as the capstone work to a series of studies investigating the economic and social worth of New Hampshire freshwaters. The studies began with a literature review in 2000, and concluded with a random telephone survey of New Hampshire residents in 2004.

The first phase of this series of studies determined which types of uses of freshwater in New Hampshire were most likely to have a significant influence on the economy. Those uses are boating, swimming, fishing, public drinking water and waterfront property taxes[8].

The second phase of the series was a classic economic impact study that used secondary data to estimate the economic value of those five uses of freshwater in New Hampshire. This phase estimated the value of fishing, boating and swimming to be between $842 million and $1.182 billion dollars, in addition to generating 9,300-15,000 full-time and part-time jobs in the state. The total estimate of the economic worth of freshwater in New Hampshire for those five uses was as high as $1.8 billion annually, in 2002 dollars[9].

The next phase of the series analyzed public opinion, via telephone survey, of a random selection of New Hampshire residents regarding their use of freshwater resources; their attitudes about overall beauty; their opinions about water quality issues such as pollution, crowding, and water levels and flows; and how their use and attitudes would change if water quality were to decline in New Hampshire. The results of this phase indicated that New Hampshire residents are fairly regular participants in freshwater activities, with 21% visiting more than once a week, 17% visiting once a week and 27% visiting once or twice a month. The majority rate the overall character and quality of the waters as good (58%) to excellent

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[7] The Lakes, Rivers, Streams and Ponds Partnership is co-sponsored by the following agencies and organizations: The New Hampshire Lakes Association, The New Hampshire Rivers Council, The New Hampshire Department of Environmental Services, The New Hampshire Fish and Game Department, Squam Lakes Association, Lake Sunapee Protective Association, Newfound Lake Region Association, and the New Hampshire Department of Resources and Economic Development.

[8] A Study of the Econimc Values of the Surface Waters of New Hampshire. Phase I Report. (August 2001). Prepared for the Lakes, Rivers, Streams and Ponds Partnership by Gallagher, Callahan and Gartrel, Concord, New Hampshire.

[9] An Estimate of Select Economic Values of New Hampshire Lakes, Rivers, Streams and Ponds. Phase II Report. (June 2003). Prepared for the Lakes, Rivers, Streams and Ponds Partnership by Gallagher, Callahan and Gartrel, Concord, New Hampshire. See **Appendix** for explanation of differences in economic methods between Phase II and Phase IV.

(20%); and 58-75% reported they would significantly decrease their usage patterns if water quality declined[10].

The results from this series of studies clearly establish that New Hampshire freshwaters contribute a significant amount of revenue to the state economy; that users value the water resources for their overall beauty and purity; and that the unique and attractive qualities of freshwaters play a significant role in how residents spend their time recreating in New Hampshire. These findings generated the capstone question:

> *"How would the New Hampshire economy be affected if resident and non-resident recreationalists who fish, boat and swim perceive any negative changes to the water quality in the areas where they recreate?"*

The final phase of this research series is the current study, based on primary data collected in summer 2006. This study takes a relatively unique approach to calculating the economic impact and contingent value of a natural resource. Typically, the economic value of an activity or location is calculated by asking people to hypothetically say what they would be willing to spend for a quality resource (Contingent Valuation Method) without asking what they actually spend; or by calculating an economic value for just one specific location, by asking how much time and money visitors spent to go there (Travel Cost Method). Alternatively, an economic impact study can use secondary data and methods that employ government-generated "multipliers" to estimate how much the direct spending of recreationalists will ripple into other sectors of a regional or state economy. Direct spending data can also be obtained by asking visitors to recall their visits and spending in a "spending log" or survey, and then transforming those answers with multipliers from an appropriate input/output model such as REMI or IMPLAN (for example: Gartner et al. 2002)[11].

The methodology for this study uses a combination of the approaches described above, something rarely attempted either because of cost constraint or inability to obtain a representative sample (however, see Earnhart and Smith, 2002; University of Tennessee CBER, 2003; Soutukorva, 2005)[12]. In this case it was possible to obtain a state-wide random sample of freshwater access points and visitors, thereby creating conditions for analyzing the economic cost of declining water quality.

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[10] Public Opinion Poll Results in the Study of Select Economic Values of New Hampshire Lakes, Rivers, Streams and Ponds. Phase III Report. (December, 2004). Prepared for the Lakes, Rivers, Streams and Ponds Partnership by Gallagher, Callahan and Gartrel, Concord, New Hampshire.

[11] "Economic Impact and Social Benefit of Cold-water Angling in Minnesota" (2002). Gartner et al. University of Minnesota Extension Service

[12] "Countervailing Effects of Atrazine on Water Recreation: How do Recreators Evaluate Them?" (2003). Earnhart, D., Smith, V., Water Resources Research, Vol. 39, no. 4

"Economic Effects of TVA Lake Management Policy" (2003). University of Tennessee Center for Business and Economic Research.

"The Value of Improved Water Quality: A Random Utility Model of Recreation in the Stockholm Archipelago". (2005). Soutukorva, A. Beijer International Institute of Ecological Economics, The Royal Swedish Academy of Sciences.

It was important to first establish the economic impact of the recreational use of New Hampshire fresh waters on a state-wide and regional basis, by analyzing the actual spending and visitation behavior of recreationalists who fish, boat and swim.

The economic impact was then analyzed in light of responses to a hypothetical situation, much like that used in the Contingent Valuation method. Instead of asking what users would be willing to pay for a resource, however, users were asked how they would change their intended visits if a particular change in water quality occurred within the next 12 months. If users reported that they would decrease their visits, they were then asked where they would go instead, on the assumption that a decrease in visits would not translate to an actual economic loss unless visitors left New Hampshire (or the tourism region).

In this study, combining the economic impact analysis with a version of Contingent Valuation produces a link between the economic impact of the resource with the perception of value brought by users- as manifested by their actual and intended visits and their reactions to hypothetical declines in water quality.

Definitions of concepts measured by the questionnaire

> *Water Quality* is measured by recreationalists' perception of and satisfaction with:
> > Crowding levels
> > Purity and clarity levels (mercury, milfoil, algae)[13]
> > Flows and water levels
> > Natural beauty and scenery

> *Recreational use* includes *only* the following activities:
> > Power boating (including jet skiers and water skiers);
> > Non-power boating (including sailing, kayaking, canoeing);
> > Shore fishing;
> > Boat fishing;
> > Swimming.

> *Tourism Region* is the locale(s) at which the recreation takes place over the course of a visitor trip. The state is commonly divided into 7 tourism regions:
> > Great North Woods
> > White Mountains
> > Lakes
> > Dartmouth/Sunapee
> > Monadnock
> > Merrimack Valley
> > Seacoast
> > **Please see appendix for complete list of towns in each region.*

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[13] These three aspects of clarity and purity were chosen so as to remain consistent with earlier phases of the study.

User satisfaction includes:

Satisfaction with overall water quality at site;
Rating of the overall water quality at site;
Satisfaction with each of the four key water quality parameters;
Rating of each of the four key water quality parameters.

Visitor days are measured by:

The total number of days spent on this trip, at the site and in NH;
The number of people in the visitor's party;
The number of days in the past 12 months respondents report engaging in water-related activities of fishing, swimming and boating at the site;
The number of days they intend to visit the site in the next 12 months for fishing, boating or swimming;
Total visitor days is a calculated figure

Spending is measured by:

Daily spending per person in typical economic categories (lodging, restaurants, groceries, fuel, fees, equipment, transportation) in New Hampshire *and* in the tourism region;
Average daily per person spending is a calculated figure;
Total visitor spending per person is a calculated figure.

Economic impact of declining water quality is measured by:

Extrapolating how changes in intended use (total visitor days) would affect total visitor spending.
Changes in intended use are obtained by proposing a hypothetical example of worsening conditions at the recreation site in the next 12 months.
Where the visitors would go instead: out of state, elsewhere in region; or to another region.

Please see appendix for complete economic methodology

Use and availability of raw data

Audiences and researchers who might find this data useful include: state lawmakers; state agency decision-makers; city councils; mayors; municipal managers; select boards; planning/zoning boards; conservation commissions; lake, river and watershed associations; the media; and the general public.

As in any statistical reporting, it is important to keep the results within the context of the framing questions. That means cultivating transparency, referring to the original research question(s) and survey questions that generated the data, and understanding and acknowledging the methodology that generated the data. For example, since this is a state-wide study of recreational users stratified by tourism region, it is permissible to analyze and report results by region or by user type, but it is not valid to make assertions about individual access points or towns.

The Partnership has decided that the raw data from this study will be available to any qualified applicants, on a case-by-case basis. This means that anyone (or group) who wishes to access the data should first contact the Executive Director at the New Hampshire Lakes Association[14]. The group/person will then contact the Project Manager[15] to arrange actual analysis. If the person(s) wishing to use the data does not need the Project Manager to analyze the data, then at the very least the Project Manager will be required to review any analyses before publication or other dissemination to ensure accurate interpretation.

It is expected that users of the data will present or make accessible the material in such a way that the general public (including non-New Hampshire residents), policy-makers and the media are accurately informed about the value of water resources in New Hampshire, i.e. the link between water quality and the economy.

Possible further analyses of the data include highlighting the link between conditions (i.e. crowding, milfoil, flows) and economic impact for specific audiences such as resource managers and lawmakers, so that they can prioritize and balance competing demands as they update and develop policy regarding surface waters.

Additional analysis could also be performed to investigate the economic effect of inter-regional displacement, that is the effect of users who would not leave the state but would leave the region if they perceived deteriorating conditions.

Structure of the report

This report is organized to highlight how visitors' plans to recreate in New Hampshire might be affected by perceived changes in four types of water quality, and the subsequent economic impact of those changes on the state and regional economies. The four issues that emerged from discussions and previous research are: water clarity and purity (the presence of algae, mercury, milfoil, other invasives); adequate water levels and flows; natural beauty and scenery; and crowding. These seem to be perennial issues facing New Hampshire waters, and also issues that lend themselves well to policy and enforcement.

The first chapter places this study into the context of the New Hampshire tourism economy, by examining and comparing the economic impact of various recreational activities in New Hampshire. Relevant activities for comparison include Downhill and Cross-country skiing, snowmobiling, NASCAR races, Bike Week, Off-Highway Vehicle use and agricultural fairs and tourism.

Chapter 2 reports demographics and survey results, including visitor attitudes and behaviors.

Chapters 3 through 6 report in detail the economic impact of perceived changes in each of the four water quality areas, at both the state and regional levels. Technical explanations for the sampling and economic modeling methodologies are appended, as are the lists of towns and regions, sampling sites and the annotated version of the questionnaire results.

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THE ECONOMIC IMPACT OF TOURISM AND RECREATION IN NEW HAMPSHIRE: FISHING, BOATING AND SWIMMING IN CONTEXT

New Hampshire is heavily dependent upon traveler and tourism revenue, which makes up about 8% of the gross state product[16]. The importance of tourism to the state economy is such that New Hampshire is among the top ten states in the nation that depend on tourists and travelers as a significant source of income[17]. It is reported that tourism and travel is the second most important export sector in New Hampshire, after manufacturing. When second home ownership is factored in, tourism and travel is the largest export sector in the state[18].

The current study indicates that visitors and residents who fish, boat and swim in New Hampshire make a significant contribution to the state tourism industry: $379 million in total sales, or roughly 26% of all summer spending; about $134 million in household income; and about 6,000 full-time and part-time jobs[19]. Visitors who fish, boat and swim represent about 14.9 million visitor days in New Hampshire.

Visiting, traveling and spending numbers are highest in New Hampshire's summer season[20], in part due to annual events such as Laconia Motorcycle Week and the two NASCAR races in Loudon. Fishing, boating and swimming revenues rank well above the strongest sources of summer recreational tourism revenue in New Hampshire, and also higher than most winter recreational revenues, although fishing, boating and swimming revenues are lower than those from all agricultural-related tourism sources (Table 1.7).

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[16] http://www.nhtourism.org/facts.html

[17] New Hampshire Travel Barometer, Summary for Fiscal Year 2006. Institute for New Hampshire Studies. Plymouth State University.

[18] New Hampshire Fiscal Year 2004 Tourism Satellite Account. Institute for New Hampshire Studies, Plymouth State University. Prepared by Laurence E. Goss, Ph.D.

[19] It is probable that these numbers are conservative by 10-20%, as research has shown that visitors tend to underestimate their spending when asked during a trip as opposed to after the trip. (L. Goss, Personal Communication, April 2007)

[20] Ibid

ECONOMIC IMPACT OF SELECT TOURISM ACTIVITIES IN NEW HAMPSHIRE

	Year of Study	2006 Dollars (Total Sales)
Fishing, Boating, Swimming	2006	$379 Million
Skiing, Ice-fishing and Snowmobiling	2006	$381 Million
"Bike Week"	2004	$352 Million
All Terrain Vehicles	2002-03	$195 Million
NASCAR	2004	$191 Million
State Fairs	2002	$118 Million

TABLE 1.7

"Bike Week" is a classic New Hampshire phenomenon, and it makes a significant contribution each year to the state's economy. In 2004 this weeklong-plus event generated almost $330 million in total sales ($352 million in 2006 dollars); $186 million in household income ($198 million in 2006 dollars) and created 4,434 jobs[21].

The New Hampshire International Speedway in Loudon hosts two NASCAR events per year. In 2004 the two Nextel Cup races generated about $179 million in total spending (about $191 million in 2006 dollars); $103 million in household income ($110 million in 2006 dollars) and just over 2,500 jobs[22].

The economic impact of Off-Highway Vehicle (all-terrain vehicles, trail bikes) use in New Hampshire in 2002-2003 was estimated to be approximately $176 million in total sales (about $195 million in 2006 dollars). OHV users also generated about $61 million in household income (about $67 million in 2006 dollars) and created 2,379 jobs[23].

Agricultural fairs in New Hampshire are an important tradition in this rural state. During the summer/fall season of 2002 there were 11 fairs held around New Hampshire. In 2002 it was estimated that revenues from these fairs added up to just over $105 million (about $118 million in 2006 dollars); with approximately $40 million of that derived from household

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[21] Impact of the Nextel Cup races and Bike Week on the New Hampshire Economy. RKM Research and Communication, Portsmouth NH. (2004).

[22] Ibid

[23] The Impact of Spending by ATV/Trail bike Travel Parties on New Hampshire's Economy During July 2002 to June 2003. Institute for New Hampshire Studies, Plymouth State University

income. Agricultural fairs also generated about 1,100 jobs in 2002 [24]. These figures were recently updated for 2005, and the resulting economic impact of agricultural fairs in New Hampshire was $114 million in sales, about $45 million in income and 836 jobs[25].

Agricultural tourism includes visits to state fairs (discussed above) as well as visits to and purchases at farms, farmer's markets and roadside stands. Tourists who specifically drive through agricultural lands for scenic sight-seeing purposes are also included in the definition of agricultural tourism[26]. Agricultural tourists bring significant revenue to New Hampshire: the combined impacts from agricultural sight-seeing and purchases are almost $900 million in sales, $293 million in household income and about 7,000 jobs created[27].

A recent report estimates that winter visitors and residents who Downhill ski, Cross-country ski, ice-fish or snowmobile in New Hampshire contribute about $381 million in total spending to New Hampshire's winter economy; the demand for skiing creates around 11,500 jobs and ice fishing and snowmobiling and additional 4600 jobs. The majority of that spending and job creation is in the four northernmost counties, which will therefore be most negatively affected by the recent lack of cold temperatures and snow cover[28].

The economic impact of open space in New Hampshire (defined as activities related to agriculture, forestry, tourism and recreation and vacation homes) was estimated to be more than $8 billion dollars in 1996/1997 ($10 billion in 2006 dollars)[29]. Tourism and recreational spending, income and jobs contribute more than one-third of that value. The continued availability and quality of open space, including lakes, rivers, streams and ponds, is critical to the strength of the New Hampshire economy.

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[24] The Economic Impact of the 2002 Agricultural Fairs in New Hampshire. Institute for New Hampshire Studies, Plymouth State University.

[25] The Impact of Agriculture on New Hampshire's Economy in Fiscal Year 2005. Institute for New Hampshire Studies, Plymouth State University.

[26] Ibid

[27] Ibid

[28] Winter Recreation and Climate Variability in New Hampshire: 1984-2006. Wake, C., Burakowski, E., Goss, L. (2006).

[29] Economic Impacts of Open Space in New Hampshire. Resource Systems Group. (1999)

RESPONDENT CHARACTERISTICS AND ATTITUDES: SURVEY DEMOGRAPHICS

From Memorial Day to Labor Day 2006, visitors who were fishing, boating or swimming were interviewed at 75 randomly selected fresh water public and semi-public access sites around New Hampshire.   A total of 912 people were surveyed, 843 of whom provided usable data. The majority of visitors in the sample were New Hampshire residents (65%), and 60% of all visitors were away from home for less than 1 day. Visitors traveled a median of 25 miles from home to the site where they were interviewed: non-residents traveled about 130 miles while residents traveled 15 miles.   Twenty percent of all visitors were from Massachusetts.

Non-residents, who made up 35% of the sample, tended to be away from home a median of seven days, three of which were spent visiting the site where they were interviewed. Of the non-resident visitors, 57% were from Massachusetts; 8% from Connecticut; 5% each were from Vermont and Maine, and the remainder of visitors were from a variety of other states and countries.

Non-residents tended to have the highest median trip expenditures in the region ($430) compared to residents ($21.25)   Expenditures were usually for an average of 2-3 people, and 76% of respondents reported that these were typical expenditures for such a trip. About 16% of the sample reported spending $0 on their trip, 91% of whom were local residents.

The sample was somewhat evenly split amongst anglers, boaters and swimmers. Respondents who were shore fishing or boat fishing comprised 35% of the sample; swimmers accounted for 39%; and those who were power boating or non-power boating were 26% of the sample[30].

There is very little difference between anglers, boaters and swimmers in attitudes toward water quality and potential water quality issues as measured by the questionnaire. When asked to rate the overall water quality at their site, and their satisfaction with that water quality, about three-quarters of the sample gave the water quality the highest possible rating of "good". Similarly, about 85% of the sample were "satisfied" or "very satisfied" with the overall water quality at their site. Participants were asked these same two questions at the end of the survey, and the responses were almost identical with their original answers (Table 2.1).

PERCEPTION OF WATER QUALITY AT THE BEGINNING AND END OF THE SURVEY

	"Good" Water Quality (beginning)	"Good" Water Quality (end)	"Very Satisfied" or "Satisfied" with Water Quality (beginning)	"Very Satisfied" or "Satisfied" with Water Quality (end)
Anglers	73%	77%	86%	84%
Boaters	74%	76%	87%	83%
Swimmers	76%	74%	85%	86%
Overall	74%	76%	85%	84%

Table 2.1

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[30] Please see Economic Method appendix for explanation of how visitors were selected into each group

When asked to rate specific water quality issues at the interview site, overall about one-third of visitors gave the highest rating of "good", or the equivalent thereof to crowding levels, water levels and flows, and water clarity and purity. The vast majority gave the highest rating to the natural views and scenery at the site (91%) (Table 2.2). Swimmers were less likely than boaters or anglers to say the site was uncrowded, and with good reason: they were also more likely to report they had seen more people recreating at the site (Graph 2.1). Swimmers were more likely to give a "good" rating to water levels and flows, whereas about one-third each of anglers and boaters thought the water level or flows were too high.

VISITOR RATING OF WATER QUALITY ISSUES

	"Uncrowded"	"Adequate" Water Levels/ Flows	"Good" Natural views and scenery	"Good" Water Clarity and Purity
Anglers	66%	62%	87%	63%
Boaters	66%	61%	92%	66%
Swimmers	50%	74%	95%	66%
Overall	60%	66%	91%	65%

Table 2.2
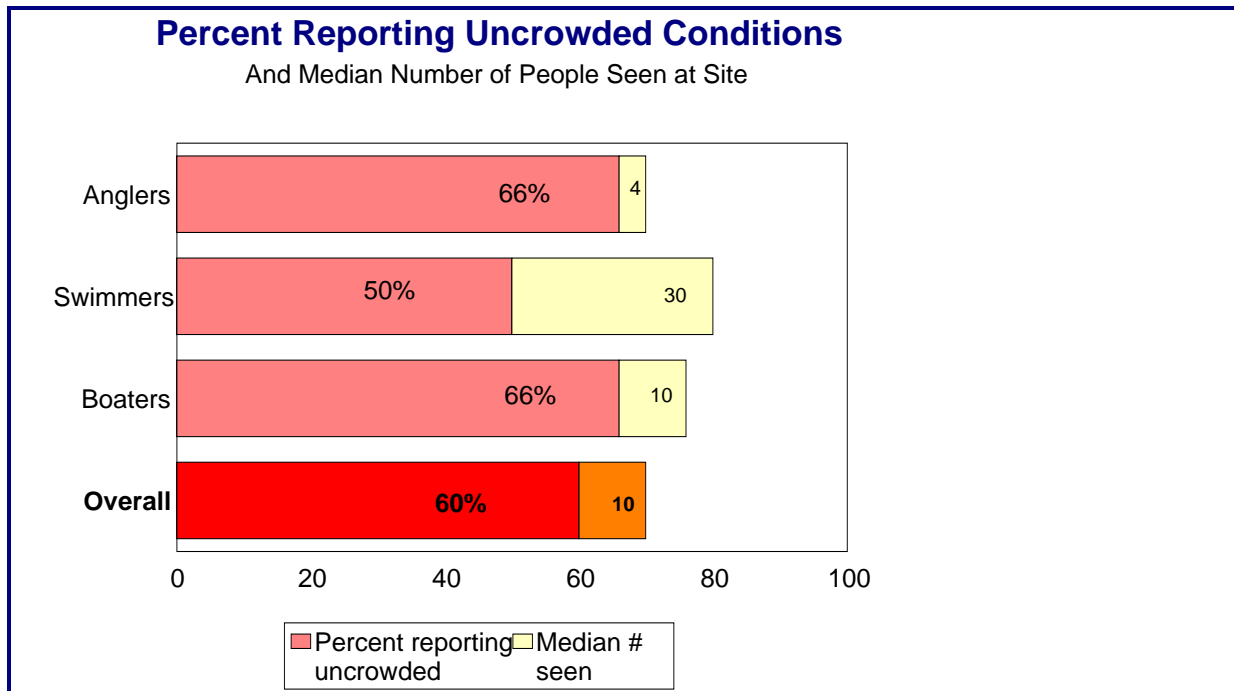
Graph 2.1

Most respondents gave good ratings to the specific attributes of their site, and the majority also reported being "satisfied" or "very satisfied" with these specific water qualities (Table 2.3). It is interesting to note that overall visitors reported far less satisfaction with water clarity and purity (79%), compared to other potential issues. There is very little difference between anglers, boaters and swimmers in their ratings.

SATISFACTION WITH WATER QUALITY ISSUES: PERCENT "VERY SATISFIED" OR "SATISFIED"

	Crowding levels	Water levels/ flows	Natural views and scenery	Water clarity and purity
Anglers	91%	88%	92%	80%
Boaters	92%	90%	96%	78%
Swimmers	90%	92%	95%	78%
Overall	91%	90%	94%	79%

Table 2.3

There is also very little difference between anglers, boaters and swimmers in terms of what they would do if conditions became worse in the next 12 months, with the exception that swimmers would be more likely to decrease visits if they perceived water clarity and purity to decline (Table 2.4). Similarly, there is no difference in the median number of days by which anglers, boaters and swimmers would decrease their visits: about 5-6 days for each user, regardless of the issue.

PERCENT WHO WOULD DECREASE OR CEASE VISITS IF CONDITIONS WORSENED

	Crowding	Water Levels/ Flows	Natural views and scenery	Water clarity and purity
Anglers	47%	42%	51%	65%
Boaters	48%	43%	57%	61%
Swimmers	42%	43%	60%	79%
Overall	46%	43%	56%	69%

Table 2.4

Those visitors who would cease or decrease their visits were asked where they would go instead of the current site, if they perceived a decline in water quality conditions. Respondents who would decrease their visitation appear most sensitive to changes in water levels or flows, in that 44% say they would leave the region or the state if they perceived a change from what they consider "adequate". About one-third of respondents report they would leave the region or New Hampshire if crowding conditions became worse (Table 2.5).

Of those who would leave New Hampshire (Table 2.5), more replied that they would travel instead to Maine (about 35%) or Massachusetts (about 17%) than to any other location. This was the general pattern of responses, regardless of the water quality issue.

OF THOSE WHO WOULD CEASE OR DECREASE VISITS, THEY WOULD...

	Crowding	Water Levels/Flows	Natural views and scenery	Water clarity and purity
Leave the Region	16%	19%	18%	18%
Leave New Hampshire	18%	25%	22%	23%
Stay in the Region	35%	25%	28%	29%
Don't know/ NH	31%	31%	32%	30%

Table 2.5

Although nearly one-quarter of respondents indicated they would leave New Hampshire if they perceived a decline in water clarity/purity, there were some interesting differences between anglers, boaters and swimmers in regard to their perceptions about specific water clarity and purity issues (Tables 2.6 - 2.8).

MILFOIL AFFECTS WATER CLARITY AND PURITY AT THIS SITE

	Not at all	Somewhat	Very Much	Don't Know
Anglers	51%	21%	12%	17%
Boaters	37%	27%	13%	23%
Swimmers	41%	24%	8%	26%
Overall	44%	24%	11%	22%

Table 2.6

ALGAE AFFECTS WATER CLARITY AND PURITY AT THIS SITE

	Not at all	Somewhat	Very Much	Don't Know
Anglers	55%	26%	11%	8%
Boaters	42%	33%	14%	11%
Swimmers	46%	30%	13%	11%
Overall	48%	30%	13%	10%

Table 2.7

MERCURY AFFECTS WATER CLARITY AND PURITY AT THIS SITE

	Not at all	Somewhat	Very Much	Don't Know
Anglers	28%	17%	8%	48%
Boaters	24%	11%	5%	61%
Swimmers	29%	19%	8%	54%
Overall	27%	12%	7%	54%

Table 2.8

THE ECONOMIC COST OF DECLINING WATER CLARITY AND PURITY

Summary

As perceived by recreationalists, a negative change in water clarity and purity would have the largest negative economic impact on New Hampshire revenues, compared to the other issues of crowding, water levels and flows, and natural views and scenery. Summer travelers and visitors to New Hampshire who fish, boat or swim report that they are most likely to decrease their visits if issues pertaining to water clarity and purity grow worse than they are now. Water clarity and purity is comprised of three components for the purpose of this study: milfoil or other invasives; mercury; and algae.

A total of 69% percent of anglers, boaters and swimmers say they would decrease their intended visits if water clarity and purity grows poor(er). Of those who would decrease their intended visits, 23% would leave the state and 18% would go to another region in New Hampshire. Approximately 29% reported they would continue to visit the region in which they were interviewed, and 30% would go to some unspecified location elsewhere in New Hampshire (Graph 3.1). Those anglers, boaters and swimmers who would leave the state because of declining water clarity and purity represent a displacement of visitor days from New Hampshire to other states totaling 14%...a loss of more than 2 million visitor days.

The economic effects of this out-migration would be significant to the New Hampshire economy. Fishing, boating and swimming generated about $379 million in total sales, plus an additional $134 million of income in 2006. The loss represented by those 69% who would decrease their visits translates to a decrease of more than $50 million in total sales, $18 million in household income, and just over 800 jobs (Table 3.1).

Destination of Users Who Would Decrease Visits

If *Water Clarity and Purity* Deteriorated (69% of all visitors)

Leave region
18.0%

Leave NH
23.0%

NH/dk*
30.0%

Stay in region
29.0%

(*dk = "don't know")
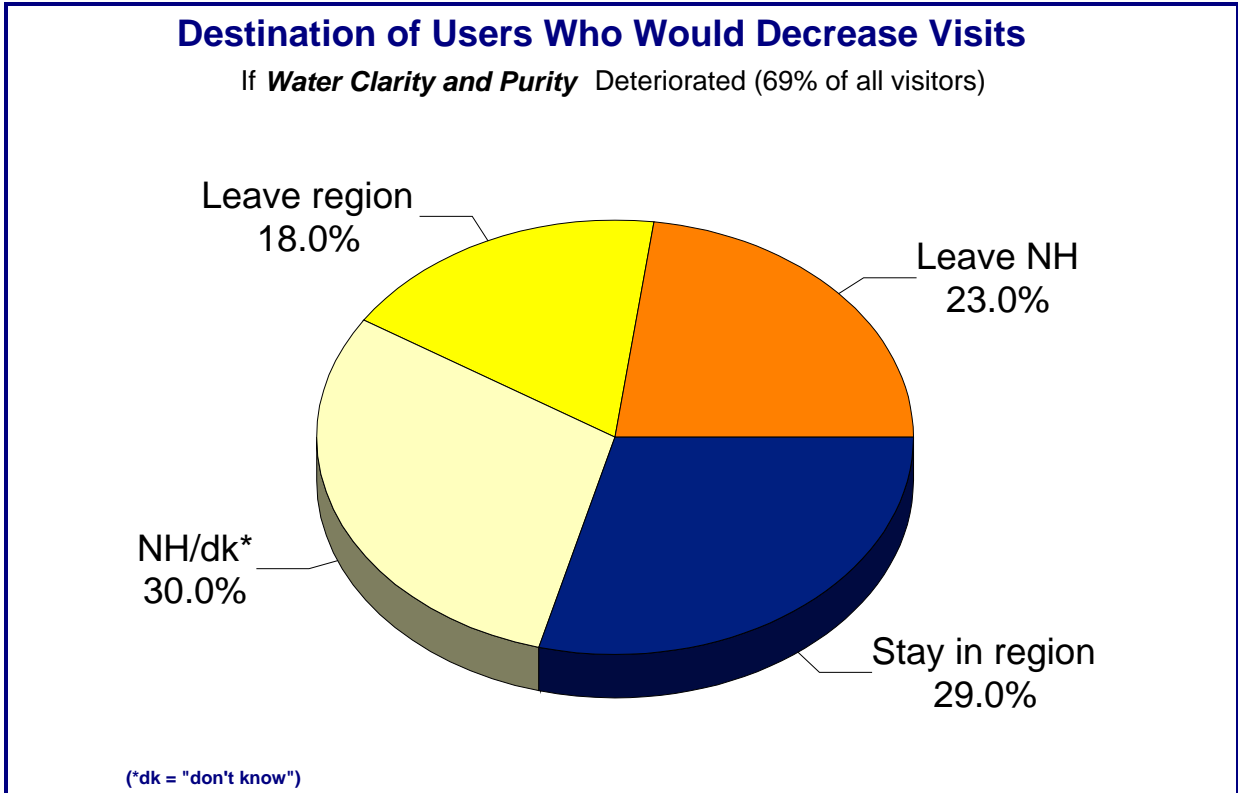
Graph 3.1

ALL USERS AND REGIONS

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs
TOTAL	**$ 378,837,590**	**$ 134,250,642**	**5991**
Effect of Decreased Water Clarity			
Anglers...............	($2,578,736)	($919,343)	(44)
Boaters..............	($8,674,623)	($3,078,461)	(137)
Swimmers..........	($39,665,224)	($14,038,086)	(630)
TOTAL LOSS due to decreased water clarity and purity	**($50,918,583)**	**($18,035,890)**	**(811)**

Table 3.1

Summary of Results by Region

The economies of the seven tourism regions in New Hampshire would similarly be most affected by a perceived decline in water clarity and purity. This is the surface water issue for which the highest percentage of visitors and travelers in every region would be most likely to displace out of New Hampshire or to another region if they perceived poor(er) conditions relating to milfoil, algae and mercury.

Recreationalists visiting the Dartmouth-Sunapee and Merrimack Valley regions (85% each) appear most sensitive to the issue of declining water clarity and purity, followed by those in the White Mountain (72%) and Monadnock (68%) regions (Graph 3.2). However those who would decrease the number of days they intend to fish, boat or swim won't necessarily leave the region or New Hampshire. Instead they may simply pursue other activities in the area, spending money in other sectors and potentially creating the same economic impact.

It is only those recreationalists who say they would leave the state or the region who will have a negative impact on either the New Hampshire or regional economy, respectively. Recreational visitors to the Seacoast region are most likely to say they will *leave New Hampshire* (32%), followed by those from the Lakes region (27%) and the White Mountains (26%) (Table 3.2). Only those who report they would leave New Hampshire are included in the economic impact portion of this research.

In terms of overall dollars and jobs lost, the cost of visitors leaving the state because of perceived deterioration of water clarity and purity has the highest economic impact in the Lakes region (Table 3.3). In terms of dollars and jobs lost as a percentage of overall fishing, swimming and boating revenues, the Merrimack Valley region, the Seacoast region and the White Mountain region would each lose about 19% of revenues if visitors perceive a decline in water clarity and purity. The Lakes region and the Dartmouth-Sunapee region would each lose about 12% of their fishing, boating and swimming revenues and the Monadnock and Great North Woods regions would each lose about 7% of their revenues if visitors perceived a decline in water clarity and purity.

Percent Who Would Decrease Visiting Days

If *Water Clarity and Purity* Deteriorate in the Next 12 Months

Region	Percent
All Regions	69%
DS	85%
MV	85%
WM	72%
MON	68%
GNW	61%
LR	61%
SC	59%
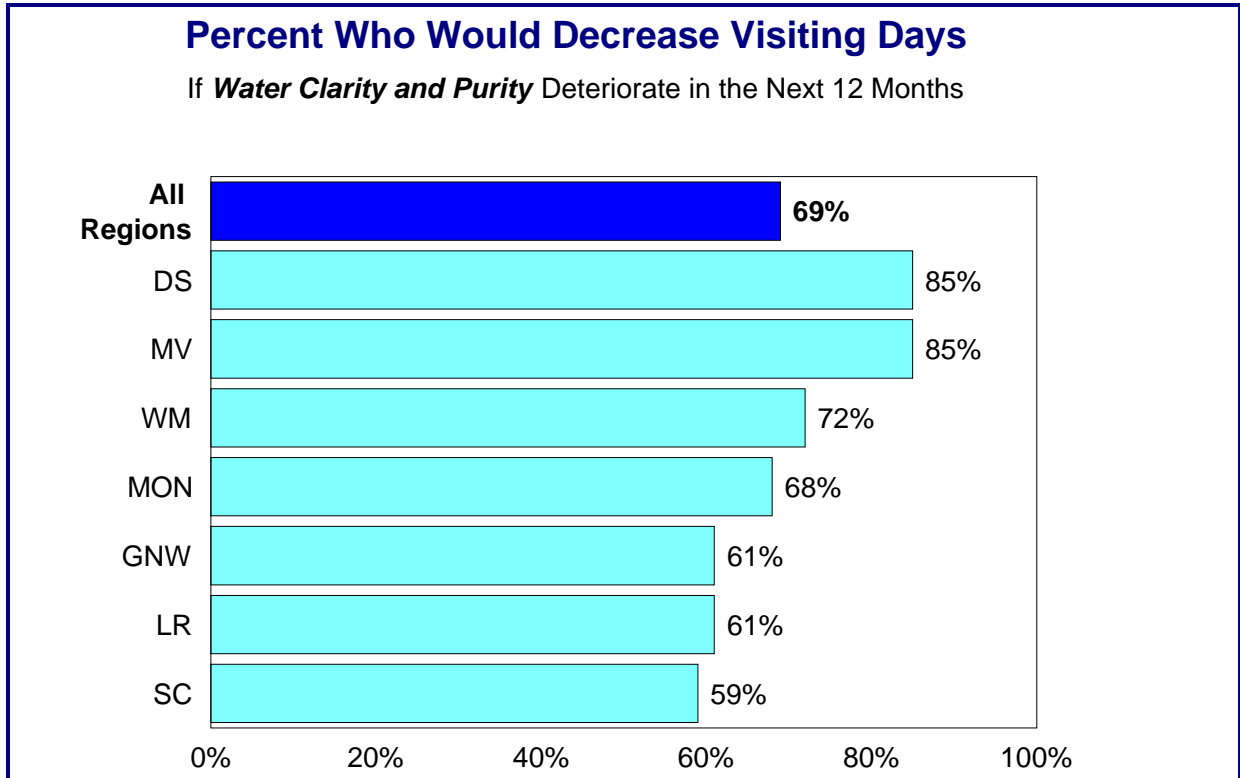
Graph 3.2

DESTINATIONS OF USERS WHO WOULD DECREASE VISITS IF WATER CLARITY AND PURITY DECLINED: BY REGION

REGION	Remain in the Region	Go elsewhere in NH/dk	Leave the Region	Leave NH
GNW	40%	27%	11%	22%
WM	26%	35%	14%	26%
LR	38%	17%	18%	27%
DS	42%	9%	26%	23%
MON	24%	45%	13%	18%
MV	22%	40%	27%	11%
SC	13%	47%	8%	32%

Table 3.2

ECONOMIC LOSS IF WATER CLARITY AND PURITY DETERIORATED: BY REGION

REGION	(Total Sales)	(Household Income)	(Jobs)
GNW	($1,807,634)	($642,723)	(29)
WM	($11,841,792)	($4,192,965)	(189)
LR	($24,964,837)	($8,843,580)	(396)
DS	($873,727)	($309,625)	(14)
MON	($509,448)	($180,845)	(9)
MV	($8,290,851)	($2,934,907)	(131)
SC	($2,630,294)	($931,245)	(43)
TOTAL	($50,918,583)	($18,035,890)	(811)

Table 3.3

Great North Woods

A total of 61% of anglers, boaters and swimmers say they would decrease their intended visits to the Great North Woods if water clarity and purity grew poor(er). Of those who would decrease their intended visits, 22% would leave the state and 11% would leave the region. Approximately 27% would go to some unspecified location in New Hampshire, and 40% would remain in the region. Those recreationalists who would leave the state because of declining water clarity and purity represent a displacement of visitor days from the region to other states totaling 7%…a loss of about 73,000 visitor days.

Overall, surface water recreation in the Great North Woods generates over 400 jobs, over 9 million in personal income and more than $26 million in business sales, totaling about 7% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived decline in water clarity and purity in the Great North Woods region would lead to a loss of almost 30 jobs, a loss of about $650,000 in personal income and a loss of nearly $2 million in business sales.

GREAT NORTH WOODS

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL IMPACT	$ 26,138,458	$ 9,333,576	419	1,043,000
TOTAL LOSS due to decreased water clarity and purity	($1,807,634)	($642,723)	(29)	(73,010)

32

White Mountains

A total of 72% of anglers, boaters and swimmers say they would decrease their intended visits to the White Mountain region if water clarity and purity grew poor(er). Of those who would decrease their intended visits, 26% would leave the state and 14% would leave the region. Approximately 35% would go to some unspecified location in New Hampshire, and 26% would remain in the region. Those recreationalists who would leave the state because of declining water clarity and purity represent a displacement of visitor days from the region to other states totaling 18%…a loss of about 483,000 visitor days.

Surface water recreation generates just over 1000 jobs in the White Mountains. These jobs equate to about $24 million in personal income and over $67 million in business sales, totaling about 18% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived decline in water clarity and purity will bring about the greatest change in the White Mountain regional economy. A decrease in water clarity and purity would cause a loss of nearly 200 jobs, a loss of about $4 million in personal income and approximately $12 million in lost business sales.

WHITE MOUNTAINS

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	$67,651,915	$23,994,486	1,078	2,682,000
TOTAL LOSS due to decreased water clarity and purity	($11,841,792)	($4,192,965)	(189)	(482,760)

Lakes Region

A total of 61% of anglers, boaters and swimmers say they would decrease their intended visits to the Lakes Region if water clarity and purity grew poor(er). Of those who would decrease their intended visits, 27% would leave the state and 18% would leave the region. Approximately 17% would go to some unspecified location in New Hampshire, and 38% would remain in the region. Those recreationalists who would leave the state because of declining water clarity and purity represent a displacement of visitor days from the region to other states totaling 12%…a loss of more than 8 million visitor days.

Surface water recreation generates about 3300 jobs in the Lakes Region. These jobs equate to almost $75 million in personal income and over $210 million in business sales, totaling about 55% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived decline in water clarity and purity will bring about the greatest

change in the Lakes Region economy. A decrease in water clarity and purity would cause a loss of nearly 400 jobs, about $9 million in personal income and approximately $25 million in business sales.

LAKES REGION

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$210,641,206**	**$74,561,310**	**3,313**	**8,344,000**
TOTAL LOSS due to decreased water clarity and purity	**($24,964,837)**	**($8,843,580)**	**(396)**	**(1,001,280)**

Dartmouth-Sunapee

A total of 85% of anglers, boaters and swimmers say they would decrease their intended visits to the Dartmouth-Sunapee Region if water clarity and purity grew poor(er). Of those who would decrease their intended visits, 23% would leave the state and 26% would leave the region. Approximately 9% would go to some unspecified location in New Hampshire, and 42% would remain in the region. Those recreationalists who would leave the state because of declining water clarity and purity represent a displacement of visitor days from the region to other states totaling 12%…a loss of about 35,000 visitor days**.**

Surface water recreation generates over 100 jobs in the Dartmouth-Sunapee Region. These jobs equate to $2.6 million in personal income and almost $7.5 million in business sales, totaling about 3.5% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived decline in water clarity and purity will bring about the greatest change in the Dartmouth-Sunapee economy. A decrease in water clarity and purity would cause a loss of 14 jobs, about $309,000 in personal income and almost $1 million in business sales.

DARTMOUTH-SUNAPEE

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$7,492,565**	**$2,658,018**	**119**	**298,000**
TOTAL LOSS due to decreased water clarity and purity	**($873,727)**	**($309,625)**	**(14)**	**(35,760)**

Monadnock

A total of 68% of anglers, boaters and swimmers say they would decrease their intended visits to the Monadnock Region if water clarity and purity grew poor(er). Of those who would decrease their intended visits, 18% would leave the state and 13% would leave the region. Approximately 45% would go to some unspecified location in New Hampshire, and 24% would remain in the region. Those recreationalists who would leave the state because of declining water clarity and purity represent a displacement of visitor days from the region to other states totaling 7%…a loss of about 21,000 visitor days**.**

Surface water recreation generates just over 120 jobs in the Monadnock Region. These jobs equate to almost $3 million in personal income and almost $8 million in business sales, totaling about 4% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived decline in water clarity and purity will bring about the greatest change in the Monadnock region economy. A decrease in water clarity and purity would cause a loss of 9 jobs, about $180,000 in personal income and approximately one-half million in business sales.

MONADNOCK

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$7,798,459**	**$2,764,883**	**123**	**298,000**
TOTAL LOSS due to decreased water clarity and purity	**($509,448)**	**($180,845)**	**(9)**	**(20,860)**

Merrimack Valley

A total of 85% of anglers, boaters and swimmers say they would decrease their intended visits to the Merrimack Valley Region if water clarity and purity grew poor(er). Of those who would decrease their intended visits, 11% would leave the state and 27% would leave the region. Approximately 40% would go to some unspecified location in New Hampshire, and 22% would remain in the region. Those recreationalists who would leave the state because of declining water clarity and purity represent a displacement of visitor days from the region to other states totaling 19%…a loss of about 340,000 visitor days**.**

Surface water recreation generates about 700 jobs in the Merrimack Valley Region. These jobs equate to almost $16 million in personal income and over $44 million in business sales, totaling about 21% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived decline in water clarity and purity will bring about the greatest change in the Merrimack Valley economy. A decrease in water clarity and purity would

cause a loss of about 130 jobs, almost $3 million in personal income and approximately $8 million in business sales.

MERRIMACK VALLEY

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$44,362,495**	**$15,709,778**	**704**	**1,788,000**
TOTAL LOSS due to decreased water clarity and purity	**($8,290,851)**	**($2,934,907)**	**(131)**	**(339,720)**

Seacoast

A total of 59% of anglers, boaters and swimmers say they would decrease their intended visits to the Seacoast Region if water clarity and purity grew poor(er). Of those who would decrease their intended visits, 32% would leave the state and 8% would leave the region. Approximately 47% would go to some unspecified location in New Hampshire, and 13% would remain in the region. Those recreationalists who would leave the state because of declining water clarity and purity represent a displacement of visitor days from the region to other states totaling 18%…a loss of about 100,000 visitor days**.**

Surface water recreation generates more than 200 jobs in the Seacoast Region. These jobs equate to slightly more than $5 million in personal income and nearly $15 million in business sales, totaling about 7% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived decline in water clarity and purity would bring about significant change in the Seacoast economy. A decrease in water clarity and purity would cause a loss of more than 40 jobs, almost $1 million in personal income and more than $2.5 million in business sales.

SEACOAST

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$14,752,492**	**$5,228,591**	**235**	**596,000**
TOTAL LOSS due to decreased water clarity and purity	**($2,630,294)**	**($931,245)**	**(43)**	**(107,280)**

THE ECONOMIC COST OF CHANGES IN WATER LEVELS OR FLOWS

Summary

Summer travelers and visitors to New Hampshire who fish, boat or swim report great sensitivity to issues of water levels and flows. Of those who would decrease their visits, the percentage of visitors who reported that they would *leave* the region or New Hampshire if they perceived that flows or levels became "less than adequate" is higher than with any other issue. For some users (anglers, boaters) this could mean that water levels are too high or fast, while others are somewhat less particular (swimmers)[31]. As perceived by recreationalists, a decline in the quality of water levels and flows would have the second-largest negative economic impact on New Hampshire revenues, when compared to water clarity and purity, natural views and scenery, and crowding issues.

A total of 43% percent of anglers, boaters and swimmers say they would decrease their intended visits if they perceived changes in water levels or flows. Of those who would decrease their intended visits, 25% would leave the state and 19% would go to another region in New Hampshire. Approximately 25% reported they would continue to visit the region in which they were interviewed, and 31% would go to some unspecified location elsewhere in New Hampshire (Graph 4.1). Those anglers, boaters and swimmers who would leave the state because of changes in flows or levels represent a displacement of visitor days from New Hampshire to other states totaling 8%…a loss of more than 1 million visitor days**.**

The economic effects of this out-migration would be significant to the New Hampshire economy. Fishing, boating and swimming generated about $379 million in total sales, plus an additional $134 million of income in 2006. The loss represented by those 43% who would decrease their visits translates to a decrease of almost $30 million in total sales, a loss of $10 million in household income, and almost 500 jobs lost (Table 4.1).

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[31] See Chapter 2 "Respondent Characteristics and Attitudes", Table 2.5

Destination of Users Who Would Decrease Visits
If *Water Levels or Flows* Change (43% of all visitors)

Leave region 19.0%

Leave NH 25.0%

NH/dk* 31.0%

Stay in region 25.0%

*dk="don't know"
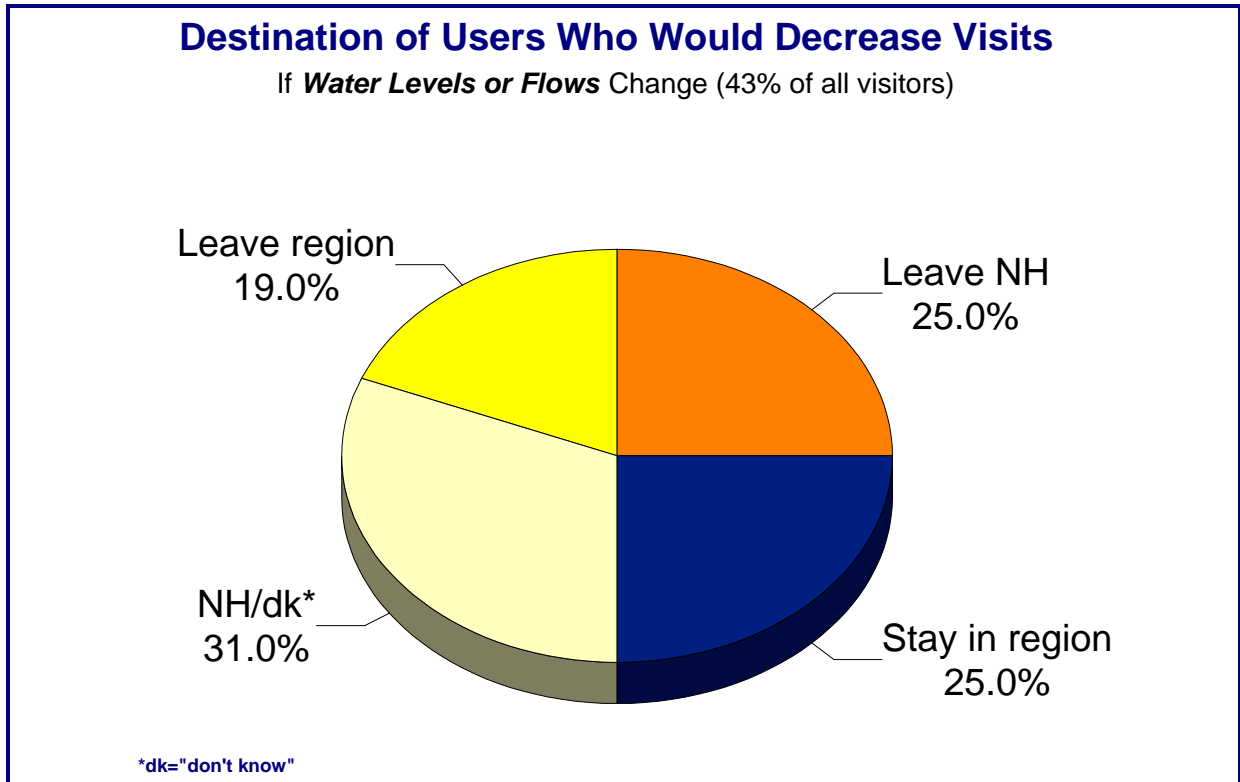
Graph 4.1

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs
TOTAL	**$ 378,837,590**	**$ 134,250,642**	**5991**
Effect of Changes in Levels or Flows			
Anglers...............	($2,174,378)	($774,385)	(37)
Boaters.............	($8,750,917)	($6,381,989)	(138)
Swimmers..........	($18,058,779)	($3,101,349)	(287)
TOTAL LOSS due to changes in levels or flows	**($28,984,074)**	**($10,257,723)**	**(462)**

Table 4.1

The Economic Cost of Declining Water Quality in New Hampshire: The Link between Visitor Perceptions, Usage and Spending_____

May 2007

Summary of Results by Region

Recreationalists visiting the Monadnock (57%) and the Dartmouth-Sunapee (54%) regions appear most sensitive to the issue of changing levels and flows, followed by those in the Merrimack Valley (50%) (Graph 4.2). However those who would decrease the number of days they intend to fish, boat or swim won't necessarily leave the region or New Hampshire. Instead they may simply pursue other activities in the area, spending money in other sectors and potentially creating the same economic impact.

It is only those recreationalists who say they would leave the state or the region who will have a negative impact on either the New Hampshire or regional economy, respectively. Recreational visitors to the Seacoast region are most likely to say they will *leave New Hampshire* (40%) if they perceive a negative change in water levels or flows, followed by those from the Dartmouth-Sunapee and Lakes Regions (29% each) (Table 4.2). Only those who report they would leave New Hampshire are included in the economic impact portion of this research.

In terms of overall dollars and jobs lost, the cost of visitors leaving the state because of perceived negative changes in water levels or flows has the highest economic impact in the Lakes Region (Table 4.3). In terms of dollars and jobs lost as a percentage of overall fishing, swimming and boating revenues, the Merrimack Valley region, the Seacoast region and the White Mountain region would each lose about 9% of revenues if visitors perceive a negative change in water levels or flows. The Lakes Region and the Dartmouth-Sunapee region would each lose about 7.5% of their fishing, boating and swimming revenues the Monadnock region would lose about 6.5% and the Great North Woods region would lose about 5% of its revenues if visitors perceived a negative change in water levels or flows.

Percent Who Would Decrease Visiting Days

If *Water Level or Flows* Change in the Next 12 Months

Region	Percent
All Regions	43%
MON	57%
DS	54%
MV	50%
SC	44%
WM	38%
LR	36%
GNW	32%
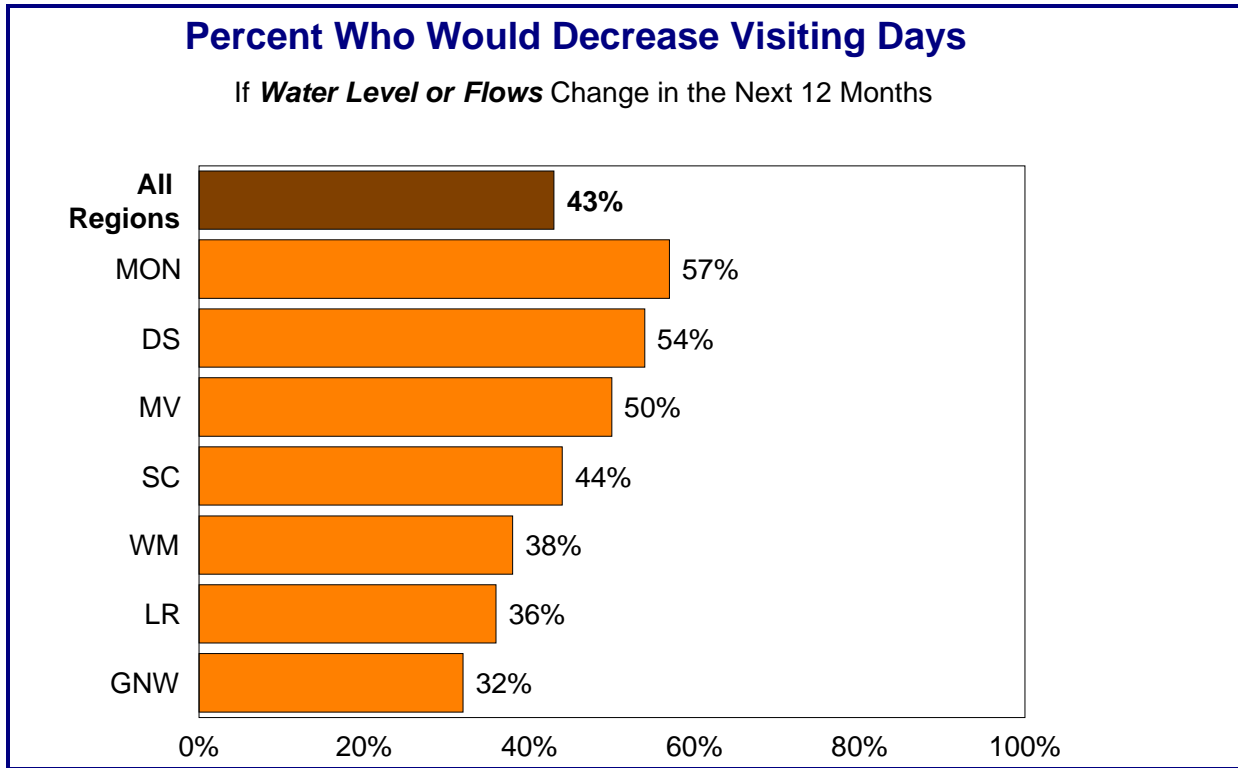
Graph 4.2

DESTINATIONS OF USERS WHO WOULD DECREASE VISITS IF WATER LEVELS OR FLOWS CHANGED: BY REGION

REGION	Remain in the Region	Go elsewhere in NH/dk	Leave the Region	Leave NH
GNW	29%	29%	16%	26%
WM	13%	37%	24%	26%
LR	38%	14%	19%	29%
DS	42%	5%	24%	29%
MON	15%	52%	18%	15%
MV	21%	41%	27%	11%
SC	12%	46%	2%	40%

Table 4.2

ECONOMIC LOSS IF WATER LEVELS AND FLOWS CHANGED: BY REGION

REGION	(Total Sales)	(Household Income)	(Jobs)
GNW	($1,420,222)	($477,723)	(21)
WM	($5,738,846)	($2,034,195)	(93)
LR	($15,361,559)	($5,532,192)	(247)
DS	($579,681)	($188,265)	(9)
MON	($521,713)	($164,870)	(8)
MV	($4,057,770)	($1,408,204)	(63)
SC	($1,304,283)	($452,274)	(21)
TOTAL	($28,984,074)	($10,257,723)	(462)

Table 4.3

Great North Woods

A total of 32% of anglers, boaters and swimmers say they would decrease their intended visits to the Great North Woods if they perceived a negative change in water levels or flows. Of those who would decrease their intended visits, 26% would leave the state and 16% would leave the region. Approximately 29% would go to some unspecified location in New Hampshire, and 29% would remain in the region. Those recreationalists who would leave the state because of perceived changes in water flows or levels represent a displacement of visitor days from the region to other states totaling 5%…a loss of about 50,000 visitor days.

Overall, surface water recreation in the Great North Woods generates over 400 jobs, over $9 million in personal income and approximately $25 million in business sales, totaling about 7% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived change in water levels or flows in the Great North Woods region would lead to a loss of about 20 jobs, a loss of about one-half million in personal income and a loss of nearly $1.5 million in business sales.

GREAT NORTH WOODS

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	$ 26,138,458	$ 9,333,576	419	1,043,000
TOTAL LOSS due to changes in water levels or flows	($1,420,222)	($477,723)	(21)	(52,150)

White Mountains

A total of 38% of anglers, boaters and swimmers say they would decrease their intended visits to the White Mountain region if they perceived a change in water levels or flows. Of those who would decrease their intended visits, 26% would leave the state and 24% would leave the region. Approximately 37% would go to some unspecified location in New Hampshire, and 13% would remain in the region. Those recreationalists who would leave the state because of perceived changes in water levels or flows represent a displacement of visitor days from the region to other states totaling 9%…a loss of more than 240,000 visitor days.

Surface water recreation generates just over 1000 jobs in the White Mountains. These jobs equate to about $24 million in personal income and over $67 million in business sales, totaling about 18% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived change in water levels or flows in the White Mountains region would lead to a loss of almost 100 jobs, a loss of about $2 million in personal income and a loss of nearly $6 million in business sales.

WHITE MOUNTAINS

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$67,651,915**	**$23,994,486**	**1,078**	**2,682,000**
TOTAL LOSS due to changes in water levels or flows	**($5,738,846)**	**($2,034,195)**	**(93)**	**(241,380)**

Lakes Region

A total of 36% of anglers, boaters and swimmers say they would decrease their intended visits to the Lakes Region if they perceived a change in water levels or flows. Of those who would decrease their intended visits, 29% would leave the state and 19% would leave the region. Approximately 14% would go to some unspecified location in New Hampshire, and 38% would remain in the region. Those recreationalists who would leave the state because of perceived changes in water levels or flows represent a displacement of visitor days from the region to other states totaling 7.5%…a loss of well over one-half million visitor days.

Surface water recreation generates about 3300 jobs in the Lakes Region. These jobs equate to almost $75 million in personal income and over $210 million in business sales, totaling about 55% of the recreational revenue generated by anglers, boaters and swimmers in New

Hampshire. A perceived change in water levels or flows would cause a loss of almost 250 jobs, about $5.5 million in personal income and approximately $15 million in business sales.

LAKES REGION

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$210,641,206**	**$74,561,310**	**3,313**	**8,344,000**
TOTAL LOSS due to changes in water levels or flows	**($15,361,559)**	**($5,532,192)**	**(247)**	**(625,050)**

Dartmouth-Sunapee

A total of 54% of anglers, boaters and swimmers say they would decrease their intended visits to the Dartmouth-Sunapee Region if they perceived a change in water levels or flows. Of those who would decrease their intended visits, 29% would leave the state and 24% would leave the region. Approximately 5% would go to some unspecified location in New Hampshire, and 42% would remain in the region. Those recreationalists who would leave the state because of changes in water levels or flows represent a displacement of visitor days from the region to other states totaling 7.5%…a loss of more than 20,000 visitor days.

Surface water recreation generates over 100 jobs in the Dartmouth-Sunapee Region. These jobs equate to $2.6 million in personal income and almost $7.5 million in business sales, totaling about 3.5% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived decline in water levels and flows would cause a loss of 9 jobs, about $200,000 in personal income and approximately one-half million in business sales.

DARTMOUTH-SUNAPEE

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$7,492,565**	**$2,658,018**	**119**	**298,000**
TOTAL LOSS due to changes in water levels or flows	**($579,681)**	**($188,265)**	**(9)**	**(22,350)**

Monadnock

A total of 57% of anglers, boaters and swimmers say they would decrease their intended visits to the Monadnock Region if they perceived a change in water levels or flows. Of those who would decrease their intended visits, 15% would leave the state and 18% would leave the region. Approximately 52% would go to some unspecified location in New Hampshire, and 15% would remain in the region. Those recreationalists who would leave the state because of perceived changes in water levels or flows represent a displacement of visitor days from the region to other states totaling 6.5%…a loss of about 20,000 visitor days**.**

Surface water recreation generates just over 120 jobs in the Monadnock Region. These jobs equate to almost $3 million in personal income and almost $8 million in business sales, totaling about 4% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived change in water levels or flows would cause a loss of 8 jobs, about $165 thousand in personal income and approximately one-half million in business sales.

MONADNOCK

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$7,798,459**	**$2,764,883**	**123**	**298,000**
TOTAL LOSS due to changes in water levels or flows	**($521,713)**	**($164,870)**	**(8)**	**(19,370)**

Merrimack Valley

A total of 50% of anglers, boaters and swimmers say they would decrease their intended visits to the Merrimack Valley Region if they perceived a change in water levels or flows. Of those who would decrease their intended visits, 11% would leave the state and 27% would leave the region. Approximately 41% would go to some unspecified location in New Hampshire, and 21% would remain in the region. Those recreationalists who would leave the state because of perceived changes in water levels or flows represent a displacement of visitor days from the region to other states totaling 9%…a loss of about 160,000 visitor days**.**

Surface water recreation generates about 700 jobs in the Merrimack Valley Region. These jobs equate to about $15 million in personal income and over $44 million in business sales, totaling about 21% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived change in water levels or flows would cause a loss of over 60 jobs, nearly $1.5 million in personal income and approximately $4 million in lost business sales.

MERRIMACK VALLEY

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$44,362,495**	**$15,709,778**	**704**	**1,788,000**
TOTAL LOSS due to changes in water levels or flows	**($4,057,770)**	**($1,408,204)**	**(63)**	**(160,920)**

Seacoast

A total of 44% of anglers, boaters and swimmers say they would decrease their intended visits to the Seacoast Region if they perceived changes to water levels or flows. Of those who would decrease their intended visits, 40% would leave the state and 2% would leave the region. Approximately 46% would go to some unspecified location in New Hampshire, and 12% would remain in the region. Those recreationalists who would leave the state because of perceived changes in water levels or flows represent a displacement of visitor days from the region to other states totaling 9%…a loss of approximately 50,000 visitor days.

Surface water recreation generates just over 200 jobs in the Seacoast Region. These jobs equate to about $5 million in personal income and over $14 million in business sales, totaling about 7% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived change in water levels or flows would cause a loss of about 20 jobs, about one-half million in personal income and $1.3 million in business sales.

SEACOAST

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$14,752,492**	**$5,228,591**	**235**	**596,000**
TOTAL LOSS due to changes in water levels or flows	**($1,304,283)**	**($452,274))**	**(21)**	**(53,640)**

THE ECONOMIC COST OF CHANGING NATURAL VIEWS AND SCENERY

Summary

Summer travelers and visitors to New Hampshire who fish, boat or swim appear to value natural views and scenery quite highly. As perceived by recreationalists, a decline in the quality of natural views and scenery would have the third-largest negative economic impact on New Hampshire revenues, compared to water clarity and purity, water levels and flows, and crowding issues.

A total of 56% percent of anglers, boaters and swimmers say they would decrease their intended visits if they perceived a change in natural views and scenery at their recreational site. Of those who would decrease their intended visits, 22% would leave the state and 18% would go to another region in New Hampshire. Approximately 28% reported they would continue to visit the region in which they were interviewed, and 32% would go to some unspecified location elsewhere in New Hampshire (Graph 5.1). Those anglers, boaters and swimmers who would leave the state because changes to natural views and scenery represent a displacement of visitor days from New Hampshire to other states totaling 7%…a loss of over 1 million visitor days.

The economic effects of this out-migration would be significant to the New Hampshire economy. Fishing, boating and swimming generated about $379 million in total sales, plus an additional $134 million of income in 2006. The loss represented by those 56% who would decrease their visits translates to a decrease of more than $27 million in total sales, almost $10 million in lost income, and more than 400 jobs (Table 5.1).

Destination of Users Who Would Decrease Visits
If *Natural Views and Scenery* Deteriorate (56% of all visitors)

Leave region
18.0%

Leave NH
22.0%

NH/dk*
32.0%

Stay in region
28.0%

*dk="don't know"
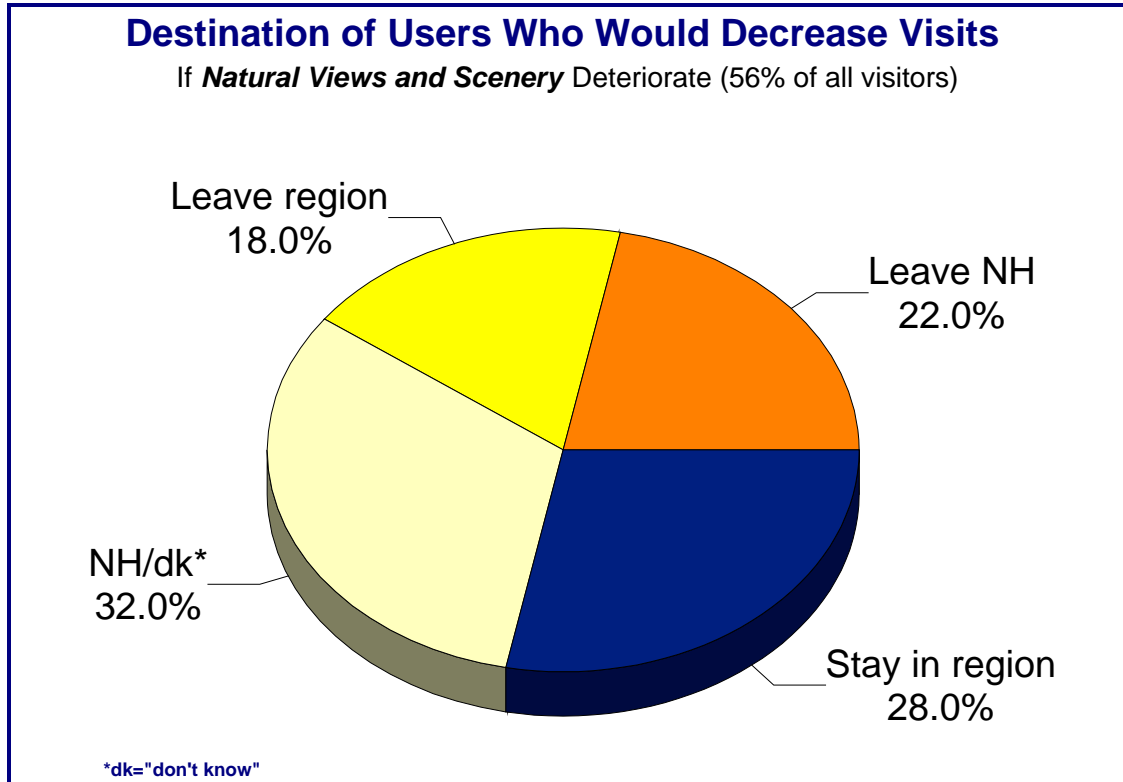
Graph 5.1

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs
TOTAL	**$ 378,837,590**	**$ 134,250,642**	**5991**
Effect of Changing Natural Views and Scenery			
Anglers...............	($1,358,033)	($480,653)	(24)
Boaters..............	($6,935,121)	($2,456,665)	(110)
Swimmers..........	($19,363,405)	($6,847,382)	(308)
TOTAL LOSS due to Changing Natural Views and Scenery	**($27,656,559)**	**($9,784,700)**	**(442)**

Table 5.1

Summary of Results by Region

Recreationalists visiting the Merrimack Valley (74%) and the Dartmouth-Sunapee (69%) regions appear most sensitive to the issue of negative changes to natural views and scenery (Graph 5.2). However those who would decrease the number of days they intend to fish, boat or swim won't necessarily leave the region or New Hampshire. Instead they may simply pursue other activities in the area, spending money in other sectors and potentially creating the same economic impact.

It is only those recreationalists who say they would leave the state or the region who will have a negative impact on either the New Hampshire or regional economy, respectively. Recreational visitors to the Seacoast region are most likely to say they will *leave New Hampshire* (27%) if they perceive a change in natural views and scenery, followed closely by those from the Dartmouth-Sunapee and White Mountain regions (26% each) (Table 5.2). Only those who report they would leave New Hampshire are included in the economic impact portion of this research.

In terms of overall dollars and jobs lost, the cost of visitors leaving the state because of perceived changes to the natural beauty and scenery of a site has the highest economic impact in the Lakes Region (Table 5.3). In terms of dollars and jobs lost as a percentage of overall fishing, swimming and boating revenues, the Merrimack Valley region, the Seacoast region and the White Mountain region would each lose about 9% of revenues if visitors perceive negative changes to natural beauty and scenery. The Lakes Region and the Dartmouth-Sunapee region would each lose about 7% of their fishing, boating and swimming revenues, the Monadnock region would lose about 6%, and Great North Woods region would lose about 3% of its revenues if visitors perceived a loss of natural views and scenery.

Percent Who Would Decrease Visiting Days
If *Natural Views and Scenery* Deteriorate in the Next 12 Months

Region	Percent
All Regions	56%
MV	74%
DS	69%
MON	55%
GNW	53%
WM	52%
SC	47%
LR	46%
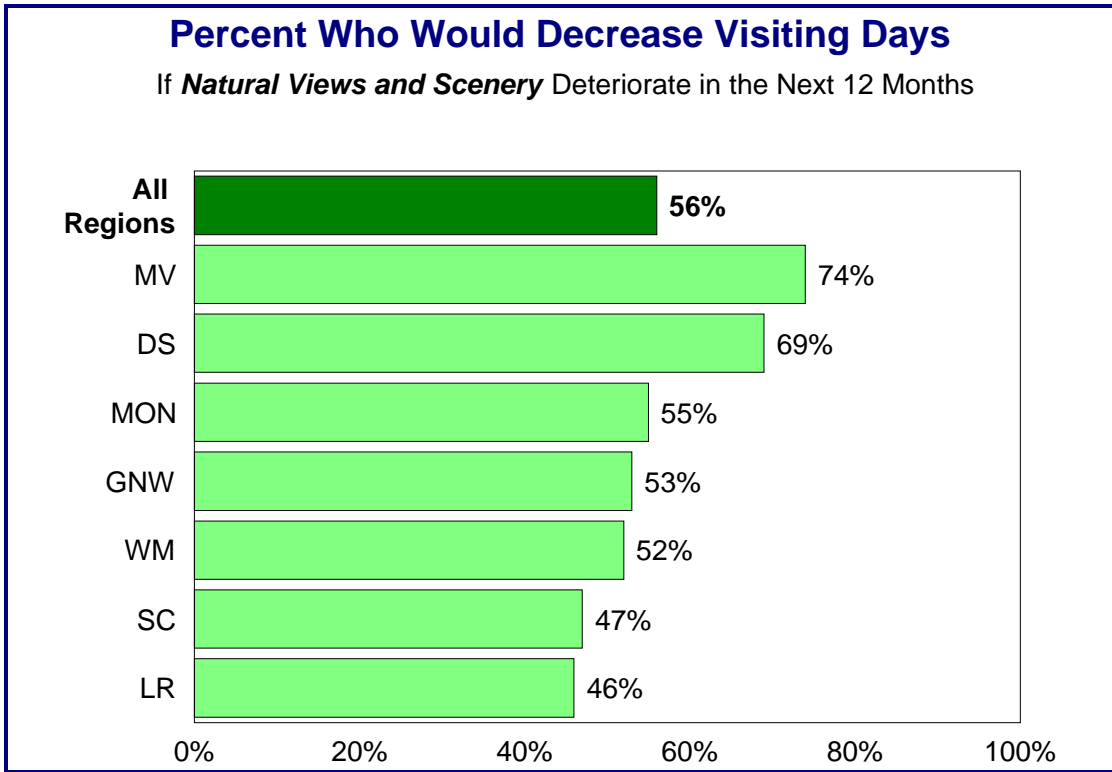
Graph 5.2

DESTINATIONS OF USERS WHO WOULD DECREASE VISITS IF NATURAL VIEWS AND SCENERY CHANGE: BY REGION

REGION	Remain in the Region	Go elsewhere in NH/dk	Leave the Region	Leave NH
GNW	22%	32%	15%	31%
WM	21%	35%	18%	26%
LR	40%	23%	17%	20%
DS	42%	8%	24%	26%
MON	19%	43%	19%	19%
MV	23%	39%	26%	12%
SC	20%	48%	5%	27%

Table 5.2

ECONOMIC LOSS IF NATURAL VIEWS AND SCENERY CHANGE: BY REGION

REGION	(Total Sales)	(Household Income)	(Jobs)
GNW	($967,979)	($347,529)	(15)
WM	($5,807,877)	($2,070,954)	(94)
LR	($14,381,410)	($5,137,644)	(231)
DS	($553,131)	($172,005)	(9)
MON	($442,505)	($129,957)	(7)
MV	($4,148,483)	($1,463,102)	(65)
SC	($1,355,174)	($463,509)	(21)
TOTAL	($27,656,559)	($9,784,700)	(442)

Table 5.3

Great North Woods

A total of 53% of anglers, boaters and swimmers say they would decrease their intended visits to the Great North Woods if they perceived a change in natural beauty and scenery. Of those who would decrease their intended visits, 31% would leave the state and 15% would leave the region. Approximately 32% would go to some unspecified location in New Hampshire, and 22% would remain in the region. Those recreationalists who would leave the state because of perceived changes in natural beauty and scenery represent a displacement of visitor days from the region to other states totaling 3%…a loss of about 31,000 visitor days.

Overall, surface water recreation in the Great North Woods generates over 400 jobs, over $9 million in personal income and approximately $25 million in business sales, totaling about 7% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived change in natural beauty and scenery in the Great North Woods region would lead to a loss of 15 jobs, a loss of about $350,000 in personal income and a loss of nearly $1 million in business sales.

GREAT NORTH WOODS

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	$ 26,138,458	$ 9,333,576	419	1,043,000
TOTAL LOSS due to Changing Natural Views and Scenery	($967,979)	($347,529)	(15)	(31,290)

50

White Mountains

A total of 52% of anglers, boaters and swimmers say they would decrease their intended visits to the White Mountain region if they perceived changes in natural beauty and scenery. Of those who would decrease their intended visits, 26% would leave the state and 18% would leave the region. Approximately 35% would go to some unspecified location in New Hampshire, and 21% would remain in the region. Those recreationalists who would leave the state because of perceived changes in natural beauty and scenery represent a displacement of visitor days from the region to other states totaling 9%…a loss of approximately 240,000 visitor days**.**

Surface water recreation generates just over 1000 jobs in the White Mountains. These jobs equate to about $24 million in personal income and over $67 million in business sales, totaling about 18% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived change in natural beauty and scenery in the White Mountains region would lead to a loss of almost 100 jobs, a loss of approximately $2 million in personal income and a loss of nearly $6 million in business sales.

WHITE MOUNTAINS

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$67,651,915**	**$23,994,486**	**1,078**	**2,682,000**
TOTAL LOSS due to Changing Natural Views and Scenery	**($5,807,877)**	**($2,070,954)**	**(94)**	**(241,380)**

Lakes Region

A total of 46% of anglers, boaters and swimmers say they would decrease their intended visits to the Lakes Region if they perceived a change in water levels or flows Of those who would decrease their intended visits, 20% would leave the state and 17% would leave the region. Approximately 23% would go to some unspecified location in New Hampshire, and 40% would remain in the region. Those recreationalists who would leave the state because of a perceived change in natural beauty and scenery represent a displacement of visitor days from the region to other states totaling 7%…a loss of approximately one-half million visitor days**.**

Surface water recreation generates about 3300 jobs in the Lakes Region. These jobs equate to almost $75 million in personal income and over $210 million in business sales, totaling about 55% of the recreational revenue generated by anglers, boaters and swimmers in New

Hampshire. A perceived change in natural beauty and scenery would cause a loss of over 200 jobs, over $5 million in personal income and about $14 million in lost business sales.

LAKES REGION

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$210,641,206**	**$74,561,310**	**3,313**	**8,344,000**
TOTAL LOSS due to Changing Natural Views and Scenery	**($14,381,410)**	**($5,137,644)**	**(231)**	**(584,080)**

Dartmouth-Sunapee

A total of 69% of anglers, boaters and swimmers say they would decrease their intended visits to the Dartmouth-Sunapee Region if they perceived changes in natural beauty and scenery. Of those who would decrease their intended visits, 26% would leave the state and 24% would leave the region. Approximately 8% would go to some unspecified location in New Hampshire, and 42% would remain in the region. Those recreationalists who would leave the state because of changes in natural beauty and scenery represent a displacement of visitor days from the region to other states totaling 7.5%…a loss of approximately 22,000 visitor days**.**

Surface water recreation generates over 100 jobs in the Dartmouth-Sunapee Region. These jobs equate to $2.6 million in personal income and almost $7.5 million in business sales, totaling about 3.5% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived change in natural beauty and scenery would cause a loss of 9 jobs, about $170,000 in personal income and approximately one-half million in business sales.

DARTMOUTH-SUNAPEE

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$7,492,565**	**$2,658,018**	**119**	**298,000**
TOTAL LOSS due to Changing Natural Views and Scenery	**($553,131)**	**($172,005)**	**(9)**	**(22,350)**

Monadnock

A total of 55% of anglers, boaters and swimmers say they would decrease their intended visits to the Monadnock Region if they perceived changes in natural beauty and scenery. Of those who would decrease their intended visits, 19% would leave the state and 19% would leave the region. Approximately 43% would go to some unspecified location in New Hampshire, and 19% would remain in the region. Those recreationalists who would leave the state because of changes in natural beauty and scenery represent a displacement of visitor days from the region to other states totaling 6%…a loss of close to 18,000 visitor days.

Surface water recreation generates just over 120 jobs in the Monadnock Region. These jobs equate to almost $3 million in personal income and almost $8 million in business sales, totaling about 4% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived change in natural beauty and scenery would cause a loss of 7 jobs, about $130,000 in personal income and about one-half million in business sales.

MONADNOCK

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$7,798,459**	**$2,764,883**	**123**	**298,000**
TOTAL LOSS due to Changing Natural Views and Scenery	**($442,505)**	**($129,957)**	**(7)**	**(17,880)**

Merrimack Valley

A total of 74% of anglers, boaters and swimmers say they would decrease their intended visits to the Merrimack Valley Region if they perceived changes in natural beauty and scenery. Of those who would decrease their intended visits, 12% would leave the state and 26% would leave the region. Approximately 39% would go to some unspecified location in New Hampshire, and 23% would remain in the region. Those recreationalists who would leave the state because of changes in natural beauty and scenery represent a displacement of visitor days from the region to other states totaling 9%…a loss of about 160,000 visitor days**.**

Surface water recreation generates about 700 jobs in the Merrimack Valley Region. These jobs equate to about $15 million in personal income and over $44 million in business sales, totaling about 21% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived change in natural beauty and scenery would cause a loss of 65 jobs, about $1.5 million in personal income and approximately $4 million in business sales.

MERRIMACK VALLEY

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$44,362,495**	**$15,709,778**	**704**	**1,788,000**
TOTAL LOSS due to Changing Natural Views and Scenery	**($4,148,483)**	**($1,463,102)**	**(65)**	**(160,920)**

Seacoast

A total of 47% of anglers, boaters and swimmers say they would decrease their intended visits to the Seacoast Region if they perceived changes in natural beauty and scenery. Of those who would decrease their intended visits, 27% would leave the state and 5% would leave the region. Approximately 48% would go to some unspecified location in New Hampshire, and 20% would remain in the region. Those recreationalists who would leave the state because of changes in natural beauty and scenery represent a displacement of visitor days from the region to other states totaling 9%…a loss of approximately 50,000 visitor days**.**

Surface water recreation generates over 200 jobs in the Seacoast Region. These jobs equate to about $5 million in personal income and over $14 million in business sales, totaling about 7% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived change in natural beauty and scenery would cause a loss of about 20 jobs, about one-half million in personal income and approximately $1.3 million in business sales.

SEACOAST

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$14,752,492**	**$5,228,591**	**235**	**596,000**
TOTAL LOSS due to Changing Natural Views and Scenery	**($1,355,174)**	**($463,509)**	**(21)**	**(53,640)**

THE ECONOMIC COST OF CROWDING

Summary

Summer travelers and visitors to New Hampshire who fish, boat or swim are least likely to leave the state or the tourism region if issues pertaining to crowding grow worse than they are now. Compared to issues of water clarity and purity, water levels and flows, and natural views and scenery, visitors report they are least affected by crowding problems.

A total of 46% percent of anglers, boaters and swimmers say they would decrease their intended visits if they perceived an increase in crowding at their recreational site. Of those who would decrease their intended visits, 18% would leave the state and 16% would go to another region in New Hampshire. Approximately 35% reported they would continue to visit the region in which they were interviewed, and 31% would go to some unspecified location elsewhere in New Hampshire (Graph 6.1). Those anglers, boaters and swimmers who would leave the state because of a perceived increase in crowding represent a displacement of visitor days from New Hampshire to other states totaling 5%…a loss of almost 750,000 visitor days.

The economic effects of this out-migration would still be significant to the New Hampshire economy. Fishing, boating and swimming generated about $379 million in total sales, plus an additional $134 million of income in 2006. The loss represented by those 46% who would decrease their visits because of increased crowding translates to a decrease of more than $19 million in total sales, almost $7 million in lost income, and just over 300 jobs lost (Table 6.1).

Destination of Users Who Would Decrease Visits

If *Crowding* Increases (46% of all visitors)

Leave region
16.0%

Leave NH
18.0%

NH/dk*
31.0%

Stay in region
35.0%

*dk="don't know"
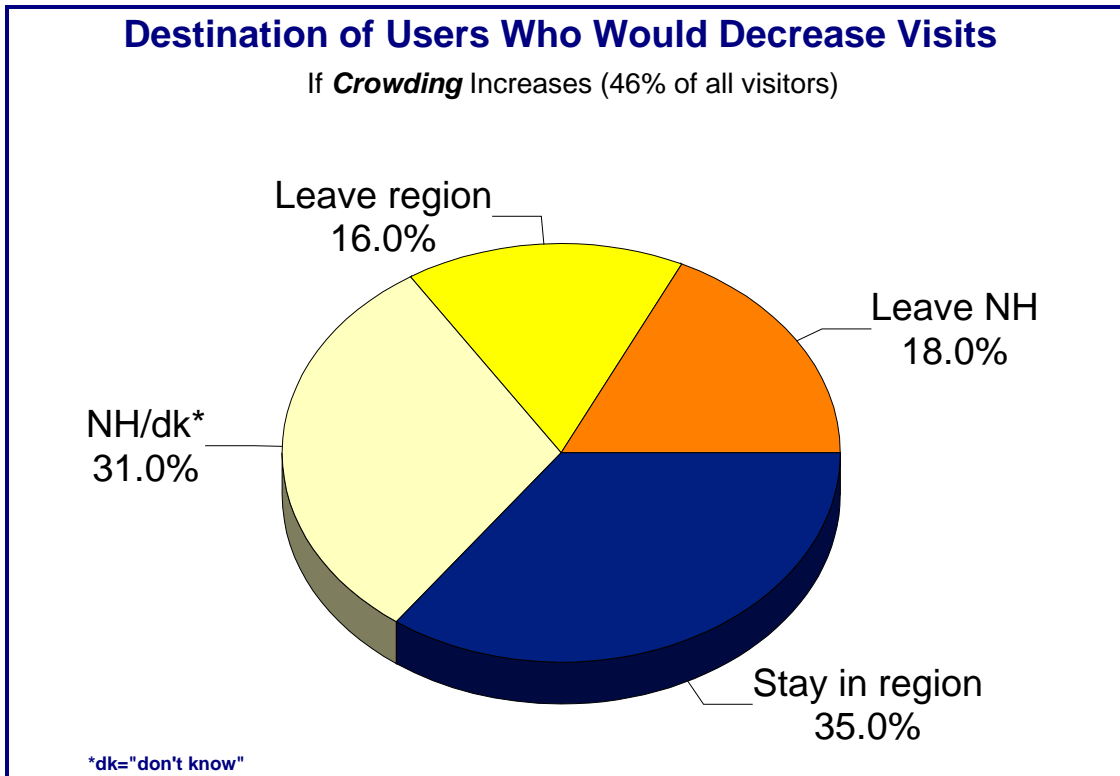
Graph 6.1

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs
TOTAL	**$ 378,837,590**	**$ 134,250,642**	**5991**
Effect of Crowding Anglers............... Boaters.............. Swimmers..........	($1,220,704) ($14,122,011) ($3,700,257)	($434,876) ($1,308,441) ($4,989,624)	(22) (59) (224)
TOTAL LOSS due to increased crowding	**($19,042,972)**	**($6,732,941)**	**(305)**

Table 6.1

Summary of Results by Region

Recreationalists visiting the Merrimack Valley (57%), White Mountain and Monadnock (48%) regions appear most sensitive to the issue of increased crowding (Graph 6.2). However those who would decrease the number of days they intend to fish, boat or swim won't necessarily leave the region or New Hampshire. Instead they may simply pursue other activities in the area, spending money in other sectors and potentially creating the same economic impact.

It is only those recreationalists who say they would leave the state or the region who will have a negative impact on either the New Hampshire or regional economy, respectively. Recreational visitors to the Seacoast region are most likely to say they will *leave New Hampshire* (33%) if they perceive an increase in crowding, followed by those from the Dartmouth-Sunapee (21%) and White Mountain regions (20%) (Table 6.2). Only those who report they would leave New Hampshire are included in the economic impact portion of this research.

In terms of overall dollars and jobs lost, the cost of visitors leaving the state because of perceived increases in crowding has the highest economic impact in the Lakes Region (Table 6.3). In terms of dollars and jobs lost as a percentage of overall fishing, swimming and boating revenues, the Merrimack Valley region, the Seacoast region and the White Mountain region would each lose about 7% of revenues if visitors perceive an increase in crowding levels. The Lakes Region and the Dartmouth-Sunapee region would each lose about 5% of their fishing, boating and swimming revenues, and the Monadnock and Great North Woods regions would each lose about 3% of their revenues if visitors perceived an increase in crowding.

Percent Who Would Decrease Visiting Days
If *Crowding* Increases in the Next 12 Months

Region	Percent
All Regions	46%
SC	39%
LR	41%
GNW	42%
DS	45%
WM	48%
MON	48%
MV	57%
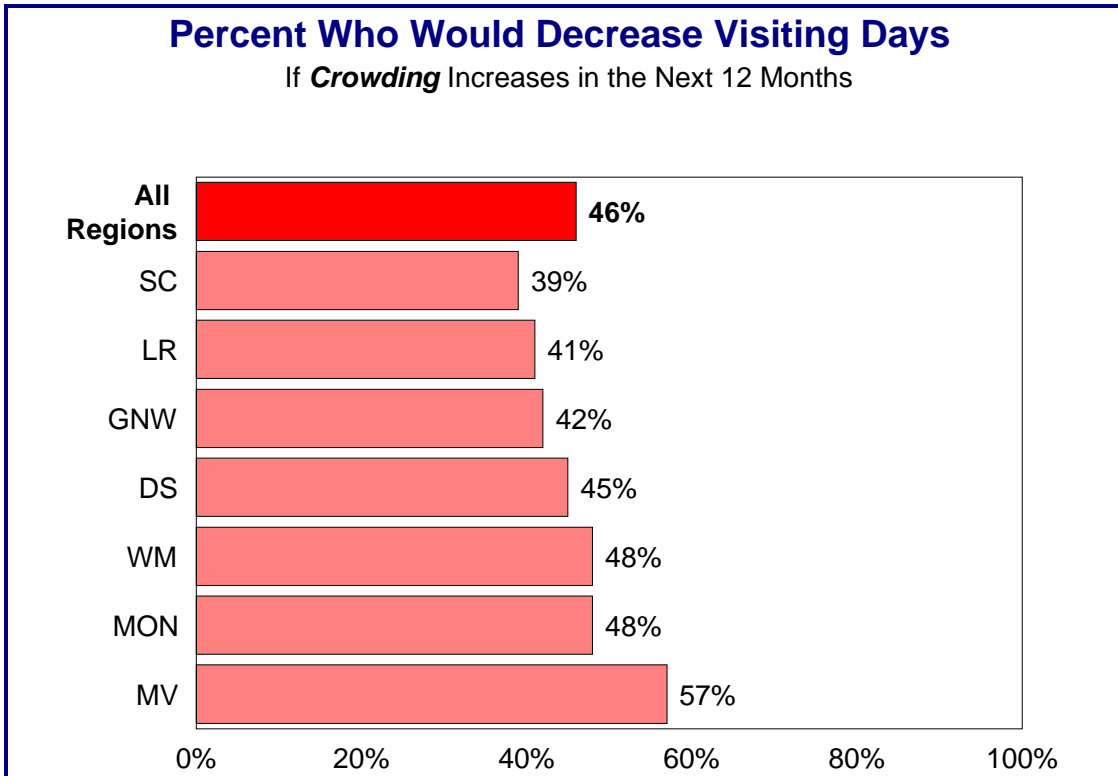
Graph 6.2

DESTINATIONS OF USERS WHO WOULD DECREASE VISITS IF CROWDING INCREASED: BY REGION

REGION	Remain in the Region	Go Elsewhere in NH/dk	Leave the Region	Leave NH
GNW	43%	23%	17%	17%
WM	23%	33%	24%	20%
LR	61%	18%	6%	15%
DS	37%	21%	21%	21%
MON	26%	40%	19%	15%
MV	30%	35%	26%	9%
SC	12%	51%	4%	33%

Table 6.2

ECONOMIC LOSS IF CROWDING INCREASES: BY REGION

REGION	(Total Sales)	(Household Income)	(Jobs)
GNW	($783,141)	($278,217)	(12)
WM	($4,309,958)	($1,523,806)	(71)
LR	($9,457,087)	($3,342,828)	(149)
DS	($334,058)	($118,173)	(6)
MON	($215,918)	($76,433)	(4)
MV	($2,988,725)	($1,056,228)	(47)
SC	($954,085)	($337,256)	(16)
TOTAL	($19,042,972)	($6,732,941)	(305)

Table 6.3

Great North Woods

A total of 42% of anglers, boaters and swimmers say they would decrease their intended visits to the Great North Woods if they perceived a change in crowding levels. Of those who would decrease their intended visits, 17% would leave the state and 17% would leave the region. Approximately 23% would go to some unspecified location in New Hampshire, and 43% would remain in the region. Those recreationalists who would leave the Great North Woods for another state because of perceived increases in crowding represent a displacement of visitor days from the region totaling 3%…a loss of about 31,000 visitor days.

Overall, surface water recreation in the Great North Woods generates over 400 jobs, over $9 million in personal income and approximately $26 million in business sales, totaling about 7% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived crowding increase in the Great North Woods region would lead to a loss of 12 jobs, a loss of about $278,000 in personal income and a loss of nearly $800,000 in business sales.

GREAT NORTH WOODS

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	$ 26,138,458	$ 9,333,576	419	1,043,000
TOTAL LOSS due to increased crowding	($783,141)	($278,217)	(12)	(31,290)

White Mountains

A total of 48% of anglers, boaters and swimmers say they would decrease their intended visits to the White Mountain region if they perceived an increase in crowding. Of those who would decrease their intended visits, 20% would leave the state and 24% would leave the region. Approximately 33% would go to some unspecified location in New Hampshire, and 23% would remain in the region.   Those recreationalists who would leave the White Mountains for another state because of increased crowding represent a displacement of visitor days from the region totaling 6.5%…a loss of approximately 175,000 visitor days**.**

Surface water recreation generates just over 1000 jobs in the White Mountains. These jobs equate to about $24 million in personal income and over $67 million in business sales, totaling about 18% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived crowding increase in the White Mountains region would lead to a loss of about 70 jobs, a loss of about $1.5 million in personal income and a loss of more than $4 million in business sales.

WHITE MOUNTAINS

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$67,651,915**	**$23,994,486**	**1,078**	**2,682,000**
TOTAL LOSS due to increased crowding	**($4,309,958)**	**($1,523,806)**	**(71)**	**(174,330)**

Lakes Region

A total of 41% of anglers, boaters and swimmers say they would decrease their intended visits to the Lakes Region if they perceived a change in water levels or flows Of those who would decrease their intended visits, 15% would leave the state and 6% would leave the region. Approximately 18% would go to some unspecified location in New Hampshire, and 61% would remain in the region. Those recreationalists who would leave the Lakes Region for another state because of a perceived crowding increase represent a displacement of visitor days from the region to totaling 4.5%…a loss of about 375,480 visitor days**.**

Surface water recreation generates about 3300 jobs in the Lakes Region. These jobs equate to about $75 million in personal income and over $210 million in business sales, totaling about 55% of the recreational revenue generated by anglers, boaters and swimmers in New

Hampshire. A perceived increase in crowding would cause a loss of nearly 150 jobs, about $3 million in personal income and approximately $9.5 million in business sales.

LAKES REGION

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$210,641,206**	**$74,561,310**	**3,313**	**8,344,000**
TOTAL LOSS due to increased crowding	**($9,457,087)**	**($3,342,828)**	**(149)**	**(375,480)**

Dartmouth-Sunapee

A total of 45% of anglers, boaters and swimmers say they would decrease their intended visits to the Dartmouth-Sunapee Region if they perceived an increase in crowding. Of those who would decrease their intended visits, 21% would leave the state and 21% would leave the region. Approximately 21% would go to some unspecified location in New Hampshire, and 37% would remain in the region. Those recreationalists who would leave the Dartmouth-Sunapee region for another state because of a perceived increase in crowding represent a displacement of visitor days from the region totaling 5%…a loss of almost 15,000 visitor days**.**

Surface water recreation generates over 100 jobs in the Dartmouth-Sunapee Region. These jobs equate to $2.6 million in personal income and almost $7.5 million in business sales, totaling about 3.5% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived increase in crowding would cause a loss of 6 jobs, about $118,000 in personal income and approximately $334,000 in business sales.

DARTMOUTH-SUNAPEE

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$7,492,565**	**$2,658,018**	**119**	**298,000**
TOTAL LOSS due to increased crowding	**($334,058)**	**($118,173)**	**(6)**	**(14,900)**

Monadnock

A total of 48% of anglers, boaters and swimmers report they would decrease their intended visits to the Monadnock Region if they perceived an increase in crowding. Of those who would decrease their intended visits, 15% would leave the state and 19% would leave the region. Approximately 40% would go to some unspecified location in New Hampshire, and 26% would remain in the region. Those recreationalists who would leave the Monadnock region for another state because of a perceived increase in crowding represent a displacement of visitor days from the region totaling 3%…a loss of about 8,900 visitor days.

Surface water recreation generates just over 120 jobs in the Monadnock Region. These jobs equate to almost $3 million in personal income and almost $8 million in business sales, totaling about 4% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived increase in crowding would cause a loss of 4 jobs, about $76,000 in personal income and approximately $216,000 in business sales.

MONADNOCK

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	**$7,798,459**	**$2,764,883**	**123**	**298,000**
TOTAL LOSS due to increased crowding	**($215,918)**	**($76,433)**	**(4)**	**(8,940)**

Merrimack Valley

A total of 57% of anglers, boaters and swimmers say they would decrease their intended visits to the Merrimack Valley Region if they perceived an increase in crowding. Of those who would decrease their intended visits, 9% would leave the state and 26% would leave the region. Approximately 35% would go to some unspecified location in New Hampshire, and 30% would remain in the region. Those recreationalists who would leave the Merrimack Valley region for another state because of a perceived increase in crowding represent a displacement of visitor days from the region totaling about 7%…a loss of approximately 118,000 visitor days.

Surface water recreation generates about 700 jobs in the Merrimack Valley Region. These jobs equate to about $16 million in personal income and over $44 million in business sales, totaling about 21% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived crowding increase would cause a loss of nearly 50 jobs, about $1 million in personal income and approximately $3 million in business sales.

MERRIMACK VALLEY

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days

TOTAL	$44,362,495	$15,709,778	704	1,788,000
TOTAL LOSS due to increased crowding	($2,988,725)	($1, 056,228)	(47)	(118,008)

Seacoast

A total of 39% of anglers, boaters and swimmers say they would decrease their intended visits to the Seacoast Region if they perceived an increase in crowding. Of those who would decrease their intended visits, 33% would leave the state and 4% would leave the region. Approximately 51% would go to some unspecified location in New Hampshire, and 12% would remain in the region. Those recreationalists who would leave the Seacoast for another state because of a perceived increase in crowding represent a displacement of visitor days from the region totaling 7%…a loss of nearly 42,000 visitor days.

Surface water recreation generates over 200 jobs in the Seacoast Region. These jobs equate to about $5 million in personal income and over $14 million in business sales, totaling about 7% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived increase in crowding would cause a loss of 16 jobs, about $337,000 in personal income and nearly $1 million in business sales.

SEACOAST

Economic Impact of Fishing, Boating and Swimming	Total Sales	Household Income	Jobs	TOTAL Visitor Days
TOTAL	$14,752,492	$5,228,591	235	596,000
TOTAL LOSS due to increased crowding	($954,085)	($337,256)	(16)	(41,720)

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APPENDICES

SAMPLING METHODOLOGY

It was imperative to create a sound sampling methodology to test the hypothesis that perceived degradation to water quality would result in recreational visitors decreasing or ceasing their visits to New Hampshire, thus resulting in measurable costs to the state economy.

The first challenge was to obtain a representative (probability) sample of in-state and out-of-state anglers, boaters and swimmer, from a probability sample of freshwater access points in New Hampshire. A probability sample is one which allows generalization from the small group of respondents to the larger population of interest. Obtaining a generalizeable sample was the most critical part of the methodology, so as to ensure a low probability that the results occurred by chance, or are in some way biased.

The second particular challenge of this study was to collect answers in a timely, cost-efficient and methodologically sound manner. The benefit of collecting primary data via face-to-face interviews ("intercept surveys") should not be underestimated, despite the huge logistical effort. The main benefit of intercept surveys is the elimination of any "recall bias" as respondents enumerated their spending on recreational activities for the day on which they were interviewed. Further benefits included the ability of the interviewer to ensure an adequate completion rate (thus reducing error from non-response); to clarify any confusing questions; or to probe for answers.

The strategies employed in this project, a stratified random sample and face-to-face-interviews, are among the most rigorous and powerful methods available. They are also among the most complex; as such they are described in detail below.

Sample Design

The sample design was necessarily complex for this study. Multiple levels of data were needed to answer the research question "How will visitor expenditures change as a result of perceived changes in water quality?" In order to generalize this information to all freshwater bodies and the users who visit them it was necessary to obtain both a representative sample of freshwater access points and a representative sample of recreational visitors who are anglers, boaters or swimmers.

It was neither feasible nor necessary to survey all users at all access points; instead a random sample was used to accurately reflect these populations. A random sample was desirable because it allowed the results from a small representative group of users and places to be generalized to all users and places, with a certain level of confidence. This study used "multistage stratification sampling" which is a combination of advanced sampling strategies. In this research there were two sampling frames: all public and quasi-public access points to the lakes, ponds, streams and rivers of New Hampshire; and the 101 days of summer, which

were used as proxy sample for all recreational visitors [32]. This study presented many methodological challenges, and the following steps were followed to determine the appropriate random samples.

Step One

Determining adequate sample size is a fundamental question in every study, because it is important to represent all users and be able to make statistically valid inferences about the population from which they came. Contrary to popular thinking, it is not necessary to obtain a particular percentage of the population to make up the sample. To make a valid statistical inference one must determine: 1- how much error (variance) one is able to tolerate, and 2- what level of confidence one wishes to speak about the results (95% confidence is typical, meaning that the sample statistics will match the population parameters 95 out of 100 times).

In this study, the primary variable of interest is <u>visitor expenditures</u>, so it made sense to select a sample size based on this key outcome variable.

According to the most recent definitive statistical report about New Hampshire tourism[33], summer traveler spending in 2003 was 36.6% of overall traveler spending in New Hampshire, or $1,447.2 million. Since the current study focused on what are usually summer activities (fishing, boating and swimming), it was <u>summer expenditures</u> that were used to determine sample size.

It is known that the average summer spending per visitor day is $69.44 for all of New Hampshire[34]. For the purposes of this project, it was reasonable to expect that a visitor might spend five times the average or might spend nothing at all, e.g. spending per day ranges from $0-$347.00.

Thus to estimate sample size, the following formula was used:

$$N = 4 * variance \ / \ limit \ squared$$

Where limit is the amount the sample mean is allowed to differ from the population mean at the 95% confidence level [35]

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[32] In determining an acceptable substitution of a proxy for a population list, it is necessary that every user of the site be equally represented by the proxy information. Since it is possible to enumerate site days, i.e. create a list of all possible times that recreation could occur at a site, a random selection of site days is an acceptable substitution for a random selection of visitors. (See for example, <u>"Forest Service National Visitor Use Monitoring Process: Research Method Documentation"</u> (2001) D.B.K. English et al.; and <u>"Wilderness Recreation Use Estimation: A Handbook of Methods and Systems</u>" (2000) A.E. Watson et al.)

[33] <u>New Hampshire Fiscal Year 2004 Tourism Satellite Account</u>. Institute for New Hampshire Studies, Plymouth State University. Prepared by Laurence E. Goss, Ph.D.

[34] Ibid

[35] Snedecor, George W. and William G. Cochran. Statistical Methods. Seventh Edition. The Iowa State University Press, Ames, IA. 1982. (in Leones, 1998)

However, in this study, as in most, the variance is unknown, so an intermediate step must be accomplished to estimate the variance:

> *Estimated variance = (1/16)(range)^2*
>
> Where the range is the difference between the highest and lowest expected values [36]

Thus the range is calculated as $(347-0)^2 = 120409$;

the estimated variance is: $(.0625)(120409) = 7525$;

and the sample size using $20.00 as the limit is n=30100/400

<u>75 sites across the state were randomly selected.</u>

This means that the spending data gathered from the 75 sites across the state will be an accurate reflection of visitor spending in New Hampshire 95% of the time, plus or minus $20.00.

Step Two
Once sample size was determined, random sites across the state had to be chosen. This occurred in two steps: 1- choosing the number of sites in each region, and 2- choosing the actual sites.

Step Two, Part 1
New Hampshire is commonly divided into seven tourism/recreational regions. It was justifiable to stratify by region in this study, as the New Hampshire tourism data has shown great differences in amount of spending and number of visitor days across regions[37]. Furthermore, these tourism regions are a known and widely used classification for the state. Stratification also helps to increase precision of the statistics, by making the standard error smaller. It was also expected that the differences between regions will have strong potential for explaining differences (variability) in spending and perceptions of water quality.

This study used "probability proportionate to size" (*pps*) stratification. This means that the number of sites selected from each region was based on their proportion of overall sites in the state, rather than simply choosing an equal number of sites from each region.

Table 1 shows 364 total public and private freshwater access points across the seven recreation/tourist regions of New Hampshire, as well as the relative proportion of sites in each region. The number of sites chosen randomly from each region was obtained by calculating what percentage of the n=75 sites is in each region (e.g. % of total sites*75).

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[36] "A Guide to Designing and Conducting Visitor Surveys" (1998) J. Leones, Arizona Cooperative Extension.

[37] New Hampshire Fiscal Year 2004 Tourism Satellite Account. Institute for New Hampshire Studies, Plymouth State University. Prepared by Laurence E. Goss, Ph.D.

	Public access (including state parks and campgrounds)	Private camp grounds	Hotels, motels and marinas	**Total number of sites**	Percentage of total sites %	Number of sites in the sample
Great North Woods	32	4	0	**36**	10%	**8**
Monadnock	22	8	1	**31**	8%	**6**
Dartmouth/Sunapee	39	9	4	**52**	14%	**11**
Lakes Region	46	27	45	**118**	32%	**24**
White Mountains	21	21	1	**43**	12%	**9**
Seacoast	2	13	0	**15**	4%	**3**
Merrimack Valley	60	8	1	**69**	19%	**14**
TOTAL	222	90	52	**364**	100%	*75*

Table 1[38]

Step Two, Part 2
After stratification of sites into regions, the selection of the actual sites was done using a systematic random sample method. For example, there were 24 sites to be chosen out of a total of 118 in the Lakes region. Therefore every 5th site from the Lakes Region list was selected, until the total 24 were acquired.

Step Three
This step was also done in two parts: 1- deciding how many days would be spent in each region, and 2- then deciding how the days would be allocated to the sites. If inclement weather precluded data collection on any day, the next non-conflicting time slot was substituted.

Step Three, Part 1
There were a total of 101 days from May 27 through September 4, 2006 (Memorial Day weekend to Labor Day). Using a strategy similar to that in the steps above, the number of days selected was based on the proportionate percentage of annual visitors to each region[39]. These percentages are multiplied by 101, to give the number of days to be randomly sampled in each region, as shown in Table 2.

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[38] Table 1 is up-to-date, as of early April, 2006. All private campgrounds that were uncertain as to waterfront status were called to see if they have water access, as were the uncertain hotels and marinas. This eliminated more than 80 sites from the original list.

[39] Based on New Hampshire Fiscal Year 2004 Tourism Satellite Account. Institute for New Hampshire Studies, Plymouth State University. Prepared by Laurence E. Goss, Ph.D. (Annual figures are used rather than summer, because the Seacoast receives ocean visitors in the summer- giving an inflated number of visitors for the purposes of this study, which is concerned only with freshwater).

	Annual number of visitor days (in millions)	Percentage of annual visitor days %	Number of days in the sample	Over sample
Great North Woods	1.33	2.6	**3**	**+11**
Monadnock	3.27	6.4	**6**	**+8**
Dartmouth/Sunapee	2.57	5.0	**5**	**+9**
Lakes Region	7.29	14.3	**14**	–
White Mountains	7.67	15.0	**15**	–
Seacoast	10.26	20.1	**21**	–
Merrimack Valley	18.76	36.7	**37**	–
TOTAL	51.15 million	100%	***101***	***129***

Table 2

Over Sampling in Regions

To any common-sense observer it would appear that 3 to 5 days in a region is not an adequate number. If disproportionate sampling were to be used, there would be 14 days sampled in each region – however this method would then under sample visitors to the busier, spendier Lakes, White Mountains, Seacoast and Merrimack Valley regions.

Furthermore, a sample of 500 surveys from each region was the unofficial goal for this study. Given an average of about 3 surveys per hour, over the course of a 12 hour day, this would result in 36*3 = 108 surveys for the Great North Woods, a shortage of 392, or 11 days worth of data collection. In other words, a minimum of 14 days were needed in each region, to reach the goal of 500 surveys per region. Thus over sampling was used to ensure adequate representation of all subgroups.

Additional days were selected through over sampling procedures to supplement the sample size of three smallest subgroups of the state: Great North Woods, Monadnock, and Dartmouth/Lake Sunapee. These groups were selected for over sampling because they are not a large enough proportion of the population to produce reliable estimates in the random sample. They also are shown to have higher spending rates per visitor day than their total spending rank indicates[40]. Statistical analysis of the stratified sample and the over sampling of subgroups will need to take into account the effect of these methodologies on the variance.

Step Three, Part 2

The sample days were chosen by first stratifying the summer season as to whether a date is "low season" or "high season". Low season encompasses May 27 through June 30, while high season is July 1 to September 4. Of the 101 days, 33 are low season and 66 are high season. Each day was further divided into an "a.m." and a "p.m." time slot, consisting of 6 hours each. Then, using a simple random selection procedure (SRS), time slots were chosen,

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[40] New Hampshire Fiscal Year 2004 Tourism Satellite Account. Institute for New Hampshire Studies, Plymouth State University. Prepared by Laurence E. Goss, Ph.D

first for the low season then for the high season, and allocated across the previously chosen sites of the seven regions.

To select an SRS, all of the timeslots in each season were consecutively listed and assigned a number. Then numbers from a random number table were selected and matched to the corresponding timeslots, until the appropriate number of slots for each season in each region was reached. The dates were then allocated to the sites in each region by choosing a site at random, and then assigning the timeslots to each site sequentially.

Step Four
The final decision was how to actually find and intercept the recreationalists. There was no way to know in advance who would be at the site, or what they would be doing. However, a recent study has estimated the number of visitor days that each activity brings to the state of New Hampshire:[41]

Boating	3.6 million days
Fishing	3.1 million days
Swimming	8.0 million days

Although swimming represents 2.5 times more visitor days than fishing and boating, the amount of sales and income it brings to New Hampshire is about the same as fishing, and both bring in a little less than boating.[42]

Since the current study is concerned with fishing, boating and swimming *expenditures*, a simple method of selection alternating each type of user as they exited the recreation area ensured approximately equal numbers of each type of user, and thus equal spending representation.

In order to meet statistical assumptions for analysis, the users were selected as *independent observations*, that is they were not related to each other. Field workers were instructed to interview only one person per group, using some random selection method such as who had the latest birthday.

Sampling Frame

The sampling frame is the "master list" for the population of interest. It is typically not the same as the entire population, usually because such lists do not exist. So the sampling frame, or target population, must be carefully crafted from multiple sources, to include as many members as possible of the target population.

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[41] An Estimate of Select Economic Values of New Hampshire Lakes, Rivers, Streams and Ponds. Phase II Report. (June 2003). Prepared for the Lakes, Rivers, Streams and Ponds Partnership by Gallagher, Callahan and Gartrel, Concord, New Hampshire.

[42] Ibid

In this research the sampling frame was composed of:
1. State parks and campgrounds with waterfront property or access
2. Public boat landings and fishing sites
3. Private campgrounds with waterfront property or access
4. Motels and resorts with waterfront property or access
5. Marinas

Public sites accounted for more than 50% of the total water access sites in the frame, and offered few problems in gaining access to visitors. To gain access to those visitors who do not use public ramps, marinas or beaches the study included private campgrounds, hotels/motels and resorts with waterfront property or access in the sampling frame. Once private sites were selected into the sample, letters were sent to the owners explaining the purpose of the project and asking permission for our field workers to spend X hours/days there over the course of the summer. Alternative sites in the same town or region were randomly selected if permission was not granted.

Sources for the Sampling Frame

1. The list of state campgrounds, parks and beaches was compiled from www.newhampshire.com and cross checked against the DeLorme Atlas and Gazetteer list.

2. The public boat landings and fishing access list was obtained from several sources: www.newhamshire.com, the New Hampshire Fish and Game Department fishing access list: www.wildlife.state.nh.us/fishing and the DeLorme Atlas and Gazetteer list.

3. The private campground list was compiled and cross-checked using four sources: DeLorme's New Hampshire Atlas and Gazetteer; New Hampshire RV Parks and Campgrounds list from the RV-Clubs.us Web Site, owned and maintained by Go Campin' (http://www.rv-clubs.us/); http://www.nhoutdoors.com; and the New Hampshire Campground Owner's Association Directory (http://www.ucampnh.com/) list of affiliated campgrounds.

4. The waterfront motels and resorts list was compiled using "The New England and Lodging Tourism" search engine (http://www.seenewengland.com) with the search terms "any type, New Hampshire, all regions, lakefront/riverfront".

5. The list of marinas was obtained by searching multiple websites and cross-checking for duplicates or omissions: www.nhoutdoors.com; www.directorynh.com; and www.newhampshire.com.

Final Sample

Town	Site name	Water body	Directions	Delorme Coords	Region
GREAT NORTH WOODS REGION					
Pittsburg1	Public Boat Launch	Lake Francis	2067 N. Main st Pittsburgh NH 03592 603.538.6361	52, H5	GNW
Dalton	Dalton Cartop Boat Launch	Connecticut River	Rt 135 & 142	47,G11	GNW
Errol	Androscoggin River	Androscoggin River	Rt 26 to N Mountain Rd	51,F10	GNW
Milan1	Nansen Wayside Park	Androscoggin River	Rt 16 N of Berlin	49,D9	GNW
Pittsburg2	Idlewilde	2nd CT Lake	Rt 3 to Pint Rd to East Inlet stay on Road to Boundary Rd	53,D9	GNW
Pittsburg3	Lake Francis State Park	Lake Francis	Rt 3 N to River Rd (2 miles)	52,H6	GNW
Stewartstown	Big Diamond Pond	Big Diamond Pond	Rt 26 to Diamond Pond Rd, 6.9 mi	52,K6	GNW
Milan2	*Cedar Pond CG	Cedar Pond	265 Muzzy Rd Milan NH 603.449.2240	48 , A7	GNW
WHITE MOUNTAINS REGION					
Lisbon	*Littleton KOA Kampground	Ammonoosuc River	2154 Rte. 302 Lisbon NH 03585 603.838.5525	42 B7	WM
Warren	Flood Control Site	Hildreth Pond	Rte 25 Warren	38 B7	WM
N. Woodstock	*Maple Haven Camping, Cottages and Lodge	Lost River	RFD 1 Box 54 N. Woodstock, NH 03262 603.745.3350	43 J10	WM
Conway	Echo Lake SP	Echo Lake	River Rd to Westside Rd	45 I9	WM
Gorham	Moose Brook SP	Moose Brook	Rt 2 Jimtown Rd	49 H8	WM
Littleton1	Dodge Hill Boat Launch	Moore Reservoir	Old Waterford Rd	47,J8	WM
Littleton2	Pine Island Boat Launch	Moore Reservoir	Rts 135 & 18	46,K7	WM
Shelburne	Shelburne Canoe Launch	Androscoggin River	Rt 2 to Meadow Rd, cross river, take 1st L	49,H10	WM
Thornton	*Pemi River Campground	Pemi River	2458 US Rt. 3 Thornton NH 03223 603.726.7015	39 D12	WM
LAKES REGION					
Moultonborough	*Trexler's Marina	Lake Winni	15 Long Island Rd	40	LR

Alton Bay1	*Sandy Point Beach Resort	Lake Winni	190 Mt. Major Hgwy.	36 F7	LR
Laconia1	Weirs Beach	Lake Winni	Rte 3	36 B2	LR
Gilford1	Town dock	Lake Winni	Rte 3	36 C4	LR
Center Harbor1	Public access	Hawkins Pond		39 J14	LR
Center Harbor2	*Lakeshore Motel	Lake Winni		40 J2	LR
Meredith	Public Boat Launch	Pemi Lake		35 B13	LR
Melvin Village	Public Docks	Lake Winni		40 J6	LR
Plymouth	*Plymouth Sands Campground	Pemi River		39 G10	LR
Alton Bay2	Public Boat Launch	Lake Winni	Rte. 11	36-37	LR
Bridgewater2	Wellington SP	Newfound Lake		35 A9	LR
New Hampton	*Twin Tamarack Campground	Pemi Lake	101 Campground Rd	35 B13	LR
W. Ossipee	*Whit's End Campground	BearCamp River	Rte. 16	41 F8	LR
Wolfeboro1	Brewster Beach	Lake Winni	Bay St	37 C8	LR
Barrington	Swain's Lake	Swain's Lake	Rt 202 to Rt 9 to Young Rd	29,E12	LR
Center Harbor3	Neck Rd	Public docks		40 J2	LR
Gilford2	Ellacoya State Park	Lake Winnipesauke	Rt 11 & Scenic Drive	36,C5	LR
Holderness	Squam Channel	Squam Lakes		39 I13-14	LR
Laconia2	Opechee Bay State Forest	Opechee Bay	Rt 3 to Meredith Rd 2.2 mi	36,D2	LR
New Durham	Coldrain Pond	Coldrain Pond		37,G9	LR
New Hampton	Sky Pond	Sky Pond	Winona Rd to Dana Hill Rd, .6 mi to Lower OxBow Rd, to Sky Pond Rd	39,K14	LR
Rochester	Ayers Pond	Ayers Pond		29, C12	LR
Wolfeboro2	Public Docks	Lake Winni		37 C8	LR
Barnstead	Big River Recreation Area	Big River	Rt 28 .3 mi E on 126	37,K7	LR
DARTMOUTH-SUNAPEE REGION					
Washington	*Idle Times Campground	Highland Lake	928 Valley Rd	26 G2	DS
George's Mills	*Sargeant's Marine	Lake Sunapee		34 H3	DS
Canaan	Goose Pond	Goose Pond	Rt 4 to Canaan Rd to	38,I2	DS

	Park		Randy Hill Rd to 2 mi to Goose Pond Rd		
Croydon	Croydon Beach and Boat Access	Rocky Bound Pond	Rt 10 to Pine Hill Rd	34,G1	DS
Enfield	Crystal Lake	Crystal Lake	Rt 4 to Shaker Hill Rd to Crystal Lake Rd onto Algonquin Rd	34,B2	DS
Hanover	Fullington Boat Landing	Connecticut River	Rt 10 N of Hanover	32,H3	DS
Lempster	Dodge Pond	Dodge Pond	Rt 10 to Mountain Rd after Lempster cemetary	25,D14	DS
Salisbury	State Forest Nursery	Stirrup Iron Pond	Boscawen Rt 3 to Stirrup Iron Rd 1.2 mi on rough track! Or Rt 127 N from Salisbury, first right (unmarked)	35,J11	DS
Bradford	Massasecum Lake	Massasecum Lake	Rt 114	26, D6	DS
Wentworth	Flood Control Site 6A	Baker River	Rt 25, Ellsworth Hill Rd	38,D6	DS
Andover	Hopkins Pond	Hopkins Pond		35 H9	DS
MONADNOCK REGION					
Jaffrey	Public Boat Launch	Gilson Pond		20 E3	MON
Richmond	*Shir-Roy Camping Area	Cass Pond	100 Athol Rd	19 I12	MON
Antrim	Willard Pond	Willard Pond	Rt 123 to Willard Pond Rd	26,K4	MON
Hinsdale	Prospect Street Boat Launch	Connecticut River	Off Rt 119 N to Prospect St	18,F6	MON
Marlow	Sand Pond	Sand Pond	Rt 10 to Sand Pond Rd, 3.4 to Lake	25,F14	MON
Swanzey	Swanzey Lake	Swanzey Lake	N side Swanzey Lake Rd at int of East & West Shore Rds	19,F11	MON
MERRIMACK VALLEY REGION					
Contoocook	*Sandy Beach Family Campground	Rolfe Pond	Clement Hill Rd	27 E10	MV
Suncook	Ferry St. Boat Launch	Merrimack River		28 G2	MV
Boscawen	Merrimack River	Merrimack River	Exit 17 Rt 93 (new ramp)	27 B13	MV
Canterbury	Intervale Road Canoe Launch	Merrimack River	West Rd to Intervale Rd to Old Still Rd	27,B14	MV
Concord	Hot Hole Pond	Hot Hole Pond	Rt 132 to Hoit Rd	28,B1	MV
Concord2	Turtletown Pond	Turtletown Pond	Rt 93 to Exit 16 to Shawmut St to Oak Hill Rd 1 mi on R	28,C1	MV

Derry	Beaver Lake	Beaver Lake	Rt 102	22,D6	MV
Henniker	River Road Boat Ramp	Contoocook River	River Rd	27, F9	MV
Hopkinton	Hopkinton Lake	Dam Project	Off Stumpfield Rd, just East of the Golden Pineapple	27 F11	MV
Manchester	Stark Boat Landing	Merrimack River	End of S Commercial St	68,G6	MV
Northwood	Lucas Pond	Lucas Pond	Rt 43 to Lucas Rd .3 on R	29,F9	MV
Pittsfield	Drake's Field	Suncook River	off of Rt 107	28,A6	MV
Weare	Mount William Pond	Mount William Pond	Rt 77 to Mount William Pond Rd – across from Dimitri's Pizza	27,I11	MV
Brookline	Lake Potanipo	Lake Potanipo		21 J12	MV
SEACOAST REGION					
Kingston	Kingston State Park	Great Pond	Off Rte. 111	23 C12	SC
Newton	Public Launch	Country Pond	Rte. 125	23 D11	SC
Hampstead	Public Boat Launch	Powwow Pond		23 E9	SC

* Privately owned

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Great North Woods Towns

Acworth	Carroll	Colebrook	Dalton	Dixville Notch
Errol	Lancaster	Milan	Northumberland	Pittsburg
Stark	Stewartstown	Stratford	Whitefield	

White Mountain Region Towns

Albany	Bartlett	Bath	Benton	Berlin
Bethlehem	Brookfield	Campton	Clarksville	Columbia
Conway	Dummer	Easton	Ellsworth	Franconia
Gorham	Groton	Haverhill	Jackson	Jefferson
Landaff	Lincoln	Lisbon	Littleton	Monroe
North Conway	North Haverhill	Ossipee	Piermont	Randolph
Shelburne	Sugar Hill	Thornton	Tuftonboro	Warren
Waterville Valley	Woodstock	Woodsville		

Lakes Region Towns

Alexandria	Alton	Ashland	Barnstead	Barrington
Belmont	Bridgewater	Bristol	Center Harbor	Chatham
Eaton	Effingham	Farmington	Franklin	Freedom
Gilford	Gilmanton	Hebron	Hill	Holderness
Laconia	Lyman	Madison	Meredith	Middleton
Milton	Moultonboro	New Durham	New Hampton	Northfield
Pittsfield	Plymouth	Rochester	Rumney	Sanbornton
Sandwich	Strafford	Tamworth	Tilton	Wakefield
Windsor	Wolfeboro			

Dartmouth-Sunapee Region towns

Andover	Canaan	Charlestown	Claremont	Cornish
Croydon	Danbury	Dorchester	Enfield	Goshen
Grafton	Grantham	Hanover	Langdon	Lebanon
Lempster	Lyme	New London	Newbury	Newport
Orange	Orford	Plainfield	Salisbury	Springfield
Sunapee	Sutton	Unity	Warner	Washington
Webster	Wentworth	Wilmot		

Monadnock Region towns

Alstead	Antrim	Bennington	Chesterfield	Deering

Dublin	Fitzwilliam	Francestown	Gilsum	Greenville
Hancock	Harrisville	Hillsboro	Hinsdale	Jaffrey
Keene	Lyndeborough	Marlborough	Marlow	Mason
Nelson	New Ipswich	Peterborough	Richmond	Rindge
Roxbury	Stoddard	Sullivan	Surry	Swanzey
Temple	Troy	Walpole	Westmoreland	Wilton
Winchester				

Merrimack Valley Region towns

Allenstown	Amherst	Auburn	Bedford	Boscawen
Bow	Bradford	Candia	Canterbury	Chester
Chichester	Concord	Contoocook	Deerfield	Derry
Dunbarton	East Derry	Epsom	Goffstown	Greenfield
Hampstead	Henniker	Hollis	Hooksett	Hopkinton
Hudson	Litchfield	Londonderry	Loudon	Manchester
Merrimack	Milford	Mont Vernon	Nashua	New Boston
Northwood	Pelham	Pembroke	Pinardville	Plaistow
Raymond	Salem	Sandown	Sharon	Weare
Windham				

Seacoast Region towns

Atkinson	Brentwood	Brookline	Danville	Dover
Durham	East Kingston	Epping	Exeter	Fremont
Greenland	Hampton	Hampton Falls	Kensington	Lee
Madbury	New Castle	Newfields	Newington	Newmarket
Newton	North Hampton	Nottingham	Portsmouth	Rollinsford
Rye	Seabrook	Somersworth	South Hampton	Stratham
Kingston				

ECONOMIC METHODOLOGY[*]

Introduction

The purpose of this section is twofold. The first is to describe how the economic impacts of surface water usage in New Hampshire were estimated. The second is to show how it was estimated that those impacts would change with changes in surface water quality. Extrapolating numbers gathered in this survey with REMI, a computer based econometric modeling program, the total economic effects were estimated for the state as a whole and for the different tourism regions.

This report focuses on the purchases made by visitors and state residents who use New Hampshire surface waters for fishing, swimming and boating and how these purchases change with environmental conditions. These purchases cycle through the economy and create additional spending. Measuring the cycling of dollars through the economy will illustrate the potential economic impact of surface water recreation in New Hampshire, and how those impacts might change if recreationalists decrease their visiting days.

Regional Economic Models, Inc (REMI)

REMI was used in this report to estimate the total impacts of surface water user spending on the State of New Hampshire. REMI is a computer based econometric modeling program that allows the analyst to answer "what if" questions. Built within the software are different equations that approximate the interactions of different industry sectors with one another. A change in one industry, such as additional employment or spending, will impact the whole model.

In the case of this report, the ability of the software to answer "what if" questions proved useful. This was because the analysis looked at not only what the current economic impacts of surface water usage were, but was also able to forecast what would happen if spending changed due to changing environmental conditions.

Within the REMI model, employment numbers represent jobs regardless of full-time, part-time, or temporary status. This means that individuals who hold multiple jobs in New Hampshire are counted once for each job. The same amount of wages can support more part-time jobs than full-time jobs, and more seasonal jobs than year-round jobs.

For this analysis a single region (New Hampshire statewide) was used. The REMI model was a 169 industry sector, REMI Policy Insight® model, version 9.0.

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[*] Prepared by North Country Council, Inc., Bethlehem, N.H.

Modeling New Hampshire Results with REMI

REMI is used to estimate the indirect and induced impacts on business sales, employment and personal income. To measure the total impacts from visitor expenditures, and their corresponding decreases with environmental changes, each category was run through the REMI model individually. These categories, as presented earlier, are the Current Conditions and the impacts from Increased Crowding, Decreased Scenery, Decreased Water Quality, and Decreased Water Level.

Each category was run through the model separately for each of the different uses (fishing, swimming and boating). This was done instead of running only the Current Conditions through and then computing the changes from environmental conditions to check if these changes impacted the REMI model differently.

Modeling Regional Results with REMI

REMI is able to use counties or state-wide totals to analyze data. That is, it does not have zip-code based capabilities to model local economies. This includes tourism regions, which are not census-based measurement tracts and are thus not local economies that are or can be built into REMI.

This is significant because it affected how to measure the impacts of visitor spending by tourism region. One method was to group counties together as best as possible and treat these as the particular tourism regions. This would lead to a large amount of overlap, however, as many counties are in different tourism regions.

The other method, and the one selected, was to analyze the data on a statewide scale and then split up the results based on the spending percentages identified in the survey results. For example, if 10% of the total spending by boat users was in the Great North Woods, then it would have 10% of the total impacts (employment, personal income and business sales).

This assumes that the survey and the survey method, which is the basis for this study, is proportionately representative of the tourism regions throughout the state. If this is the case, then it can be assumed that dividing the total impacts by the percentage of expenditures for each region is a reasonable approximation of the actual numbers. However, it is important to note that wage variation among different parts of the state will mean that the number of jobs generated by the same dollar amount of sales will vary somewhat from one tourism region to the next. For example, the same amount of sales will generate fewer jobs in the areas like the Seacoast as compared to the Great North Woods.

This methodology also assumes that the tourism regions' economies and the interactions between the different industries is analogous to the New Hampshire economy as a whole. While this would be an egregious assumption if this report measured timber production, or

some other industry which is location specific within the state, because this is looking at service sector industries, which is statewide, it is not too great an assumption to make.

Because of the assumptions made in the methodology for this section the numbers generated for the state, as presented earlier, should be seen as a more exact estimation of what the economic impact of surface waters is for the State of New Hampshire.

Also presented are the impacts to the tourism regions if people decided to do their surface water recreation out-of-state. These were computed by dividing the total lost expenditures in the state by the ratios where people were interviewed.

Unfortunately, the impacts of people leaving to recreate in different tourism regions could not be estimated, for reasons mentioned above (tourism regions are not census-based measurement tracts). When respondents were asked where they would go instead for surface water recreation due to a change in environmental factors many said "New Hampshire" and did not specify what tourism region within New Hampshire they intended to visit. An equal proportion also replied that they would go to another region in New Hampshire, but given the difficulties with modeling regional impacts, mentioned above, the analysis did not take into account the economic cost of visitors leaving one tourism region for another because of perceived degradation to the quality of fresh water resources.

Methodology

Multipliers

A multiplier shows or summarizes the total impact within an economy that can be expected from a change in a given economic activity (Miller & Armbruster). In this case the impacts of the spending by surface water users are considered a change in the local economy. The economic impact of New Hampshire's surface waters is the economic contribution made to the regional economy due to its existence. If New Hampshire's surface waters did not draw any visitors then the impact would be zero. Multipliers measure the impact of the activities of New Hampshire surface water users and the resulting activities that take place in the regional economy.

For this study three different multipliers are used for analysis; they are:

> *Sales (Output) Multiplier* – estimates the total change in local sales (or output) resulting from a change in sales at a basic industry (a change in this case means the difference between there being no economic activity and there being one).

> *Employment Multiplier* – estimates the total change in employment in a local economy resulting from an initial change in employment within an industry.

> *Income Multiplier* – estimates the total change in income in the local economy resulting from a change in income within an industry.

Questions Used for the Estimation of the Economic Impacts

The following survey questions were used in the analysis[43]:

Question #6: established what the primary surface water activity the respondents were participating in for that particular trip.

Question #7: asked how many days were spent on each of the three different activities (fishing, boating, and swimming) in the last twelve months and what were planned by respondents for the next twelve. Many respondents to this question indicated that they used New Hampshire surface waters for more than one use, making it different from Question #6 where they could only indicate their primary reason for using surface waters.

Question #8: respondents were asked to break down the amount of money spent on their trip in different sectors of the economy and what percentage of that had been spent in the region.

Question #9: asked how many people were in the party, establishing how many people were involved in the expenditure data.

Question #10: established whether the expenditures were normal for the respondents.

Question #15: asked if crowding became more of a problem would respondents change their usage of the resource and by how much.

> Question #15b: if respondents did decrease their usage of the resource where would they go instead.

Question #19: asked if natural beauty and views became poorer would respondents change their usage of the resource and by how much.

> Question #19b: if respondents did decrease their usage of the resource where would they go instead.

Question #26: asked if water clarity and purity became poorer would respondents change their usage of the resource and by how much.

> Question #26b: if respondents did decrease their usage of the resource where would they go instead.

Question #30: asked if water levels and flows became consistently less than adequate would respondents change their usage of the resource and by how much.

> Question #30b: if respondents did decrease their usage of the resource where would they go instead.

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[43] Please see annotated survey in Appendix

Calculation of Direct Impacts

There were two steps in calculating the economic impact of surface waters in New Hampshire and how those impacts could be expected to change with different environmental changes. Step 1 was to estimate the current impact. Step 2 was to estimate how that impact would change if visitors were to perceive environmental changes in and around New Hampshire surface waters.

Step 1 – Estimating Average Expenditures Per Visitor Day and Visitor Days

The estimation of the expenditures of surface water users at present was calculated for each of the three different uses (swimming, fishing, and boating). This is based on the reported amount spent by visitors on the trip to the site at which they were interviewed. Dividing the individual expenses in Question #8 by both the number of people in a group and the number of days participating in that usage resulted in the <u>average expenditures per visitor day</u> (Table 1).

Average Expenditures per Visitor Day

	Total Direct Impact	Retail trade	Automotive equipment rental and leasing	Museums, historical sites, and similar institutions	Accommodation	Food services and drinking places
Fishing	$12.95	$6.32	$0.01	$0.84	$4.09	$1.69
Swimming	$18.93	$7.07	$1.14	$0.93	$7.02	$2.77
Boating	$32.36	$16.63	$0.82	$1.34	$10.43	$3.14

Table 1

Table 1 displays the average expenditures per visitor day. A person who fishes for a day on a New Hampshire surface water body is estimated to spend approximately $13. A little over $6 of this is spent in the Retail Trade sector of the economy. About $4 is spent in Traveler Accommodation and a little over $1.50 is spent at Food and Drinking places.

Swimmers are expected to spend approximately 32% more per visitor day, or $18.93 per person per visitor day, as compared to anglers. Much like people who use surface waters for fishing, the majority of swimmer's expenditures were in Retail Trade, Traveler Accommodation and Food Services and Drinking Places. It is also interesting to note that a swimmer is expected to spend over $1.00 a day on Automotive Equipment Rental and Leasing, indicating that many people who use New Hampshire surface waters for swimming purposes originate from outside of the state.

The largest of the three, in terms of expenditures per visitor day, was boaters. It is estimated an average boater, in one day, will spend around $32. Over half of this will be spent in the Retail Trade sector of the economy (about $16.50). Traveler Accommodation and Food Services and Drinking Places also make up a substantial portion of the total.

Visitor days were estimated based on findings from the "Estimates of Select Economic Values of New Hampshire Lakes, Rivers, Streams and Ponds, Phase II Report" (Shapiro & Kroll, 2003). These numbers could not be taken directly, as the total visitor days were for the summer 2003 and obtained from secondary data. For the purpose of this study the visitor days figures needed to be tailored for the summer of 2006, and to be representative of the actual visitors who participated in the interviews.

Total Visitor Days

	Fall 1999-Summer 2004 NSRE Data	**Survey sample n=832**	**Weighted average growth rate**	**Phase II Summer 2003**	**Summer 2006**
Swimming	**8.9% increase**	321	0.013735	8.0 million total visitor days	8.1 million total visitor days
Freshwater Fishing	**0.2% increase**	291	0.0002798	3.1 million total visitor days	3.1 million total visitor days
Boating	**2.8% avg. increase**	220	0.0029615	3.6 million total visitor days	3.6 million total visitor days

Table 2

Using a methodology created for a study looking at the effects of lake management policy in Tennessee (Center for Business and Economic Research at The University of Tennessee, 2003) the numbers generated in the Phase II report could be tailored for this report. Using the growth rates estimated in the National Survey on Recreation and the Environment and the results from this survey, a weighted average growth rate was generated. This, when applied to the numbers in the Phase II report, estimated the total visitor days for the State of New Hampshire (Table 2).

The total visitor days used in the Phase II report were acceptable numbers to base total visitor days in this report for several reasons. First, in the follow-up report to the Phase II report, the Phase III report, the authors conducted a random telephone survey of New Hampshire residents and found that the numbers that were used in the Phase II report were acceptable. Second, the number of visitor days in the Phase II report and the number of visitor days estimated in the National Survey of Fishing, Hunting and Wildlife Associated Recreation (US Fish and Wildlife Service, 2001) were very similar to one another.

Taking the total visitor days and then multiplying by the average expenditures per person per visitor day results in the total direct expenditures for each of the three different uses (fishing, swimming and boating) of fresh water in New Hampshire.

Step 2 – Change in Usage

The second step in analyzing the data before it was run through the REMI model was to measure how direct expenditures would change with perceived changes to environmental conditions in New Hampshire's surface waters.

In Question #7 the respondents indicated how often they planned on participating in each use category (fishing, swimming and boating) over the next twelve months. For each response that number was modified in correspondence to how the respondent felt their usage would change based on changes to various environmental conditions (Questions #15, 19, 26 and 30 in the survey).

The amount that users spent was only taken out of the model if the respondents indicated they would go out of state for their surface water recreation needs. If the respondents said they would decrease their use, but go somewhere else in the state their numbers were kept as they were still putting money into the New Hampshire economy.

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EXPLANATION OF DIFFERENCES IN ECONOMIC IMPACT ASSESSMENT METHODOLOGIES

There are a variety of ways to approach economic impact assessment, ranging from "subjective estimates that rely mostly on expert opinion" to studies that collect primary data and estimate impact using economic input/output models[44]. In this series of studies commissioned by the New Hampshire Lakes, Rivers, Streams and Ponds Partnership, the 2003 and 2006 studies not only used different approaches to assessing the economic impact of freshwaters and water-based recreation in New Hampshire, but also asked different research questions, extrapolated from different populations and in some cases measured different expenditures.

Both studies relied on representative samples of visitors, but from different populations. The 2003 study extrapolated spending data from two sources: all visitors to New Hampshire[45] and all anglers and hunters in the United States[46]. The current (2006) study obtained spending data from a representative sample of residents and visitors in New Hampshire who were fishing, boating and swimming during summer 2006.

Furthermore, somewhat different variables were used in calculating some expenditures. For example the boating figures in the 2003 study may also have included saltwater boating expenditures, which would have inflated the figures; the National Survey of anglers and hunters included expenditures for categories not included in the 2006 study, including: public transportation, heating/cooking fuel and boat mooring, storage, maintenance, pump-out and insurance. Subsequently swimming and boating expenditures in the 2003 study were estimated to be about $75 per person per day, much higher than the daily expenditures in the 2006 study.

The research questions guiding data collection in each study were also different: The 2003 study essentially investigated "what's our water worth?" and the 2006 study asked "what is the potential cost of perceived decline in water quality?"

Despite the differences in the approaches of the two studies, both of them utilized valid economic impact assessment methodologies and the resulting estimates should be considered serious indicators of the worth that healthy freshwaters contribute to the New Hampshire economy.

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[44] Daniel J. Stynes "Economic Impacts of Tourism". http://www.msu.edu/course/prr/840/econimpact/index.htm

[45] Institute for New Hampshire Studies visitor spending profiles

[46] 1996 National Survey of Fishing, Hunting and Wild-life Associated Recreation. U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, Bureau of the Census.

ANNOTATED SURVEY RESULTS

Location:_____Region:_____   Date:_____

Weather: _____Temperature:_____   Interview Time:_____

Interviewer Name: Survey Number:

1.   Is New Hampshire your primary residence?   **65%__**Yes____₀No.....................⬜

2.   Are you away from home for more than one day?   **40%__**Yes___No....**80% res; 24% non-res.** ⬛

        2a. **If "YES"** how many days are you in NH for **this trip**?.....................**m=6**.................⬜

        2b. **If "YES"** how many days are you visiting **this site** on this trip?........**m=3**.................⬛

3.   Approximately how many miles from home is this site?...**res=15 non-res=130**........**(m)**...........⬜

3A. Are you visiting anywhere else in NH on this trip // today?   **21%__**Yes____₀No............................⬛
        3b. **If "YES"** list towns or water bodies: **13% residents**
                                                                                 36% non-residents

4.   How would you rate the overall water quality **at this site**? **3%_**Poor   **23%_**Fair **74%** Good... ⬜

5.   How satisfied are you with the overall water quality **at this site**?   ⬛
        3%__ Not Very Satisfied   **12%_**Somewhat Satisfied   **41%_**Satisfied   **__44%** Very Satisfied...

6.   What is your **primary** freshwater recreation activity for this **entire** trip // day? (check one)

        ___₁ Shore fishing ---**35%**--- Boat fishing   ___₃ Freshwater swimming-------**39%**

                ___₄ Power boating ---**26%**---Non-power boating   ___₆ Other.................⬜

7. **FOR THIS SITE:**	How many days in the **LAST 12 Months:**	How many days in the **NEXT 12 months:**
TOTAL DAYS spent Fishing, Boating or Swimming		
# Days....exclusively Fishing		
# Days ...exclusively Boating		
# Days ...exclusively Swimming		
# Days ...Multiple Activities? (fish, boat, swim)		

7a. IF "**YES**" to multiple activities above: What is your primary combination activity? (check one)
___₁ Boating & fishing   ___₂ Boating & swimming   ___₃ Boating, fishing & swimming   ___₄ Other ⬛

8. Please estimate the amount **you** spent **on this trip** for each of the categories listed below.
   (if trip not complete, give best estimate of final expenditures)

	TOTAL $ In NH	% This Area // Region
Lodging, including Camping		
Restaurants/ Bars		
Groceries		
Fuel (gasoline and oil)		
Fees (admission, ramp, license, launch)		
Fishing equipment (bait, lures, rod, ice)		
Boating equipment, including rentals		
Personal services (lessons, camp, guides)		
Transportation (airfare, tolls, car rentals)		
Retail shopping (gifts, clothes, souvenirs)		
Other, i.e. pet care (List)		
TOTAL EXPENSES	**16% spent $0,**	this was typical for 86% of them

9. Expenses for **2-3** # of people?.. ▢

10. How typical are these expenditures for your freshwater trips like this one?
    14%_ Lower   **76%_**About the Same   **8%_**Higher   **2%_**First visit........................... ☐

Crowding and Natural Beauty   ALL QUESTIONS ARE FOR THIS SITE
DK=don't know

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11. How many people have you seen recreating here today (not in the parking lot)?.........**m=10**. ▢

12. How would you rate the conditions today? **60%_**Uncrowded **35%__** OK   **5%__**Too crowded.....☐

13. How satisfied are you with the number of people seen today?
    2%__ Not Very Satisfied **7%___**Somewhat Satisfied   **44%_**Satisfied   **47%** _Very Satisfied... ▢

You mentioned that you plan to visit this site ---XX--- days in the next 12 months

14. If you knew the crowding conditions here would be consistently **less than OK** in the next year would you change your number of planned visits to this site? **46%** Yes ____$_0$No......... (**IF NO SKIP TO #16**) ☐

15. **If YES**, by how many days? [   ]   15a In which direction? ____$_1$More ___$_0$Less........... ▢

    15b. **If YES and LESS**, where would you go instead?

$_1$Another state (list):**or** **18%**	$_3$Other: **(NH/DK) 31%**	▢
$_2$Elsewhere in NH (list): **(another region) 16%**		

16. How would you characterize the quality of the natural views and scenery at this water body?
    <1% Poor   **8%__** Fair   **91%__** Good.. ☐

17. How satisfied are you with the quality of natural views and scenery at this site?
    ____Not Very Satisfied   **6%___**Somewhat Satisfied   **31%__**Satisfied   **64%_**Very Satisfied... ☐

You mentioned that you plan to visit this site ---XX--- days in the next 12 months

18. If you knew that the quality of natural beauty and scenery would **become poor(ER)** in the next year, would you change your number of planned visits to this site?   **56%** Yes ___$_0$No..................... ☐
    (**IF NO SKIP TO #20**)

19. **If YES**, by how many days ☐   19a. In which direction _____$_1$More   ____$_0$Less......... ☐

   19b. **If YES and LESS**, where would you go instead?

$_1$Another state (list): **or** **22%**	$_3$Other: **(NH / DK) 32%** ☐
$_2$Elsewhere in NH (list): **(another region) 18%**	

Water Clarity and Purity		**ALL QUESTIONS ARE FOR <u>THIS SITE</u>**	
1=Not at all	**2=Somewhat**	**3=Very**	**DK=don't know**

20. To what extent do you think milfoil or other invasives affect water clarity and purity here? (1-3)..... ☐
    1= 43% **2=23%** **3=11%** **4=23%**
21. To what extent do you think algae (green scum) affects water clarity and purity here? (1-3)............. ☐
    1= 48% **2=29%** **3=13%** **4=10%**
22. To what extent do you think mercury affects water clarity and purity here? (1-3)................................ ☐
    1= 27% **2=13%** **3=7%** **4=54%**
23. How would you characterize the water clarity and purity here? **6%** Poor   **29%_**Fair   **65%** Good... ☐

24. How satisfied are you with the water clarity and purity at this site? . ☐
    5%_ Not Very Satisfied   **16%_**Somewhat Satisfied   **40%_**Satisfied   **38%__**Very Satisfied.............

You mentioned that you plan to visit this site ---XX--- days in the next 12 months

25. If you knew that the water clarity and purity here would **become poor(ER)** in the next year would you change your number of planned visits to this site? **69%_** Yes____$_0$No... ☐
    (**IF NO SKIP TO #27**)

26. **If YES**, by how many days ☐   26a. In which direction _____$_1$More   ____$_0$Less....... ☐

   26b. **If YES and LESS**, where would you go instead?

$_1$Another state (list): **or** **23%**	$_3$Other: **(NH / Dk) 30%** ☐
$_2$Elsewhere in NH (list): **(another region) 18%**	

27. How would you characterize the water level//flow at this site? **7%** Low **66%** Adequate **27%** High

28. How satisfied are you with the water level // flow at this site?
3%__Not Very Satisfied   **7%**__Somewhat Satisfied   **56%**_Satisfied   **39%**_Very Satisfied............

You mentioned that you plan to visit this site ---XX--- days <u>in the next 12 months</u>

29. If you knew that the flows // levels here would **become consistently less than adequate** in the next year would you change your number of planned visits to this site? **43%** Yes___$_0$No....................
(**IF NO SKIP TO #31**)

30. **If YES**, by how many days   30a. In which direction _____$_1$More   ____$_0$Less....

30b. **If YES and LESS,** where would you go instead?

$_1$ther state (list): **or 25%**	$_3$Other: **(NH / Dk) 32%**
$_2$Elsewhere in NH (list): **(another region) 19%**	

31. Now that we have discussed some issues concerning fresh waters in NH, how would you rate the overall water quality at <u>this site</u>? **2%** Poor **22%** Fair **76%** Good.......................................

32. How satisfied are you with the overall water quality at <u>this site</u>?
2 % Not Very Satisfied   **14%** Somewhat Satisfied   **39%** Satisfied   **45%**_Very Satisfied.............

Zipcode   Home State
NH = 65%   MA = 20%

Age: **7%** 18-25   **15%** 26-35   **31%** 36-45   **25%** 46-55   **15%** 56-65   **7%** 66+........

Interviewer fills in gender   **62%** Male   **38%** Female..

Thanks again, the study will be finished by the end of the year.
Results at **www.nhlakes.org** by 2007 (give summary card)