Marine Recreational Uses of Green Bay: A Study of Human Behavior and Attitude Patterns

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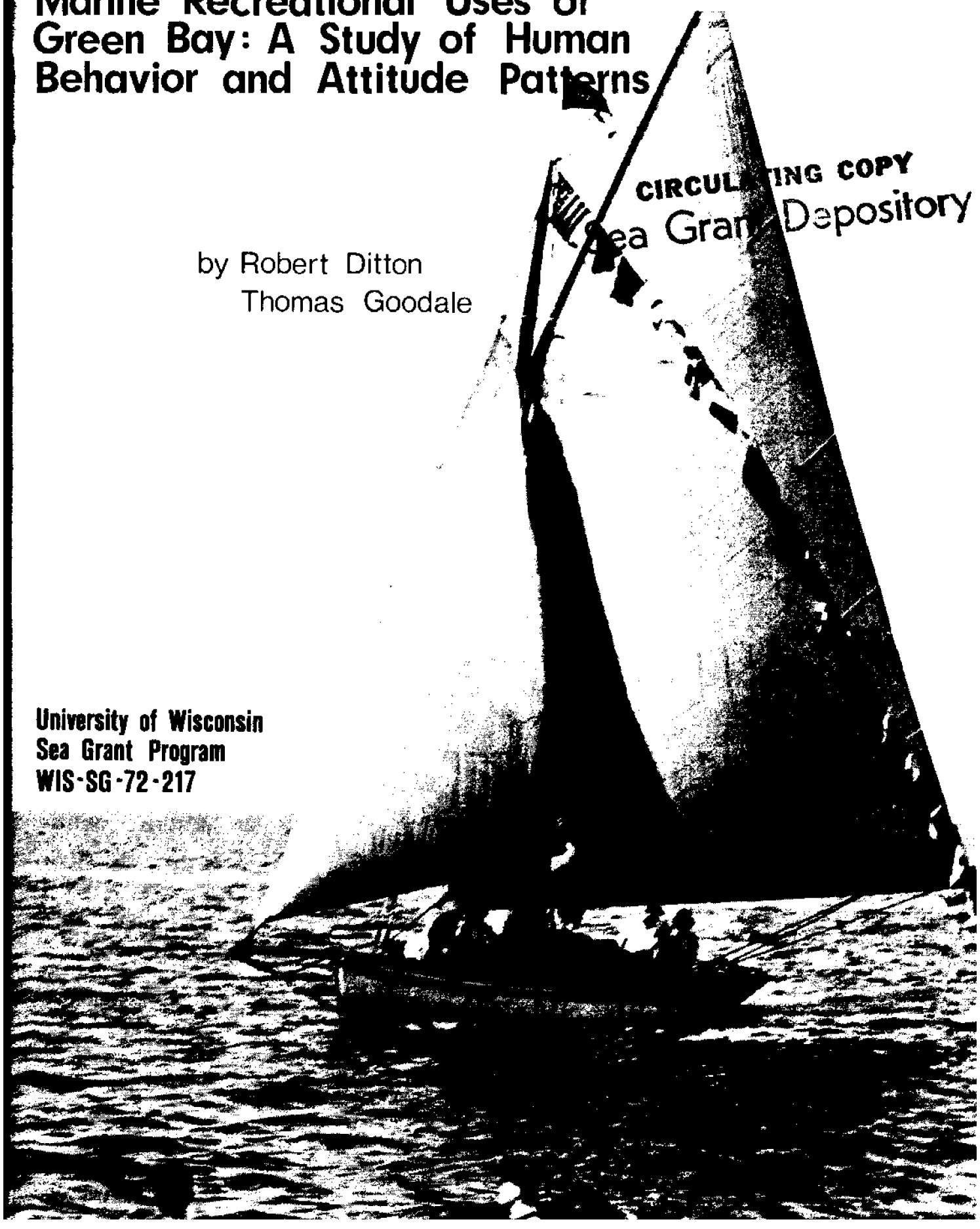

University of Wisconsin
Sea Grant Program
WIS-SG-72-217

MARINE RECREATIONAL USES OF GREEN BAY: A SURVEY OF HUMAN BEHAVIOR AND ATTITUDE PATTERNS

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TECHNICAL REPORT #17
UNIVERSITY OF WISCONSIN SEA GRANT PROGRAM
DECEMBER, 1972
WIS-SG-72-217

COVER PHOTO: Boating and Swimming at Bay Beach on Green Bay in 1914.

Photo courtesy of Stiller Collection, Noville Public Museum, Green Bay, Wisconsin.

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ACKNOWLEDGMENTS

We wish to acknowledge the contributions of the many individuals who made this report possible. They are: Dr. David Jowett for his continuous assistance in computer analysis techniques; Curt Ruthmansdorfer and Steve Hessel for data processing, computer program writing and technical assistance; Drs. Ija Korner and Edward Storey for assistance in construction of the survey instrument; Mary Eichman, Jean Brien, Evelyn Farrell and Barbara Schultz for assistance in gathering technical information; James Quinn, Director of the Neville Public Museum for providing photos from their Otto Stiller collection; and to our typists, Melanie Strub, Joy Phillips, Jean Brien and Hope Wilquet.

Space does not permit us to list the names of the numerous public and private officials who provided us with information as needed, or the University of Wisconsin-Green Bay students who carried out the 2,174 interviews that provided the basis for this study. Without their willing cooperation, this study would never have been completed.

This project was supported in part by the National Oceanic and Atmospheric Administration's Office of Sea Grant, U.S. Department of Commerce, through an institutional grant to the University of Wisconsin.

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CHAPTER I

INTRODUCTION

The Social Sciences and Marine Research

The social sciences are intellectual disciplines that study man as a social being by means of the scientific method. It is their focus on man as a member of society and on the groups and societies that he forms that distinguishes the social sciences from the physical and biological sciences. However, it can be reasoned that all professions and disciplines are somehow concerned with people and consequently require some understanding of human behavior. Engineers, for example, need be concerned with how values and goals affecting system preferences are evolved and how engineering solutions are perceived and used. Environmental perception has come to be recognized as a crucial component in the analysis and management of environmental systems. A National Science Foundation report dealing with the social sciences and the professions indicates some changes in focus for engineering that extend to all professions and disciplines:

> "Engineers must be trained to assist better in 1) identification of the problems of society that merit technological solutions, and 2) the evaluation of the potential consequences that such solutions may have on society. This does not mean that engineers must be trained as social scientists ... (but that) ... engineers must be given the knowledge to appreciate the relevance of social science theory in their work, as well as the ability to know what kinds of assistance social scientists can provide them."[1]

The social sciences themselves are not without fault. While the body of social science knowledge has grown slowly, great gaps in this knowledge exist simply from the complex and diverse nature of man. Often unable to formulate and test appropriate hypothesis, the social scientists must utilize intuitive understanding in pursuing new knowledge. This doesn't imply that the social sciences are any less scientific than other sciences but that there are still wide gaps in human understanding as well as a plethora of fragments of knowledge that require consolidation.

While the vast majority of water resources research projects have been of a biological and engineering nature, the social aspects of water resource problems have been virtually ignored. Increasingly though, research activities are being focused toward quantity and quality aspects of water as they relate to man's well-being in society. This is being accomplished both by an intuitive reorientation of priorities among physical researchers as well as by an increasing social science commitment and input.

The University of Wisconsin Sea Grant Program has avoided the pitfall of relying solely on the physical and biological sciences in marine research by encouraging inputs from the social sciences. In so doing, it recognizes that technical solutions to water resource problems are often not solutions if human well-being is the goal; often misunderstood and without popular or political support; and often rejected in the decision making process.

Survey research that probes collective behavior and attitudes are prerequisite for indicating behavioral and attitudinal trends, levels of problem awareness, and commitment to problem solution and acceptance of action programs. Survey research coupled with economic and legal analyses provide the background for implementation of technological solutions to Great Lakes problems. Without this comprehensive research orientation, successful problem resolution is severely impeded.

Studies of the water quality requirements for water-based recreation are illustrative of the need for social science input. Sanitary engineers, water chemists, and public health officials have traditionally refined water quality criteria for recreation pursuits. These criteria have been sanctioned in state statute and implemented by water management personnel. In addition to public health and safety concerns, esthetic requriements supposedly reflecting human concerns have also been established. These

proxy values were established without any study of human reaction or preference.

Past social science research reveals that man during leisure views water quality differently than the water chemist or sanitary engineer responsible for physical, biological and chemical monitoring. Because the individual's evaluation may shape his recreation behavior with considerable social and economic consequences, it is necessary to investigate peoples' attitudes and recreation behavior (or lack of it) to further identify and refine some of the social-physical relationships involved. Understanding these relationships is vital if the Great Lakes' potential for recreation is to be realized and sustained.

Recreational Use of Water as a Public Concern

On the basis of research conducted during the past fifteen years, the recreational use of water is the most rapidly growing use of water. With increasing leisure, income, mobility and increasingly degraded waterbodies inland, the 8,345 miles of Great Lakes' shoreline becomes critically important if present and future recreational needs of both regional and national populations are to be met.

The extent of regional dependence is clear when we recognize that the present Great Lakes Basin population of 30 million will increase 84 percent of the year 2020. Further, the demand for recreation is expected to increase at a much faster rate than the population. Wisconsin's population increased nearly 8 percent from 1960-65. During the same period, recreation showed an increase of 12 percent for fishing, 18 percent for boating and 15 percent for swimming. Recreation requirements of the Great Lakes Basin population as projected by the Great Lakes Basin Commission will triple from 637 million recreation days in 1970 to 1.9 billion recreation days in 2020.[2]

What will be the recreation requirements of future populations in 1980, 2000, and 2020? Will there be enough open water and public access to meet recreation requirements on a regional basis? Can our water resources physically support the demands to which they will be subjected in the future? How do we compensate for the increasing tendency of people to live in Standard Metropolitan Statistical Areas? (In the Great Lakes Basin in 1970, 76 percent of basin residents resided in SMSA's.) How can we reclaim areas with recreation potential? Such questions were seldom raised until the early sixties. The American people are

now deeply concerned about the recreation potentials of water resources.

Governmental response to public concern for recreation is best illustrated on the national level by the series of public laws oriented toward the coordination, acquisition, planning and development of recreation resources and services. An early landmark in recreation legislation was the Act of June 28, 1958 (PL 85-470) which created the Outdoor Recreation Resources Review Commission (ORRRC) to assess the status of Outdoor Recreation in America.[3] Basically they were to answer these questions:

> "What are the recreation wants and needs of the American people now and what will they be in the years 1976 and 2000?
>
> What are the recreation resources of the nation available to fill those needs?
>
> What policies and programs should be recommended to insure that the needs of the present and future are adequately and efficiently met?"

In addition to finding that 44 percent of the population preferred water-based activities over any other, the Commission's studies of recreation resource supply revealed that less than two percent of the nation's shoreline was in public ownership for recreation, with only about 5.5 percent of the shoreline with recreation potential in public hands. Further, only 336 miles of Atlantic Coast shoreline was publicly owned for recreation, a mere three percent of the total recreational shoreline.[4] In addition to firmly establishing water as the recognized focal point of recreation, the Commission made a number of policy and program recommendations based on such unfavorable recreation supply-demand balances.

One of ORRRC's principal recommendations called for the establishment of a Bureau of Outdoor Recreation in the Department of Interior with responsibilities for coordinating the various federal programs and assisting other levels of government to meet the demands for recreation. Supported by President Kennedy, the Bureau of Outdoor Recreation was created by executive order on April 2, 1962.

The Land and Water Conservation Fund Act of 1965 (LAWCON) has had a direct impact on use and planning of water and related land resources. This Act has provided monies for acquisition at higher funding levels than previously obtained. In addition to providing funds for federal acquisition, LAWCON made a state outdoor recreation plan

prerequisite to approval of funds to the states for acquisition. A major result of LAWCON was to promote comprehensive and coordinated federal, state, and regional recreation planning.

Concurrent with the development of legislation directly related to recreation resource acquisition and development, recreation was beginning to be recognized as a motivating force in programs and projects for pollution control and as a necessary objective in the allocation of funds therefore. The first Water Pollution Control Act, approved June 30, 1948, stated that "due regard shall be given to the improvements which are necessary to conserve such (interstate) waters for ... recreation purposes ... ."[5] Later amendments strengthened research and enforcement capabilities. The Water Quality Act of 1965 not only established the Federal Water Pollution Control Administration but required establishment of water quality standards for all interstate and coastal waters prior to June 30, 1967. The Secretary of Interior subsequently established the first National Technical Advisory Committee on Water Quality Criteria to collect a basic foundation of water quality criteria for water uses to assist the states in setting and evaluating their water quality standards.[6]

In Wisconsin the recreational use of water became more of a public concern with the passage of the Outdoor Recreation Act Program (ORAP) with revenue derived from one cent tax on a pack of cigarettes. Monies derived were to be used for land acquisition and more specifically for improving water access. Later in 1969, the Outdoor Resources Action Plan (ORAP), calling for a bond issue of $200 million, was submitted to and passed by Wisconsin voters. In recognition of the undeniable relationship between pollution control and outdoor recreation, the ORAP dollar was to be allocated, $0.72 and $0.28, respectively, between pollution abatement programs and recreation resource acquisition and development. ORAP dollars to be used for recreation resource acquisition and development would be used on a partial match basis with federal dollars derived under the Land and Water Conservation Act.

While population levels and recreation demands are both increasing, the effective supply of Lake Michigan water is being systematically reduced through conflicting water uses. These conflicts have resulted in degraded water quality conditions, closed beaches and reduced shoreland property values. Obviously, these impacts have been felt the greatest near our urban centers where recreation demands are known to be the greatest. To understand why these

conflicts occur and restrict recreational use, it is necessary to evaluate the multiple use concept of management of which recreation is but one water use.

Water has economic values when either withdrawn or not-withdrawn from a water body. In addition to recreation, other non-withdrawn uses of water include navigation, waste disposal, power generation, flood control and wildlife conservation. Other uses of water such as for industrial water supply and irrigation require withdrawal. Theoretically, Lake Michigan is supposed to support all these uses. The term multiple use, however, has come to stand for conflicting water uses eventually leading to impairment or displacement of some uses. A single water use can restrict or eliminate the recreational use of water simply by rendering water quality unacceptable. Commercial fishing and municipal water supply uses have also been displaced in particular locations. Table I, Page 7 , indicates water uses by sectors in the Fox River - Green Bay area and identifies uses adversely affected by water pollution.

Multiple use planning, development, and management recognizes that several uses of water can be made simultaneously when uses are judiciously integrated and coordinated. The operational objective is that of scheduling and utilizing supply so as to produce maximum net benefits. Where conflicting interests must be reconciled, they will supposedly be decided on the basis of the greatest good for the greatest number in the long run. Thus, multiple use management is complex, difficult to operationalize, and a lack of research on the value of recreation benefits makes it difficult to optimize recreation potentials.

Prior to the passage of the Federal Water Project Recreation Act (PL 89-72), multiple use had different meaning than it does today simply from the standpoint of water uses recognized. This act granted statutory authority for outdoor recreation as an equal among project purposes and a legitimate concern of the federal government. Previously, recreation was regarded as a secondary purpose; as a residual legatee or by-product of management or development and as such was relegated inferior status among project purposes. The Act recognized that the federal government was responsible to meet at least part of the burgeoning outdoor recreation demand and by elevating recreation to primary purpose status, insured that the recreation potentials of water could now be purposely optimized. Based on conditions in the Fox River - Green Bay area, as well as elsewhere, it can be concluded that multiple use, as a comprehensive management concept for making maximum use of our waters, has not optimized recreation potentials. While in the past

TABLE I-1

WATER USES BY SECTORS, FOX RIVER-GREEN BAY AREA

Water Uses	Green Bay	Lower Fox River	Lower Oconto River	Lower Peshtigo River	Lower Menominee River
Municipal Water Supply	P*	P*	-	-	-
Industrial Water Supply	P*	P*	-	-	P
Recreation					
Whole Body Contact	P*	-	P*	-	-
Partial Body Contact	P*	P*	P*	P*	P*
Irrigation Water Supply	P*	P	P	-	-
Fish-Pollution					
Tolerant	P*	P*	P*	P*	P
Faculative	P*	-	P*	P*	P
Intolerant	-	-	-	-	P*
Wildlife and Stock Watering	P*	-	P	P	P
Hydropower	-	P	P	-	-
Commercial Shipping	P	P	-	-	P
Cooling Water Supply	P*	P*	-	-	P
Waste Assimilation	P	P	P	P	P
Esthetics	P*	P*	P	P	P*

P = Present use and anticipated future use
- = Neither present or anticipated
* = Use presently adversely effected by pollution

From: U. S. Federal Water Pollution Control Administration, A Comprehensive Water Pollution Control Program, Lake Michigan Basin, Green Bay Area (Chicago, Illinois, Great Lakes Region, Federal Water Pollution Control Administration, 1966), p. 3-2.

this failure was attributed to our inability to adequately price the recreation experience and consequent secondary economic impact benefits, it has become increasingly clear that the water quality requirements for recreation as presently used in water resource planning and pollution abatement are not totally relevant to the provision and maintenance of quality recreation experiences.

In addition to impaired water quality, inappropriate shoreland development, grandfather clauses in zoning ordinances, erosion processes, and lack of public access and/or facilities are shoreland conditions that restrict the optimal recreational use of the Lake Michigan coastal zone. These conditions portend economic loss for the state as well as the degradation of human experiences of its people.

The relationship between burgeoning regional populations with recreational needs and a lack of public access becomes clear in analyzing shoreline ownership on Lake Michigan:

TABLE I-2

Lake Michigan Shoreline Ownership, 1971

	Miles	Public Ownership Miles
Residential	462	0.0
Industrial and Commercial	70	0.4
Agricultural and Undeveloped	281	2.4
Public Buildings and Lands	21	21.0
Recreational	161	156.0
Wildlife and Game Preserves	18	13.0
Forests	350	62.0
Totals (Approx.)	1363 (islands excluded)	254.8

From: U. S. Army Corps of Engineers, Great Lakes Region Inventory Report, National Shoreline Study (Chicago: North Central Division, U. S. Army Corps of Engineers, 1971, pp. 38,44, 48, 56, 69, 74, 84, 92, 104.

Couple the predominant northernmost location of many of these public ownership miles with the rapidly growing urban population at the southern end of Lake Michigan and the supply-demand imbalance for urban populations becomes apparent. Public access is not where the people are and vice versa.

In urban and suburban areas it is necessary to understand and cultivate the relationship between social quality and urban water quality improvement. In Evaluating Urban Core Usage of Waterways and Shorelines, Whitman, et. al., make a number of observations regarding public access to water and other recreation resources in the Cleveland Metropolitan Area.[7] Inhabitants of Cleveland's core area are not only denied access to Lake Erie but they are too great a distance from the major metropolitan park development as well. Observing that suburban residents have greater access both to Lake Erie and metropolitan recreation resources, the authors note:

> "the water resources of the Cleveland area, as presently developed, benefit those population groups the least who, sociologically and psychologically, have the greatest need for and the most to gain from their utilization."[8]

Water quality standards traditionally established for water resources in urban areas are usually set low due to economic and related political pressures. Even when public access is financially possible it is often impractical as the water quality is not suitable for recreational activities. Pressures to adopt the highest standards that appear reasonable are now being exerted at federal and state levels in recognition of the national and statewide interests involved.

While water-based recreation activity in the Great Lakes region continues to increase, it is abundantly clear that such activity cannot continue to increase independent of several constraints: 1) lack of public access to water, 2) conflicts of water use and economic interest and 3) resultant impairment of water quality. The inequities of resource allocation as reflected in recreation opportunities is a recognized public concern that has led to modifications in the focus of LAWCON and ORAP. Both of these programs can have substantial impact in reversing supply deficiencies in urban core areas. A study to evaluate provision of new parks in Milwaukee's central city versus provision of transportation of central city residents to suburban parks is useful to understanding the financial difficulties in providing increased access to Lake Michigan and urban tributaries:

"On the basis of data, Charles River Associates estimated the cost of park land in the suburbs at less than $1,000 per acre and land in the urban core at about $80,000 per acre."[9]

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7. Ira L. Whitman, Evaluating Urban Core Usage of Waterways and Shorelines (Columbus, Ohio: Battelle Memorial Institute, 1971, pp. 3-6).

8. Ibid.,p. 5.

9. Ibid., p. 9.

CHAPTER II

THE BAY OF GREEN BAY

Description

Green Bay is approximately 118 miles long, with a mean width of 23 miles and a mean depth of about 65 feet. The Green Bay watershed contains a total drainage area of approximately 15,000 square miles, or about one-third of the total Lake Michigan Basin. Approximately two-thirds, or 10,000 square miles of the Green Bay watershed lies within Wisconsin; the remainder is within Michigan. Of the five major rivers draining into Green Bay, the largest in terms of length (mi.), extend of drainage area (sq. mi.), mean discharge (cfs) is the Fox. The other major rivers are the Oconto, the Peshtigo, the Menominee and the Escanaba. Length, drainage area, and mean flow of these rivers are shown in Table II-I.

TABLE II-I

MAJOR TRIBUTARIES OF GREEN BAY

Stream	Length of Stream (mi.)	Drainage Area (sq. mi.)	Mean Discharge (cfs)
Fox	200	6,443	4,140
Menominee	120	4,150	3,098
Peshtigo	145	1,155	832
Oconto	130	933	569
Escanaba	115	920	895

From: U. S. Federal Water Pollution Control Administration, Lake Michigan Basin - A comprehensive Water Pollution Control Program - Green Bay Area (Chicago: Federal Water Pollution Control Administration, 1966), p. 2-1. and U. S. Federal Water Pollution Control Administration, Water Pollution Problems of Lake Michigan and Tributaries (Chicago: Federal Water Pollution Control Administration, Great Lakes Region, 1968), p. 10.

Large concentrations of industry and people are characteristic of the Green Bay watershed, particularly along the major Fox River tributary. The most significant source of pollution in the Green Bay watershed are the pulp and paper industries which discharge wastes with a population equivalent (PE) of 2,600,000 (industrial wastes discharged to the waters of the Green Bay watershed are equivalent in terms of oxygen consuming power of raw wastes of over 2,600,000 persons).[1] The second major source of pollution in the watershed is the effluent from numerous inefficient municipal waste treatment plants. As a result of these and other sources of pollution, several legitimate water uses of the Fox River and lower Green Bay, namely municipal water supply, body-contact water recreation, and fishing have been impaired if not eliminated. The interstate "Conference on the Matter of Pollution of Lake Michigan and its Tributary Basin" (1969) took special notice of the Fox River tributary because of its immediate threat to the quality of Lake Michigan.[2]

Bay Conditions as Monitored

It is not necessary to provide more than a cursory review of water quality data and findings as they may exist. Readers interested in more detailed information on water quality elements as monitored are encouraged to contact the investigators involved in monitoring and analysis.

Because of the diverse nature of Green Bay's water quality, data must be grouped according to established zones. Each of the many studies conducted on Green Bay utilize different zones based on the particular water quality element under study. Since this study of recreational use utilized the five zones created for data description by the Federal Water Pollution Control Administration, data from other sources will be so arranged where possible. On the basis of data differences found, Green Bay will be viewed as three distinct areas (Figure II-1): 1) the Lower Bay (FWPCA Zone I), 2) the Middle Bay (FWPCA Zones II and III), and 3) the Upper Bay (FWPCA Zones IV and V). Data on winds, water temperature, currents and bottom sediments defy classification according to these zones and will be dealt with separately. Baseline data on localized conditions such as algae, dead fish, bottom quality, chemical effluent concentrations, weeds, and fecal coliform densities (except in immediate vicinity of the City of Green Bay) are not available.

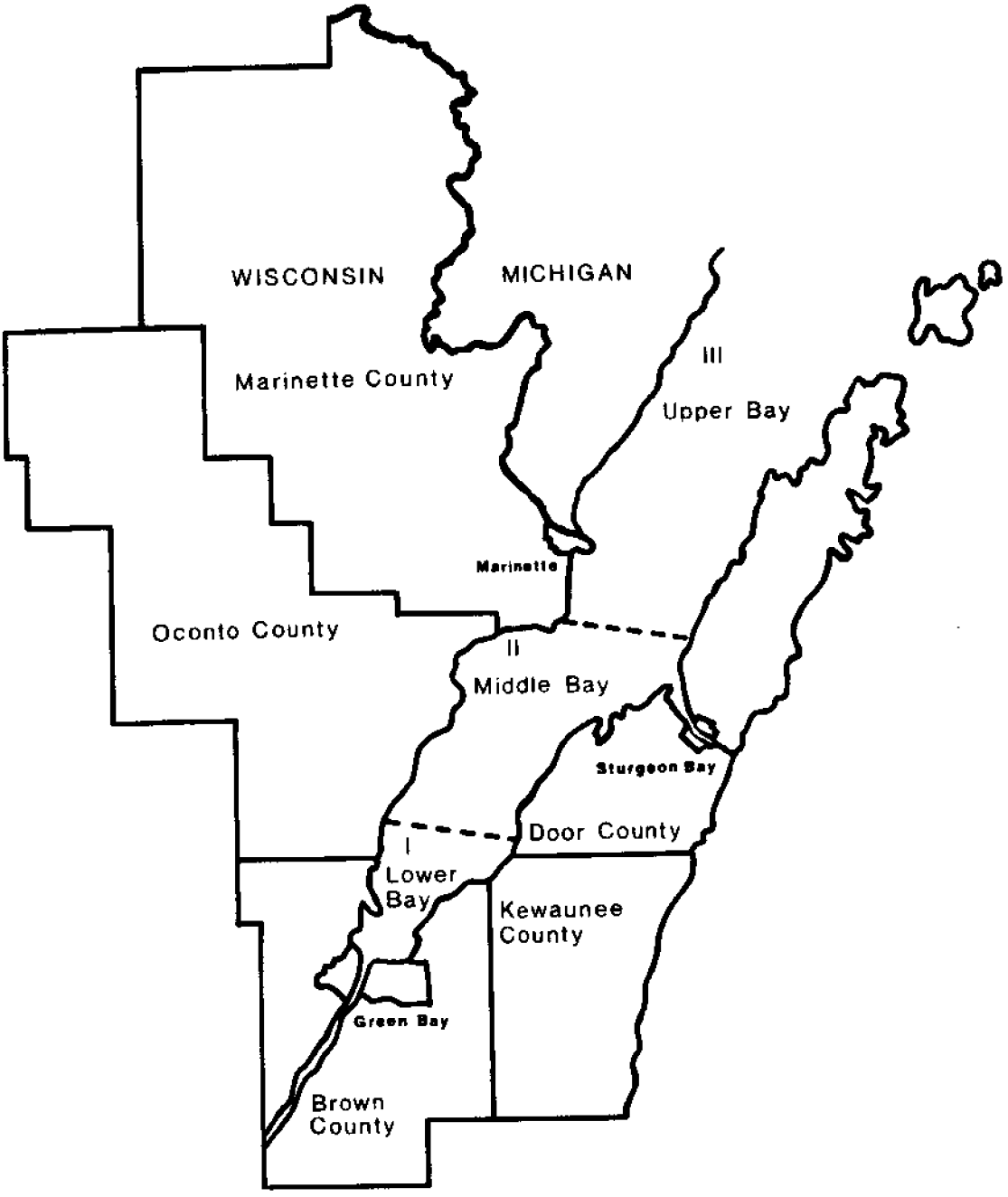


Figure II-1 Green Bay Sectors Defined by Monitored Data

The density of algae is dependent upon several factors, including the concentration of nutrients. Soluble phosphorous and total inorganic nitrogen have been of particular concern in the past with the establishment of critical levels for the stimulation of algae blooms (7.02 mg/l and 7.3 mg/l, respectively). Because factors other than nutrient levels have been related to the presence of algae growth and blooms, the credibility of these standards has been lost.[3] Therefore, nutrient levels for the three zones will not be reported.

Green Bay becomes thermally stratified weeks before the adjacent deeper water of Lake Michigan. The shallow southern end of the Bay is nearly 13°F warmer than the deeper north end in June and more than 22°F warmer than the deeper Lake Michigan water. Water temperature records show that thermal stratification in Green Bay is separate from the main portion of the Lake.[4] The prevailing wind direction on the Bay from May - August is from the south through southwest. During storm periods, the winds are from the west through northeast.

Generally, water movement tends to parallel the shore as water depths increase. Waters are discharged from the Fox, diluted and move northward along the eastern shore.

Seiche and tidal activity in the Bay as well as Lake Michigan are also responsible for a modest influx of Lake waters into the Bay:

> "On the basis of temperature and wind effects Green Bay appears to be an independent Lake separate from Lake Michigan. Local interaction between the Bay and the Lake produce a changing current pattern every 12 hours. The seiche or wind coupling with the Lake, plus inflow from Lake Michigan below the 60 feet depth and occasional northeast storm, act to dilute portions of the northern basin of the Bay with inflows from Lake Michigan. The southern reaches of the Bay, south of the Sturgeon Bay Canal, are probably not affected by any inflows from the Lake."[5]

Bottom sediments, varying in color and makeup, explain color and clarity differences throughout the Bay. Sediments in the southern area of the Bay are black, semi-fluid muds similar to Fox River sediments. Extending lakeward along the eastern Bayshore, sediments become a brownish silt; while on the western side of the Bay, sediments are sandy with little organic matter.[6]

Lower Green Bay (FWPCA Zone 1)
Mouth of Fox River and Bay Beach Area

The mouth of the Fox River has been traditionally regarded as the outfall site for wastes entering the Bay. Diffusivity studies conducted by Ahrnsbrak and Ragotskie led these researchers to postulate that Longtail Point and the bar extending from it across the Bay (at the 5 mile point from the mouth of the Fox) is in reality the Fox River discharge point.[7] Therefore, to describe water quality in the southernmost portions of the Bay, attention focuses largely on Fox River water quality.

Dissolved oxygen values in these areas are particularly low in the summer months. DNR study findings based on data-gathering in summer 1966 revealed that:

> "By July 5, the concentration (D.O.) was 2.8 mg/l at the surface and 3.4 mg/l at the bottom. On August 12, no dissolved oxygen could be detected in the river at either the surface of the bottom. Gas bubbles were observed and hydrogen sulfide odors were pronounced. The low dissolved oxygen values generally prevailed through Oct. 20."[8]

In addition to creating odor problems the implications of zero oxygen for fish populations (past, present and future) should be clear. As river water moves toward Point Sable and beyond, it becomes slightly more saturated with oxygen.

Turbidity in this zone is pronounced due to the muddy nature of suspended solids. Secchi disc readings range between 1-3 ft.[9]

Coliform bacteria levels in this zone have been of paramount concern to local public health officials. The impact of chlorination of sanitary effluent by the Green Bay Metropolitan Sewerage District has been dramatic in sharply reducing bacterial dangers. While the testing is far from systematic, sampling does indicate a trend of reduced fecal coliform dangers.

Plankton populations were difficult to assess in studies conducted by the DNR in summer, 1966. At the mouth of the Fox River:

> "The highest population of plankton was observed on July 5 when 1,353 micrograms per liter were observed in the Number 20 mesh net. On August 12, the algae population was not noticeable on the stream water and, indeed, only 95 micrograms per liter of solids were captured with approximately 50 per cent of that present observed to be debris rather than algae."[10]

Just off the mouth of the Fox, which is regarded as an algae transition zone between the river and Bay, plankton pupulations were composed of blue-green algae or diatoms (July 5, 1966 - 3,350 micrograms per liter).[11] The Bay Beach or southeast Bay shoreline is a distinct area as a receptacle for wind-blown algae accumulations together with more action along the shoreline.

In a biological evaluation of the benthos of Green Bay, Howmiller and Beeton analyzed invertebrates in the lower Bay and made comparisons with study findings of 17 years earlier. Some benthic fauna are capable of withstanding polluted conditions and multiplying rapidly when competition with less tolerant forms is eliminated. Since oligochaete worms (commonly knows as sludgeworms) are generally regarded as a positive indicator of advancing pollution, their increase throughout the lower and middle Bay is significant. Their numbers are exceedingly high in the lower Bay except near the mouth of the Fox where oligochaetes have been eliminated. But so have all other forms of benthic life in this area due to long periods of oxygen depletion. In their "Biological Evaluation of Environmental Quality, Green Bay, Lake Michigan," Howmiller and Beeton cite and apply some benthic standards to lower Green Bay:

> "Wright and Carr and Hiltunen used the following numbers of oligochaetes per square meter to designate pollution areas in western Lake Erie:) (light pollution, 100 to 999; moderate pollution, 1,000 to 5,000; and heavy pollution, more than 5,000. Lower Green Bay is, by these standards, heavily polluted)."[12]

With polluted conditions via the Fox River expected to continue, one must anticipate an even larger area around the river mouth will become abiotic.

Open Water North of Longtail Point - Point Sable to Harbor Entry Light
(10 Miles from Mouth of Fox River)

Dissolved oxygen values did not appear to be overly affected by waste discharges and were sufficient to sustain fish and fish food organisms (>4 mg/l D.O.) during summer months.[13]

While less than at the mouth of the Fox, plankton populations in this area are moderately high with approximately 1,000 micrograms per liter in a 20 mesh net. Blue-green algae was the primary constituent of this plankton population.

Secchi disc readings were generally better than the lower area of the Bay with readings routinely of 3 to 4 ft. Color analysis of waters taken from surface on August 9, 1966 revealed a reading of 20 s.u.[14]

No fecal coliform data indicating the rate of bacterial die-off from Green Bay discharge points are available.

Middle Green Bay (FWPCA Zones 2 and 3)

Middle Green Bay is that section of the Bay from the Harbor entry light (10 miles from the mouth of the Fox River) to above Sturgeon Bay (approximately 40 miles from the mouth of the Fox). Dissolved oxygen conditions in this area did not appear to be affected by summer waste discharges of the Fox and other rivers discharging from the west side of the Bay. There was a moderate oxygen depletion near the bottom, however:

> "At the 10 mile entry light, no apparent stratification could be detected but at the 15 and 25 mile stations the dissolved oxygen at the bottom was approximately 2.5 mg/l. The temperature was 55 degrees compared to 70 degrees at the surface, suggesting some thermal stratification."[15]

At the entrance light, summer plankton studies recorded 994 micrograms per liter. Other samples collected in the same area revealed over 1,000 micrograms per liter. The samples were routinely dominated by diatoms although zooplankton and blue-green algae were also major components. Summer plankton findings in the middle Bay north of the light were consistently less than those previously cited with the same major plankton constituents present.[16]

In their evaluation of the benthos of the middle Bay, Howmiller and Beeton found that oligochaetes, generally regarded as an indicator of polluted conditions increased in abundance from 1952 to 1969:

> "The middle Bay (Stations 11 to 27), according to Wright's standards, was only "lightly polluted" in 1952 (Table 1) but was at least "moderately polluted" in 1969."[17]

Secchi disc readings range from 5 to 6 feet at the 10 mile entrance light to 9 to 10 feet at the northern extremities of the middle Bay. Color analysis taken at the surface 10 miles above the entrance light reveal a reading of 8 s.u.[18]

No fecal coliform data is available to analyze bacterial dangers to body contact recreation in this zone.

Upper Green Bay (FWPCA Zones 4 and 5)

Upper Green Bay is that section of the Bay from above Sturgeon Bay to Washington Island, 70 miles from the mouth of the Fox River. Dissolved oxygen conditions in this section were not affected by waste discharges of tributary streams, however:

> "Moderate oxygen depletions were noted near the bottom during mid-summer at the 40 and 50 mile stations but the 70 mile station on August 19 revealed 8.7 mg/l dissolved oxygen at the surface and 8.0 mg/l at 30 meters just off the bottom."[19]

Secchi disc readings are more than adequate for recreation with readings of 9 to 10 feet 40 miles north of the mouth of the Fox River and 16 to 20 feet 75 miles north, or just west of Washington Island. Color readings at the surface range from 8-5 s.u. in this area.[20]

Plankton populations are sharply reduced as you move northward in the Bay. They were generally at about 100 to 200 micrograms at the 40 mile point and less than 100 micrograms per liter at 60 miles.

In lieu of an updated analysis of the benthos in upper Green Bay by Beeton (not yet available), data collected by the DNR in summer, 1966 contrasts sharply with benthic conditions in the lower and middle Bay as already reported:

> "The bottom organism populations began to reveal significant numbers of Pontoperina affinis at 40 miles north of the mouth of the Fox River). Pontoperina affinis is a shrimp typical of aerated waters such as Lake Michigan and Big Green Lake. Were the waters of outer Green Bay substantially affected by waste discharges at any time during the year, this organism would probably be unable to sustain itself."[21]

Based on chemical, biological and bacteriological data gathered and analyzed by the Great Lakes - Illinois River Basins Project, the FWPCA reached the following conclusions with respect to Green Bay's water quality:

1. The water quality of parts of Green Bay may be considered as separate from Lake Michigan, because of the relatively minor mixing of its waters which results in a differing water quality from the main body of the Lake.

2. Areas of degraded water quality are generally confined to zones near the mouths of tributary streams, harbors, and population centers where treated and untreated waste discharges are prevalent.

3. The principal water quality problems of the degraded areas are due to high concentrations of ammonia, phosphate and phenol, and low dissolved oxygen concentrations resulting from organic wastes. The presence of tolerant benthic animals in large numbers, along with dense concentrations of plankton algae, and the presence of high concentrations of coliform bacteria also indicate degraded water quality conditions.

4. The region most degraded is at the southern tip of Green Bay adjacent to the mouth of the Fox River.

5. Other degraded zones appear at the mouths of the Oconto, Peshtigo, and Menominee Rivers.

6. The lower Fox River, tributary to Green Bay, is grossly polluted, contributing the bulk of the phosphate, ammonia, phenol and organic contaminants and having at times little or no dissolved oxygen for distances 20 miles.

7. The coliform levels in the lower Fox River have been found to be as high as 600,000 per 100 ml. Other biological analyses confirm the gross pollution of this stream.

8. The Oconto River, between Oconto Falls and its mouth, is severely degraded by organic pollution.

9. The Peshtigo River below Peshtigo to its mouth is also severely degraded from organic pollution.

10. Other streams tributary to Green Bay show varying degrees of pollution as generally reflected in the quality of water near the tributary mouths.[22]

A number of actions are underway which appear to be positive in reducing present waste loads. These would include: 1) interstate water quality standards for Lake Michigan, calling for secondary treatment of all municipal wastes, have been established and approved by the Secretary of the Interior.[23] According to Thomas Frangos, Director, DNR, Bureau of Water Resources:

"Implementation of this requirement will be substantially accomplished by December 1972."[24]

2) the State of Wisconsin has issued orders against all cited municipalities and industries to upgrade their treatment capabilities:

> "Treatment facilities to meet water quality standards that relate to dissolved oxygen, suspended solids and phosphorus removal are to be substantially accomplished by December 1972."[25]

and 3) two pulp and paper industries and the City of Green Bay are cooperating with the Metropolitan Sewerage District in the development of a joint municipal industrial treatment facility. In addition to difficulty in predicting water quality responses to these actions reducing waste loadings, there is little agreement on acceptable levels of stream quality desired and/or financially feasible. These issues are brought out quickly in discussing the legislation introduced in Congress by Senator Edmund Muskie that requires zero-discharge. It can be argued (and is) that the Fox River tributary and Green Bay should be returned to trout stream quality (as we know it) as it used to be. But were these bodies of water ever this pristine?

Known fecal coliform dangers that prohibit swimming in the lower Fox and Bay are of recent vintage. The problem resulted from the refinement of useful indicator organisms, increasing population density and a concomitant sewerage treatment incapability. Although the Green Bay Board of Health did not monitor fecal coliform bacteria levels until 1968, it is reasonable to assume that the adjacent population in the early 1900's resulted in contamination that went undetected. While the voluminous discharge of man/industrial-related oxygen consuming wastes is also a relatively recent phenomena, early Bay conditions were such that French explorers referred to it as the "Bay of Bad Odors."

History of the "Bay of Bad Odors"

> "Green Bay was forty leagues deep according to de la Potherie's account. It was eight to ten leagues wide and at the southern end it was two leagues wide with the mouth being closed by seven islands. The Indians hunt ducks, black and white ones in the fall. Some they net as they feed on wild rice. They fish for sturgeon year around. The rivers in the area are deep and closed with rapids which helps fishing."[26]

Green Bay is mentioned often in the notes and recollections of early explorers like Nicolet, Joliet, Marquette, Andre and Champlain. Their early descriptions of the Bay and its surrounding inhabitants provide some early bases for how the Bay was originally viewed. Physical water quality conditions were of critical importance in naming the Bay as well as its inhabitants.

Jean Nicolet came to Green Bay in 1634, just fourteen years after the Pilgrims landed at Plymouth. Upon his landing at Red Banks the Bay appeared green like the green sea of the Orient he was searching for but never found. Also, as a result of this predominant water characteristic, the French in 1634 gave the settlement of Green Bay its original name, La Baye Verte.

Marquette and Champlain both described the waters of Green Bay as salty. Without apparently conducting any investigation, Champlain noted that the water was as salty as sea water. Marquette, on the other hand, found no salt upon investigation and spoke of "the mud and slime to be found there, constantly exhaling noisome vapors which cause the loudest, longest peals of thunder I ever heard."[27] The roar Marquette spoke of was the sound of the tide documented by other early explorers.

On the matter of a tidal influence Father Andre in 1677 noted:

> "... I began to suspect that there might really be a tide in the bay des Pauns. We had left our canoe in the water, in very calm weather, and the next morning were greatly surprised to find it high and dry. I was more astonished than the rest, because I bore in mind that for a long time the Lake had been perfectly calm."[28]

In this quotation Andre refers to Green Bay as Bay des Puans. Champlain believed the Bay to be salty like the sea and subsequently referred to the local tribes as "people of the sea" or Puans. The Puans were also called by the Algonquin name of Quinipig or "Stinking Water" even though the Quinipig were a tribe of Dakota origin.

> "The nation that inhabits here is so called because they dwelt in certain marshy places full of stinking water situated on the South Seas."[29]

The Puans were predominantly of the Winnebago tribe and lived along the shores of the Fox River and Lake Winnebago. They also lived near Red Banks where Jean Nicolet landed. Later, in 1721, Father Charlevoix further discussed how the Puans were named and by whom:

> "They have settled on the shores of a lake and I do not know but it is living on fish of which the lake furnishes them in great abundance that has given them the name of Puans (foul smelling) because all the length of the shore where were built their cabins one saw dying fish, with which the air was infected. It appears to be at least the origin of the name that the other savages had given them before us (the French and which has been communicated to the Baye)."[30]

Consequently, the early French referred to Green Bay as the "Bay of Bad Odors." Both the name Puans as well as the Bay of Bad Odors provide some historic documentation of Green Bay water quality conditions as early as 1634. Many in 1972 would agree that both names are still appropriate today.

Past Recreational Use of Green Bay

Information on past recreational uses of Green Bay is virtually non-existent except for newspaper accounts or the Stiller photo collection in the Neville Public Museum, Green Bay. These records focus on the early facilities used for recreation (entirely in the lower Bay) rather than on any quantitative description of recreational use of the Bay. The latter data has never been compiled and is one of the reasons for undertaking this research.

Swimming

The documented focus of recreation in the lower Bay

1914-Bay Beach, Green Bay
Source: Stiller Collection, Neville Public Museum, Green Bay, Wisconsin

1943-Bay Beach, Green Bay
Source: Stiller Collection, Neville Public Museum, Green Bay, Wisconsin

has been the Bay Beach facility, conceived and developed by Mitchell Nejedlo in 1892.[31] He secured a stretch of land along the lower Bayshore, improved the grounds, cleaned up the beach and set up a park. Following the connection of city streetcar lines to the park, and the erection of a bathhouse and pavillion, Bay Beach, a privately supported venture, became a popular recreation attraction for the nearby Green Bay residents. On June 14, 1920, Frank E. Murphy and Fred Rahr donated the Bay View Beach which they jointly owned to the City of Green Bay. The property east of Irwin Avenue was approximately eleven and one-half acres and contained all the buildings previously developed. After an additional purchase of Bayshore land and the purchase of the Bay-Shore Railway by the Wisconsin Public Service Corporation, Bay Beach Park became a reality as a public park. In 1929, 222.09 acres were purchased from John Marsch increasing the park property to 243 acres. Since the Green Bay area was a traditional route for migrating waterfowl, a wildlife sanctuary was established at the Bay Beach area in the late 1930's (1938-1941) with W.P.A. assistance.

From 1910 to 1920 Bay Beach was a popular swimming location except during hot weather when the relatively shallow water heated up rapidly. Swimmers had to walk out quite far to get to deep water but the shallower water was used extensively by children. Farther out, the Bay had a velvety sand floor with few clams or stones to bother swimmers. There was a bathhouse with an adjacent "boardwalk" located on the dock but ice breakups caused major repairs each year. No specific water quality information on conditions at Bay Beach from 1920 to its closure in 1942 is available.[32]

With either no information or records no longer available, it is difficult to establish when water quality conditions began to eliminate swimming as a recreational use of the Bay or when Bay Beach was closed. What is clear, however, is that with no metropolitan sewerage treatment facilities developed until 1934-1935, water quality levels in the late 20's and 30's were at a low level:

> "It is estimated that about 40% of the domestic sewage of Green Bay runs into East River, there being more than twenty sewer outlets emptying into this stream in addition to those in Allouez. The sewage from Preble runs into Ellis Creek, a small tributary of East River. This sewage, together with waste matter from several industrial plants along

the river, has polluted the stream as to cause considerable discomfort to the nearby residents.

Physicians testified to treating boys afflicted with eye sores, which they attributed to infection caused from swimming in these polluted waters."[33]

Though the Fox and tributary East Rivers both needed cleaning up, local officials formed a Metropolitan Sewerage District in 1931 which was just large enough to deal with the polluted but small East River. Pointing to the up-river sources of water pollution:

"Many officials in Brown County were of the opinion that the cleaning up of the local Fox River situation should wait until such time as the river came to us in a relatively unpolluted condition."[34]

With no waste treatment facilities in operation, it is no surprise that the State Board of Health found the water in the lower Bay "so highly polluted as to constitute a menace to public health."[35] Bay Beach was officially closed by this state board for the summers of 1931, 1932 and apparently numerous other times. During this depression period, the newly formed Metropolitan Sewerage District began construction of a waste treatment plant interceptor sewer system to deal with the more immediate water quality problems in the East River with a spillover effect on the downstream Fox River and lower Bay.

In 1932, any improvement of water quality in these nearby waterbodies looked so remote that the Green Bay Park Board actively considered the development of a swimming pool in the Bay Beach area:

"To the suggestion that an outdoor swimming pool, similar to those maintained by other park departments in cities where water frontage is not available or is not suitable for bathing, might solve Green Bay's problem, not only for this year but for years to come, Mr. Huybrect (Director of Parks and Recreation) said it was the feeling of the board that a pool of this kind would meet the needs at least for the children of the city and would also go a long way toward taking care of adults."

"Park board authorities are agreed that in the absence of any publicly owned shore frontage with clean water, a pool is the only solution of the difficulty."[36]

Perhaps interest in the pool waned when water quality levels improved as sewerage treatment facilities developed. Recreational use of Bay Beach apparently continued despite continuous closings by the State Board of Health until the area was permanently closed in 1943.

Upon the recommendation of the Green Bay Board of Health, the Bay Beach swimming area was closed permanently on July 12, 1943. On August 4, 1942 the Green Bay Board of Health cited continuous contamination in their minutes as the reason for closing Bay Beach for the remainder of the summer. Subsequently, in 1943, Bay Beach was closed permanently because of extraordinarily high coliform counts averaging 10,000/100ml for 15-20 random tests taken in 1942-1943. This is the first qualitative data taken relative to contamination in the lower Bay and we have no reason not to assume that these conditions were commonplace throughout the 30's and early 40's. Bay Beach was probably permanently closed when it was because of the creation of the Board of Health in 1941 and its subsequent undertaking of random water quality testing.[37] It is conceivable that Bay Beach would have been closed permanently earlier had there been a local Board of Health with sufficient testing capabilities.

This analysis is somewhat corroborated by John Lee, Outdoor Editor of the Green Bay Press Gazette, who notes that swimming on the lower Fox River and at Bay Beach dropped off sharply in the mid-thirty's long before the permanent closing of the Bay Beach area. This counters the impression that might arise that the closing of Bay Beach left a large number of individuals with no place to swim. People generally compensated for the degraded water quality conditions by finding alternative swimming locations or pursuing alternative activities long before the permanent closing. It is therefore not surprising that pressures to construct swimming pools did not arise immediately. Pool facilities were not constructed by the Green Bay Park and Recreation Department until 1951 or nearly eight years after the permanent closing of Bay Beach. Since no warning or "no swimming" signs were placed at Bay Beach, it was necessary to discourage any unsanctioned use of the area. This was accomplished by eliminating the beach area with a rubble mound and backfilling with topsoil.

Systematic monitoring of total coliform bacteria was not undertaken by the City Health Department until 1967. In 1968 the City began to monitor the more sensitive fecal coliform bacteria indicator at six monitor stations. According to 1970 water quality data gathered by the City

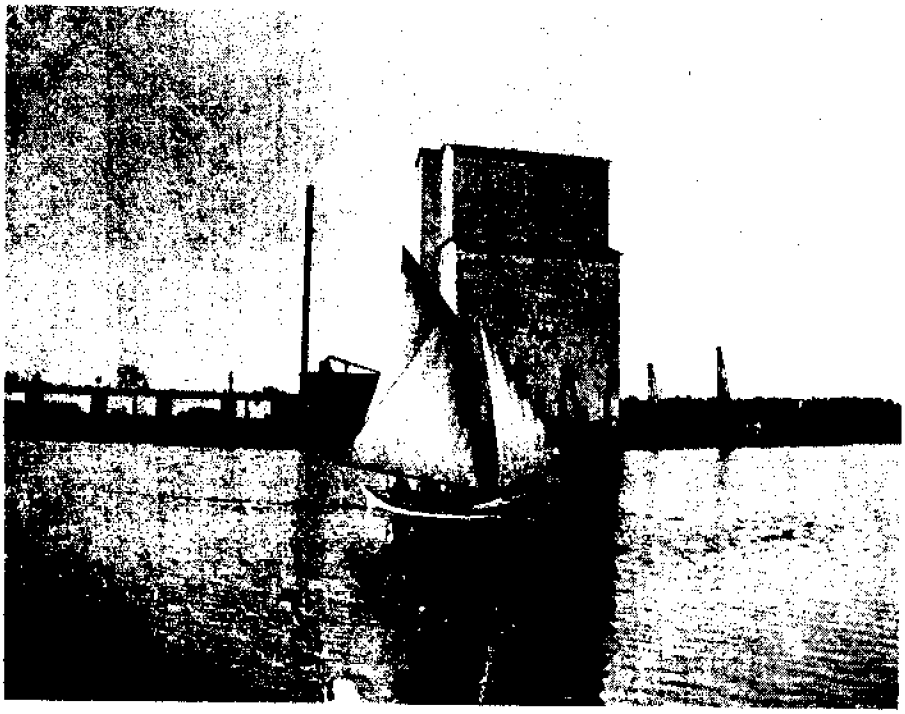
Health Department, total coliform counts exceeded the critical levels established in the Wisconsin Administrative Code for direct body contact recreation activities.[38] Consequently, City health officials recommend against direct body contact recreation activities of any kind in the lower Bay. As a result of chlorination of effluent begun by the Green Bay Metropolitan Sewerage Plant in 1971, water quality data gathered during the summer of 1971 reveals sharp decreases in fecal coliforms. Since there is no state-sanctioned criteria for fecal coliform levels, public health officials must still adhere to the less specific total coliform requirements (100 total coliform/100ml) established by state statue. Since this level is still reached on several occasions and since plate counts are still exceedingly high, City public health officials still strongly recommend against swimming and other body contact activities. While clarity and other water quality parameters reduce the swimming potential of the lower Bay, City officials are nonetheless encouraged by the sharp reduction in fecal coliform levels. Their optimism was reflected at a December 16, 1970 budget hearing conducted by Governor-elect Patrick Lucey in Green Bay where Thomas Frangos, Administrator of the Division of Environmental Protection, Wisconsin Department of Natural Resources noted that:

> "I think swimming (at Bay Beach) might be possible by 1972 but you might not like it." "...swimming might be safe enough from a health standpoint, but that accumulations of silt and other wastes on the Bay bottom could be objectionable."[40]

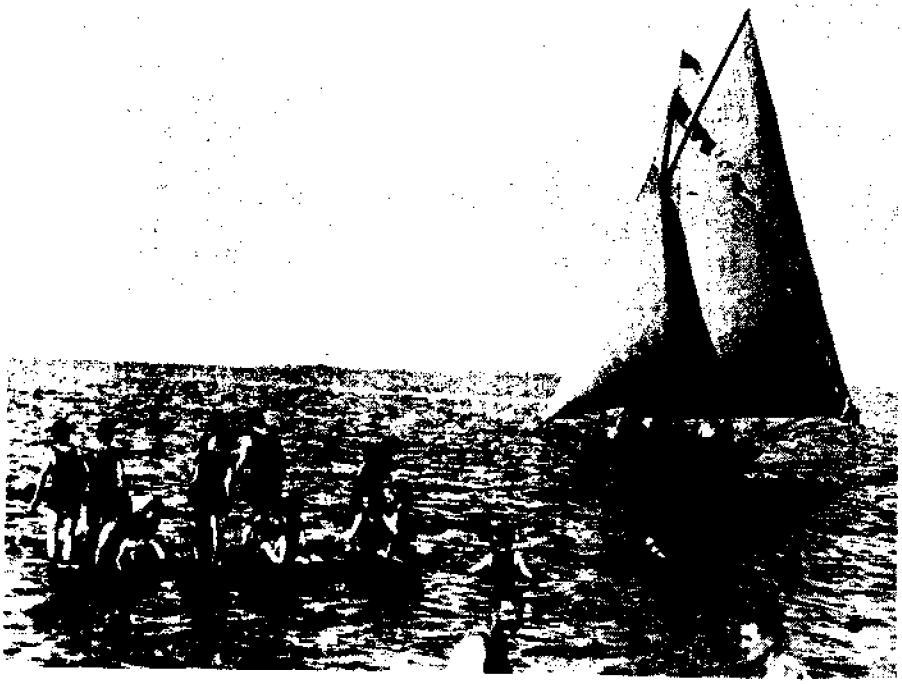
Away from the mixing zone of the lower Bay, swimming continues to be a major use of the Bay with 13 public beaches along the five-county shoreline. As part of the National Beach Inventory conducted by the U. S. Environmental Protection Agency, Bayside beaches were investigated to determine whether any had been closed in summer, 1970, because of water pollution. Records reveal none were closed.[41]

Boating

In the early 1900's trips could be made from Walnut Street to Bay Beach on Captain John A. Cusick's steamer, "Bell." The alternative route to reach Bay Beach was to go by horse and buggy over a dirty, mosquito-infested road that was little more than a trail with chuckholes.



1910-Boating at the mouth of the Fox River
Source: Anonymous



1914-Bay Beach, Green Bay
Source: Stiller Collection, Neville Public Museum, Green Bay, Wisconsin

In 1903 the Green Bay Yacht Club was founded at Bay Beach using Cusick's steamer dock. Later the club erected a $4,500 breakwater a few hundred feet offshore and Henry Rahr donated some Bayshore property and a building to the group for their headquarters. In the 19th and early 20th centuries, boating nationwide was almost wholly limited to the wealthy but with the advent of the outboard motor, boating became highly popular with those with more limited financial resources for the activity. While boating grew slowly in the 1920's and 1930's, those who had previously depended upon the excursion boats for their waterborne experiences turned away from the Bay with the advent and popularity of the automobile. Excursion trips down the Fox, and to Marinette, Door County, Mackinac Island and points beyond were virtually eliminated by 1919 due to improved roads for automobile travel. The automobile was also credited with hastening the demise of the Green Bay Yacht Club in 1912.[42]

Weather conditions together with minimal harbor facilities were short of ideal on the Bay. Pleasure yachts were found beached on one occasion at the Bay Beach Yacht Club location.[43] On her 1825 cruise on Green Bay, Mrs. Elizabeth Therese Baird noted that the Bay was subject to squalls and winds forcing the captain to keep his boat close to the shoreline.[44] She indicated that this would make future pleasure boating on the Bay difficult. Later, boating facilities were developed on the lower Fox River below the Green Bay bridges (1922-1934) but due to inconveniences to motor traffic caused by bridge openings, the club resettled near the mouth of the Fox on Diener Drive (Green Bay Yachting Club began January 18, 1934).

Boat registration records (1971) maintained by the Wisconsin Department of Natural Resources reveal total boat registrations by county. These boats may be used in the Bay, the Lake or inland waters with no predominant use location noted. This data does reveal 3,870[45] inboard, outboard, and sailcraft 16 feet and longer which most probably are forced to utilize the Bay or Lake because of their size. The majority of boats registered in the five county area are outboards under 16 feet. Many probably utilize the Bay for fishing and other activities with the convenient access of 34[46] public boat launching points along the Bayshore. In the lower Bay, however, public boating facilities are limited. As a result, the owners of the 7,548[47] inboard, outboard, and sailcraft under 16 feet registered in Brown County are often required to

TABLE II-2

BOATS REGISTERED: FIVE COUNTY AREA, 1971

	Brown County		Door County		Kewaunee County		Oconto County		Marinette County	
	Indi-vidual	Fleet*	Indi-vidual	Fleet*	Invi-vidual	Fleet*	Indi-vidual	Fleet*	Indi-vidual	Fleet*
Outboards	9,001	138	1,779	537	597	30	1,768	421	2,663	417
Sailboats	206	2	83	31	5	--	15	2	33	--
Inboards	330	3	199	10	50	1	34	2	40	--
Outboards										
under 16'	7,338	110	1,257	459	474	26	1,531	403	2,332	397
" 26'	1,647	27	514	76	122	4	235	18	328	19
" 40'	16	1	8	1	1	--	1	--	3	1
Sailboats										
under 16'	83	1	39	12	1	--	9	--	9	--
" 26'	107	1	39	18	4	--	6	2	17	--
" 40'	14	--	5	1	--	--	--	--	7	--
" 65'	2	--			--	--	--	--	--	--
Inboards										
under 16'	16	--	5	--	5	1	7	1	5	--
" 26'	234	3	148	7	34	--	18	1	23	--
" 40'	70	--	43	3	11	--	9	--	11	--
" 65'	10	--		--	--	--	--	--	--	--

*Fleet boats - when an individual owns three or more boats
- rental boats in conjunction with a resort

From: Wisconsin Department of Natural Resources

transport their craft away from the lower Bay area to a suitable water access point. Lack of access in the lower Bay can be seen as a function of degraded water quality, or exceedingly-high land values for water frontage areas. In the past year access has been even further reduced with the elimination of a boat launching ramp near the Mason Street Bridge.

The Green Bay Yacht Club is still in operation today and provides dockage facilities for recreational craft in the 20'-40' category. Unfortunately, the club, which has leased the land at their present location at the mouth of the Fox River for the past 40 years, is being displaced by the proposed expansion of the Metropolitan Sewerage District. They were given five years to vacate the property and find an alternate location in the lower Bay to service the larger watercraft. A new location has not been determined at the writing of this report.

Fishing

A review of newspaper accounts in the five-county study area implies that fishing systematically declined in the Bay during the last 70 years -- from a fishery predominant with trout, whitefish and pike to one of bluegills, alewife, carp, and crappies. Data collected by the Wisconsin Department of Natural Resources is useful in reaching conclusions regarding the nature of Green Bay's fishery.

In 1970 Green Bay's commercial fish production (25,226,000 pounds) accounted for 51 percent of the total Lake Michigan commercial fish production (49,914,000 pounds). See Table II-4 on page for fish production of the Bay and Lake Michigan since 1949.[48] To place this sizable percentage in some perspective, there is need to identify the more plentiful fisheries involved in Lake Michigan commercial production:

TABLE II-3

PRODUCTION OF MAJOR FISHERIES: LAKE MICHIGAN, 1971

Fishery	Pounds
Lake Trout	2,933
Whitefish	470,666
Chubs	3,107,938
Herring	5,765
Perch	213,485
Alewife	26,148,096

From: Ronald Poff, Staff Supervisor, Great Lakes Operations, Wisconsin Department of Natural Resources, March 17, 1972.

Sport fishing in Green Bay according to creel census counts involves not only different fisheries than does commercial fishing but takes place exclusively in the northern reaches of Green Bay. No lower Green Bay locations (adjacent to either Brown, Kewaunee or Oconto Counties) were included in the 1971 DNR creel census. This is because none of the streams to the lower Bay support anadromous fish.

For record keeping purposes, sport fishing on Lake Michigan is associated solely with andromous fish. DNR creel counts reveal that lake trout composed the greatest portion of the Lake Michigan catch (37.4 percent) followed by coho, rainbow trout, brown trout, chinook and brook trout.[49] No records of non-andromous sport fishing are available, yet such fishing is done especially in the lower Bay areas where an andromous fishery does not exist.

The nature of sport and commercial fishing has changed substantially over the years in terms of target fishery, reducing competition between the two user groups. With government regulations preventing commercial fishermen from taking the coho and lake trout, they must sustain their marginal operations with other lower value fisheries often as part of government-sponsored trash fish removal programs.

With fishing license fees used to partially support stocking programs, sport fishermen have andromous fish all to themselves. Since none of the streams tributary to the lower Bay will support anadromous fish, sport fishing in the lower Bay most probably involves the same fishery as pursued by the commercial fisherman. It is perhaps ironic that there is no competition among sport and commercial fishermen by government regulations on Lake Michigan open waters,

TABLE II-4

COMMERCIAL FISH PRODUCTION OF GREEN BAY
IN RELATION TO LAKE MICHIGAN (IN THOUSANDS OF POUNDS)

Year	Green Bay Production	Pounds Per Acre Yield	Lake Michigan Production	Percent of Total From Green Bay
1949	15,768	16.4	25,573	61.7
1950	15,654	16.2	27,078	57.8
1951	15,273	15.9	27,648	55.2
1952	18,803	19.6	32,061	58.6
1953	15,875	16.5	28,834	55.1
1954	17,510	18.3	30,291	57.8
1955	16,637	17.4	30,036	55.3
1956	17,038	17.7	30,798	55.3
1957	13,389	13.9	27,223	49.2
1958	13,610	14.2	27,771	49.4
1959	10,033	10.4	20,808	48.2
1960	8,444	8.8	24,311	34.7
1961	7,447	7.8	25,559	29.1
1962	7,035	7.3	23,475	29.9
1963	6,636	6.9	21,021	31.6
1964	7,261	7.6	26,201	27.7
1965	5,292	5.5	26,994	19.6
1966	15,512	16.1	42,764	36.3
1967	27,871	29.0	53,496	52.1
1968	19,336	20.1	45,810	42.2
1969	23,102	24.0	47,489	48.6
1970	25,226	26.2	49,914	50.5

From: U. S. Bureau of Commercial Fisheries, Report on Commercial Fisheries Resources of the Lake Michigan Basin, 1965, (for data previous to 1964) and Michigan, Ohio and Wisconsin Landings, Current Fisheries Statistics, (U. S. Department of Commerce) National Marine Fisheries Service, (for reports since 1964).

TABLE II-5

FISHING LICENSES: FIVE COUNTY AREA, 1970

County	Regular Resident	Husband and Wife Combination	Non Resident	Husband and Wife Non Resident	Total
Brown	8,459	1,796	284	24	10,563
Door	4,252	820	3,657	1,083	9,812
Marinette	5,938	999	3,714	601	11,252
Oconto	5,331	1,083	2,051	465	8,930
Kewaunee	2,196	274	588	86	3,144
Total Five-Counties	26,176	4,972	10,294	2,259	43,701
Total Wisconsin	686,685	79,360	333,166	57,157	1,156,368

From: Wisconsin Department of Natural Resources

but where waters are impaired as in the lower Bay and fisheries of less value, there is potential conflict.

Again, lack of official records makes it difficult to assess past sport fishing utilization of Green Bay. It was not until 1947 that a fishing license was required for all types of sport fishing. Not until 1970 were fishing licenses required for fishing on Lake Michigan or Green Bay. Fishing license data (1970) maintained by the Wisconsin Department of Natural Resources indicate the number of licenses by county, and residency/non-residency, but fail to discriminate Great Lakes from predominant inland use.

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14. Ibid., p. 35.

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25. Ibid., 390.

26. Bacqueville de la Potherie, Historie l'Amerique Septentrionale (Paris, France: J. L. Nion, F. Didot, 1722).

27. Ibid., p. 63.

28. Lawrence Martin, The Physical Geography of Wisconsin (Madison, Wisconsin: State of Wisconsin, 1916), p. 291.

29. Green Bay Historical Bulletin, Vol. 2, May - June 1926, p. 4.

30. Ibid.

31. Green Bay Press Gazette. "Gift of Frank Murphy and Fred Rahr is Site of State Celebration," July, 1934 (Tercentennial Edition), p. 1.

32. This is due to a fire at Green Bay City Hall in the early 50's during which all official records of the Green Bay Department of Parks and Recreation were destroyed.

33. Green Bay Metropolitan Sewerage District. "First Annual Report of the Commissioners of Green Bay Metropolitan Sewerage District," January 15, 1933, p. 6.

34. Ibid., p. 5.

35. Green Bay Press Gazette. "Pool May be Solution to Park Problem." Feb. 24, 1932, p. 1.

36. Ibid.

37. The Green Bay Board of Health was reorganized in 1941. Since public health concerns were previously undertaken by a one-man operation, the creation of a Board of Health was really much more than a reorganization. Board now had the staff to undertake a comprehensive water sampling program.

38. State of Wisconsin, Wisconsin Administrative Code, NR 102, Section .02, "Categories of Standards, #4," January, 1972.

39. The Wisconsin Administrative Code recognizes no fecal coliform criteria in NR 102, Section .02 but indicates criteria may be adopted in future revisions.

40. Green Bay Press Gazette, "Swimming at Bay Beach by 1972 Called Possible," December 17, 1970, p. 1.

41. Compiled from beach inventory forms on physical characteristics completed by county agents in the five-county study area, January, 1972.

42. Green Bay Press Gazette. "Severe Storm Wrecked "Bay" Club Regatta," July, 1934 (Tercentennial Edition), p. 1.

43. Ibid.

44. Lyman Draper (ed.), Wisconsin Historical Collections, Madison Wisconsin: Wisconsin Historical Society, Volume VI, p. 169.

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CHAPTER III

WATER QUALITY AND RECREATION: LITERATURE

Water Quality and Health Concerns

Water quality criteria are scientific requirements on which a decision or judgment may be based concerning the suitability of water quality to support a designated use. With public health and safety concerns foremost, water quality requirements for recreation deal exclusively with physical, chemical and biological aspects of water. These requirements have been indispensible for evaluating the suitability of potential water recreation sites as well as maintaining existing recreation potentials. The process of evaluating the recreational suitability of water has traditionally been carried out by public health officials perhaps partially explaining the health and safety emphasis.

In February, 1967 the Secretary of the Interior established the first National Technical Advisory Committee on Water Quality Criteria. A Subcommittee on Recreation and Aesthetics was charged with collating the water quality criteria specific to non-body contact, indirect body contact, direct body contact and de facto recreation activities for use in setting and evaluating water quality standards.

Their findings indicate the primary concern of criteria with public health and safety matters. Going beyond total coliforms as the accepted indicator of contamination, they promulgated two new and more sensitive indicators: fecal coliform and fecal streptococci. While research has provided techniques for measurement and interpretation of these new indicators, they have not, however, been accepted to the point where their use is recognized by government agencies. The National Technical Advisory Committee also

recognized safety oriented criteria for pH and water clarity. Except for the microbiological criteria established to restrict waterborne diseases of epidemic proportions, no quality requirements were found to exist that minimized eye, ear, nose, throat and skin infections and gastrointestinal illness resulting from body contact recreation activities. One may assume that these deleterious health effects have gone unnoticed because they fail to approach epidemic proportions.

A case for more extensive and rigorous criteria was implied by the National Technical Advisory Committee by their recognition that extensive recreation use of water is made at other than designated sites. Their requirements for the de facto recreation use of water recognize the undeniable attraction of water to human beings as well as the need to sustain if not improve water quality for its recreation potentials.

Stevenson noted that water used for body-contact recreation activities must conform to three general conditions: it must be esthetically enjoyable, free from obnoxious floating or suspended substances, objectionable color, and foul odors; it must contain no substances that are toxic upon ingestion or irritating to the skin; it must be reasonably free from pathogenic organisms.[1] Water quality criteria have seldom defined the first two conditions in any but general qualitative terms. If collective esthetic concerns and judgements of people were considered parallel to public health and safety concerns, one might expect outcomes of the new criteria to far exceed those presently used to judge recreation suitability.

The fact that promulgation of more sensitive water quality criteria poses a dilemma for local officials has most likely affected the extent of criteria developed. Consequently, criteria seem to be balanced between reasonable safeguards for public health and safety and placing undue restrictions on the availability of waters for contact recreation. If criteria became too inclusive and rigorous, it could make it impossible to satisfy water recreation demands short of massive pollution abatement expenditures. Perhaps a reflection of past inability to price recreation values, together with spiralling pollution abatement costs, past effort has focused on keeping suitability requirements for recreation narrowly focused (and relatively easy to satisfy). But in the past it was not necessary for water to be pleasing to users --

only safe and not detrimental to their health. The machinations of benefit-cost analysis for pollution abatement may broaden the water quality requirements for recreation.

Water Quality as a Predictor of Water Based Recreation Participation

The provision of recreation facilities or services has traditionally been regarded as a collective or free good where minimal user charges, if levied, are of little assistance in appraising their social value. It is generally recognized that user charges or an individual's willingness to pay do not measure the entire value of recreation facilities or services to society. Government investments in recreation, water research development, and water quality improvement are and must be carefully scrutinized within a benefit-cost formework to judge which potential government projects or decisions are worthwhile and which are not. Since these are markets in which prices (as we usually know them) are either lacking or are widely divergent from social values, government participation is indicated:

> "Benefit-cost analysis is closely analogous to the methods of investment project appraisal used by businessmen. The only difference is that estimates of social value are used in place of estimates of sales value when appropriate."[2]

In the literature, substantially greater emphasis has been placed on the benefit side of benefit-cost analyses perhaps reflecting the complexities encountered in implementing this aspect of the formula. Benefit analysis can best be described as:

> "...a projection of the physical output of the undertaking, either in each year of its life or in some typical year of operation...Next there would have to be estimates of the unit social value of each of these physical outputs...These two estimates induce at once an estimate of the gross social contribution of the enterprise in a single year."[3]

Prior to assigning any estimates of unit social value to recreation activity at a particular location, it must be possible to predict the present and future demand for outdoor recreation. While strength of prediction relies on our knowledge of the variables involved together with their influence on recreation behavior, a review of the

literature reveals a great deal of uncertainty in outdoor recreation demand prediction. Participant-oriented socio-economic variables have perhaps received the greatest research attention:

> "We know all too little about why different persons seek outdoor recreation, or what they hope to gain from it. And too often we have thought of recreation administration and management in terms of physical area, and not enough in terms of demand, and the user public. Just as modern marketing is turning to a study of what the consumer wants, expects, and is willing to pay for, so must modern recreation administration turn to a study of its consumers."[4]

Some of the participant-oriented variables studies include income, amount of leisure, education, occupation, age, race and place of residence. Studies conducted by the U. S. Outdoor Recreation Resources Review Commission (ORRRC) revealed which participant-oriented factors are most relevant in projected future participation in outdoor recreation as well as their approximate magnitude of influence on participation. Using multiple classification analysis, they found that income, education, occupation, length of paid vacation, race, age, life-cycle station, region and place of residence only explained:

> "about 28 percent of the variance in the activity scale for men and 29 percent for women. Probably a somewhat greater proportion of the variance in outdoor recreational activity would have been explained if a more refined measure of participation could have been devised. In any case, it is clear that factors other than socio economic characteristics are major determinants of outdoor recreation activity."[5]

Consequently, a number of investigators have studied the recreation participant in terms of his relationship with and use of the environment (Storey, 1964; Abramson, 1964; Cesario, 1966; Ellis, 1966; Johnston and Pankey, 1968; Munson, 1968; and Jones, 1968). Variables studied include availability or accessibility of recration resources in terms of distance, time and cost of travel, attractability in physical and attitudinal terms, transportation facilities, regional physiography and climate, existing opportunity, saturation, and competing opportunities.

The environmental variable of particular concern in this literature review is attractability. Cesario found

two attractiveness components, namely, the size of the recreation site in acres and the quantity of water available to be significant factors affecting use. Ellis developed a planning evaluation model based on knowledge of physical constraints and behavioral assumptions regarding the propensity to visit a particular recreation facility. His regional "RECSYS" model assumed that on-site participation is positively related to attractiveness of that facility. Johnston and Pankey view the attractability determinant in terms of: 1) natural site attributes, e.g., size of the reservoir in land and water acres and seasonal changes in water area and pool level; and 2) man-made facilities, e.g., capital investment in recreation facilities, number of camp sites and boat launching ramps. Attractability as operationalized by Cesario, Johnston and Pankey and Ellis does not include site quality as evaluated by participants or potential participants. Munson examined the opinions of providers and users about site quality for water recreation on eight small lakes in Arkansas but didn't correlate their evaluations with the extent and locus of their recreation behavior. There is a critical need to redefine attractability because it can be hypothesized that resource quality as perceived by potential users and participants is a determinant of site use or participation. This view is shared by Jones:

> "The 'commodity' recreation comes into being because someone chooses to do something which he expects will give him an enjoyable experience. These expectations are not always realized. But if we accept the principle of consumer sovereignty, the decision to recreate, (and to pay the price in terms of time, distance travelled, and other costs) -- this decision is based on his expectation of receiving an experience which will provide the recreator with a certain amount of pleasure or satisfaction. What amount we cannot say and it is not important to the argument."[6]

While environmental variables involved in recreation decisionmaking have been assumed, probed and studied empirically, conceptualization of variables involved, how they are measured, as well as their influence on recreation behavior are relatively unknown. This lack of basic understanding makes it difficult for economists to probe the social value of increased recreation potentials resulting from an improvement in water quality to determine the magnitude of added benefits. Without the relationship between perceived water quality and recreation behavior established, there is little ground upon which the economist

can stand beyond assumption.

It is usually assumed that recreation activities will benefit from improved water quality. In addition to not operationalizing "improved water quality" for recreation uses and users, studies have yet to be made on whether recreation benefits predicted in analysis were ever realized.

Dutta and Asch observe that it appears successive levels of improvement in water quality increase total recreation potentials:

> "...the quality level sufficient for boating may not render fishing possible. Swimming and water-skiing demand still higher water quality. Graphically, the situation can be described by a step function."[7]

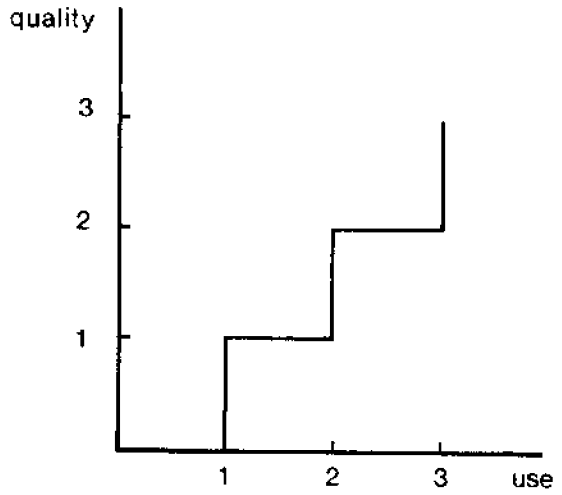

Figure III-1 Water Quality and Use as a Step Function

Economists involved in predicting demand functions for water quality based recreation[8] have traditionally based their analyses on water quality criteria prescribed by public health officials. While it is generally agreed that recreation utility will increase with incremental increases in water quality, it is doubtful that increased utility and benefits are correlated with implementation of public health oriented water quality criteria. There is little guarantee that areas meeting these requirements will be used for recreation and produce the benefits predicted in benefit-cost decisionmaking. Further, water quality requirements utilized by economists as water quality goals are non-specific and without social science foundation. For example, Davidson, Adams, and Seneca note that:

> "Two requirements are necessary for water recreational activities: 1) the quality of the water (oxygen content, purity, absence of odors, etc.) must be high enough to permit such activities as fishing, swimming and other water sports, and 2) various accessory commodities used in these activities must be readily available."[9]

Their first requirement again follows public health interests rather than necessarily being the relevant criteria by which individuals base their decisions to participate or not participate in water-based recreation. Water quality requirements for recreation need to be represcribed to include all water quality variables involved in human decisionmaking not just public health concerns. After all, if economic decisionmaking is to represent, project, and price increased recreational behavior (benefits) resulting from water quality improvement, it is necessary to define water quality and water quality improvement from the individual's frame of reference.

Aesthetics has long been a problem for economists and economic research because of its intangible and immeasurable nature:

> "Not only are there no observable revenues or prices, but this type of "output" is itself rarely "consumed" in any meaningful sense. Despite this difficulty, there is good reason to believe that a substantial portion of those benefits which might be imputed to aesthetic improvement are measured indirectly. Such measurement may be seen to occur once the effects of aesthetic improvement are defined."[10]

Thus while the economist implicitly includes the portion of value for which aesthetic beauty is responsible in the total dollar value for recreation, he is unable to relate increased recreation utility to proposed increases in the aesthetics of water quality. If aesthetic conditions are implicit in the recreation experience, we need to be able to isolate that portion of recreation benefit associated with aesthetics. In other words, the relationship between peoples' participation in water based recreation and their water quality perceptions needs to be probed and understood prior to meaningful economic analysis.

Water Quality Requirements and Perceptions of Users

As an extension of empirical demand analysis previously done where variables were identified and weighed, survey research has been undertaken to probe the water quality requirements and perceptions of recreation users (Barker, 1967; Bishop and Aukerman, 1970; Simpson and Kamitakahara, 1971). With both recreation participants and non-participants making daily decisions based on their environmental perceptions, it is imperative that representative samples, rather than only users, be studied (Willeke, 1968; David, 1971). All of the survey research studies cited generally investigate: 1) the water quality attitudes, perceptions and preferences of participants and/or users, and 2) the interaction of attitudes towards water quality and participation and/or use. Methodologically, all studies previously conducted provide some insight for studying water quality perception and water use interactions on Green Bay. The methodology for this study described in Chapter IV was based on a careful assessment of the strengths and weaknesses of past survey efforts. Since four of the five studies cited above relate to the Great Lakes or the Pacific Ocean, their findings are of particular interest.

Willeke conducted a nine-county survey in the San Francisco Bay area (representative cross section of 914 adults were interviewed) to determine what effect perceived pollution of San Francisco Bay had on its use for major recreation activities and on attitudes toward the Bay. In studying water quality as a deterrent to recreation participation, David was the only other investigator to study a representative sample. Willeke found that about 20 percent of the sample said they refrained from swimming in the Bay because of pollution. The comparable figure for waterskiing

was about 5 percent; for fishing, 2 percent; and for boating and sailing, about 2 percent. Unfortunately, the forms of pollution to which the respondents were reacting weren't probed. While Willeke focused on health apprehensions related to water recreation behavior, his study identified a need to investigate the effects on participation of dissatisfaction with specific water quality characteristics. He found that people who believe contact with water will be harmful to health are much more apt to say they didn't participate in water recreation activity because of the unappealing nature of the water.

Barker likewise developed and used an interview schedule rather than a questionnaire. She completed 440 interviews during summer weekends at 12 beach sites near the City of Toronto, Canada. Of the 440 interviews, 333 were conducted at Great Lakes beaches. In studying the general water quality evaluations made by respondents, Barker found considerable within and between site variations. While relying entirely on general descriptions such as "somewhat dirty" or "very dirty," Barker nevertheless found in a companion household study of beach users that 56 percent of beach users evaluated water quality on the basis of appearance while 15 percent thought odor was significant. Unfortuantely, the subcomponents of appearance and odor were not probed. The general water quality evaluations were related only to respondents' swimming behavior as this was the only water recreation activity studied.

David completed perhaps the most comprehensive study of its kind to date. Utilizing a representative sample of adults in the State of Wisconsin (N=574), she studied the effects of perceived pollution on recreation without any particular frame of reference as to waterbody. She was also fortunate to be able to conduct longitudinal studies to place water quality perceptions and problems in some better perspective (questions were posed each year over a three year period). In allowing respondents to define their concept of pollution, she found algae and green scum mentioned by 40 percent of the sample; murky dark water was mentioned by 35 percent of the people; smell and floating debris were mentioned by 20 percent; and sewage, weeds and suds or foam were each mentioned by 10 percent of the people. In addition to respondent definition of water pollution, water quality attributes were evaluated as a deterrent to swimming and as an indicator of pollution. As a deterrent to swimming, green scum and algae were cited most often (80 percent) followed by cans and glass on the bottom (70 percent). Similarly, 40 percent of the people reported

scum and algae as the prime indicator of water pollution while 25 percent indicated suds and foam, and 20 percent chose dark water.

In studying Opinions on Recreation and Pollution in Lake Ontario, Simpson and Kamitakahara used a sample derived from a list of names of those taking part in previous drift stick studies. In earlier studies researchers released drift sticks in Lake Ontario to draw conclusions about currents. The sample used was drawn from the list of individuals finding and returning the drift sticks to the Great Lakes Institute. Usable questionnaires were received from 420 respondents. Their brief questionnaire (7 questions) did not probe socio-economic predictor variables and dealt with water quality definition and its deterrent effects in open-ended fashion. After grouping open-ended responses into classifications, the investigators found that 47 percent of the sample mentioned algae, seaweed or moss as a pollutant. Of those who mentioned this particular complaint, 54 percent more specifically applied the term "algae," 33 percent "seaweed" and 13 percent "moss." Thirty-three percent of the sample defined pollution as dead fish found either on shore or in the water, while 28 percent indicated offensive smells as their prime complaint about Lake Ontario waters.

In summary, most of the studies conducted previously have focused on users rather than representative samples. Most relied on questionnaires rather than interview schedules. None probed physical water conditions characteristic of the Great Lakes, such as water temperature and waves. Also, none of the studies included any comparative analyses with actual monitored water quality. Whereas Willeke found almost 50 percent of his sample considered San Francisco Bay "polluted," it would be useful to know the monitored extent of water pollution there. This study of how a representative sample of household heads perceives physical, chemical and biological characteristics of Green Bay waters and how this perception interacts with use is geared to operationalizing the basic elements of attractability necessary to weigh water quality as a water recreation demand determinant.

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3. Ibid., p. 7.

4. Marion Clawson and Jack Knetsch, Economics of Outdoor Recreation (Baltimore: The Johns Hopkins Press, 1966), p. 45.

5. U. S. Outdoor Recreation Resources Review Commission, Participation in Outdoor Recreation: Factors Affecting Demand Among American Adults (Washington, D. C.: U. S. Government Printing Office, 1962), p. 27.

6. D. M. Jones, "Intensity of User Participation as a Basis for Differentiating the Recreation Project," An Economic Study of the Demand for Outdoor Recreation (San Francisco, California: Cooperative Regional Research Technical Committee, 1968), pp. 85-95.

7. Manoranjan Dutta and Peter Asch, The Measurement of Water Quality Benefits, A Report Prepared for the Delaware River Basin Commission (New Brunswick, New Jersey: Bureau of Economic Research, Rutgers-The State University, 1966), pp. 28-29.

8. A term used by Dutta and Asch to denote those outdoor recreation activities with water quality requirements.

9. P. Davidson, F. G. Adams, and J. Seneca, "The Social Value of Water Recreational Facilities Resulting from an Improvement in Water Quality: The Delaware Estuary" reprinted from Water Research, A. V. Kneese and S. C. Smith (eds.), (Baltimore: The Johns Hopkins Press, 1966), p. 175.

10. Dutta and Asch, pp. 30-31.

CHAPTER IV

THE PRESENT STUDY

Objectives

The objectives of this research project are considered under three headings:

Recreation Participation

1. To identify and report participation in swimming, boating, and fishing by heads of households within the five county study area in Northeastern Wisconsin (Door, Kewaunee, Brown, Oconto and Marinette Counties). To determine the location of participation in swimming, boating and fishing activity on Green Bay and elsewhere, and by sectors of Green Bay established by the Federal Water Pollution Control Administration (FWPCA).

2. To evaluate the significance of variables pertinent to participation/non-participation in water recreation activities as well as participation/non-participation on the Bay.

3. To determine and evaluate the deterrants to further participation in swimming, boating and fishing as reported by respondents.

Water Quality Perception

1. To report generalized water quality evaluations as well as particular water quality parameters of concern to respondents.

2. To establish relationships between recreation behavior patterns and water quality assessment wherever possible.

Local Participation, Perception, and Attitudinal Data

1. To provide data from the regional sample regarding the Bay, water quality, condition changes and probable responses to change, funds and fund sources for water quality improvement, and the like.

2. To report data for the major political jurisdictions in the region, to local and regional officials, planners and managers, as well as summaries for the total area.

Application

High priority was placed on generating data of practical use to officials, planners, public agents, and other decisionmakers within the five county region under study. This would include 1) the extent of recreation participation by the county population, 2) demographic and socio-economic characteristics that determine participation, 3) location of water-based recreation activity, 4) ownership and rental of recreation equipment and 5) attitudes expressed by respondents that pertain to future recreational use of the Bay.

Since the pertinent data was borken out on a county basis, it is relatively easy to present this data with limited interpretation to officials in the study area with the hope that it will be useful in decisionmaking pertinent to parks, recreation and water quality improvement. In addition, the data and results of this project will serve as the basis for establishing a meaningful dialogue with officials of the Wisconsin Department of Natural Resources, U. S. Army Corps of Engineers, U. S. Environmental Protection Agency, the Bay Lakes Regional Planning Commission, the Northeast Wisconsin Regional Planning Commission, the University of Wisconsin-Green Bay, and Sea Grant Research and Advisory Services staffs.

The Study Area

Five northeastern Wisconsin counties were included in the study area (Figure IV-1). The only criteria for selection was adjacency to the waters of Green Bay. Each of the five counties, then, is bordered in part by the Bay. Kewaunee County's shoreline on the Bay side of the peninsula is only a few miles in length while Door County has well over 100 miles of Bay shoreline.

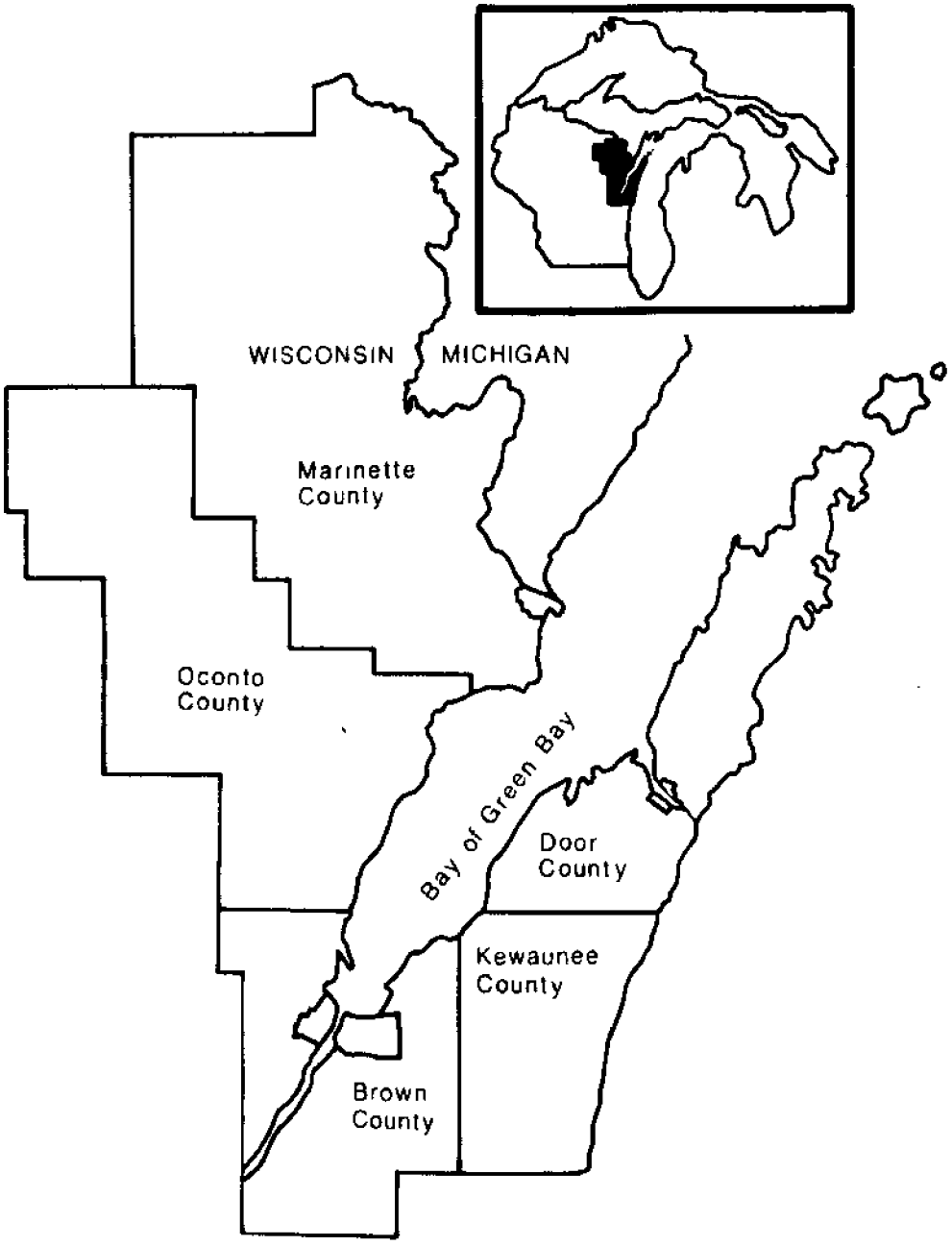


Figure IV-1 Five County Study Area

TABLE IV-1

POPULATION AND SAMPLE CHARACTERISTICS BY COUNTY

	Total 5 County Areas		Brown		Door		Kewaunee		Marinette		Oconto	
		% of Total		% of Total		% of Total		% of Total		% of Total		% of Total
Population	258,674	100	158,244	61.1	20,106	7.7	18,961	7.3	35,810	13.8	25,553	9.8
Population in Households	252,831	100	153,787	60.8	19,794	7.8	18,842	7.4	35,074	13.8	25,334	10.0
Number of households	74,626	100	43,560	58.3	6,536	8.7	5,493	7.3	11,252	15.0	7,785	10.4
Number of households sampled	2,054	100	1,041	50.6	192	9.3	129	6.2	462	22.4	230	11.1
Percent of households sampled	2.75		2.39		2.94		2.35		4.11		2.95	
Median age of household heads - population	49.1		46.5		55.1		51.6		53.5		53.7	
Median age of household heads - sample	48.5		44.5		51.3		49.3		54.7		51.7	
Percent of female heads - population	17.4	100	17.5	58.7	18.3	9.2	15.1	6.3	18.5	16.0	15.9	9.5
Percent of female heads - sample	17.9	100	17.2	48.6	21.9	11.4	24.8	8.6	18.0	22.5	13.9	8.6
Percent married - population	77.0		77.8		75.4		78.2		74.7		76.0	
Percent married - sample	84.7		88.2		81.2		85.2		74.8		91.3	

The population of the five-county area, according to 1970 census data, was 258,674. Just over sixty percent of that total, or 158,244, reside in Brown County, mostly in the Green Bay metropolitan area. This is one of the most rapidly growing (in population) areas of the country. In the remainder of the five-county area, population changes are less marked, with Kewaunee County growing modestly during the past two decades, while Door and Oconto lost a small percent of their population and Marinette remained virtually unchanged.

Not included in these population figures are seasonal residents or tourists whose length of stay in the area may vary from a few days to several weeks. During peak summer periods, the population in some areas of Door and Marinette Counties may be doubled, while Kewaunee and Oconto Counties experience considerable seasonal influx as well.

Oconto and Marinette are among the largest counties in the state with land areas of 1,106 and 1,378 square miles respectively. With their irregular shapes and long northeast to southwest axes, some county residents live a considerable distance from the Bay. For many, then, the Bay may be remote from their experience, and their water-based recreation may be oriented more toward smaller inland lakes and streams. Oconto, and especially Marinette, are blessed with such water-based recreation resources. On the other side of the Bay, in Door and Kewaunee Counties, both having extensive shorelines on the Lake Michigan side of the Peninsula, some of the water-based recreation is oriented to the Lake side. In Door County, the decision to boat or fish on the Bay side as opposed to the Lake side may depend more on wind direction and velocity than any other determinant.

Table IV-1, page 53 includes population figures and figures on selected characteristics of the population of the five-county area included in the study. The table also includes comparisons of population census with data from the sample.

The Sample

During the summer of 1970, a virtually complete listing of households in the five-county area was compiled. This is a most difficult task since the required information is scattered among hundreds of local government offices including clerks, assessors and others. Conventional sources such as plat books and directories are usually dated and in other

ways inaccurate. Yet through the cooperation of scores of individuals and agencies, both public and private, a virtually complete enumeration of households was developed.

According to the 1970 census, there were 74,626 households in the five-county area. In developing the list of households in the study area for sampling purposes a total of 82,679 households were identified. Most of this difference can be attributed to the fact that the compilation used for this study included seasonal residences. Approximately 4.8 percent of our sample was of households occupied on a weekend or seasonal basis and not occupied permanently. This would suggest a total of approximately 4,000 such residences in the five-county area. However, the seasonal population, for obvious reasons, is underrepresented in the sample, and it would appear reasonable to assume a figure double that suggested by the sample fraction. This would account for the difference. Certainly, there are a number of other factors which would result in an enumeration different from that of the 1970 census. These, however, would account for only minor, and possibly off-setting variances. The inclusion of seasonal residences for sampling purposes undoubtedly accounts for most of the differences. In any event, it is clear that the enumeration of households from which the sample was drawn was as complete and accurate as any such enumeration could be.

All of these households were then divided into clusters of fifteen each, based on geographic proximity. The purpose of clustering households in this manner is, of course, to reduce the time and travel required in collecting the data. This resulted in about 5,500 clusters of about fifteen households each. These clusters were numbered, and a sample of clusters was drawn using a table of random numbers. A total of 200 clusters, or 3,000 households were drawn. In essence, then, the sample used was a random sample of clusters. The sample fraction was 3.63 percent based on the enumeration used in this study. More importantly however, the actual sample number was more than adequate to satisfy the analytical and other uses of the data for which the study was designed.

The Instrument

The data collecting instrument was developed over about a one year period. The original plan was to develop a questionnaire to be completed by the respondent and mailed back to

the investigators. The questionnaire was to have been distributed by field workers calling personally at each household selected in the sample. The worker was to have introduced the study, explained its importance, emphasized the ease of completing and returning the instrument, and so on. This field work method has been employed elsewhere, with a response rate of near fifty percent.

With a number of general content areas of inquiry in mind, several studies and instruments of a related nature were examined and various question and instruments appraised. Then the questions were formulated and sequenced through several drafts. In late spring of 1970, drafts of the questionnaire were reproduced and tested on a group of students which was followed by a question by question evaluation of each question. A second instrument was then prepared and reproduced. In the summer of 1970 this was tested on a sample of household heads in the Oconto Falls area and the city of Green Bay. Ninety households in clusters other than those drawn in the sample were contacted and asked to complete and mail back the questionnaire. Forty-nine completed instruments were returned. Two weeks after receiving each instrument, each of the forty-nine respondents was asked to complete the same instrument and to return it via mail, thus replication with the same sample. Twenty-seven were returned. There was then, an attrition rate slightly less than fifty percent with each of the two test surveys.

The twenty-seven replicated responses were then compared to establish consistancy of response. Since much of the data is nominal, the percent of identical answers between the first and second response was calculated. At the same time, each questionnaire returned was studied to identify any remaining questions or phrases causing difficulty. As a result, some questions were eliminated, including one on household income, and others were modified. Table B-1, page 203 lists the percent of identical responses for those items that were incorporated in the final instrument unchanged.

In evaluating the time and travel costs incurred contacting households as part of the response replication procedure, and in estimating the return rate from a proposed sample of 4,000, it was decided that interviews could be conducted for about the same expenditure if the sample were reduced to 3,000. At the same time, it was estimated that the response rate would appreciate considerably, yeilding a greater number of returns than with the questionnaire

administered to a larger sample. In addition, of course, the completeness and consistency of the returns would also be greater than by a mail-back questionnaire.

Changes in the instrument were however, minor. Most of the revisions entailed eliminating the instructions, or changing them to address the interviewer rather than the respondent. The result was an interview schedule which was nearly self-administering. The closed-ended question format was retained permitting pre-coding to computer punch cards. It also reduced to a minimum the amount of probing and interpretation required by the interviewers, most of whom had no prior interviewing experience.

Field Work

The interviewers were students at the University. The economic situation during the summer, with a shortage of seasonal employment, gave the investigators a large pool from which to draw. As a result, the field staff were mature and experienced in working with people. In addition the students lived in or near the clusters assigned them, and were familiar with their areas and with the characteristics of the people residing therein.

About six hours were spent in preparing the interviewers. In addition to thoroughly reviewing the interview schedule and procedures to be followed, each interviewer conducted at least four practice interviews, each followed by a discussion of any questions that had arisen. Questions where some interpretation was required, such as type of occupation, were reviewed at great length to establish reliability between interviewers.

The interviews were conducted furing the six-week period between August 1 and September 15, 1971. This time period was selected for several reasons. Since water-based activities concentrate in the summer months, interest and recall ability would be high. It was also possible, with this time period, to reach some seasonal residents of the area and also to reach those permanent residents who may have vacationed elsewhere. In addition, it was felt that this span of time would be sufficient to complete the interviews assigned. Each interviewer was assigned 150 households in ten clusters. In a few cases, all the interviews were not completed in the time available.

At each household, the interviewer queried the household head. In most cases, but not all, this was a male. In instances where the household head was not available, two call backs were made. After the third call, substitutions were made. Substitutions were also made for vacant or non-existing addresses. The address in closest proximity to the cluster was chosen for this purpose. No substitutions were made in instances where the household head refused to be interviewed.

Completed instruments were returned to the investigators within one or two days. These were reviewed carefully and where any questions or difficulties were noted, they were resolved at once. Nearly all of the returns that were unusable were received in the first few weeks. Generally this was due to missing data.

The summary of returns was as follows:

Completed and usable returns	2,174
Households not contacted	542
Refusals	188
Completed but not usable	96
Total initial sample	3,000

Excluding households not contacted, there were 2,458 households surveyed. On this basis, the summary of returns expressed as percents was:

Completed and usable returns	88.4%
Completed but not usable	3.9%
Refusals	7.6%

Analysis

Three major categories of analyzing and reducing the data were employed, with major emphasis on the first two. The initial stage was to provide a descriptive summary of the responses to each question. In doing this, tabulations were done by place of residence in order to provide information for local jurisdictions as well as the total five-county area. Summary tables, then, have been divided

into seven places of residence; the five counties, with the Green Bay metropolitan area tabulated separate from the remainder of Brown County, and a seventh category comprised of seasonal residents. These summary tables are presented in the Appendix.

The second analysis process consisted of calculating cross tabulations and Chi square tests of significance to explore relationships between variables where differences were hypothesized. In addition to comparing single items a reduced number of variables were selected for comparing sub-groups of the population identified by manipulation of the original variables. Thus, for example, Chi square statistics were used to compare participants with non-participants, those who use Green Bay for water-based recreation with those whose activity took place on some other water body, comparisons by primary activity, by primary location of the activity, and so on.

Throughout this analysis, attention was focused on three major water-based recreation activities: fishing, motor boating, and swimming. Data was collected on five other water-based activities to provide summary descriptions of participation in all water-based and water-related activity but these were not used in preparing cross-tabs or calculating Chi square statistics.

The third analysis scheme will consist of multivariate analysis of a sub-set of variables to identify population sub-groups. A cluster analysis is currently underway, having been delayed by the need to acquire a program from a British university and adapt it to the hardware available.

CHAPTER V

THE FINDINGS DESCRIBED

Characteristics of Respondents

The most striking characteristic about heads of households is that their median age is almost double that of the total population. Respondents in this study, with a median age of 48.5 years, were slightly younger than the median age 49.1 of all household heads in the five-county area. Sixty percent of those sampled were over 45 years of age, and about 21 percent were 65 or more. The heads of households in Brown County, with its metropolitan Green Bay area, are a few years younger than those in other counties. This reflects the typical rural to urban migration pattern and imbalance in age distribution. Household heads in Door County, on the average, are nine years older than those in Brown County, while those in Marinette and Oconto are about seven years senior.

This rural to urban migration pattern is also reflected in data on length of residence in the area. Thirty-three percent of the heads of households in the Green Bay metropolitan area have lived in the area more than 35 years. Comparable figures for the remainder of Brown County, and for Door, Kewaunee, and Oconto Counties are 51, 57, 60, and 57 percent respectively. The percent residing in the area 35 years or more from Marinette is 44, perhaps reflecting the influence of the City of Marinette.

Among the household heads reporting, fifteen percent, including six percent who were never married, had no children. Twelve percent of the household heads had one child, 43 percent had two or three children, 19 percent had four or five children, and 11 percent had six or more children. The relatively high proportion of large families would be

expected in a region characterized by family farms and by conservatism regarding matters of birth control and family planning. Family size is often used as a variable to explain differing kinds and amounts of recreation activity participation. Fishing, boating, and swimming, however, are among the most popular family activities.

Consistent with the large proportion of households in the older age groups, in nearly 30 percent of the families, all the children were over 21 years old. About 45 percent of the families have children under 15 years of age, of which 21 percent have pre-school children under five years old.

Most of the respondents in this survey were male, since at each residence, only the head of the household was interviewed. The percent of females responding was 17.9, which compares with 1970 census data indicating 17.4 percent female household heads in the five-county area.

Respondents were not asked to report household income, though this data is often used in explaining or predicting recreation choices and activity patterns. Questions about two variables highly correlated with income, namely occupation and formal education, were included.

About 11 percent of the household heads responding had graduated from college. Among seasonal residents, the percent of college graduates was 22 percent, or double that of permanent residents. Geographic breakdowns again reflect rural-urban differences, including age imbalances. Sixteen percent of the household heads from the Green Bay metropolitan area were college graduates, compared to five percent from Door and Kewaunee Counties and seven and eight percent from Oconto and Marinette Counties respectively. Green Bay household heads were also least likely to have concluded their formal education with grade school, with four percent in this category. In Marinette and Oconto Counties, 12 percent did not attend school beyond grade six, while among Door and Kewaunee residents, the figure was eight percent. For the total sample, 35.7 percent completed high school, 15.2 percent attended but did not complete four years of college (including some who completed two-year programs), and 11.4 percent had received baccalaurate degrees.

Among all household heads responding, 69 percent were employed full-time. Retirees made up 18.3 percent of the

sample. The smallest percent employed full-time and largest percent retired resided in Door and Marinette Counties, with non-resident seasonal visitors also including 22 percent retirees. Since Door and Marinette Counties experience the greatest influx of visitors, these figures together suggest a cause-effect relationship. That is; people may tend to retire to those areas which they visit during vacation periods. Second homes, it appears may become the permanent home upon retirement.

Four and one-half percent of the respondents were not presently employed full-time, with the highest percentage among Door County residents and lowest among Oconto County residents at eight and two percent respectively. One percent of the sample was students, while slightly more than seven percent were housewives.

Among full-time workers, 62 percent were employed in private enterprises and an additional 23 percent were self-employed. Fourteen percent were employed in the public sector by government at all levels and the remaining two percent were employed in various non-profit agencies.

Occupation type of the full-time employees, grouped by census categories, is summarized below.

Professional, technical and kindred	14%
Managers, officials, proprietors	16%
Clerical	3%
Sales	7%
Craftsmen, foremen	9%
Skilled, semi-skilled	26%
Service workers, laborers	15%
Farmers	9%

The small percentage in clerical and sales categories is due, in part, to the small percentage of women in the sample, half of whom were housewives and an additional number retired.

Marked differences, according to place of residence, appear in two categories. The percentages in the first two categories of occupation type were highest among Green Bay and Brown County residents and among seasonal residents. The proportions engaged in farming were highest in Kewaunee and Oconto Counties and lowest in Marinette County and, of course, the metropolitan area of Green Bay.

Of the 2,054 interviewees whose permanent residence was in the five-county area, nearly 85 percent reported that they were married. This is somewhat higher than the proportion of the region's population married according to the 1970 census data. The census figure was 77 percent. The difference might be explained in two ways. Firstly, the likelihood of contacting a person in a single-person household is somewhat less than when there are two or more household residents. Secondly, the interview schedule question did not include such categories as widowed or divorced and perhaps some respondents who once were married reported married as their present status.

Of the total 2,174 respondents, 400, or 18.4 percent owned a camp or cottage. This figure is somewhat misleading in that 94 percent of those whose permanent residence was outside the five-county area owned a camp or cottage while 14 percent of the residents of the five-county area owned a camp or cottage. The greatest percentage of ownership among permanent residents was 25 percent among Green Bay residents while Door and Kewaunee residents included only nine and four percent camp or cottage owners respectively. Over 80 percent of the camps or cottages owned were located in Marinette, Oconto and Door Counties. Two percent of the respondents owned a camp or cottage outside of the five-county area.

Fifty-two percent of the respondents owned one car, and 32 percent owned two. Seven percent owned three cars or more, while about eight percent did not own a car. Two or more car households were most prevalent in Oconto and Brown Counties at 43 and 44 percent respectively, and least prevalent in Door County with 29 percent.

The following list summarizes ownership of other recreational equipment used in water-related activity. More precise ownership data, including breakdowns by seven places of residence and the exact number of items owned, is presented in the Appendix, Table A-3.

Boat(s)	27.8%	of the households owned one or more
Fishing tackle (sets)	71.5%	
Water skiis (pair/s/)	9.9%	
Camping trailer or unit(s)	8.7%	

In addition to questions relating to ownership of recreational equipment, respondents were asked whether or not they had rented recreational facilities or equipment during the past year. Seven percent reported having rented a camp or cottage, two-thirds of which were located outside the five-county area. Approximately seven percent had rented a boat during the preceeding twelve months and about four percent had hired a charter boat for fishing. One and one-half percent had rented a camping trailer or unit.

Participation in Recreational Activities

Fishing

By far the most popular water-based recreation activity in the five-county area surrounding Green Bay is fishing. Fifty-three percent of the household heads interviewed reported having fished one or more times during the preceding twelve month period. Since participation frequencies were grouped in categories for analytic purposes, an exact mean could not be calculated. A mean of 16.5 fishing occasions per fisherman during the past twelve months is a close approximation.* For the total sample, this would be an average of about 8.8 fishing occasions for the year.

The greatest proportion of fishermen among the seven residence groups was, as would be expected, in the seasonal resident population. Seventy-eight percent of seasonal resident household heads fished one or more times during the

*Based on multiplying the number of participants times the mid point of the frequency category, and assigning 60 as the mid point of the "over 50" category.

past twelve months. Further, as Table A-6, page 168 , indicates, they fished more frequently than those from other resident groups. By comparison, Door and Kewaunee County household heads were less likely to have fished the previous year, and fished less frequently, than residents of Green Bay or Brown, Oconto, and Marinette Counties. Forty percent of Door and 42 percent of Kewaunee County respondents had fished at least once during the twelve month period. Among permanent residents, those from Oconto and Marinette were more likely to have fished, and fished more frequently, than respondents from other areas. A partial explanation for this can be attributed to the wealth of lakes, rivers and streams in these two counties.

The abundance of lakes, streams, and rivers in Oconto and Marinette Counties, and the popularity of fishing among their residents, help explain the finding that "inland" lakes (in this region the term "inland" commonly refers to lakes other than Lake Michigan) and streams and rivers were nearly twice as popular as the Bay or other parts of Lake Michigan. Of the total sample, 32.6 percent of the respondents reported having fished on inland lakes during the previous twelve month period, while 27 percent fished streams and rivers. By comparison, approximately 17 percent fished on Green Bay and 14 percent fished on Lake Michigan. (In this region, people distinguish between the Bay of Green Bay and Lake Michigan as if they were separate water bodies.) A large portion of fishermen fish at more than one site, so the four location categories employed here are not mutually exclusive. However, the analysis included identifying the location used most often; hereafter referred to as "primary" location.

Of the four location categories, inland lakes again ranked as the most popular "primary" location; twice as popular, in fact, as any of the other locations. About 22 percent of those who fished during the previous twelve months fished on Green Bay more frequently than other water bodies. An almost identical number of fishermen fished streams and rivers more often than the Bay. Lake Michigan or smaller (inland) lakes. About 12.5 percent fished Lake Michigan more frequently than other locations.

With the exception of Door County, the majority of whose fishermen fished on the Bay, and Kewaunee County, whose fishermen were most apt to fish Lake Michigan, inland lakes were the primary fishing location of residents of every area.

Among those who fished Green Bay at least once during the past twelve month period, the areas of the Bay used most frequently were areas three and four (see Figure V-1, p. 78), accomodating about 31 and 26 percent of the users respectively. Areas one and two were each used most frequently by between 18 and 19 percent of all those who fished on Green Bay, while the northern-most area received only about five percent of the total recreational (sport) fishing on the Bay.

Swimming

Swimming ranked as the second most popular water-based recreation activity among the heads of households surveyed. Of the 2,174 respondents, 966, or 44 percent reported at least one swimming occasion during the previous twelve month period. As noted earlier, frequency of participation responses were grouped, and a mean frequency must be approximated. The mean number of swimming occasions during the preceeding twelve months is estimated to be 17 - 18 occasions per swimmer. For the total sample, including non-swimmers as well as swimmers, the mean number of swimming occasions per year was slightly less than eight.

Once again, the seasonal resident group included the highest proportion of swimmers. Sixty-seven percent of the 120 seasonal residents swam one or more times during the twelve months preceding the interview. They also swam more frequently than those in the other place of residence groups. Residents from Green Bay and its suburban area, and those from Brown County included the second and third highest proportion of swimmers at 53 and 50 percent respectively. Here too, the frequency of participation among participants from these areas was second only to that of the seasonal residents. The lowest percent of participants and rates of participation were from Kewaunee and Door Counties. Only 19 percent of Kewaunee residents swam during the previous twelve months while among Door residents the percent was 26. Age, education, and occupation characteristics are related to swimming participation in a way consistent with these results. For example, Green Bay area and Brown County residents are, by comparison, younger than residents of other areas and among the better educated. Seasonal residents, while being older than residents from other areas in the region, included the highest proportion employed in professional and managerial occupational categories.

Of the 966 household heads reporting one or more swimming occasions during the previous twelve months, 709, or 73 percent, did no swimming at all in Green Bay. Thus only 27 percent of those who swam at least once during the year, swam in Green Bay. Of the entire sample, only 12 percent swam in the Bay during the previous twelve month period.

The most popular type of swimming area, by a wide margin, was inland lakes. Twenty-seven percent of all respondents reported swimming at an inland lake location. Second in order of location of swimming activity was swimming pools. Just over 17 percent of all respondents swam at a pool during the twelve months prior to the interview. Lake Michigan was used least frequently of the five location categories, with 4.5 percent of the respondents swimming in Lake Michigan.

Residents of Door County, along with seasonal visitors, were more likely to swim in the Bay than were other resident groups. Among Green Bay and Brown County residents, inland lakes and pools were more likely used than was the Bay, and in Marinette and Oconto, inland lakes and streams are rivers were most popular.

Of the 966 swimmers, 464, or 48 percent, reported swimming at inland lakes more frequently than at the other locations. Twenty-three percent swam at pools more often than other places. The Bay was used more frequently than other locations by 17 percent of the swimmers, or eight percent of the total sample.

Among those who swam one or more times on the Bay, areas three and four (Figure 1, page 78) were used more often than other locations. The two southern most areas received 17 and 18 percent of the Bay use respectively, while area five at the north end received eight percent of the use.

Boating

Boating (only motor boating is included in this category) participants numbered 738 or 34 percent of the 2,174 respondents, making it third in popularity behind fishing and swimming. Approximating the mean number of boating occasions from grouped frequencies indicates between 10 and 11 boating occasions per boater per year. The mean for the total sample, then, would be about 3.5 occasions per year.

As with fishing and swimming, the highest proportion of boaters was found among seasonal residents. Fifty-six percent of the seasonal resident household heads reported one or more boating occasions. By comparison, the lowest proportion of boaters was found among Kewaunee residents where only 15 percent of the respondents reported any boating during the previous twelve month period. The proportion of boaters among Oconto, Brown County, and metropolitan Green Bay area residents was 40, 39, and 36 percent respectively. Only 24 percent of the respondents from Door County reported any boating while the percent of boaters among Marinette residents was 28.

Frequency of participation was also highest among the seasonal residents and those from Brown County and the Green Bay metropolitan area. Residents of these areas were, then, more likely to go boating and to go boating more frequently than were residents from the other areas included in the study. Water-based recreation activity seems to be cumulative in this manner, and also cumulative in that those who participate in one activity tend to participate in other activities. To illustrate: 1,502 household heads participated in at least one of the three activities (fishing, swimming, or boating). Totaling the number of participants in each of the three activities yields a sum of 2,856, which means a 90 percent overlap between user groups.

As was the case with fishing and swimming, inland lakes were the water bodies most frequently used by boaters, but the Bay was almost equally popular. Of the total sample, about 17.5 percent boated on an inland lake during the previous twelve months and slightly more than 16 percent boated on the Bay of Green Bay. Only about eight percent of the population boated on a stream or river at least once, and only 4.5 percent had been boating on Lake Michigan.

Among boaters, inland lakes and the Bay of Green Bay were mentioned almost an equal number of times as being the "primary" boating location, with 41 percent of the boaters citing inland lakes and 40 percent citing the Bay. Only about five percent reported Lake Michigan as the primary location, the other fourteen percent doing more boating on streams and rivers than at other sites. Seasonal residents and those from Door County were more likely to boat on the Bay than those from other areas. Those from city and suburban Green Bay, and from Brown and Marinette Counties more likely boated on inland lakes than residents of other areas but also did much boating on the Bay.

TABLE V-1

PARTICIPANTS, PARTICIPANTS USING GREEN BAY, AND PARTICIPANTS USING THE BAY PRIMARILY: FISHING, BOATING, SWIMMING

	Fishing			Boating			Swimming		
	Number	% of all Respon-dents	% of Fisher-men	Number	% of all Respon-dents	% of Boaters	Number	% of all Respon-dents	% of Swim-mers
Total Sample	2174	100		2174	100		2174	100	
Did not participate -- past 12 months	1022	47		1436	66		1208	56	
Did participate (1 or more times)	1152	53	100	738	34	100	966	44	100
Did not participate on Bay	779	36	68	390	18	53	709	33	73
Did participate on Bay	373	17	32	348	16	47	257	12	27
Did not use Bay as primary location	898	41	78	437	20	59	800	37	83
Did use Bay as primary location	254	12	22	301	14	41	166	8	17

Among those boating on the Bay, only four percent reported using the northern most area (Area 5 on Fig. V-1) while the remaining 96 percent of use was spread rather evenly over the other four areas. The percent use distribution, starting from the south end of the Bay, was 23, 24, 27, and 21 percent respectively.

Primary locations where the fishing, swimming, and boating activity took place are summarized in Table V-1.

A total of 1,502 household heads participated in at least one of these three major activities during the previous twelve month period. Thus 672 household heads, or 31 percent of the total were non-participants. A total of 842 household heads, or 39 percent of the total reported fishing more frequently than swimming or boating. Fishing, then, could be regarded as the major activity, while ten percent did more boating than any other activity. Table VII-1, page 122, summarizes, for each activity, the percent of participants and the percents for whom the activity is the major activity. It indicates clearly the relationship and relative importance of these three water-based recreation activities.

While not included in the analysis in the following sections, participation data for five other activities based on or related to water was gathered in the survey. The following Table summarizes the percent who participated in each of the activities, and the percent who participated at least once on or near the Bay of Green Bay.

TABLE V-2

PARTICIPANTS AND PARTICIPANTS USING AREAS ON OR NEAR GREEN BAY: SELECTED ACTIVITIES

Activity	Percent Who Participate	Percent Who Participate On Or Near Bay
Picnicing or just relaxing	73%	32%
Camping	17%	3%
Duck Hunting	12%	6%
Water Skiing	10%	3%
Sailing	5%	3%

Participation Deterrents

In reference to participation in each of the three major activities (i.e., fishing, boating and swimming) respondents were asked a series of questions as follows: those who did not participate were asked to state the major reason why they did not; all respondents were asked if they would like to participate more frequently; those indicating a desire to do more were asked the reason for not doing so.

In virtually every study where questions of this nature are posed, the major reason for not participating or for not participating as much as desired is some variation of lack of time. In many cases, the validity of such a response is unquestioned. However, for a very large proportion of those who report time restraints, the problem is not the lack of discretionary time but the relative priority given various time use alternatives.

It is also recognized that among deterring factors, the lack of time is one of those deterrents from which public resource policy and management is somewhat remote. It should be noted, however, that further declines in time spent at work will continue to increase participation rates. Too, the manner of distributing additional discretionary time is of equal consequence. Fifty-two, three-day weekends may be one virtue of a four day work week. It may, on the other hand, be one of the vices. In either case, responses of the "not enough time" variety were not recorded. Instead, respondents were probed to ascertain another major deterrent identified by the respondent.

Fishing

Among those who did not fish during the twelve months preceding the study, the majority reported that they were just not interested in fishing. About 60 percent of the non-fishermen reported lack of interest as the reason for not participating. Advanced age or ill health was found to be the next most frequently mentioned deterrent, accounting for about 13 percent of those who had not fished during the previous twelve month period. Not owning a boat, not catching any fish, and having to travel too far as deterring factors were each mentioned by about six percent of the non-fishing group. Cost, poor water quality, and crowded conditions were the least significant deterrents.

Nearly 1,300 household heads, or 60 percent of the respondents, indicated a desire to do more fishing than they did the previous year. About one-third of the non-fishermen indicated a desire to do more. In contrast, nearly 80 percent of those who had done some fishing indicated a desire to do more. Even among those who reported fishing 50 or more times during the previous twelve months, over 70 percent indicated they would like to do even more fishing!

When this group of respondents was asked why they did not do as much fishing as they desired, the deterrents mentioned most frequently differed substantially from the non-participant group. The two most important reasons for not doing more fishing were "too far to travel" and "never catch anything," followed by "don't own a boat." The least frequently mentioned deterrents were, as before, poor water quality and crowded conditions. Some 174 respondents, or about 12 percent of those desirous of doing more fishing, indicated that lack of interest on the part of other family members is what kept them from participating more.

It should be noted that though only one response was recorded, the deterring forces are not mutually exclusive. This applies regardless of the activity being referred to, whether fishing, boating or swimming. Thus, it is possible that a person reporting travel distance as being too far is responding to the fact that sites closer by are too crowded, that he regards the water quality as inadequate or that he never catches any fish at nearby places. Interviewees were asked open-ended questions about deterring forces. No suggestions or alternatives were presented to them, nor were their responses probed. So it is possible that these questions interact in such a way that exact numbers may be more realistically regarded as close approximations in cases where a cause-effect relationship among alternatives might exist.

Boating

Among those who had done no boating last year, about half reported no interest in the acitivity. As would be expected, not owning a boat was also a major deterrent, and it must be assumed that a boat is just too expensive for many of these respondents. An additional four and one-half percent of the non-boaters said very directly that they couldn't afford the activity, so cost was apparently the major deterrent for about one-third of the non-boaters interviewed.

Only about three percent of the non-boaters mentioned travel distance as the major deterrent and less than two percent reported being deterred by poor water quality.

Of the total 2,174 respondents, 1,063 (or about 49 percent) expressed a desire to do more boating than they had done during the previous twelve month period. Sixty-four percent of those who had done no boating during the previous year also had no desire to do so, while 36 percent did wish to do some boating. Among those who had done some boating, 74 percent would like to have done more. Even among those who reported 50 or more occasions boating, half desired to have done even more.

For the 1,063 people who would like to boat more frequently than they did, not owning a boat and/or the expense involved was the major obstacle. About 65 percent of the group boated less frequently than desired for this reason. Travel distance was the main deterrent of about 14 percent and lack of interest among other family members deterred 13 percent. About eight percent participated less frequently than desired due to poor water quality and just under four percent were deterred by crowded conditions.

Swimming

Of the respondents who did not swim during the twelve months preceding the study, about 40 percent expressed no interest in swimming. Approximately 28 percent reported that the major reason they did not swim was because of poor health or advanced age. About 19 percent of the non-swimming group said that not knowing how to swim was the main reason for not participating.

That the water was "too dirty" was mentioned as the main obstacle to participation by about seven percent of the group, while about five percent cited travel distance as the main reason. Only about one percent of the non-swimmers indicated crowded conditions as the major deterrent for them.

Forty-three percent, or 946 of the 2,174 respondents, reported they would like to have done more swimming than they did during the preceding twelve month period. Twenty-six percent of the 1,208 non-swimmers expressed a desire to swim, while among those who swam one or more times during the past one year period, just under two-thirds said they would like to have done more swimming.

As was the case with fishing, the important deterrents mentioned by those desiring to participate more differed markedly from those who did not participate at all. Having to travel too far was mentioned by 270 respondents (28 percent) as the reason for not swimming as much as desired. About 16 percent of the swimmers said the water was "too cold" and another 15 percent reported not swimming more because the water was "too dirty." Four other deterring factors were mentioned by between nine and 12 percent of those who desired to have done more swimming than they did. Problems of age or ill health, inability to swim, lack of interest among other family members, and "overcrowding" were each mentioned by 90 or more respondents.

Those who had participated in fishing, boating, or swimming were asked one other question related to their participation. They were asked why they preferred the place they participated most frequently rather than some other place. Among fishermen, the two most important reasons why they fished where they fished were that the area was close by and that they cought more fish there. That the water was "cleaner" than at other locations was also mentioned frequently, being cited by about 14 percent of those having fished in recent years.

Boaters responded to this question in somewhat the same way as fishermen. About 45 percent of the boaters reported proximity as the major reason for preferring the spot where they do most of their boating. About 20 percent reported "cleaner" water as the major attraction for them, while about eleven percent each reported that the area was "prettier" or the people "friendlier." Comparatively few boaters were attracted to the area they boat most frequently by the launch, harbor, or marina facilities or because the area was not too crowded. Response to these variables was lower than one might expect. Perhaps what is reflected by this is not the overall adequacy or inadequacy of these facilities but the lack of alternatives for the boater or the lack of variety among facilities available. Among fishermen, launch facilities was also the least important of the six "attractiveness" variables.

Among swimmers, the order of response magnitudes changes somewhat and "cleaner" water was the most important reason for preferring one area to another. That the area was close by was also mentioned by a large percent of swimmers, and these two reasons, together, were cited by about 80 percent of the respondents. About six percent of the respondents mentioned "not too crowded" and another six percent thought the facilities were better there than elsewhere.

Locations Used Most Frequently

Participants in each of the three activities were asked how frequently they participated at each of four water resource locations; Green Bay, elsewhere on Lake Michigan, inland lakes, streams or rivers. For swimmers, swimming pools was a fifth resource type. From this it was possible to determine the water resource type used most frequently. Twice as many fishermen and swimmers participated most frequently at inland lakes than at any other resource. For boaters, Green Bay and inland lakes ranked equally. A summary of locations used most frequently by each of the activity groups is provided in Table VII-3 on page 124.

That more people use inland lake water recreation resources than other water resources does not necessarily imply that these areas are preferred over others. It is necessary to know why people participate, where they participate. This is summarized in the following table, Table V-3.

There being three dimensions, there are three perspectives from which to approach the Table. The relative importance of each of the reasons cited is one. For example, the vast majority of boaters and swimmers cited either proximity ("is close by") or water quality ("the water is cleaner there"). For fishermen, the major reasons for fishing an area more frequently than other areas were proximity and success ("I catch more fish there") and to a lesser extent water quality, though this is no doubt related to success. Good facilities for the activity and visual qualities ("it's prettier than other places") were infrequently mentioned. Again, however, it should be noted that these findings do not mean that facilities or beauty are not important. More likely, it means that there are a number of areas available where facilities are equally good or bad, areas equally beautiful or ugly. Given that, a respondent would more likely choose reasons where distinctions between areas are more readily identifiable. The difference between an area near by and one far away is clear.

A second approach is to compare responses between those using one area to those using another. This is more straight forward, and it is abundantly clear that the major reason Green Bay is a primary location for activity is proximity. In comparison, for those using inland lakes primarily, proximity appears to be much less important a reason. The attractions of inland lakes seem to be sufficient to overcome longer distances, if one considers that most of the population lives close to the Bay; closer, no doubt, than

TABLE V-3

REASONS FOR SELECTING AREAS USED MOST FREQUENTLY:
FISHING, BOATING, SWIMMING

	Close by %	Cleaner Water %	Not too Crowded %	Pretty Spot %	Good Facil-ities %	Catch More %	Friendly People %	Water Warmer %
Most Fishing								
Green Bay	52.4	8.3	3.5	2.8	2.4	29.5	-	-
Lake Michigan	26.0	15.1	3.4	2.7	2.1	50.7	-	-
Inland Lakes	28.6	20.9	8.9	7.1	3.2	31.0	-	-
Streams & Rivers	35.6	10.0	12.0	6.0	.4	35.6	-	-
Most Boating								
Green Bay	61.8	7.9	4.3	8.9	7.9	-	8.2	-
Lake Michigan	28.6	28.6	11.4	2.9	17.1	-	8.6	-
Inland Lakes	23.9	34.0	10.4	12.6	4.9	-	12.6	-
Streams & Rivers	59.4	14.9	5.0	10.9	7.9	-	1.0	-
Most Swimming								
Green Bay	62.9	15.0	7.8	6.0	4.8	-	-	1.8
Lake Michigan	40.6	40.6	.0	12.5	3.1	-	-	3.1
Inland Lakes	28.6	50.5	5.2	4.9	7.3	-	-	1.9
Streams & Rivers	51.8	30.6	5.9	3.5	2.4	-	-	5.9
Pools	34.2	46.4	7.7	2.3	5.0	-	-	4.1

to inland lakes. This is especially significant because of the finding that inland lake sites are by far the most frequently mentioned primary use locations.

A third approach to the Table is to compare responses between different activity groups. Note, for example, that fishermen are somewhat less apt to fish an area because it is close by than are boaters to boat an area, or swimmers to swim it. This lends further credence to the suggestion made elsewhere that there is an intensity to fishing participation which surpasses that of swimming or boating. Note too, that "cleaner water" is much more important to swimmers that to boaters. The importance of fishing success accounts for the comparatively low response to clean water as the reason for fishing that area fished most often, recognizing that these are not mutually exclusive alternatives.

Bay Use Location Determinants

A separate question related to the question of why one area is preferred to another was asked. This question differed in that the question was directed to the Bay only, rather than to the site the person actually used most frequently. In this case, each respondent was asked what (s)he thought was the major determinant of the location on the Bay people chose to use for water-based recreation. Respondents were asked to choose one of four parameters, each related to an attractability - accessibility dimension.

Of the four alternatives, proximity was judged the major reason by just over 31 percent of the population. But, good facilities at the site were judged most important by over 36 percent, making this the most frequently mentioned variable. That the place chosen was "not too expensive" was the least frequently mentioned variable, 11 percent responding this way. Twenty-one percent thought the most important reason was that the chosen site was "not too crowded."

The percent of respondents choosing each of these variables was different for different places of residence. Respondents from the Green Bay area and from Brown and Oconto Counties were most likely to cite proximity as the major determinant for Bay users. The highest percentage was from Oconto County (41 percent). The lowest percentage was from Marinette County with only 19 percent citing proximity as the major Bay site location determinant.

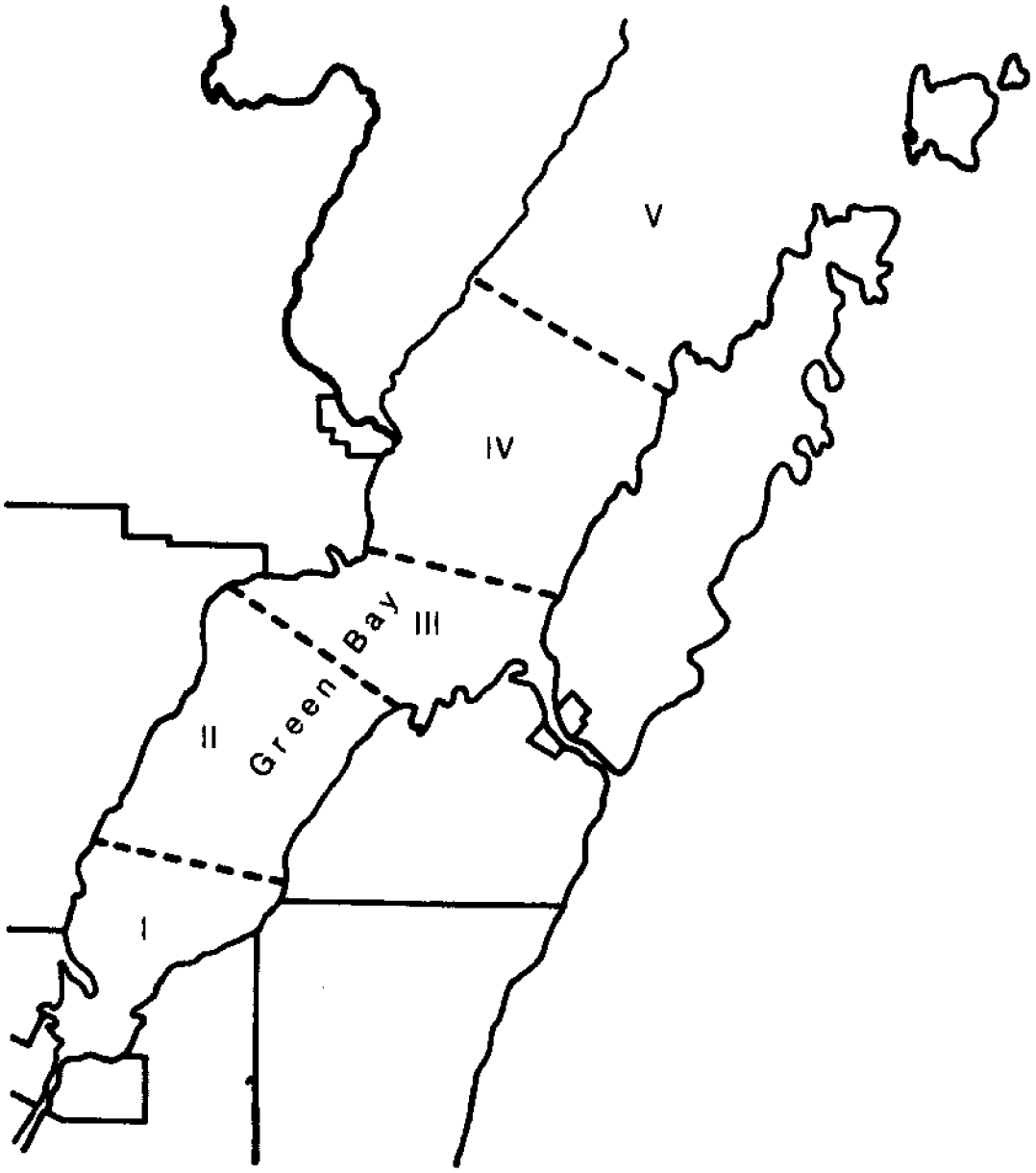


Figure V-1 Green Bay Recreation Use Sectors

Marinette residents were most likely to say that good facilities were the major reason for selecting a location for water-based recreation activity on the Bay. Seasonal residents, and those from Door, Kewaunee, and Marinette Counties mentioned not being too crowded as the major determinant more frequently than residents of other areas. Quite likely, this reflects more frequent exposure of residents of these areas to crowded conditions, such as occur on summer weekend peak days. If not, then it must certainly reflect growing concern on their parts.

Little variation was found between people who used the Bay as primary location of their activity and those more frequently using other sites. This was also generally true when comparing Bay users according to the area of the Bay they used most frequently, although it was apparent that those using the two southernmost areas rated proximity as the major determinant more frequently than users of other areas (Figure V-1). Among those whose activity centered in the central and northern regions, good facilities and not being crowded were more frequently cited as reasons for selecting the Bay area used.

Description of Green Bay Waters

Of the 2,174 heads of households interviewed, 1,072, or nearly 50 percent, regard Green Bay as "dirty." Only four and one-half percent of the total responded "clean" when asked how they would describe the Bay's waters, though an additional 15.7 percent thought Bay waters "reasonably clean." Over 21 percent regarded the Bay as "somewhat dirty." The remaining nine percent volunteered that the description would depend on the location on the Bay.

Probably most observers would agree with those who indicated that different places on the Bay should be described differently. As most recognize, the southern (and particularly southeastern) section of the Bay is "dirty" by comparison to the northern portions. Yet only nine percent volunteered that information to the interviewer. What respondents seemed inclined to do was attribute the Bay's water quality in areas closest to their place of residence to the entire Bay.

Two out of three residents of the City of Green Bay and of Brown County stated that the Bay was "dirty." One-half of the Kewaunee residents replied dirty, about one-third of the Oconto and Door County residents replied dirty,

TABLE V-4

DESCRIPTION OF GREEN BAY WATERS BY PLACE OF RESIDENCE:

	N	Clean %	Reason-ably Clean %	Some-what Dirty %	Dirty %	Depends on Location %
Brown County	335	2.1	6.9	16.4	65.4	9.3
Green Bay and Suburbs	706	1.1	5.4	17.3	68.6	7.6
Door County	192	17.2	21.4	17.2	35.9	8.3
Kewaunee County	129	3.1	15.5	25.6	50.4	5.4
Marinette County	462	6.1	30.7	24.9	25.8	12.6
Oconto County	230	2.6	20.9	33.9	35.7	7.0
Seasonal Residents	120	9.2	25.0	25.0	28.3	12.5
Total	2,174	4.5	15.7	21.4	49.3	9.1

while just over one-fourth of the Marinette residents and the seasonal residents (most of whom are located in Marinette, and northern Oconto and Door Counties) responded that the Bay was dirty. Given the distribution of the population and the varying descriptions appropriate, depending on the location on the Bay, the composite appears to be a reasonable portrayal of the existing conditions. As Table V-4 indicates, respondents recognized that water quality of the Bay varied from one location to another, but they tended to respond to the area of the Bay nearest their place of residence.

There were many other variations between groups in describing Bay waters. Fishermen who do most of their fishing on Lake Michigan were most apt to describe the Bay as "dirty" (63 percent), while about one-half of the Bay and inland lake fishermen said "dirty." Only about 40 percent of the lake and stream fishermen used that description.

Among boaters, those who did most of their boating on inland lakes were most apt (58 percent) to describe the Bay as "dirty," though Lake Michigan and Bay boaters used that description (54 percent) almost as often. Again, those boating streams and rivers more than other sites were least apt to describe the Bay as dirty (38 percent).

Swimmers using different locations for most of their activity also differed in describing the Bay of Green Bay waters. As with fishing and boating, those swimming mostly on streams or rivers were least likely to describe Bay waters as "dirty." Also, as before, Lake Michigan swimmers were most likely to describe the Bay as dirty; at a rate of 65.5 percent, this was even a higher percentage than among those using swimming pools for most of their activity. These comparisons of descriptions according to where people do their water-based recreation seem to indicate that the descriptions are based on comparing Green Bay waters to the waters one is most accustomed to using.

This variation in describing Bay waters was also evident between different groups of fishermen, boaters, and swimmers all of whom used the Bay, but at different locations along the north-south axis. Though except among boaters, the differences (Chi square .01) were not significant, the trend was clear among all three user groups. Those who used the southern portions of the Bay were more likely to describe the Bay as dirty than were those who used the more northerly areas.

Clearly, the term "dirty" isn't very clear. Technically, the term would more closely resemble turbidity than other conditions. But the respondent might have a number of other parameters in mind; fecal coliform, perhaps, or algae. This type of description, however vague to those highly conversant with water resources and water resource problems, is nonetheless important as the respondent's attitude and feeling is also reflected in these terms.

Still, a more precise understanding of what people of the area regard as the water quality of the Bay, and what they regard as major problems to those who would use it for various recreations, is of major importance. So two questions, dealing more specifically with water quality parameters, were addressed to every respondent.

The two questions were used in order to get responses to slightly different dimensions, to elicit two responses without making the instrument complex, and to separate physical properties of the water from other types of water quality variables. To facilitate this process, each respondent was given a sheet with two lists, and asked to select from each list the one element which bothered him most about the Bay, or the one he thought was the biggest problem for Bay users. The two lists, and percent response to alternatives on each list was:

	%		%
Water is too cold	6.9	Water is cloudy	12.6
Unpleasant smell	46.7	Chemicals	11.7
Wind	6.5	Harmful bacteria	16.1
Waves	4.1	Suds, film, foam on water	14.1
Junk on the bottom	20.5	Dead fish	45.5
Too many weeds	15.3		

Those familiar with local history would not be surprised by these percentages. The Bay has had a reputation for "bad odors" for nearly 350 years. Present residents of the area, most of whom probably know little of the descriptions of the Bay made by early explorers, have repeated those early descriptions to a large degree. Perhaps the sources of unpleasant smells, now including odors resulting from certain

manufacturing processes, and the kinds of dead fish, most notably the alewife, have changed. But the description of the Bay, as these percentages make apparent, has not.

Again, responses to these two questions varied to some extent according to where the respondent resided. Green Bay metropolitan area and Brown County residents were most apt to indicate "unpleasant odor" as the biggest problem for Bay users (56 percent) while seasonal residents and those from Door and Marinette Counties were least likely to cite unpleasant odors as the major problem. This pattern was reversed where "too many weeds" was the major concern. Those along the lower Bay (southerly end) were least likely to mention "weeds" as a major problem (about ten percent) while 20 to 25 percent of the seasonal residents and those from Marinette and Door Counties considered "weeds" the major problem.

In comparing the responses to the two questions, it might appear that the high proportion of responses to "dead fish" and to "unpleasant smell" as major problems are related as cause-effect. No doubt that is true to some extent. However, the highest proportion of respondents citing "unpleasant smell" were residents of Green Bay and Brown County and the lowest proportions were from Door and Marinette Counties. But of those citing "dead fish" as a major problem, the highest proportion were from Marinette and Door Counties. This suggests that while residents of the southern Bay area may have responded to odor problems resulting from alewife die off and the like, they may also be responding to odors resulting from industrial and municipal activities. The alewife die off has been more of a problem in the northern areas of the Bay than in the southern end.

Among fishermen, those using the Bay as the primary location for their activity were least likely to cite "unpleasant smell" as the major problem for Bay users and most likely to indicate winds, waves, and cold water as problems. However, "unpleasant smell" was most frequently mentioned by each of the primary use location groups, ranging from 37 percent among Bay users to 51 percent among those fishing mostly inland lakes. There was little variation between those fishing different locations in citing "dead fish" as a problem; this alternative, again, most frequently cited by all groups. Bay of Green Bay users were most likely to indicate "cloudiness" of the water as a problem with 18 percent reporting cloudiness as a problem compared to ten percent among fishermen fishing streams and rivers more than other waters.

The responses of boaters using different bodies varied in much the same manner as fishermen. While "unpleasant smell" was most frequently mentioned by each boating location group, those using the Bay primarily were least apt to report smell as the major problem and most apt to report winds or waves as the major problem. To the second set of alternatives, boaters using the Bay, like Bay fishermen, were most apt to cite cloudiness as a major problem. Those fishing streams and rivers mostly were least apt to report cloudiness as a problem, and also least apt to reply "dead fish," though this alternative was still mentioned most frequently by each boating location group.

Of all swimming location groups, those using the Bay for most of their activity were twice as likely to report that winds bothered them (about 16 percent) as were other swimming location groups. And though "unpleasant smell" was reported as the most bothersome Bay problem for all location groups, Bay swimmers were least likely to choose that alternative. As with fishermen and boaters, those swimming in the Bay more frequently than at other sites were most likely to report "cloudiness" as a problem. But unlike fishermen and boaters, Bay area swimmers were also most likely to report "dead fish" as the alternative of greatest concern to them. This may be related to the fact that the swimming activity on the Bay tends to concentrate a bit more northerly than fishing and boating, and that residents of the northernmost counties, Door and Marinette, were also more apt to cite the problem of "dead fish" than were residents located further south.

Participants in each of the three activities, who used the Bay more than other locations, were compared on the basis of where on the Bay they participated most frequently. Generally, those using the lower, or southern, end of the Bay were most apt to rate "unpleasant smell" as a problem and least apt to rate "water is too cold." This held true for fishermen, boaters, and swimmers. Problems of winds and waves were mentioned more frequently by participants using the more central locations along the north-south axis. It is difficult to determine if this tendency means that the problem of winds and waves is greater there than at other Bay locations, or if problems such as odor or cold water temperature were of so little concern by comparison that winds and waves were more of a problem than the other alternatives.

Comparing different Bay location user groups on the second set of alternatives yielded no significant differences. This was true for fishermen, boaters, and swimmers.

Water Quality Improvement Funds

In the press and other news media, much has been made of the problem of paying for environmental quality and for cleaning up polluted air, land, and water resources. Usually, it is assumed that through higher taxes or higher prices for goods, or both, each citizen will have to pay more than at present. This at a time when various kinds of taxes are under heavier attack than usual and when taxpayers' revolts are going beyond the talking stage.

Without making any assumptions, which is to say each respondent made his own, each interviewee was asked how much federal expenditures to improve water quality should be increased. Responses, while completely open ended, were recorded in four categories as follows:

None	20.7% (N=449)
A little	32.4% (N=705)
Quite a bit	26.0% (N=556)
A lot	20.9% (N=454)
	100.0% (N=2,174)

On questions of this nature, there is always a tendency to respond in ways which would avoid extreme ends of the scale. No doubt these figures reflect that tendency to some extent. No doubt, too, these figures reflect differing assumptions made by respondents; the group replying "none," perhaps assuming, moreso than other respondents, that they would have to pay higher taxes, though some of them probably do not regard water quality problems as serious enough to warrent more effort in this area. Perhaps some respondents replied "none" to this question feeling that the polluters should pay for cleanup efforts rather than the federal government. Those replying that federal expenditures should be increased "quite a bit" or "a lot" more likely felt the problem merited greater effort, was a federal responsibility, and would be willing to pay additional taxes if that were required.

In the interview, this question preceded all questions related to water quality or other properties, or to deterrents to participation, location preferences, or the like. Earlier question to earlier questions had dealt only with participation data, data on owning or renting recreation equipment or housing, and certain population characteristics. Still, some courage and conviction would be required of those replying "none," given the emphasis placed on pollution and on the environment over the past three years. Those replying "a lot" also indicated some strength to their convictions, as such replys are often invested of self-fulfilling prophecy.

The proportion of responses to these categories of increasing federal expenditures varied significantly according to respondents place of residence and by other variables. Differences by place of residence are summarized in Table V-5. Residents of Door, Kewaunee, and Marinette Counties were least apt to suggest expenditure increases of "quite a bit" or "a lot." Seasonal residents, and those situated along more southerly locations on the Bay were much more likely to suggest larger increases in federal expenditures to improve water quality.

Comparing respondents to different expenditure increase categories according to other variables yields a portrait which can be described in a general way. Those suggesting the larger increases in expenditures tended to be younger and better educated than those suggesting smaller or no increases. Those in professional, technical, managerial, proprietary and sales occupations suggested increase categories of "quite a bit" and "a lot" more frequently than other groups. Those not employed full-time and those engaged in farming were most apt to suggest no increase in such expenditures. Those employed in public or non-profit agency positions would increase expenditures more than those employed in the private sector, including those self-employed.

Respondents who described the Bay as "dirty" suggested larger expenditures than those describing the Bay as "clean." Participants in fishing, boating, and/or swimming, and participants who use the Bay of Green Bay for some of their activity suggested higher expenditures for improving water quality than did those who did not participate in these water-based activities or who did not use the Bay.

Following this question on how much federal expenditures should be increased to improve water quality, respondents were given this hypothetical question:

TABLE V-5

SUGGESTED INCREASE IN FEDERAL EXPENDITURES FOR IMPROVING WATER QUALITY BY PLACE OF RESIDENCE

	N	None %	A Little %	Quite a Bit %	A Lot %
Brown County	335	16.7	28.1	29.9	25.4
Green Bay and Suburbs	706	16.3	30.7	26.1	26.9
Door County	192	31.3	42.7	15.6	10.4
Kewaunee County	129	31.8	40.3	20.2	7.8
Marinette County	462	26.4	36.1	26.6	10.8
Oconto County	230	14.3	26.5	28.7	30.4
Seasonal Residents	120	18.3	26.7	30.8	24.2
Total	2,174	20.7	32.4	26.0	20.9

"If more were to be spent on improving water quality without raising taxes, the money would have to come from some other government program. Which of these programs would you take the money from?"

Each interviewee was given a list of eight federal program areas, the order of which was determined randomly. The program alternatives, and the number and percent of responses to each alternative was as follows:

	Number	Percent
Education	(48)	2.2
Transportation	(59)	2.7
Defense	(317)	14.6
Health	(24)	1.1
International Aid	(598)	27.5
Space	(1035)	47.6
Agriculture	(24)	1.1
Community Development	(69)	3.2
	(2174)	100.0%

It should be noted, here, that among the 449 respondents answering "none" to the previous question, not more than a dozen said that they wouldn't take money from any of these programs. The interview staff, in commenting on each interview after its completion, very seldom mentioned having to repeat the question emphasizing its hypothetical nature.

A review of the response summary indicates clearly the priorities that people of this region have in terms of federal programs. Of eight choices, nearly 50 percent of the respondents said they would cut space. Undoubtedly this figure is inflated by the fact that a few weeks prior to the field work the United States had its second pair of astronauts on the moon, and affairs of this moon trip were still prominent in the news. It appears very likely that the reaction to all the television and other media coverage of this space venture was that the space program should be

cut in deference to other needs. Of course, a short time after this event, funds for the space program were cut.

International aid was the second most frequently mentioned program from which funds would be taken for reallocation to water quality improvement programs. With 27.5 percent of the respondents choosing to cut funds from this program, "space" or "international aid" combined would have been cut by 75 percent of the population. Adding the 14.6 percent who would have cut "defense" spending, 90 percent of all respondents would have cut one of these three programs, while a total of ten percent of the responses were divided among the five other programs.

As was the case with cutbacks in funding the space program, the Congress also halted its foreign aid appropriations for a brief period. In these instances, it would appear that the mood of northeastern Wisconsin was representative of the mood in Washington and around the country.

It is probably true that had respondents been told how much was presently allocated to each of the eight program functions, defense might have been identified more often for funding cuts, that being, by far, the largest consumer of federal funds. But how well or ill informed the population may be on questions like this can only be guessed. Certainly, the issues involved here are much more complex than these questions suggest. Further, the eight programs listed are rather inclusive. One, for example, might be happy to cut funds for highways or for developing supersonic aircraft but would like more funds for Amtrack and urban mass transit systems. So "transportation," or the other program titles, are too general, especially to those best informed. Yet, despite a number of valid criticisms, it is still abundantly clear that people do want more money spent to improve water quality and that the money could be taken from space, international aid, and defense programs, but not from the "domestic" programs. This is, unmistakeably a statement of the priorities of residents of this five-county area.

Just as the amounts of money allocated to water quality varied according to different characteristics of the population, there was also some variation in what programs would be cut to obtain the funds. Residents of Green Bay and Brown County and seasonal residents were least apt to cut "space" and most apt to cut "defense" and "international aid" compared to residents of other locales. Much of this variation it appears, is attributable to other

variables, however. Residents of Green Bay, Brown County, and seasonal residents are, by comparison, better educated. They are also more likely to be found in higher paying jobs in professional, technical, managerial, and sales categories. Significant (.01) differences were found between those who would cut different federal programs and the education and occupation variables. Those in the highest education category, for example, were four times more likely to cut "defense" as were those in the first education level category. It was also observed that those working in government jobs or employed by some non-profit agency were more likely to cut money from "defense" for reallocation to water quality improvement programs. Also, participants in fishing, boating, or swimming were more apt to cut "defense" than were non-participants. It should also be pointed out that among those who indicated that increases for improved water quality should be "a lot," the tendency to cut "defense" was greater than among other groups. Generally, as the proportion who would cut defense increased, so did the proportion who would cut international aid, while the proportion selecting space for funding cuts decreased.

Water Condition Changes and Responses

Participants in each of the three activities were asked a series of questions regarding changes in water quality conditions and how they would react should conditions deteriorate. Tables V-6, V-7, and V-8, in the Appendix summarize these responses for the total sample and for each place of residence group. A tally of the kinds of changes, for the better or the worse, is also presented.

Since the reference point for condition changes and reactions was the place the respondent participated in each activity most frequently, it is necessary to compare responses by location. This is done in the following Tables. For each activity and each location type, participants were asked a series of three questions: (a) How have conditions changed at the place you fish (boat, swim) most frequently since you started fishing (boating, swimming) there? (b) What would you do if conditions deteriorated? (c) Do you think you'll have to make that decision soon?

Generally for each of the three activities, those who used Green Bay waters more frequently than other water resources were less apt to report that there was no change in conditions and more apt to report conditions had changed

TABLE V-6

CONDITION CHANGE AT THE AREA USED MOST FREQUENTLY:
FISHING, BOATING, SWIMMING

	No Change %	Better %	Worse %
Fishing			
Green Bay	40.2	12.6	46.5
Lake Michigan	51.4	18.5	30.1
Inland Lakes	62.1	4.7	32.7
Streams & Rivers	52.8	5.6	41.2
Boating			
Green Bay	43.4	12.5	43.1
Lake Michigan	54.3	14.3	28.6
Inland Lakes	57.9	7.1	33.3
Streams & Rivers	43.6	10.9	44.6
Swimming			
Green Bay	38.9	13.8	46.7
Lake Michigan	53.1	3.1	43.8
Inland Lakes	60.0	6.5	26.7
Streams & Rivers	60.0	5.9	34.1
Pools	80.6	6.3	13.1

for the worse. But -- those using Green Bay primarily were also more apt to report that conditions had changed for the better. Conversely, those using inland lakes primarily were most apt to report conditions had not changed, thus among the least likely to report conditions changing for the better or the worse. If one were to compare the ratios of better to worse responses between Bay users and inland lake users, proportionately more Bay users report conditions changing for the better than do inland lake users. That is not, however, surprising for it is more likely that an area generally regarded as dirty would change for the better than one regarded as clean. Two general statements may be derived from Table V-7. Except for inland lakes, most users regard conditions at areas they use most frequently for fishing, boating, and swimming as changing and this is especially seen among Bay users. Overwhelmingly, the changes are seen as being for the worse, rather than the better. These changes are not, however, exclusively changes in water quality, as the tally of kinds of changes in Table A-9, page 200 , makes clear.

The second question in this sequence was specific to the condition of the water, with respondents reporting if and how they would modify their activity patterns should water conditions deteriorate. Again, this was tabulated by primary location for each of the three activities.

As with some other tables in this report, there are three types of comparisons facilitated by Table V-7. Comparing the different responses to water condition deterioration is one. Note for example, the proportions who would not change their activity pattern in comparison to other types of responses, and particularly to the proportions who would simply "give up" and stop participating in that activity altogether. In comparing those who would continue to participate but shift location of use, it will be noted that even among those using Green Bay primarily, most of the relocation would be to water resources other than the Bay. By combining response categories, the proportions who would continue participating at the same location, change location, or stop participating can be ascertained. For example, among boaters using Green Bay primarily, 28.3 percent would stay at the same location, 49 percent would move to some other location, and 21.7 percent would stop boating if water conditions deteriorated.

Comparing activity groups with each other, it is evident that fishermen and swimmers would be less apt to move to a location on Green Bay than would boaters. This is especially true in comparing Bay swimmers with Bay boaters. In addition, boaters presently using the Bay were much more apt to report that they would not be bothered if water conditions deteriorated, or that they would stay in the same location but participate less frequently than would fishermen or swimmers. Consistantly, swimmers and fishermen were more likely to report they would relocate their activity at sites other than the Bay than were boaters.

In comparing location groups, it can be seen that inland lake users, generally, are less apt to stop participating, less apt to change locations, and less apt to relocate on the Bay than are participants using other locations primarily. Those using the Bay primarily, as would be expected, were much more likely to report they would move to some (other) location on the Bay.

It is always necessary, in dealing with hypothetical conditions such as this, to bear in mind that what respondents say they would do, and what they actually would do should such conditions ensue, are not always the same though, no doubt, related. An additional reason for caution and one often ignored when posing hypothetical questions is that responses may be influenced by the respondents' estimate of the probability such situations may arise. In asking respondents to judge whether or not such conditions were likely to arise, the confidence they have in water conditions deteriorating (or not deteriorating) can be estimated, at least in a comparative way.

Respondents were asked if they thought they would have to make that decision soon, referring to the previous question - What would you do if water conditions deteriorated at the place you do most of your boating (fishing, swimming)? Due to the phrasing of the question, respondents volunteering that they had already changed their activity pattern due to water conditions deteriorating, were much fewer than would have been the case were the question oriented to the past rather than the future. Thus, the second two columns of Table V-8 are of major interest.

The results of this tabulation are consistent with other findings. Green Bay boaters, fishermen, and swimmers were much more likely to say they might have to make the decision soon (in essence that water conditions might

TABLE V-7

RESPONSE IF WATER CONDITIONS DETERIORATED AT AREA USED MOST FREQUENTLY FOR FISHING, BOATING, AND SWIMMING

	Would Not Bother Me %	Stay in Same Location but Participate Less Frequently %	Move to a Location on Green Bay %	Move to a Location not on Green Bay %	Stop Participating Entirely %
Fishing					
Green Bay	5.5	8.3	22.4	31.9	31.1
Lake Michigan	1.4	4.1	7.5	56.8	30.1
Inland Lakes	2.4	10.8	4.1	63.9	18.3
Streams & Rivers	4.0	8.4	4.4	62.4	20.4
Boating					
Green Bay	13.5	14.8	18.4	30.6	21.7
Lake Michigan	8.6	2.9	5.7	54.3	25.7
Inland Lakes	4.5	15.5	5.8	55.3	17.2
Streams & Rivers	3.0	20.8	7.9	38.6	28.7
Swimming					
Green Bay	2.4	7.8	20.4	43.7	25.1
Lake Michigan	.0	6.3	12.2	43.8	37.5
Inland Lakes	2.6	9.5	2.2	66.2	18.7
Streams & Rivers	3.5	12.9	.0	55.3	28.2
Pools	5.0	8.1	6.3	55.4	24.3

TABLE V-8

PROSPECTS OF HAVING TO RESPOND TO WATER CONDITION DETERIORATION
AT AREA USED MOST FREQUENTLY: FISHING, BOATING, SWIMMING

	Already Have %	May Have to Soon %	Not Likely %
Fishing			
Green Bay	5.1	37.4	56.7
Lake Michigan	4.1	33.6	62.3
Inland Lakes	2.8	20.7	76.1
Streams & Rivers	1.2	29.6	68.4
Boating			
Green Bay	4.3	34.5	60.2
Lake Michigan	2.9	31.4	62.9
Inland Lakes	2.9	25.9	69.6
Streams & Rivers	4.0	31.7	63.4
Swimming			
Green Bay	1.2	41.9	56.3
Lake Michigan	6.3	28.1	65.6
Inland Lakes	2.4	20.0	76.8
Streams & Rivers	3.5	34.1	62.4
Pools	2.7	18.0	78.8

deteriorate soon, leading then to a decision regarding their present recreational use of the area) than were participants using other areas primarily. Again, inland lake users appeared most confident that they would not soon be faced with such a situation. Among swimmers, inland lake users were almost as confident that conditions would not deteriorate as were those swimming most frequently at swimming pools. With reference to those using the Bay primarily, it is again apparent that swimmers react more strongly to Bay water quality conditions than do fishermen, who in turn, react more strongly than do boaters.

Tables A-1 through A-8 in the Appendix provide summaries, expressed as percents for the total 2,174 respondents in total and in place of residence categories. Other findings and insights from the data resulted from between groups comparisons examined with Chi square statistics. These are reported in the following pages.

CHAPTER VI

BETWEEN GROUP COMPARISONS

Participants and Non-Participants

Of the 2,174 heads of households interviewed, 672, or 31 percent did no fishing, boating, or swimming during the 12 months preceding the survey. Chi square tests of significance were used to compare this group with the 1,502 respondents who had participated in one or more of these activities during the same period. As Table VI-1 indicates, significant differences at the .001 level were observed on 25 variables and two other comparisons were significant at the .01 level.

Age differences between participants and non-participants were marked. Of those in the 18-34 age group, 89 percent participated in fishing, boating, or swimming at least once during the previous twelve months. Among those 65 or older, 40 percent were participants, substantially less than the 64 percent of participants in the 55 to 64 age group. The between groups comparison on age of the youngest child was directly parallel. The older the children, the lower the proportion of participants. The largest drop in proportion of participants came between those with a child in the 15-21 age group and those whose youngest child was over age 21. While it is widely recognized that participation in many outdoor recreation activities decreases with age, the abrupt decreases in proportions between the 55-64 and 65 and over age groups, and between those with children 15 to 21 and over 21 suggest another influence. Typically, those over 65 are retired. Typically, those over 21 years of age have established residences separate from their parents. In both instances, close social ties are broken and the circles of companionship and contagious enthusiasm otherwise available are broken.

The influence of age was also noted when comparing participants and non-participants according to length of residence in the area. Approximately 43 percent of all respondents resided in the five-county area for 35 years or more, and it was among this group that the proportion of participants was lowest (56 percent). The highest participation rates by length of residence categories was among seasonal residents, an entirely predictable outcome. Among permanent residents, those living in the area less than ten years were most likely to be participants, followed by 11 to 35 year residents. Differences between groups according to place of residence within the five-county area were also statistically significant with the highest percentage of participants from Marinette, Oconto, and Brown Counties, along with the City of Green Bay. About one-half of the Door and Kewaunee County residents were participants, a rate about 20 percent lower than those from the other areas. Age, education and occupation differences are probably reflected in this observation, as is the finding of significant difference between groups according to whether or not the respondent resided in a rural or urban area. About 72 percent of the urban residents were participants compared to 62 percent among rural residents.

As mentioned above, significant differences between participant and non-participant groups were observed according to amount of formal education and occupation category. Eighty-six percent of those with some college education were participants compared to 50 percent among those who had not completed high school. With occupations grouped by census categories, highest proportions of participants were found among managers, officials and proprietors (88.5 percent) and professional and technical (86.6 percent) occupation groups. Lowest proportions observed were among clerical workers (72 percent) and farmers (52.5 percent). Grouped differently, it was found that 90 percent of the students interviewed were participants, as were 80 percent of those employed full-time. Among retirees and those not employed full-time, 50 percent had fished, boated, or swam during the previous twelve months, while among housewives the figure was 33 percent. A third occupation grouping including only those employed full-time, also resulted in a significant between group difference. About 71 percent of those self-employed or employed by private non-profit agencies were participants, compared to 81 percent among government employees and those in private enterprise. As partial explanation for this finding it should be mentioned that most farmers would be in the self-employed group.

Significant between groups differences were observed on three other population characteristic variables tested. Briefly, over half of the respondents who were not married were not participants compared to 27 percent non-participants among married respondents. Two-thirds of the women in the sample did not fish, boat, or swim during the preceding twelve months, compared to one-fourth of the men. The Chi square test also revealed significant between groups differences according to the number of children born to the household heads interviewed. The percent participating varied little among those with one to five children, but was considerably lower among household heads with no children and those with six children or more.

Of the 178 respondents who did not own a car, 75 percent were non-participants. Among those owning one car, 68 percent were participants, or almost exactly the proportion of participants in the total sample. Of those owning more than one car, the percentage who were participants was 77 or more.

Automobile ownership is clearly related to whether or not areas for water-based recreation are accessible to potential users. This partially explains the finding that non-participants were most apt to rate proximity as the major determinant of where people go on the Bay for recreation. Participants were more apt to reply that "good facilities" or "area is not too crowded" were the most important use location determinants.

In describing the waters of Green Bay on a "clean/dirty" continuum, participants were more likely to indicate that the description depends on the Bay location than were non-participants. Participants, interestingly, were also more likely to describe the Bay as "dirty" (52 percent) than were non-participants (43 percent). It should be remembered, here, that a sizeable majority of participants, especially swimmers and fishermen,did not fish or swim on Green Bay. It may be, then, that participants, having experience with water in addition to or other than the Bay describe the Bay in a comparative way. Non-participants, on the other hand, have less experience upon which to make a comparative judgment. This finding also suggests a different level of awareness or different level of concern (or both) between those who participate in water-based recreation and those who do not.

In selecting between a number of physical characteristics most problematical to Bay users, both participant and non-participant groups said "unpleasant smell" much more

frequently than any other alternatives. The groups did differ significantly, however, in that non-participants were more likely than participants to reply smell, while participants more frequently noted winds, waves, and bottom quality to be Bay use problems.

A similar result was observed on a second question asking respondents to report the characteristic of the Bay's water quality they disliked most. Fifty-four percent of the non-participants said "dead fish" was the major problem, compared to 41 percent of the participant group. Conversely, participants were more likely to report "cloudiness," harmful bacteria, chemicals, and suds, film or foam on the water as the characteristic disliked most.

When asked how much federal expenditures should be increased to improve water quality, significant differences between groups was again observed. Quite expectedly, participants would increase expenditures more than non-participants. Of the non-participants, 31.3 percent said no increase in water quality improvement funds compared to 15.9 percent of participants. At the other end of the scale, only 13 percent of the non-participants thought funds should be increased "a lot" compared to 24.3 percent of the participant group. It was also noted that the groups differed on what federal program they would cut back to reallocate funds for water quality improvement. Briefly, non-participants were more likely to cut expenditures for space (57% to 43.5%) while participants were more likely to cut international aid and defense programs. The fact of participating or not participating in fishing, boating or swimming during the previous twelve months is probably influencing the amount of fund increases for water quality, but not the choice of program from which to cut funds. This later difference is most likely a function of the fact that participants are, generally speaking, younger and better educated.

In a final set of questions for which between groups measurements were made, respondents were asked whether or not they would like to have done more fishing, boating, or swimming than they did during the preceding twelve month period. For each activity, those who were participants were much more likely to say they would like to have done more than were non-participants. Among all participants, about 72 percent said they would like to have fished more often than they did, while 60 percent desired more boating and 52 percent desired more swimming. For non-participants, the percent desiring to have done more were: for fishing, 32 percent; boating, 26 percent, swimming, 23 percent. This

"desire to do more" element is often referred to in the literature as "latent demand." These findings indicate clearly that most of that demand comes from those who already do participate.

If latent demand is to be expressed in actual participation, deterrents to further participation would have to be overcome. Significant between groups differences were also observed when participants and non-participants were compared on questions asking why they did not participate as frequently as they desired. It should be pointed out once more that while lack of time is mentioned most often in response to questions of this type, in this study those responses were not recorded. Rather, respondents answering "not enough time" were asked to relate another factor which deterred them.

Among participants, travel distance and lack of success ("I never catch anything") were the most frequently mentioned deterrents to more fishing participation. Among non-participants, advanced age and poor health, and not owning a boat were the major deterrents, followed by travel distance and lack of success.

Both participants and non-participants reported that the main reason for not doing more boating was that they didn't own a boat. Among participants, travel distance was the next most frequently mentioned deterrent while among non-participants the second most frequently noted deterrent was that other members of the family were not interested in boating.

For those participants who desired to do more swimming than they did, travel distance was the most frequently mentioned deterrent, followed by "water is cold" and "water is too dirty." For non-participants, advanced age and poor health, and not being a very good swimmer were the most frequently mentioned deterrents, though about 20 percent of this group said they were deterred by "dirty water."

These data clearly indicate that people who participate differ from those who do not in their reasons for not participating as much as they would like. It is also clear that there are different deterrents, depending on the activity one wishes to engage in more frequently. If latent demand is converted to participation, by conscious design or by unplanned, though not necessarily unwanted change, it will result from alleviating different obstacles for different groups to the extent that these deterring conditions can be overcome.

TABLE VI-1

PARTICIPANTS AND NON-PARTICIPANTS COMPARED

	X^2	df	Sig. Level
Age	293.03	5	.001
Age of youngest child	184.33	3	.001
Years residing in the 5-County Area	146.46	5	.001
Place of residence	83.36	8	.001
Residence urban or rural	19.25	1	.001
Years of formal education	211.17	4	.001
Occupation type	87.05	7	.001
Employment status	261.41	4	.001
Where employed	16.95	3	.001
Sex	223.07	1	.001
Married or single	106.93	1	.001
Number of children	29.06	7	.001
Cars owned	205.65	7	.001
Bay use location determinants	13.56	3	.01
General description of Green Bay waters	37.43	4	.001
Bay Physical characteristics most bothersome	18.79	5	.01
Bay water quality characteristics most bothersome	35.48	4	.001
Fund increase for improving water quality	125.18	3	.001
Fund source	59.81	7	.001
More fishing desired	300.88	1	.001
Deterrents to more fishing	103.94	7	.001
More boating desired	207.31	1	.001
Deterrents to more boating	28.13	5	.001
More swimming desired	157.15	1	.001
Deterrents to more swimming	128.15	6	.001

Bay and Non-Bay Users

Of the 1,502 respondents who fished, boated, or swam at least once during the twelve months preceding the survey, 672 or 42 percent, participated at least once on Green Bay while 875, or 56 percent, did not. Chi square tests were used to compare these groups on a number of variables to determine if, and in what way, these groups differed.

Unlike the comparison of participants with non-participants, these two groups of participants (only) did not differ in age, sex, marital status, car ownership, general description of the waters of Green Bay and other variables. However, the two groups did differ significantly in some important ways.

A linear relationship was observed between education (years of school completed) and the percentage of Bay users. The higher the years of school completed, the more likely was the respondent one who participated on Green Bay. Forty-eight percent of the college graduates used Green Bay for fishing, boating, or swimming compared to 27 percent of those who completed grade school only.

This relationship is consistant with, and no doubt related to, the significant differences observed when comparing groups by place of residence. The highest proportion of users of Green Bay was among Door County residents and the lowest among Kewaunee County residents. This appears to be mainly due to differences in access and wealth of Bay resources. Kewaunee County is bounded by the Bay for about 2.7 miles while Door County has 133 miles of Bay shoreline. Participants from the City of Green Bay, where the average education level was highest, were the next most likely Bay users. The proportion of participants using the Bay from Oconto County was about the same as from Green Bay. The lower proportion among among Marinette County residents is probably a function of the abundance of inland lakes, streams and rivers in the county.

Urban residents were more likely to have participated on Green Bay than were rural residents. The City of Green Bay residents make up most of the urban population in this area. Again, Green Bay residents have the highest level of education, which in turn is related to the frequency of participation.

The proportion of participants who used the Bay varied significantly among different occupation groups. The

proportion of farmers who used the Bay (13.5 percent) was by far the lowest proportion of all occupational groups. Since a large number of farmers in the sample were residents of Kewaunee County, this is quite consistant with other findings. Those in sales and clerical positions, most of whom live in the Green Bay metropolitan area, were more likely to use the Bay than those in other types of employment. There was very little difference in proportion of Bay users for all other employment types.

In comparing Bay users with participants who did not use the Bay on their describing the Bay along the "clean/dirty" continuum, the differences were not significant. However, the groups did differ significantly in identifying the physical and water quality characteristics which they considered most troublesome. For both Bay users and non-Bay users, unpleasant smell, junk on the bottom, and weeds were, in that order, considered to be the major problems for Bay users. However, non-Bay users were more apt to cite these problems than were Bay users. The latter group was more likely to cite winds, water too cold, and waves as problems for Bay users. On the second question related to Bay water quality and recreation use problems, nearly identical proportions (41.1% - 41.7%) of Bay participant and non-Bay participants mentioned "dead fish" as being the most troublesome characteristic. Bay users, however, were about twice as likely to be troubled by "cloudiness" of the water, while non-Bay users were more apt to indicate chemicals, harmful bacteria, or suds and film on the water as major problems.

While Bay users did not differ from non-Bay users in describing how clean or dirty was the Bay, they did differ significantly in choosing the most troublesome characteristics. Bay users, it seems, are more apt to select characteristics which are less publicized and perhaps less emotional than non-Bay users. Wind, waves, and turbidity ("cloudiness") are seldom mentioned when troublesome characteristics of the Bay are being discussed.

Yet Bay users, to a significant degree, would increase expenditures for improving water quality more than would participants who did not use the Bay. This may be related to the higher proportion of Bay users among those with the highest level of education. It may also be related to the higher proportion of Bay users among urban, and particularly Green Bay area residents who live closest to the areas of the Bay most polluted according to various criteria. These influences, no doubt are related to the between groups differences in the amount of increase in funds suggested for water quality improvement.

Group responses to reasons why they did not participate as often as they desired were compared. For both Bay and non-Bay participants, not owning a boat was the major reason for not doing as much boating as desired. Bay users, however, were three times more likely to be deterred by water being "too dirty" than were non-Bay users. This was also true when comparing groups responses on deterrents to more fishing and swimming. In each case Bay users were more likely deterred by "dirty water" than non-Bay users. The major reason for not doing as much fishing as was desired by Bay users was lack of success, followed by travel distance. For non-Bay users the order was reversed.

Among those who participated on the Bay and those who did not, travel distance was the most frequently mentioned reason cited for not doing as much swimming as desired. For Bay users, "dirty water" was second in frequency mentioned, followed by "water is too cold." These two responses were also mentioned frequently by non-Bay users, but in reverse order.

A final comparison of those who used the Bay and those who did not was made for participants in each of the three activities. Significant differences appeared in that 59 percent of all boaters used the Bay at least once while among fishermen and swimmers, only 39 and 40 percent respectively used the Bay one or more times.

Fishermen, Boaters and Swimmers

Each of the 1,502 participants were categorized into activity groups according to which activity they participated in most frequently. This is referred to as the major or primary activity. Fishing was the major activity of 842 of the 1,502 participants (56 percent) while 444 (30 percent) were primarily swimmers and 216 (14 percent) did more boating than either fishing or swimming. These three groups were compared using Chi square tests of significance to ascertain if and how these groups differed from one another.

Just as there is a significant difference in age between participants and non-participants, age differences between types of activity were also observed to be significant (Chi square $>.001$). This was true when comparing groups according to age of the household head, age of the youngest child, and length of residence in the five-county area which correlates highly with the more direct measures of age.

TABLE VI-2

PARTICIPANTS WHO USE THE BAY COMPARED TO THOSE WHO DO NOT

	X^2	df	Sig. Level
Age	6.14	5	NS
Age of youngest child	2.74	3	NS
Years residing in the 5-County Area	4.12	5	NS
Place of residence	66.44	8	.001
Residence Urban or rural	9.08	1	.01
Years of formal education	22.6	4	.001
Occupation type	30.32	7	.001
Employment status	14.38	4	.01
Where employed	4.92	3	NS
Sex	1.32	1	NS
Married or single	4.85	1	NS
Number of children	9.32	7	NS
Cars owned	11.21	7	NS
Bay use location determinants	2.77	3	NS
General description of Green Bay waters	3.15	4	NS
Bay Physical characteristics most bothersome	24.65	5	.001
Bay water quality characteristics most bothersome	20.40	4	.001
Fund increase for improving water quality	13.68	3	.01
Fund source	3.20	7	NS
More fishing desired	.18	1	NS
Deterrents to more fishing	23.32	7	.01
More boating desired	9.52	1	.01
Deterrents to more boating	25.92	5	.001
More swimming desired	.00	1	NS
Deterrents to more swimming	21.07	6	.01
Activity engaged in most frequently	30.33	2	.001

*NS - Not significant at the .01 level

Fishing was the most popular activity for each age group except the youngest, ie: those 18 through 24 years old. It was also observed that participation in fishing declined, but declined very gradually according to age group. Forty-five percent of those in the 25-34 age group were primarily fishermen while 32 percent of those 65 and older participated in fishing more often than boating or swimming. Since about 60 percent of those 65 and older do not participate in any of the three activities, then four out of five of those still active are primarily fishermen.

Between nine and twelve percent of each age group report boating as a major activity, except for the group 65 and over, among whom only five percent are primarily boaters. Similarly, only three percent of this age group are primarily swimmers, a marked decrease from the percent who are primarily swimmers in the 18-24 age group (44 percent) or even in the 55 to 64 group (12 percent).

Clearly, then, the influence of age on participation in water-based recreation activities varies greatly according to activity. The percentage of those who swim more than other activities declines substantially by age, while among those who fish or boat primarily, the decline is much more gradual. This observation is supported by observations reported later in the chapter, and is consistent with the two other age variables noted above. The highest proportion of those who report swimming as the major activity was among those whose youngest child was in the under five years old category and those who have lived in the area less than 20 years. By comparison, higher proportions of fishermen and boaters were found among seasonal residents (who tend to be older than permanent residents) and those who have resided in the area 21 or more years. Those whose children are in the older age groups are much more likely to be fishermen or boaters than swimmers.

Variations in the primary activity of respondents was also noted when groups were compared by place of residence and whether the residence was in an urban or rural area. Seasonal residents, in general, included high proportions of participants in each of the three activity types, partly because so few of this group were non-participants. Among permanent residents, the highest percentage of those for whom fishing is the primary activity resided in Oconto, Marinette and Kewaunee Counties. Over three-fourths of the participants from Kewaunee County reported fishing as their major activity. Those from Oconto and Brown Counties were

more apt to report boating as their major activity than were residents of other areas. Conversely, residents of the City of Green Bay were most likely to report swimming as their major activity, followed in order by residents of Brown and Marinette Counties.

While rural residents were more likely not to participate in any of these activities, a higher proportion of rural residents were fishermen than were urban residents. Urban residents were nearly twice as likely as rural residents to list swimming and boating as their major activity. Clearly then, statements to the effect that rural residents are less apt to participate in water-based recreation activities ignore important differences according to type of activity, and are misleading.

Variations in major activity were also observed when comparing respondents in different occoupational situations. Importantly, among those retired from the work force, only about five percent report boating as a major activity and another five percent are primarily swimmers. However, 38 percent report fishing as a major activity, or nearly the same proportion of fishermen as found among those employed full-time. For those working full-time, fishing was the major activity reported by every occupational category with the exception of those engaged in sales, among whom swimming was most likely the major activity. This is probably related to the major activity differences observed between sexes with females twice as likely to report swimming as their major activity than they were to report boating or fishing. Among those in professional and technical positions, swimming was as apt to be cited as the primary activity as was fishing. Fishing was reported as the major activity by 43 percent of the farmers, accounting for over 80 percent of the farmers who participated in any of the three activities, since nearly one-half of the farmers did not participate in any of the three. Boating was more frequently cited among craftsmen and foremen, clerical workers, and managers, officials and proprietors than those in other occupational categories.

The widespread popularity of fishing among all respondents was again observed when comparing major activity by years of formal education completed. Among high school graduates, fishing was the primary activity of 43 percent, the highest percentage of all education levels. Thirty-seven percent of those who had not attended high school were primarily fishermen, as were 31 percent of the college graduates. The popularity of fishing, then, varied little

with amount of formal education. For boating and swimming however, a marked linear relationship was observed: the higher the level of formal education, the greater the proportion for whom boating or swimming was the major activtiy. This was especially true for swimming. Only one percent of those who did not attend school beyond grade six reported swimming as their major activity while 37 percent of those who completed college reported more swimming occasions than either fishing or boating. College graduates were the only group to include more respondents for whom swimming, rather than fishing, was the major activity.

Significant differences were observed between fishermen, boaters, and swimmers in their describing Bay waters and its most troublesome characteristics. Generally, those reporting swimming as their primary activity were more likely to describe the Bay waters as "dirty" than were fishermen or boaters. Further, swimmers seemed more sensitive to conditions varying according to location. About 13 percent of the swimmers said their description would depend on the location on the Bay being referred to, compared to only six percent of the boaters and 9.6 percent of the fishermen.

All three activity groups reported unpleasant smell, junk on the bottom, and weeds to be the major problems among the physical characteristics. Significant differences were observed, however, in that swimmers were more likely to cite cold water and junk on the bottom and less likely to cite wind and waves as major problems than were boaters or fishermen. Boaters were slightly more apt to cite weeds as a major problem for Bay users and though winds were cited as problematical by only about 14 percent of the boaters, this characteristic was cited almost twice as often by boaters as by fishermen.

On the second question relating to water quality characteristics most disliked by the respondents, the differences observed between groups were not significant at the .01 level. However, since the differences observed were revealing, and since these differences were significant at the .025 level, brief mention is in order. Again, over 40 percent of each activity reported "dead fish" as the Bay characteristic they most disliked. About 16 percent of the respondents in each activity group cited suds, film or foam as the feature they disliked. The groups differed in proportions responding to the other three characteristics presented. Swimmers were more apt to cite harmful bacteria than were fishermen or boaters. Fishermen and swimmers were about twice as likely as boaters to cite chemicals as the most disliked characteristic of Bay waters. Boaters on the

other hand, were nearly twice as apt as fishermen or swimmers to report cloudiness as the most disliked characteristic.

In comparing primary activity group responses on the question of how much federal expenditures to improve water quality should be increased, significant differences were once again observed. Briefly, fishermen were more likely to reply "none" and less likely to reply "a lot" than were boaters and swimmers. Groups also differed in selecting the federal program they would take funds from in order to increase expenditures for water quality improvement. While space, international aid, and defense would be cut, in that order, by all three groups, swimmers were more apt to cut defense than were the other two activity groups and boaters were most apt to cut international aid. On both of these questions relating to the amount and source of funds for water quality improvement, interacting variables appear to be causing much of the difference observed. Noting that swimmers, and to a lesser extent boaters, are the youngest and have completed the most years of school, differences observed between primary activity groups can be more easily understood.

Participation Frequency Comparisons

For each of the three activities, Chi square statistics were calculated to determine in what way participants within each activity group vary according to participation frequency. Eight frequency categories, ranging from one or two times per year to 50 or more times, were used. Few differences were noted between frequency groups for any of the three activities. These are summarized briefly, taking fishing, boating, and swimming participation in order.

The highest rates of participation in fishing were found among seasonal residents and among those from Marinette County. Ready access to many desirable fishing locations, particularly the middle and northern sections of the Bay explains this finding. Rates of fishing participation among Door residents were also generally high, though Brown County residents participated somewhat more frequently. Participants from Kewaunee and Oconto Counties participated less frequently, despite abundant resources, than those from other areas. Perhaps these low rates reflect the rural farming influence on participation. It may also be the case that, since many household heads from these two counties commute to jobs in Green Bay, travel time may be cutting into time that might otherwise be spent fishing, especially early

TABLE VI-3

ACTIVITY GROUPS COMPARED: FISHING, BOATING, SWIMMING

	x^2	df	Sig. Level
Age	105.57	10	.001
Age of youngest child	57.56	6	.001
Years residing in the 5-County Area	67.12	10	.001
Place of residence	71.55	16	.001
Residence urban or rural	37.39	2	.001
Years of formal education	94.41	8	.001
Occupation type	73.29	14	.001
Employment status	74.82	8	.001
Where employed	15.38	6	NS
Sex	51.66	2	.001
Married or single	19.87	2	.001
Number of children	10.19	14	NS
Cars owned	20.60	14	NS
Bay use location determinants	6.92	6	NS
General description of Green Bay waters	23.66	8	.01
Bay physical characteristics most bothersome	35.64	10	.001
Bay water quality characteristics most bothersome	17.79	8	NS
Fund increase for improving water quality	22.32	6	.01
Fund source	43.07	14	.001
Participation on Green Bay	30.33	2	.001

*NS-Not significant at the .01 level

morning and early evening hours during the week.

The influence of the rural, farming character of different locations was also observed in other comparisons. Most of those self-employed, which includes most farmers, fished between one and seven times during the previous twelve month period. Only 40 percent of the farmers fished more than seven times during the twelve months prior to the survey, compared to 64 and 63 percent respectively among those in labor and sales occupation groups.

Though significant differences were noted between frequency of fishing and whether or not the person desired to do more, the percent desiring to do more was very high among all groups. Even among those who fished 50 or more times, 71 percent reported they would like to have done more. The highest percentage (89 percent) of fishermen desiring to do more was among those who fished eight to twelve times. The 71 percent figure for those who fished 50 or more times was the lowest.

The reasons for not doing as much fishing as desired (recalling that "not enough time" responses were not recorded) differed significantly according to participation frequencies. Those fishing infrequently reported being deterred by advanced age and ill health more often than did those who fished more often. Travel, crowding, and poor water quality were reported more often by those with the highest rates of fishing participation.

No differences were observed among fishermen in describing the Bay's waters or the particular characteristics they found most troublesome, regardless of participation frequency. However, a significant, linear relationship did exist in reporting how much funds should be increased for water quality improvement. The higher the participation frequency, the higher the proportion who would increase expenditures "a lot."

Boaters from Green Bay and Brown County along with seasonal residents had somewhat higher rates of participation than boaters from other counties studied. Boaters from Kewaunee, in addition to being proportionately fewest in number, also participated less frequently than those residing elsewhere. Boaters from Marinette also participated infrequently by comparison.

Significant age group differences were also observed among boaters with high and low rates of participation. Comparatively few respondents aged 65 or older did any boating and those who did boat boated less frequently than those in younger age groups. Among 18 to 24 year old respondents, a relatively large percent had done some boating during the previous twelve month period, but they too were infrequent boating participants. Those age 45 to 64 reported the highest number of boating occasions during the period covered.

Respondents who had attended or completed college included the highest proportion of participants in boating and had the highest rates of participation. This related to differences observed comparing participation rates by occupation types, with those in professional, technical, managerial, and related occupations having the highest participation rates. Noting also that households owning two or more cars were more apt to participate and participate frequently in boating indicates an income influence, though income was not measured directly.

Interestingly, however, there was no significant difference between boating participation frequency groups and the amount of increase in funds for water quality improvement suggested (as was the case among fishermen and swimmers). Partial explanation might be that in describing the Bay's waters and the characteristics most troublesome, frequency of participation made no significant difference. It should be noted, too, that boaters, along with swimmers, were more apt to suggest larger increases in water quality improvement funds than were fishermen.

The percentages of boaters in all frequency categories who said they wanted to participate more frequently was lower than for fishermen. Just over 50 percent of those who boated on more than 30 occasions during the previous twelve months indicated a desire to do more. Among those who participated only once or twice, 74 percent indicated a desire to do more. As would be expected, a majority of those who participated infrequently but desired to do more did not own a boat. Frequent boaters were more likely deterred from greater participation by travel, cost, and because the water was "too dirty."

Of some 30 variables tested only four varied significantly between swimming groups with different rates of participation in swimming. Among population characteristic variables, variations in swimming participation rates were related

significantly only to amount of formal education. Not only are those with higher levels of education most apt to participate in swimming, they are also the most frequent swimmers.

The number of respondents desiring to swim more frequently than they did, varied significantly with the existing level of participation. Between 63 and 75 percent of respondents in each frequency group desired to do more swimming except in the two highest frequency groups. There the percent decreases to 52 and 46 percent respectively.

For each of the three activities, the highest percent of respondents desiring to participate more frequently than they did occurred among those who participated between eight and twenty times during the twelve month period. It is apparent that it is at about this frequency that the combination of most interest and least satiation is highest. But it is especially clear, particularly for fishermen, that there is a very substantial demand for fishing, boating, and swimming that is not expressed in participation data. Should the deterring forces be overcome, participation rates would increase by a large factor.

As a final note to the comparisons based on frequency of participation in each of the three activities, no differences were observed between frequency groups on questions related to the Bay's water quality or characteristics which trouble users, or in terms of the accessibility and attractiveness of Bay recreation areas.

Primary Location Comparisons

For each of the three major activities, responses of participants were examined to determine the type of water body they participated on most frequently. Location types for which participation data was recorded were Green Bay, elsewhere on Lake Michigan, inland lakes, and streams and rivers. For swimming participation, pools was an additional location alternative. As the summary tables in the Appendix indicate, inland lakes was the "primary" location of participation for each of the three activities, though among boaters the Bay was almost as popular.

Among fishermen, primary location of participation varied significantly according to age, with those aged 55 or older more apt to use the Bay primarily than were younger age groups. Fishermen aged 25 to 44 were more likely to fish on Lake Michigan than those in other age groups. It was also noted that

fishermen with the highest formal education level were least likely to use the Bay and most likely to fish on Lake Michigan, while those completing comparatively fewer years of school were most likely to fish streams and rivers. These findings are probably related in that older people are less likely to have completed high school and in that the investment required for boat, motor and tackle for fishing on Lake Michigan is greater than for fishing streams and rivers or for smaller inland lakes.

Primary fishing participation locations also varied, as would be expected, according to respondent's place of residence. Over three-fourths of those from Marinette and Oconto Counties did most of their fishing on inland lakes and on streams and rivers. Kewaunee fishermen were most apt to fish primarily on Lake Michigan while nearly two of three Door County fishermen fished the Bay primarily. About half of the fishermen from Green Bay and Brown County did most of their fishing on inland lakes, while about 20 percent used the Bay primarily and about 15 percent fished most frequently on Lake Michigan. Except for residents of Green Bay and Brown County, the relationship between place of residence and the places fished most frequently appears to be one of proximity and ready access. For residents of Brown County and particularly the Green Bay metropolitan area, however, this observation does not apply. The only plausible explanation for inland lakes being more common as primary location is that the lower Bay, adjacent to the metropolitan area, is not regarded as an alternative and other fishing locations are as close to these residents as are the middle and northern Bay areas.

This interpretation appears to be consistant with other between group (primary location) differences found to be significant. For example, those who fished on the Bay more frequently than other locations were more likely to reply being deterred from further participation by lack of success and by dirty water than were those who fished other locations mostly. Those fishing locations other than the Bay were more likely than Bay fishermen to report travel distance and not owning a boat as deterrents to participating more frequently.

Those who fished on Lake Michigan more than other water bodies were most likely (63 percent) to describe the Bay as "dirty." About half of those who used the Bay or inland lakes primarily described the Bay as dirty, while only 41 percent

of the stream or river fishermen described the Bay this way. Some of this variation may be explained by the fact that a large portion of those who fish streams and rivers primarily reside in Marinette and Oconto Counties. By most criteria, Bay waters along these middle and northwestern shores is "cleaner" than along the southern and southeast shoreline.

Those who used the Bay as their primary location were more likely to report cold water, winds, and waves as problematical than were those who did most of their fishing elsewhere. Bay users were also least likely to report unpleasant smell and junk on the bottom as problems. It appears, too, that the features of Bay waters considered problematical is based on comparing the Bay with other water areas with which the respondent was familiar. As an example, those who fished mostly on Lake Michigan were less apt to regard waves as a problem for Bay users than were those who fished other areas.

As a further refinement of group differences according to location where participants took part in these activities, those who fished on the Bay were divided into five location groups. This was done by having respondents indicate on a map of the Bay where on the Bay they fished most frequently. Few significant (.01 level) differences were observed.

Bay locations used for fishing did differ significantly according to place of residence. Eighty-seven percent of those who used Region I primarily (southernmost region) were from Green Bay and Brown County. Eighty percent of the Region II users were from Green Bay and from Brown and Oconto Counties. Most of those who fished in Region III primarily were from Door County (34 percent) and Green Bay (26 percent). Two-thirds of the seasonal residents who fished Green Bay reported doing most of their Bay fishing in Region III. Much of this seasonal resident fishing activity is launched from the Sturgeon Bay area, located in this region. Marinette residents made up 59 percent of the users who did most of their fishing in Region IV. Only 20 Bay fishermen fished Revion V primarily, twelve of whom resided in Green Bay.

Though not statistically significant (except at the .02 or .05 levels) other observed differences indicate differing reactions of Bay fishermen to Bay waters, especially those who use the southernmost regions primarily. Regions I and II users were most likely to cite "unpleasant smell" as the major problem for Bay users, were most likely to say funds for improving water quality should be increased "a lot," and were most likely to indicate they used this area because it was "close by."

Among participants in boating, the same analyses were made comparing groups categorized by where they did most of their boating, and comparing those who used the Bay by location of Bay use. Seasonal residents and those from Door and Oconto Counties were more apt to use the Bay as their primary location than were those residing in other areas. Residents of Green Bay and Brown and Marinette Counties more often cited inland lakes as the primary boating location followed closely, in each case, by the Bay. The few Kewaunee County boaters reported Lake Michigan, inland lakes, and the Bay, in that order of mention, as the location of most of their boating activity.

The major difference in boating use location for different age groups was that the youngest age group (18-24) were more likely to boat on streams or rivers primarily than were those in the older age groups. This may be a function of the size, and therefore cost, of the boat and motor available. Among those 65 or older, boating participation drops off sharply, especially on inland lake and Bay locations, these being far the most popular sites.

In describing the waters of Green Bay in general terms, differences (.02 level) were observed between primary use location groups. Bay boaters and those boating primarily on inland lakes were more likely to describe the Bay as "dirty" than were Lake Michigan or stream and river users. The latter were least likely of the four primary location groups to describe the Bay as "dirty." Bay boaters were more likely than other location users to state funds for water quality improvement should be increased "a lot" (30 percent) while Lake Michigan boaters were least apt to say "a lot" (17 percent).

The most troublesome characteristics of the Bay, according to all use location groups were unpleasant smell and dead fish. Bay users differed from other use location groups on being more likely to cite wind, waves, and cloudiness as major problems than were users of other water bodies.

For all boaters, regardless of the location they use most frequently, not owning a boat was the major deterrent to doing as much boating as they desired. Significant between group differences were found in that Bay users were more likely than other use location groups to report being deterred by dirty water and less likely deterred by travel distance. It would appear that part of this response

pattern is from those residing near, and referring to, the more southerly regions of the Bay.

As with locations on the Bay used for fishing, significant between groups differences were noted in comparing Bay use location by place of residence. Ninety-two percent of those who reported Region I (the southernmost portion) as the area on the Bay they boated most frequently, were from Green Bay and Brown County. Oconto County boaters made up 50 percent of the group boating most frequently in Region II, while Region III users were comprised mainly of seasonal residents and those from Door County as well as Green Bay residents. Half of the Region IV users were from Marinette County.

In describing the waters of the Bay on the clean to dirty continuum, users differed significantly according to area on the Bay used most frequently. None of those boating on the two southernmost regions reported the Bay was "clean," while 70 percent of the Region I boaters said "dirty" as did 58 percent of the Region II users. Of those boating in Regions IV and V, 42 and 46 percent respectively described the Bay as "dirty." Bay boating location groups also differed in the proportions identifying different characteristics of the Bay most troublesome. The further south on the Bay respondents reported boating, the higher the proportion citing unpleasant smell as the major problem and the lower the proportion mentioning water being too cold as the major problem. Region III users were more apt to mention wind, waves, and weeds as problems than were those boating most frequently at other Bay locations.

Finally, those who used Region I primarily were more likely to state they were deterred from boating more frequently by dirty water and by travel distance than were users of other regions. As with deterrents to fishing, the major obstacle for all Bay boating location groups was not owning a boat. Expense was most frequently mentioned by those boating primarily at Regions III and IV, but this was mentioned by only about ten percent of each location group.

With the exception of Door County residents, inland lakes were the most frequently mentioned primary location for swimming for all residents groups. About 50 percent of the residents from Green Bay and from Brown, Oconto, and Marinette Counties swam at inland lakes more often than other locations. About 75 percent of those using streams and rivers as

primary swimming locations were from Marinette and Oconto Counties, clearly a function of the quality and quantity of such resources in these counties. The highest proportion of swimmers using pools primarily were from Green Bay and from Brown and Kewaunee Counties. Only 32 respondents swam in Lake Michigan more frequently than at some other location.

Significant swimming location differences were observed when compared with levels of education and with type of occupation. A major difference occurs in the use of swimming pools as the primary location. College graduates are almost twice as likely to swim mostly at pools as any other group. As would be expected in comparing use location by occupation type, those in professional and technical positions swam at pools primarily more than any other group. Obviously, most respondents in this category were college graduates. It is likely that, in addition to access to a pool, this group of respondents probably has the highest proportion of people who know how to swim.

Fifty-three percent of those who did most of their swimming on the Bay described its waters as "dirty." Though this appears to be quite a high percentage, it is lower than the percent of inland lake, Lake Michigan, and pool users who describe the Bay as "dirty." About 40 percent who swim mostly at stream and river locations describe the Bay as "dirty." Again, this may be related to the fact that much of the stream and river swimming occurs among Oconto and Marinette County residents, and the water quality of the Bay along these shores is generally higher than along the southern and southeastern shores.

In identifying those characteristics of the Bay's water quality problematical for swimmers, those using the Bay more frequently reported cloudiness and dead fish than respondents who swam primarily at some site other than the Bay, though pool users mentioned dead fish almost as often as Bay users. Bay and pool users were also least likely to say chemicals was the major problem.

In reporting the amount of fund increases to improve water quality, the differences between groups was significant, but only at the .05 level. The tendency was that inland lake and stream and river swimmers were more apt to say "none" and less "apt" to say "a lot" than were those who swam mostly on the Lake, Bay, or at pools.

For all swimming location groups, especially those swimming most often on Lake Michigan, having to travel too far and water being too cold were the two most frequently mentioned deterrents to further participation. Of the five location groups, Bay users were least likely to say travel distance was the major deterrent. For those using the Bay, Lake Michigan, and streams or rivers, dirty water was the third most frequently mentioned deterrent.

Among those swimming on the Bay, comparisons were made between groups using different sectors of the Bay for swimming. The patterns of use by place of residence was much like the patterns for fishing and boating. That is; nearly all those who swam most frequently in Sector I were from Brown County or Green Bay. Sector II users were mainly from these areas and Oconto County. Seasonal and Door County residents did most of their Bay swimming in Region III and most Marinette County Bay users used Sector IV on the Bay. It was also observed that while most residents used Bay areas immediately adjacent, 77 percent of the Bay swimmers from Green Bay traveled north to Sectors II through V with the most frequently used sites distributed quite evenly over the Bay. This was true, to a somewhat lesser extent for Brown County residents. It should also be noted that among those who swam most frequently in Sectors I and II, the major use location determinant was that the area was close by, while Sector III and IV users most frequently mentioned good facilities and not being "too crowded" as major location determinants.

In choosing among characteristics considered most problematic by groups using different Bay locations for swimming, some interesting variations occur. Unpleasant smell was most frequently mentioned by users of Sectors II, IV, and I, in that order. This is consistant with other findings for Sectors I and II but not IV. Since much of the Sector IV swimming use is in the Marinette County area, some of the respondents may be responding to municipal and industrial odors eminating from uses of the adjacent shore and along the Menominee and Peshtigo Rivers. Sector III swimmers were more apt to reply winds, waves, and weeds as problems than were users of the other areas.

CHAPTER VII

SUMMARY

Water Based Recreation

More than two-thirds of the 2,174 heads of households interviewed participated one or more times in fishing, boating, or swimming during the twelve months prior to the survey. The vast majority of those who participate in one activity also participate in one or both of the other activities as well.

As Table VII-1 illustrates, fishing is by far the most popular of the three activities. The percentage of respondents who participated in fishing, swimming and boating was 53, 44, and 34 respectively. These figures, however, distort the relative importance of each activity. Of the 69 percent of the total sample who participate in any of the three activities, fishing is the activity most frequently participated in by 39 percent, while 20 percent are primarily swimmers, and 10 percent primarily boaters.

Similarly, the frequency of participation in fishing, as well as swimming, was much higher than for boating. The mean number of occasions per participant, estimated from grouped data, was 16.5 for fishermen, 17.5 for swimmers, and 10.5 for boaters.

In addition, the data suggests an intensity or level of devotion to fishing greater than that found for swimming which, in turn, appeared to be greater than that for boating. Table VII-2 comparing for each of the three activities for each level of participation, the percent who would like to participate more, illustrates the point. In addition, all participants were asked whether they regarded their present frequency of activity as being "many" or "a few" occasions. By comparing these responses

TABLE VII-1

ACTIVITY ENGAGED IN MOST FREQUENTLY

	Fishing				Boating				Swimming			
	N	% of Total Sample (2174)	% of all Participants (1502)	% of Fishermen (1152)	N	% of Total Sample (2174)	% of all Participants (1502)	% of all Boaters (738)	N	% of Total Sample (2174)	% of all Participants (1502)	% of all Swimmers (966)
Total Sample	2174	100			2174	100			2174	100		
Did part of 12 mo.	1152	53	77	100	738	34	49	100	966	44	64	100
As primary activity	842	39	56	73	216	10	14	29	444	20	30	46

TABLE VII-2

DESIRE TO FISH, BOAT, OR SWIM MORE FREQUENTLY
BY CURRENT PARTICIPATION FREQUENCY

Current Participation Frequency	Fishing		Boating		Swimming	
	Number	Percent Desiring More	Number	Percent Desiring More	Number	Percent Desiring More
None	1022	35	1436	36	1028	26
1 - 2 occasions (past 12 months)	199	75	238	74	163	69
3 - 7	313	86	243	78	267	70
8 - 12	179	89	89	80	133	63
13 - 20	136	82	61	74	123	76
21 - 30	110	82	43	77	93	68
31 - 50	111	76	26	50	73	54
over 50	104	71	38	53	114	47

TABLE VII-3

LOCATION USED MOST FREQUENTLY: FISHING, BOATING, SWIMMING

	Fishing		Boating		Swimming	
	Number	%	Number	%	Number	%
Inland Lakes	505	44	305	41	463	48
Green Bay	254	22	301	41	166	17
Streams & Rivers	249	22	99	13	84	09
Elsewhere Lake Michigan	144	13	33	04	32	03
Pools	--	--	--	--	221	23

to the actual frequency for each respondent, it was possible to estimate how many is "many" and how few is "few." Among fishermen, "many" was an average of 29 occasions and "few" was about five occasions. The approximate mean values of many and few were 26 and six swimming occasions and 20 and four boating occasions during the previous twelve month period.

Location of Water-Based Recreation

Table V-1, page 69, summarizes the number and percent of fishermen, boaters, and swimmers who use the Bay of Green Bay and also those who use the Bay more than some other water body. Table VII-3 shows the number and percent of fishermen, boaters, and swimmers using each of the different water body types as the primary location of their activity.

Among fishermen, inland lakes were twice as popular as both the Bay and streams and rivers. Of all those reporting one or more fishing occasions during the twelve months preceding the study, 22 percent fished on the Bay more frequently than elsewhere.

Inland lakes were three times more popular than the Bay among swimmers. With pools as alternative location sites for swimmers, the Bay ranked third in popularity as the most frequently used water resource, with only 17 percent of the swimmers using the Bay more frequently than other sites.

The use location pattern for boating was much different. A total of 305 boaters used inland lakes primarily, but an almost identical number (301) used the Bay more frequently than other water bodies. The Bay and inland lakes each accounted for about 41 percent of the boating use.

It is quite clear that the location of use patterns for each of the three activities is related to the quality and characteristics of Green Bay water. Boating is a "non contact" water-based activity and compared to fishing and swimming, is less demanding of water quality. Fishing is an "indirect contact" activity, more demanding of certain water qualities (oxygen, clarity, temperature, etc., depending on species being fished). Swimming, a "direct contact" water recreation activity, is the most demanding of water quality on most parameters. Boaters are more likely to use the Bay than are fishermen; fishermen

TABLE VII-4

BAY LOCATION USED MOST FREQUENTLY:
FISHING, BOATING, SWIMMING

	Fishing		Boating		Swimming	
Sector	N	%	N	%	N	%
1 - Southern	69	19	80	23	46	18
2 - Southcentral	69	19	85	24	50	19
3 - Central	117	31	94	27	64	25
4 - Northcentral	98	26	74	21	77	30
5 - North	20	5	15	4	20	8
Total	373	100	348	99	257	100

are more likely to use the Bay than are swimmers.

As Table VII-4 indicates, the pattern holds among those who use the Bay for fishing, boating, and swimming. Boaters are more apt to use the more southerly sectors of the Bay than are fishermen. Fishermen are more apt to use more northerly regions, and swimmers are most apt to use more northerly regions, even though the water temperature is considerably lower than in more southerly regions.

Influence of Population Characteristics

Age

As expected, the relationship between age and participation is inverse and linear. The older the age group the less likely its members participate in fishing, boating, and swimming. Of the three activities, fishing was most popular among all age groups except the youngest (18-24 years), among whom proportionately more were swimmers.

Very few of the respondents age 65 or older participated in swimming (nine percent) or boating (14 percent). Fishing activity, however, remained very popular with this age group, some 33 percent of whom fished one or more times during the twelve months preceding the study. The influence of age, then, varies with each activity. Swimming activity decreases most markedly; boating, and especially fishing activity declines much more gradually. In addition to the proportion in each age group who participate in each activity, the frequency of participation declines with age in a similar pattern. That is, among all fishermen frequency of participation in fishing does not decline with age but among boaters and swimmers there is a noticeable decline.

Variations of primary location of fishing and boating activity (but not for swimming) was also significantly related to respondents' age. Those age 55 or older were more likely to do most of their fishing on the Bay than were those in younger age groups. The reverse was true for boating, with those in the two oldest age groups being least likely to do most of their boating on the Bay. Among those who used the Bay for fishing, boating, or swimming, the location on the Bay was not significantly related to age variations.

Though age group differences in relating specific characteristics of Bay waters which were most bothersome were not significant, the general description of Bay waters along a clean-dirty continuum did vary significantly with age. Fund increase levels to improve water quality also varied with age. The younger the age group, the more likely were its members to describe the Bay as "dirty" and the more likely were they to say funds for improving water quality should be increased "a lot." The relationship was linear on both comparisons. As would be expected, the younger age groups were more apt to cut back defense spending for reallocation to water quality improvement than were those in other age groups.

Education

The relationship between extent of formal education and the proportion of fishermen, boaters, and swimmers differed with each activity. As with age, the relationship between education and participation in fishing was not a strong one, though proportionately fewer college graduates participated in fishing than those with less formal education. College graduates boated in greater proportion than those whose schooling terminated earlier. This was even more true with swimming. In terms of total participation, the relationship with education level is direct and linear: the higher the education, the higher the proportion of participants. Other population characteristics relate to education and interact in these relationships. Age, occupation type and probably income, though no income measure was included in the survey, are some obvious examples.

As with the proportion of participants, frequency of participation in fishing did not differ significantly according to years of school completed. Generally and significantly, the frequency of participation in boating and swimming increased as formal education level increased.

A linear relationship was also found between level of formal education and proportion of Bay users. This is a function, in part, of higher levels of participation, regardless of location, among those with the most schooling. Swimming location varied, too, in that college graduates were two to four times more likely to swim mostly at pools than were those with other levels of education. No doubt exposure to pools, the ability to swim, and

younger age are related to this finding.

No significant difference between education level and areas boated most frequently were observed, but main (primary) fishing locations did vary somewhat. Inland lakes were used about equally among those with the most and fewest years of school completed. Those who completed college were most apt to fish on Lake Michigan mostly, while those completing six or fewer years of school were most apt to fish most frequently on streams or rivers. It seems likely that income is related to this finding if one considers the expenditures required for a lake-worthy boat and lake fishing tackle with expenditures required for stream or river fishing.

Swimmers and boaters who used the Bay differed in that those with the highest levels of education concentrated much more of their activity in Regions III and IV (Figure 1, page 78) than did those who completed fewer years of school. Those with less formal education more frequently used the two southern most regions. Fishing locations on the Bay did not differ significantly.

In describing the waters of Green Bay, those with the highest levels of education were most likely to report "dirty" or "it depends on the location." In response to specific parameters considered most bothersome, they were least likely to report "dead fish" as a major problem and most likely to cite harmful bacteria as problematical. Since those with the highest education levels do the most swimming, the comparatively high proportion who cited harmful bacteria as a major problem is consistant.

As one would hope, the higher the level of education, the higher the fund increase suggested for water quality improvement. In addition, college graduates were much more likely to cut defense and international aid programs for this effort than were those who completed fewer years of education. The proportion who would cut these two programs was related to level of education in direct linear fashion. For cuts from the space program, the relationship was linear but inverse.

Place of Residence

Residents of Door and Kewaunee Counties were least apt to participate in one or more of the three water-based activities. The seasonal residents group, as would be

expected, included the highest proportion of fishing, boating, and swimming participants. Among permanent residents of the five-county area, Oconto, Marinette, and Kewaunee County residents included the highest proportions of fishermen; Brown and Oconto County residents the highest proportion of boaters; Green Bay and Brown County residents the highest proportion of swimmers.

Frequency of participation in each of the three activities varied in a pattern identical to the proportion of participants in each location group. Seasonal residents participated most frequently, Kewaunee County residents least frequently, with Green Bay and Brown County residents having comparatively high rates of participation among permanent residence groups.

Except for Door County residents, who are most apt to fish mainly on the Bay, and Kewaunee residents who fish most often on Lake Michigan, inland lakes is the main type of fishing resource for all other residents including seasonal (most of whom have camps or cottages in Oconto and Marinette Counties). Inland lakes were more popular than other use sites by a ratio of two or three to one. Streams and rivers were also very popular fishing sites, especially among Marinette and Oconto County residents and those from outside the five-county area.

Boating locations used most often were the Bay and inland lakes for most residence groups, although about 90 percent of the boating activity of Door County residents was on the Bay side of the Door Peninsula. Marinette residents, and to a lesser extent Green Bay and Brown County residents, were somewhat more likely to boat on inland lakes mostly than they were to boat on the Bay.

The differences between place of residence and swimming locations used most frequently for swimming followed much the same pattern. Inland lakes were more popular than other sites by ratios of two, three, or four to one. The exceptions were among Door County residents, about 50 percent of whom swam on the Bay more frequently than elsewhere, and among Kewaunee residents of whom nearly half of the swimmers swam most frequently at a swimming pool. About 30 percent of the swimmers from Green Bay and Brown County swam most frequently in pools.

Among those who fished, boated, or swam on the Bay one or more times during the twelve months preceding the

TABLE VII-5

PHYSICAL CHARACTERISTICS OF BAY MOST BOTHERSOME BY PLACE OF RESIDENCE

	N	Water Too Cold	Un-pleas-ant Smell	Winds	Waves	Junk On Bottom	Too Many Weeds
Brown County	335	2.7%	56.1%	6.9%	5.4%	19.7%	9.3%
Green Bay & Suburbs	706	5.4	56.1	6.8	4.4	16.6	10.8
Door County	192	10.4	33.9	12.0	3.1	21.9	18.8
Kewaunee County	129	9.3	49.6	7.0	1.6	23.3	9.3
Marinette County	462	8.9	34.4	2.6	2.8	27.3	24.0
Oconto County	230	6.1	51.7	6.1	4.8	17.0	14.3
Seasonal Residents	120	12.5	20.8	10.8	6.7	22.5	27.5

TABLE VII-6

WATER QUALITY CHARACTERISTICS OF BAY MOST BOTHERSOME BY PLACE OF RESIDENCE

	N	Water Too Cloudy	Chemicals	Harmful Bacteria	Suds, Film Foam	Dead Fish
Brown County	335	11.0%	14.0%	17.9%	11.6%	45.4%
Green Bay & Suburbs	706	15.0	12.2	21.0	12.2	39.7
Door County	192	14.6	6.3	8.9	8.3	62.0
Kewaunee County	129	6.2	11.6	8.5	16.3	57.4
Marinette County	462	7.1	10.4	15.4	18.2	48.9
Oconto County	230	19.6	15.7	9.1	15.7	40.0
Seasonal Residents	120	14.2	8.3	17.5	20.8	39.2

survey, differences in Bay locations used were directly related to place of residence. Except for Bay users from Green Bay and Brown County, whose use locations were distributed over the five sectors running northward up the Bay, Bay use locations chosen tended to be those in comparatively close proximity to place of residence.

In general descriptions of Green Bay waters, residents from different locations differed significantly as Table V-4, page 80 shows. It appears that most respondents judge the entire Bay on the basis of Bay conditions nearest their place of residence. Residence groups also differed significantly in identifying those characteristics about the Bay considered most troublesome or problematical. These are summarized in Tables VII-5 and VII-6. It bears repeating that "dead fish" and "unpleasant smell" were each selected as the most troublesome feature by nearly one-half of all respondents, though the lists on which these characteristics appeared had five and six alternatives respectively. This is highly significant practically as well as statistically. Marine environment investigators should refer to findings of such significance as "tidal facts."

Table V-5, page 87, summarizes, by place of residence the amount respondents would increase federal expenditures for water quality improvement efforts. Those from Brown and Oconto Counties and the City of Green Bay recommend the largest increases. This must be, in part, a response based on the generally degraded condition of the lower Bay, to which their residence is in close proximity. In identifying federal programs to be cut in order to make funds available, residents of Green Bay and Brown County and seasonal residents were more apt to select International Aid and Defense programs and less apt to cut Space programs than were residents of other places included in the study.

Bay Water Quality Problems

Most of the 2,174 respondents regarded the waters of Green Bay as dirty. Answers to an open ended question (How would you describe the waters of Green Bay?) are summarized as follows:

Clean	97	4.5%
Reasonably Clean	342	15.7%
Depends on Bay Location	197	9.1%
Somewhat Dirty	446	21.4%
Dirty	1,072	49.3%
Total	2,174	100.0%

Comparatively, the lower Bay regions are "dirty" by various criteria and, of course, that is where most of the people in the five-county area live. Of the 1,072 respondents who described Bay waters as dirty, 703 (68 percent) were residents of Green Bay and Brown County. In general, the conditions which are thought to prevail in areas closest to the respondent's place of residence were projected to the entire Bay.

Between Group Comparisons

Table VII-7, page 123, provides a summary of differences in how respondents categorized by activity type, amount, and location, regarded the Bay. These are differences in perception using perception in the sense of view or opinion. Differences observed, if any, are briefly explained in the brief paragraphs which follow taking each comparison in numerical order.

1. Those who participated in fishing, boating or swimming at least once during the twelve months prior to the survey were compared to those who did not. Participants were more apt to describe the Bay as dirty and to indicate that their description depended on the Bay location being referred to. Non-participants were almost twice as likely as participants to regard Bay waters as clean or reasonably clean. Of the Bay access and attractibility determinants of location of use, participants were more apt to cite good facilities and not being too crowded as major determinants while non-participants were more apt to cite proximity and "inexpensiveness" as major use location determinants. Participants were more apt to regard wind, wave, and bottom quality conditions as physical characteristics most problematical for Bay users while non-participants were more apt to cite unpleasant smell as the major problem. Unpleasant smell was seen as the major problem by both groups. Both groups also regarded

TABLE VII-7

GROUP DIFFERENCES ON BAY DESCRIPTION, ACCESS, AND MOST BOTHERSOME CHARACTERISTICS

Groups Compared	Description of Bay waters	Bay Access and Attractibility	Most Bothersome Physical Characteristics of Bay Waters	Most Bothersome Bay Water Quality Characteristics
1 - Participants compared to non-participants	.001*	.01	.01	.001
2 - Participants who used the bay compared to those who did not	NS**	NS	.001	.001
3 - Comparison by activity most frequently engaged in (ie: fishing, boating, or swimming)	.01	NS	.001	NS
4 - Comparison by locations used most frequently for fishing	.01	NS	.001	NS
5 - Comparison by locations used most frequently for boating	.02	NS	.001	.01
6 - Comparison by locations used most frequently for swimming	.001	.02	.02	.01
7 - Comparison by bay locations used most frequently for fishing	NS	.02	.02	NS

TABLE VII-7 (cont'd)

Groups Compared	Description of Bay Waters	Bay Access and Attractibility	Most Bothersome Physical Characteristics of Bay Waters	Most Bothersome Bay Water Quality Characteristics
8 - Comparison by bay locations used most frequently for boating	.01	NS	.01	NS
9 - Comparison by bay locations used most frequently for swimming	NS	.02	.01	NS
10 - Comparison by frequency of participation in fishing	NS	NS	NS	NS
11 - Comparison by frequency of participation in boating	NS	NS	NS	NS
12 - Comparison by frequency of participation in swimming	NS	NS	NS	NS

*Chi square significance level
**Not Significant at .02 level

dead fish as a major water quality problem with non-participants citing this problem more frequently than participants (54% to 41%). Participants were more likely to cite cloudiness, harmful bacteria, chemicals, and surface film or foam as major problems.

2. Only those who participated one or more times in fishing, boating or swimming were divided into two groups; those who participated one or more times on the Bay and those who did not use the Bay at all. No difference was observed in general descriptions of the Bay or the use location determinants. Both groups regarded smell as the major problem with non-Bay participants somewhat more apt to cite this problem. Non-Bay participants were also more apt to cite weeds and debris on the bottom as problems than were Bay users. Those who participated on the Bay more frequently noted wind, cold water and waves as major problems for Bay users. Both groups also regarded dead fish as the major problem on a second set of water quality problem variables in almost identical proportions. Groups differed in that Bay users were nearly twice as apt as non-Bay users to cite cloudiness as the major problem.

3. Participants were divided into the three major activity groups according to the activity they participated in most frequently, with a fourth group comprised of non-participants. In addition to differences between non-participants and participants already noted, important differences were noted between the three activity (user) groups. Swimmers were most likely to describe the Bay as dirty and least likely to regard it as clean. They were also twice as apt to report that the description depended on the particular Bay location. Boaters were least likely to note differences according to location. Boaters and fishermen differed only slightly in the proportions of each describing the Bay as clean, reasonably clean, somewhat dirty, or dirty. In noting the physical characteristics of the Bay most troublesome, the three activity groups agreed and differed little in the proportion of respondents citing unpleasant smell as the major problem. Groups did differ in proportions citing other problems. Boaters most frequently (of the three user groups) cited weeds, winds and waves as major problems. Swimmers were most apt to cite cold water and debris on the bottom as most troublesome to Bay users. Fishermen were least apt to cite cold water and most apt to cite unpleasant smell as most troublesome. Though the differences between

fishermen and boaters in citing cold, and between all three groups in citing smell were negligible. Interestingly, response proportions for fishermen were "in between" those of swimmers and boaters; boating being a non-body contact recreation, and fishing being a partial body contact activity -- or "in between."

4. All respondents who participated in fishing one or more times were placed in one of four categories according to the type of water body they fished most frequently, referred to earlier as primary location. Differences between these fishing location groups in their perception of Bay waters were then calculated and tested. Surprisingly, those who fished on the Bay primarily were less apt to reply that the general description would depend on the particular Bay location than were fishermen who did most of their fishing on Lake Michigan or inland lakes. Lake Michigan users were most apt to describe the Bay as dirty (63 percent) while those fishing streams and rivers were least apt to describe the Bay as dirty (41 percent). Just over half of those fishing on Green Bay or on inland lakes described the Bay in this way. Of the four location of use groups, Bay fishermen were least likely to regard unpleasant smell and junk on the bottom as major problems but were most likely to regard water temperature (too cold), wind, and waves as problems. Lake Michigan fishermen, as should be expected, were least likely to regard waves as a problem for Bay users. On the second set of major Bay use problems, Bay users were most apt to cite cloudiness as a problem and least apt to regard film or foam on the water as major problems. Other variations between use location groups were not large and the differences not significant at the .02 level.

5. As before, participants were divided into four groups according to primary boating location. Those boating on streams and rivers primarily were much less likely to regard the Bay as dirty as were those boating other locations primarily, including those boating on the Bay most frequently. Lake Michigan boaters were three to four times more likely to report the Bay was clean and twice as likely to say the description depended on the Bay location referred to as were boaters using other locations primarily. In citing problematical physical characteristics of Bay waters, those boating most frequently on the Bay were most apt to cite winds and waves as problems and least apt to cite unpleasant smell,

though among all boating location groups, unpleasant smell was the most frequently cited Bay use problem. As with Bay fishermen, Bay boaters more frequently noted cloudiness as a major problem for Bay users than did boaters boating other locations primarily. Of the four groups, those who boated most frequently on the Bay were least apt to regard chemicals in the water as a major problem.

6. The same division of participants according to location used most frequently was made for swimming, with the addition of a category for swimming pools. In describing the Bay along the continuum of clean to dirty, those swimming in Lake Michigan primarily and those swimming most frequently in pools were most apt to describe the Bay as dirty (66% and 61% respectively). Interestingly, Lake Michigan swimmers were also most apt to rate the Bay as clean, though, just under ten percent responded in this way. Swimmers using stream and river locations most frequently were least apt to describe the Bay as dirty (40 percent) but most apt to describe it as somewhat dirty (31 percent). It appears from this that the description of the Bay is based on comparing it to the area swimmers used most frequently. Much the same phenomena appears among fishermen and boaters, though perhaps not as clearly. In identifying determinants of Bay use locations, significant group differences were noted. Curiously, almost identical proportions of Bay users and pool users responded to each of the four alternatives, ranking good facilities first and proximity second. Lake Michigan users were least apt to cite proximity as the major use location determinant and most apt to reply "inexpensiveness." Perhaps this reflects differences in fee structures between Point Beach State Forest on Lake Michigan and that at State Parks on the Bayside of the Door Peninsula. Those swimming stream and river areas were most apt to cite good facilities as the major determinant of Bay use location. In citing the physical characteristic of Bay waters most problematical Bay swimmers were most apt to say wind was the major problem and least apt to reply unpleasant smell. Lake Michigan swimmers most frequently cited cold as a major problem for Bay users, and like bay users, were less likely than other swimming location groups to regard unpleasant smell as the major problem. But again, of the six physical characteristics thought to be problematical, unpleasant smell was mentioned most frequently by all location groups. The same was true for the second set of water quality properties considered most problematical with dead fish most frequently cited as the major Bay use problem by all swimming

location groups. As with fishing and boating, those swimming on the Bay more frequently than elsewhere were most apt to regard cloudiness as a major Bay use problem. Bay and pool users were least apt to regard chemicals as a problem, with pool users much more apt to regard harmful bacteria as a Bay use problem than Bay users.

7, 8, 9. Fishermen, boaters, and swimmers who used the Bay were placed in one of five Bay use location groups (Figure 1, page 78) and perceptions between these groups were compared. Only among boaters was there a statistically significant difference between Bay use location groups. Generally, the further north on the Bay one does most of one's boating, the less likely a description of dirty was reported. This same pattern was noted among fishermen and swimmers, but the relationship was not as strong. This may be attributed to the fact that fishermen and swimmers are slightly less apt to use the lower Bay regions than are boaters.

Among fishermen and swimmers, Bay use location groups differed in identifying the major Bay use location determinants. For both activities, users of Regions I and II (the two southernmost regions) were most apt to cite proximity as the major use location determinant, while those participating most frequently in Regions III and IV and to some extent V (though Region V received proportionately little use) cited good facilities as the major location determinant more frequently than other groups. It is interesting to note that each of the three activity groups differed according to Bay use location in identifying problematical physical characteristics for Bay users, but did not differ in responding to a second set of water quality parameters considered troublesome.

The Bay areas used most frequently for fishing, boating and swimming are summarized by percent of use in Table VII-4. Table VII-9, page 142, gives the percent response to Bay physical characteristics considered problematical for users for each activity and each region. Of the six problems, waves were, in general, least frequently cited as the major problem. Except among swimmers using the northernmost region primarily, unpleasant smell was most frequently cited as the major problem for each activity group in each location. This is most frequently cited by Region I and II users (lower Bay) and least frequently cited by those using Region III primarily. Region III users were most apt to cite weeds as a problem. Water being too

TABLE VII-8

AREAS OF THE BAY USED MOST OFTEN: FISHING, BOATING, AND SWIMMING

	N	1 (South)	2 (South Central)	3 (Central)	4 (North Central)	5 (North)
Fishing	373	19%	18%	31%	26%	5%
Boating	348	23%	24%	27%	21%	4%
Swimming	257	18%	19%	25%	30%	8%

TABLE VII-9

PHYSICAL CHARACTERISTICS OF BAY MOST BOTHERSOME
BY BAY USE LOCATION: FISHING, BOATING, SWIMMING

		N	Un-pleasant Smell	Junk On Bottom	Weeds	Wind	Water Too Cold	Waves
Fishing								
Region	1	70	53%	15%	10%	7%	6%	9%
	2	69	48	13	13	16	4	7
	3	117	34	14	23	16	7	6
	4	97	35	25	12	8	16	4
	5	20	45	30	0	15	5	5
Boating								
Region	1	80	59	20	6	10	1	4
	2	85	48	13	16	13	2	7
	3	94	31	12	25	20	5	6
	4	74	40	20	16	7	11	5
	5	15	33	27	13	13	13	0
Swimming								
Region	1	46	39	26	11	15	4	4
	2	50	50	12	16	10	8	4
	3	64	27	22	19	17	6	9
	4	77	45	22	8	6	16	1
	5	20	15	55	5	5	15	5

cold was more frequently cited as problematical the further north was the Bay use activity located. The figures for Region V are to be regarded with some caution as the actual number of participants using this region more frequently than other areas was relatively small (20 persons each for fishing and swimming and 15 for boating).

10, 11, 12. In the comparison, participants in fishing, boating, and swimming were grouped in seven frequency of participation categories. Comparing perception of Bay waters on this basis resulted in no statistically significant differences for any of the three activity groups. It may be that those who participate most frequently are most adamant in their perceptions, but it appears that those perceptions do not differ significantly from those held by less frequent participants.

CHAPTER VIII

CONCLUSIONS AND COMMENTS

Conclusions

Without replicating the detail of earlier chapters and the appendix, general conclusions relating to the objectives outlines in Chapter IV are presented here.

Recreation Participation

Of the total 2,174 respondents, 1,502 or 69 percent participated at least once in fishing, boating, or swimming during the 12 months preceding the study. Seasonal residents, as would be expected, had the highest proportion of participants; water recreation resources being very important in the selection of seasonal residence location.

Water-based recreation is cumulative in that those who participated in one of the activities tended to also participate in one or both of the other activities as well.

In terms of number of participants and frequency of participation, fishing is by far the most popular of the three activities. Swimming ranks second and pleasure (motor) boating third. Of the total sample, 53 percent fished, 44 percent swam, and 34 percent boated at least once during the preceding 12 month period. Of the 69 percent who participated in one or more activities, 39 percent were primarily fishermen, 20 percent were primarily swimmers, and 10 percent were primarily boaters. In addition, comparisons between fishing, swimming, and boating participants suggests that fishermen are more intensely involved in their activity than swimmers or boaters.

Location of Participation

The primary focal point of water-based recreation activity for residents of the five-county area is inland lakes. Exceptions to this generalization are that Door County residents are oriented to the Bay of Green Bay more than to other water resources, and that most participation in boating is divided equally between Bay locations and inland lakes.

Among swimmers, only 27 percent swam in the Bay at least once, and only 17 percent swam at Bay locations more than at some other water resource type. Among fishermen, 32 percent used the Bay at least once and 22 percent used the Bay more frequently than other areas. Forty-seven percent of the boaters boated on Green Bay at least once, and 41 percent boated on the Bay more frequently than elsewhere.

Boating participation on the Bay was rather evenly distributed over Sectors I through IV (see Figure V-1, page 69). For fishing and swimming, Sectors III and IV were more heavily used than Sectors I and II. The northern most Sector received relatively little use for any of the three activities. Despite colder water temperatures, proportionately more swimming took place at Sector V than either boating or fishing.

Participation and Location Influences

Age and formal education are strongly related to participation and participation frequency. This is especially true for swimming and to a slightly lesser extent for boating. The influence of these traits on fishing participation is much less marked. The data for fishing suggests that reduced participation in the later years may be as much related to social aspects of the life cycle as much as to age itself in that retirement and separate residence for children turned adult reduce opportunities for those in older age groups.

Location of activity is related more to location (place) of residence than other variables. This is evident in data on whether or not the Bay is used and where on the Bay activity takes place. Importantly, however, proximity is much more important to Bay users than to those who participate at other water resources areas, especially inland lakes.

That is, non-Bay participants are willing to accept the inconvenience of less proximate facilities in exchange for other conditions they seek. For fishermen, the element of success exerts a strong influence on location of participation.

Deterrents to Participation

Most of the unexpressed (latent) demand comes from those who already participate. Most non-participants express no desire to do so while those who do participate desire to do more. For fishing, 80 percent of the participants and 33 percent of the non-participants desire to participate more frequently than they did. Similarly, among boating participants 74 percent express a desire to do more while 36 percent of the non-participants desired to do some boating. For swimming, the figures are 65 percent and 26 percent.

Major deterrents to further participation were different for different groups categorized according to whether or not they participated and in which activity. Among those desiring to do more boating, both participants and non-participants most frequently mentioned not owning a boat as the major deterrent. For participants, having to travel too far was the next most frequently mentioned deterrent while non-participants reported that cost and lack of interest among other family members were major deterrents. Age and health problems and inability to swim were most often mentioned as deterrents by those who did no swimming but would like to do some. Among those who swam but wanted to do more, travel distance was a major deterrent and 16 and 15 percent respectively replied that the water was too cold and the water too dirty. Those who did no fishing but desired to most frequently mentioned lack of interest among family members and age or health problems as deterrents to activity. Fishermen most frequently cited travel distance and lack of success as major reasons why they did not participate more frequently. For reasons discussed earlier, responses of the "I don't have enough time" variety were not recorded.

Bay Description and Troublesome Characteristics

Forty-nine percent of the respondents rate the Bay as "dirty" and another 21 percent rated it "somewhat dirty."

Only 9 percent of the respondents said this description depended upon the particular Bay location being referred to and the remaining 20 percent described the Bay as "clean" or "reasonably clean." Participants in fishing, boating, and/or swimming were more apt to describe the Bay as "dirty" than were non-participants, and among participants, Bay users were slightly more apt to rate the Bay as "dirty" than were non-Bay users.

The proportion of respondents who described the Bay as "dirty" varied greatly according to place of residence. Only 28 percent of the Marinette County residents described the Bay this way, while over two-thirds of the Green Bay and Brown County residents described the Bay as dirty. It is clear from this that respondents attribute Bay conditions most proximate to their residence to the entire Bay.

The general description of the Bay also varied between groups according to use location categories. Those who did most of their fishing, boating or swimming on streams and rivers were less apt to describe the Bay as dirty than were users of other water bodies, including Bay users.

Overwhelmingly, the characteristics of the Bay most troublesome from the standpoint of water-based recreation were dead fish and smell. These were mentioned most frequently by virtually every group regardless of how classified. Non-participants were somewhat more apt to cite these two problems than were participants, and among participants, non-Bay users were slightly more apt to cite these problems than were Bay users. Those who use the Bay more frequently cited cloudiness, winds, waves, and cold water as troublesome characteristics than did non-participants or non-Bay participants.

Bay Description and Bay Use

Unquestionably, the recreational use of Green Bay is related to the respondent's description of the Bay and its problems, or, in this sense, their perception of the Bay. Nearly half of the respondents described the Bay as "dirty." Those living adjacent to the southern end of the Bay were much more apt to describe the Bay this way than were those residing near more northerly areas. Bay users were much more apt to cite proximity as the major reason for participating on the Bay than were those who used other areas. Less than one-third of all participants used the Bay at

all, and less than one-fourth of all participants used the Bay more frequently than other locations. Sectors III and IV were used more heavily than the more southerly Sectors, despite the fact that about 60 percent of the sample (and population) reside at the southern end of the Bay.

Boaters were more apt to use the Bay than were fishermen; fishermen were more apt to use the Bay than swimmers. Further, boaters were more apt to use more southerly portions of the Bay than were fishermen; fishermen were more apt to use more southerly portions of the Bay than were swimmers. Travel distance was more a deterrent to additional fishing and swimming activity than to boating. Bay users were more apt to say that conditions have changed, and for the worse, than were those using areas other than the Bay. Further, Bay users were more apt to report that water quality deterioration may soon result in having to alter the location of their activity or frequency of participation than were users of other water areas. All these data support the conclusion that respondents' description of the Bay and its most troublesome characteristics for recreation users (or would be users) was closely related to kind, amount, and location of recreation use of the Bay.

Some Implications

Obviously, there has been a large dislocation of recreational use of Green Bay, particularly in the southern regions and particularly for body contact and partial body contact recreation. This is not, however, a recent phenomenon, but one of gradual erosion over a period in excess of the four decades for which some documentation is available.

The burden of problems now characterizing the lower Bay is carried by every individual, but especially by the recreational user who has either stopped participating, participates less frequently, or shifted his activity to a different location. Consequently, the individual pays in time and money for the dislocation and the community pays in a variety of ways as well. Loss of revenue accruing from recreational use, loss of revenue due to suppressed value of adjacent properties, and loss of weekend and seasonal traffic and trade are examples of economic loss to the community. There is also the loss in aesthetics and other amenities which contribute to the quality of the recreational experience and to everyday life. Given the area of the Bay and the size of the population nearby, the cost of degraded water quality conditions is very substantial.

On matters of recreation activity patterns and locations of use, it is clear that non-participants differ from participants and that user groups differ from one another. In dealing with water-based recreation, water quality perception, location of use and related matters, these differences must be taken into account. Similarly, the influence of age, education, and place of residence in determining type, amount, and location of recreation activity must be ascertained for projecting and predicting total present and future activity patterns.

Different groups are deterred by different conditions as they view them. Either the perception or the condition must be changed, depending on how closely the perception matches actual conditions, if recreation potential is to be fully developed. It is clear from this study that something must be done about the problems of smell and dead fish if the recreation potential of the Bay is to be maximized. The first problem has been completely ignored in criteria and standard development; the second has received but little more attention.

Different groups have different levels of awareness and concern regarding water quality problems, different levels of confidence that conditions can be improved, and different levels of ability and willingness to contribute to the upgrading process. Plans and action programs which do not recognize and reflect these differences, are likely to fall short of achieving the hoped for result.

There are, of course, limits on what can be done to maximize recreation use of the Bay. Winds, waves, water temperature, and other conditions bothersome to some users or would be users will continue to be bothersome. Other deterrents, such as crowding, may become much more difficult problems than at the present. But they would be, in a sense, happier problems. When there is no available oxygen in the water and consequently no fish, crowds of fishermen will not be a problem. When a secchi disc vanishes in two feet of water, or a foot vanishes into a foot of muck, crowds of swimmers will not be a problem. When gasses are released from bottom deposits, fish and algae decay on the surface, and the air carries odors from many sources, crowds of boaters will not be a problem. The limits to the Bay's recreation potential will never be reached until problems such as these are overcome.

Some Uses of the Data

Economists, planners, state and local officials, educators and numerous other interested parties are invited to utilize this data to the fullest extent. The possibilities appear almost endless. Only a few suggestions are presented here.

A very good approximation of manifest and latent demand, by user group, by use location, by place of residence and other categories can be attained by applying the appropriate sample percentage to the population total. Such data would have a variety of uses. Dollar values of recreational equipment ownership and rental can be generated for the region and sub-parts of the region. Values attributed to recreation user days for different activities, as established by the U. S. Water Resources Council and used by various public water management agencies, can be applied to the demand figures to estimate economic impact from water-based recreation for the region and for various water resource locations within it.

Place of residence and extent and location of use data is useful in matters relating to travel time, distance, and direction with many implications for the management of water resources as well as transportation facilities.

Latent demand and participation deterrent data can be viewed and weighed in light of planned and unplanned changes in available time, income, and mobility, water quality as monitored and as perceived, modifications in travel, access, shore facilities, and the like.

Data on water quality and characteristics as perceived and as monitored can be used by researchers, educators, media personnel and others to determine in what areas and by what means problems and their ramifications should be translated if meaningful action is to result.

Data comparing group responses can be used to more carefully focus on the problems and concerns of each group and to direct information and appeals in more appropriate and productive ways.

Finally, state and local officials can use this data to determine what water quality problems and characteristics, both actual and perceived, can be alleviated to an

extent enhancing the recreation potential and use of available water resources.

Some Cautions

If possible uses of the data are many, so too are possible misuses. Some general cautions, then, are in order.

It must be constantly borne in mind that the sample is comprised of heads of households. In terms of the total population, women and young people are underrepresented. Generalizations from the sample to the population can only be on the basis of households and household heads.

In sorting respondents into groups, data is generated and reported for sub-sets of the population. Thus, care must be taken to insure that the words and figures are appropriately interpreted. Numbers, response frequencies, percentages, and the like, vary with each sub-set and cannot be applied to other sets.

It is always tempting, in studies of this nature, to assume cause-effect relationships. While it is likely that some such relationships are reflected in the data, the conditions for determining such relationships are not present, and no statement regarding such relationships can be drawn from the data. They may only be assumed or hypothesized.

The data must be taken in whole and in context. Most data is deceptively complex and easy to misconstrue and oversimplify. It is sometimes useful to refer to the exact sequence and wording of questions in the instrument to more fully understand exactly what the response does and does not say. The schedule of questions is in Appendix C.

Finally, it should be remembered that what seems obvious to one is not equally obvious to another and certainty is a rare commodity. People and their problems are enormously complex and often enormously frustrating. The alternative of simplicity and certainty is neither possible nor desirable.

APPENDIX A

TABLE A-1

POPULATION CHARACTERISTICS BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Urban residence	69.8	95	59	42	38	59	57	94
Years lived in 5-county area								
None	5.3	0	0	0	0	0	0	96
0 to 3	7.7	11	4	8	0	11	3	0
4 to 10	10.3	15	8	6	2	13	7	2
11 to 20	10.6	17	11	3	4	10	7	2
21 to 35	23.4	24	26	26	33	23	25	1
Over 35	42.7	33	51	57	60	44	57	0
Age of respondent								
18-24 years	5.6	8	7	5	3	4	4	2
25-34 years	17.8	22	20	17	17	15	16	4
35-44 years	18.4	19	27	16	23	13	13	22
45-54 years	19.9	21	14	17	16	20	27	24

TABLE A-1 (cont'd)

POPULATION CHARACTERISTICS BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
55-64 years	17.7	16	16	19	16	17	22	27
65 or over	20.7	15	17	27	24	30	19	21
Male respondents	82.8	81	87	78	75	82	86	94
Married respondents	85.1	89	87	81	85	75	91	91
Number of children								
Does not apply (never married)	6.1	6	6	8	4	6	6	7
None	9.1	9	9	13	9	10	4	7
1 child	11.9	13	9	8	9	14	12	11
2 children	22.5	24	22	20	22	20	23	30
3 children	20.2	19	20	23	24	18	22	24
4 children	12.1	12	9	16	16	13	13	7

TABLE A-1 (cont'd)

POPULATION CHARACTERISTICS BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
5 children	7.3	8	6	5	5	8	8	7
6 children	4.2	4	7	3	3	3	5	4
7 or more children	6.6	4	12	4	8	7	9	2
Age of youngest child								
Does not apply	15.1	15	14	21	13	16	10	15
Under 5 years	21.0	24	27	17	22	16	22	7
5 - 14 years	24.1	24	28	24	25	20	24	25
15-21 years	11.1	14	9	8	7	9	10	17
Over 21 years	28.7	22	22	30	33	37	33	36
Education of respondent								
Grade school (1-6 years)	7.5	4	6	8	8	12	12	6
Some high school (7-11 years)	30.1	26	29	39	40	33	30	22

TABLE A-1 (cont'd)

POPULATION CHARACTERISTICS BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Completed high school (12 years)	35.7	37	40	37	37	29	41	32
Some college (1-3 years)	15.2	18	13	11	10	18	10	17
Completed college (4 or more yrs)	11.4	16	12	5	5	8	7	22
Employment status								
Employed full-time	69.0	72	78	59	65	60	73	74
Student	.9	2	1	1	0	1	0	1
Housewife	7.3	8	2	13	15	8	7	1
Retired	18.3	13	16	20	16	27	18	22
Not presently employed full-time	4.5	5	3	8	5	5	2	2

TABLE A-1 (cont'd)

POPULATION CHARACTERISTICS BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Employment sector								
Private enterprise	42.5	53	47	32	29	33	38	47
Government agency	9.4	11	8	10	3	11	5	12
Private non-profit agency	1.6	2	2	1	5	0	0	0
Self-employed	15.5	6	20	17	27	16	30	15
Not presently employed full-time	30.9	28	22	41	35	40	27	26
Occupation category								
Does not apply	31.0	28	22	41	35	40	27	26
Professional-Technical	10.0	14	10	3	8	8	7	15
Manager, Official, Proprietor	10.8	10	16	7	6	9	12	18
Clerical	2.3	4	1	2	2	2	1	2

TABLE A-1 (cont'd)

POPULATION CHARACTERISTICS BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Sales	4.5	7	4	3	0	3	2	7
Craftsman, foreman	6.5	6	5	10	3	7	6	7
Skilled, semi-skilled	18.2	17	18	16	18	20	18	21
Service worker, Laborer	10.3	13	14	9	5	7	10	3
Farmer	6.5	1	9	9	23	4	17	1

TABLE A-2

COTTAGE OWNERSHIP, LOCATION, AND USE BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Own camp or cottage	18.4	14	25	9	4	13	12	94
Location of camp or cottage								
Does not apply	81.5	86	75	91	96	87	88	6
Brown County	.6	1	2	0	0	0	0	0
Door County	3.6	2	4	7	1	0	0	32
Kewaunee County	.1	0	0	0	1	0	0	0
Marinette County	7.1	3	6	1	1	10	3	48
Oconto County	4.6	4	8	1	2	1	8	14
Other Wisconsin	1.9	3	4	1	0	0	1	0
All other	.6	1	0	1	0	1	0	0

TABLE A-2 (cont'd)

COTTAGE OWNERSHIP, LOCATION, AND USE BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Days per year camp or cottage used								
Does not apply	81.5	86	75	91	96	87	88	6
1 - 7 days	1.0	0	2	2	0	1	0	1
8 -14 days	1.2	1	2	3	2	0	2	0
15-21 days	1.1	1	1	1	1	1	0	4
22-30 days	2.8	3	4	0	1	3	0	12
31-45 days	2.3	2	3	1	0	1	2	13
Over 45 days	10.2	7	14	3	1	6	8	65

TABLE A-3

OWNERSHIP OF CAR AND OTHER RECREATION EQUIPMENT: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Cars in household								
None	8.2	7	8	10	8	12	9	2
1 car	52.3	52	47	62	52	54	49	53
2 cars	32.4	34	36	20	34	29	37	35
3 cars	5.6	6	7	7	5	4	5	7
4 cars	1.2	1	1	1	1	1	1	2
5 cars	.2	0	0	1	0	0	0	1
Fishing rods and reels owned								
None	28.5	30	29	34	33	29	24	7
1	9.8	8	9	11	12	12	9	10
2	15.1	14	11	17	17	16	23	9
3	12.3	12	14	10	13	10	17	8

TABLE A-3 (cont'd)

OWNERSHIP OF CAR AND OTHER RECREATION EQUIPMENT: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
4	10.6	12	10	8	8	9	10	17
5	6.6	8	6	4	5	6	4	11
6, 7	10.6	8	11	9	8	11	10	23
8, 9	2.1	2	3	1	2	2	2	4
10 or more	4.5	5	7	5	2	3	1	10
Pairs of water skis owned								
None	90.1	90	87	94	98	94	85	77
1 pair	5.5	5	7	5	0	3	11	12
2 pairs	2.6	3	5	0	2	1	3	3
3 pairs	1.1	1	1	1	0	1	1	4
4 pairs	.2	0	0	0	0	0	0	2
5 pairs	.1	0	0	0	0	0	0	1
6, 7 pairs	.2	0	0	0	0	1	0	0
8, 9 pairs	.1	0	0	0	0	0	0	1

TABLE A-3 (cont'd)

OWNERSHIP OF CAR AND OTHER RECREATION EQUIPMENT: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Camping trailers or units owned								
None	91.3	91	93	96	97	90	86	92
1	8.2	9	7	4	3	10	13	7
2	.4	0	0	1	0	1	0	2
Boats owned								
None	72.2	76	74	81	91	72	65	27
1	20.5	19	18	11	9	23	27	47
2	5.2	5	6	5	1	4	6	17
3 or more	2.0	1	3	2	0	2	3	8

TABLE A-4

BAY DESCRIPTION, ACCESS, AND CHARACTERISTICS MOST BOTHERSOME BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Description of Green Bay Water								
Clean	4.5	1	2	17	3	6	3	9
Reasonably clean	15.7	5	7	21	16	31	21	25
Somewhat dirty	21.4	17	16	17	26	25	34	25
Dirty	49.3	69	65	36	50	26	36	28
Depends on location	9.1	8	9	8	5	13	7	13
Most important access dimension								
Area close by	31.3	38	34	27	30	19	41	23
Not too expensive	11.1	11	11	11	8	10	16	13
Good facilities	36.2	33	40	32	33	45	30	34
Area not too crowded	21.4	19	15	30	29	26	14	30

TABLE A-4 (cont'd)

BAY DESCRIPTION, ACCESS, AND CHARACTERISTICS MOST BOTHERSOME BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Esthetic Feature Most Problematical								
Water too cold	6.9	5	3	10	9	9	6	13
Unpleasant smell	46.7	56	56	34	50	34	52	21
Wind	6.5	7	7	12	7	3	6	11
Waves	4.1	4	5	3	2	3	5	7
Junk on bottom	20.5	17	20	22	23	27	17	22
Too many weeds	15.3	11	9	19	9	24	14	27
Characteristics most disliked about Bay								
Cloudy water	12.6	15	11	15	6	7	20	14
Chemicals	11.7	12	14	6	12	10	16	8
Harmful bacteria	16.1	21	18	9	9	15	9	17

TABLE A-4 (cont'd)

BAY DESCRIPTION, ACCESS, AND CHARACTERISTICS MOST BOTHERSOME
BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Suds, film or foam	14.1	12	12	8	16	18	16	21
Dead fish	45.5	40	45	62	57	49	40	39

TABLE A-5

AMOUNT AND SOURCE OF FUNDS FOR WATER QUALITY IMPROVEMENT
BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
How much should federal expenditures be increased to improve water quality								
None	20.7	16	17	31	32	26	14	18
A little	32.4	31	28	43	40	36	27	27
Quite a bit	26.0	26	30	16	20	27	29	31
A lot	20.9	27	25	10	8	11	30	24
From what program would you take this money								
Education	2.2	1	2	6	3	2	4	1
Transportation	2.7	2	4	4	4	3	2	1
Defense	14.6	17	17	11	5	12	13	17
Health	1.1	2	1	1	0	0	0	0

TABLE A-5 (cont'd)

AMOUNT AND SOURCE OF FUNDS FOR WATER QUALITY IMPROVEMENT
BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
International Aid	27.5	31	30	19	21	25	20	40
Space	47.6	42	39	55	62	55	53	36
Agriculture	1.1	1	2	2	2	0	1	0
Community Development	3.2	3	3	3	2	2	6	5

TABLE A-6

SUMMARY OF FISHING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Occasions fishing last								
12 months on Green Bay								
None	82.8	84	82	72	92	86	81	77
1 or 2 times	6.0	6	6	9	5	4	5	10
3 - 7 times	5.4	5	5	6	1	5	9	5
8 -12 times	2.2	2	2	4	2	2	2	2
13-20 times	1.5	2	1	4	1	1	0	3
21-30 times	.8	0	2	2	0	1	1	0
31-50 times	.6	0	1	1	0	1	0	2
Over 50 times	.6	0	1	2	0	0	1	1
Occasions fishing last								
12 months elsewhere on								
Lake Michigan None	85.9	82	85	80	71	97	93	78
1 or 2 times	5.2	7	5	8	9	1	4	6

TABLE A-6 (cont'd)

SUMMARY OF FISHING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
3 - 7 times	4.0	5	5	4	8	1	2	7
8 -12 times	1.9	3	2	3	5	0	0	2
13-20 times	1.2	2	1	2	2	0	0	2
21-30 times	.6	1	0	1	3	0	0	2
31-50 times	.5	0	1	1	1	0	0	1
Over 50 times	.6	0	0	3	2	0	0	0
Occasions fishing last 12 months on inland lakes								
None	67.4	63	64	92	85	69	57	55
1 or 2 times	7.7	9	9	4	8	7	8	5
3 - 7 times	10.7	12	12	3	5	10	15	13
8 -12 times	5.5	6	5	1	1	4	10	11
13-20 times	3.7	5	3	0	1	4	4	7
21-30 times	2.3	3	4	0	0	3	0	3

TABLE A-6 (cont'd)

SUMMARY OF FISHING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
31-50 times	1.5	1	2	0	1	1	3	2
Over 50 times	1.2	1	1	0	0	1	1	4
Occasions fishing								
last 12 months on stream								
or river None	73.0	81	78	91	81	58	58	62
1 or 2 times	7.5	7	8	4	5	9	13	7
3 - 7 times	9.4	6	7	2	11	16	16	13
8 -12 times	4.1	3	4	1	2	5	10	3
13-20 times	2.5	1	3	1	1	4	3	7
21-30 times	1.6	1	1	1	1	3	0	4
31-50 times	.8	0	0	1	0	2	0	2
Over 50 times	1.0	1	0	1	0	2	0	1
Total fishing occasions								
last 12 months None	47.3	49	48	60	58	46	40	22

TABLE A-6 (cont'd)

SUMMARY OF FISHING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
1 or 2 times	9.1	9	11	11	13	8	5	10
3 - 7 times	14.3	15	10	12	12	15	20	13
8 -12 times	8.2	7	8	4	4	10	11	13
13-20 times	6.2	6	6	3	2	5	11	13
21-30 times	5.0	5	5	5	6	4	4	11
31-50 times	5.1	5	6	2	2	6	5	8
Over 50 times	4.8	4	5	4	3	6	3	9
Location of most fishing								
Green Bay	11.7	11	12	24	5	9	11	17
Elsewhere on Lake Michigan	6.7	7	7	9	25	1	1	13
Inland Lake	23.3	27	26	2	5	21	33	33
Stream, river	11.5	6	7	5	9	23	17	15
None	46.8	49	48	59	57	46	38	21

TABLE A-6 (cont'd)

SUMMARY OF FISHING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Fishing location on Green Bay								
Does not apply	82.8	84	82	71	94	86	81	77
1	3.2	5	7	0	2	1	1	0
2	3.2	2	4	3	1	0	13	4
3	5.4	4	5	21	2	1	2	15
4	4.5	3	0	3	2	12	3	2
5	.9	2	1	2	0	0	0	2
Reason for not fishing last year								
Does not apply (if 1 or 2 above)	53.5	51	53	41	43	54	63	79
Not interested	28.7	31	26	34	32	28	28	11

TABLE A-6 (cont'd)

SUMMARY OF FISHING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Never catch anything	2.8	2	4	6	3	2	0	2
Must travel too far	2.9	5	4	1	3	2	0	2
Good spots too crowded	.3	0	0	1	2	0	0	0
Too old or poor health	6.4	5	6	8	6	10	4	2
Too expensive	1.5	1	1	3	5	1	0	0
Water too dirty	1.1	2	2	2	2	0	0	0
Don't own a boat	2.9	2	4	4	5	3	2	2
Would like to have fished more often	59.4	56	64	51	61	58	67	67
Reason for not fishing more often								
Does not apply (if no above)	40.2	43	33	49	39	42	33	33

TABLE A-6 (cont'd)

SUMMARY OF FISHING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Too old or poor health	5.7	3	4	5	5	12	7	1
Too far to travel	15.3	20	21	5	8	5	20	25
Don't own a boat	10.4	10	10	12	18	12	9	3
Good spots too crowded	2.4	1	1	2	3	5	3	3
Never catch anything	11.6	10	12	13	8	11	12	23
Too expensive	4.0	3	4	8	8	3	3	5
Water too dirty	2.3	3	3	2	3	1	3	1
Family not interested	8.0	7	11	4	9	9	10	5
Reason for fishing area preferred								
Does not apply (none in last 3 yrs)	37.4	42	35	47	47	35	31	14
Close by	22.6	15	23	22	21	28	25	46
Catch more fish	20.8	20	19	20	16	21	32	19

TABLE A-6 (cont'd)

SUMMARY OF FISHING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Not too crowded	4.7	5	4	4	6	5	2	10
Good launch or marina facilities	1.5	2	1	1	2	1	2	1
Cleaner water	9.6	13	15	4	6	6	7	7
Pretty spot	3.4	4	3	3	2	4	1	3
Condition change since first fishing there								
Does not apply (if none last 3 yrs)	37.4	42	34	47	47	35	31	14
No change	34.6	37	36	22	21	38	39	30
Better	4.9	4	5	6	15	4	1	6
Worse	23.1	17	25	24	18	22	29	50

TABLE A-6 (cont'd)

SUMMARY OF FISHING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Action if water conditions deteriorated								
Does not apply (if none last 3 yrs)	37.4	42	34	47	47	35	31	14
Stay in same place but not fish as much	5.2	5	5	1	1	8	3	13
Move to some place on Green Bay	5.0	7	1	6	3	6	5	1
Go to some place not on Green Bay	33.6	33	37	15	26	34	47	39
Wouldn't bother me	2.2	1	3	4	2	2	2	2
Give up fishing	16.7	12	19	28	22	15	12	31

TABLE A-6 (cont'd)

SUMMARY OF FISHING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Are water conditions								
bad enough for above change								
Does not apply (if none last 3 yrs)	37.4	42	34	47	47	35	31	15
Already have	3.0	2	6	3	1	2	3	8
May have to soon	17.4	15	16	22	15	17	22	27
Not likely	42.1	42	44	28	38	46	43	49
Are fish safe to eat from this spot								
Does not apply (if none last 3 yrs)	37.4	42	34	47	47	35	31	15
Yes	59.5	55	61	52	49	62	65	84
No	3.1	3	5	1	5	3	3	1

TABLE A-7

SUMMARY OF BOATING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Occasions pleasure boating last 12 months on Green Bay								
None	84.1	83	81	78	96	91	81	75
1 or 2 times	7.4	9	7	9	4	5	7	4
3 - 7 times	4.2	4	4	7	0	2	7	7
8 -12 times	1.2	1	1	2	0	0	1	2
13-20 times	1.0	1	2	1	0	0	1	2
21-30 times	.7	1	0	2	0	0	0	3
31-50 times	.2	0	0	0	0	0	0	1
Over 50 times	1.2	1	3	1	0	0	2	4
Occasions pleasure boating last 12 months elsewhere on Lake Michigan								
None	95.7	96	96	93	94	99	98	83

TABLE A-7 (cont'd)

SUMMARY OF BOATING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
1 or 2 times	1.9	2	2	3	3	1	1	4
3 - 7 times	1.4	1	1	3	2	0	0	7
8 -12 times	.6	1	0	1	1	0	0	4
13-20 times	.1	0	0	0	0	0	0	1
21-30 times	.1	0	0	0	0	0	0	0
31-50 times	.1	0	0	0	0	0	0	1
Over 50 times	0	0	0	0	0	0	0	0
Occasions pleasure boating last 12 months on inland lakes								
None	82.5	78	78	98	95	86	78	75
1 or 2 times	6.8	8	10	2	4	6	7	7
3 - 7 times	5.6	6	6	0	0	6	7	12
8 -12 times	2.3	3	2	0	0	1	6	3
13-20 times	.9	1	2	0	0	0	1	1

TABLE A-7 (cont'd)

SUMMARY OF BOATING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
21-30 times	.8	1	1	1	0	1	0	0
31-50 times	.5	1	1	0	1	0	0	1
Over 50 times	.5	1	1	0	0	0	0	1
Occasions pleasure boating last 12 months on stream or river								
None	92.2	94	94	99	96	90	83	90
1 or 2 times	2.7	3	1	0	2	4	3	2
3 - 7 times	3.2	2	3	0	2	4	7	6
8 -12 times	1.1	1	1	1	0	2	3	1
13-20 times	.6	0	1	0	0	0	3	1
21-30 times	.1	0	0	0	0	0	0	0
31-50 times	.0	0	0	0	0	0	0	0
Over 50 times	.1	0	0	0	0	0	0	0

TABLE A-7 (cont'd)

SUMMARY OF BOATING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Total pleasure boating occasions last 12 months								
None	66.1	64	61	76	85	72	60	44
1 or 2 times	11.0	13	12	9	9	12	7	8
3 - 7 times	11.2	11	13	7	3	10	13	22
8 -12 times	4.1	4	4	3	2	2	7	9
13-20 times	2.8	2	4	1	0	2	7	5
21-30 times	1.9	2	2	3	0	1	3	3
31-50 times	1.2	2	1	1	1	0	1	3
Over 50 times	1.7	2	4	1	0	0	2	5
Location of most boating								
Green Bay	14.0	15	16	22	4	8	15	24
Elsewhere on Lake Michigan	1.6	1	2	1	5	1	0	5

TABLE A-7 (cont'd)

SUMMARY OF BOATING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Inland lakes	14.2	18	20	1	5	12	13	20
Stream, river	4.7	3	3	0	2	7	13	7
None	65.6	63	59	76	84	73	59	44
Boating location on Green Bay								
Does not apply	84.0	83	81	78	96	91	80	75
1	3.7	6	9	0	2	0	0	1
2	3.9	3	4	2	0	0	18	3
3	4.3	3	3	18	1	0	1	18
4	3.4	4	2	0	1	8	0	2
5	.7	1	1	2	0	0	0	1
Reason for not boating								
Does not								

TABLE A-7 (cont'd)

SUMMARY OF BOATING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
apply (if 1 or 2 above)	34.2	36	41	23	77	27	41	53
Not interested	31.6	29	26	36	42	35	33	29
Too old or poor health	9.2	7	9	10	9	15	7	2
Water too dirty	.9	1	1	1	2	1	0	0
Don't own a boat	19.7	22	20	23	24	16	17	13
Have to travel too far	1.7	2	1	2	2	2	0	3
Too expensive	2.8	2	3	5	3	3	2	0
Would have liked boating more often	48.9	52	57	44	58	58	49	55
Reason for not boating more often								
Does not apply (if no above)	50.3	47	41	56	58	57	49	54

TABLE A-7 (cont'd)

SUMMARY OF BOATING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Don't own a boat	25.7	28	30	25	17	24	25	14
Places too crowded	1.8	2	0	2	1	2	5	5
Water too dirty	3.9	5	7	2	2	1	3	7
Unpopular with family	6.2	5	7	7	8	7	7	4
Too expensive	5.4	6	5	7	7	3	6	2
Must travel too far	6.6	7	9	2	7	5	5	13
Reason for boating area preferred								
Does not apply (if none last 3 yrs)	48.7	51	41	58	63	52	40	27
Good launch or marine facilities	3.6	3	5	5	2	3	6	2
Close by	22.9	17	24	24	16	19	42	38
Water is cleaner there	10.2	13	19	3	8	6	7	5

TABLE A-7 (cont'd)

SUMMARY OF BOATING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Pretty place	5.7	5	4	7	4	9	1	9
Not too crowded	3.3	3	2	1	5	3	2	9
Friendly people	5.7	7	4	3	4	7	2	9
Condition change since first boating there								
Does not apply (if none last 3 yrs.)	48.8	51	41	59	63	52	40	27
No change	28.4	28	33	21	22	29	30	32
Better	5.0	3	7	5	7	5	5	9
Worse	17.9	18	19	15	9	14	25	32
Action if water conditions deteriorated								

TABLE A-7 (cont'd)

SUMMARY OF BOATING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Does not apply (if none last 3 yrs.)	48.7	51	41	58	63	52	40	27
Stay in same place-not boat as much	6.7	6	6	3	0	6	12	17
Move to some place on Green Bay	5.4	8	4	6	6	5	4	0
Go some place but not on Green Bay	21.1	22	31	9	14	21	16	29
Wouldn't bother me	4.3	3	5	7	2	5	4	7
Give up boating	13.8	10	12	17	16	11	24	20
Are water conditions bad enough for above action								
Does not								

TABLE A-7 (cont'd)

SUMMARY OF BOATING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
apply (if none last 3 yrs)	48.7	51	41	58	63	52	40	27
Already have	2.4	3	3	2	0	2	3	3
May have to soon	15.8	15	16	18	9	15	17	27
Not likely	33.1	31	39	22	28	31	40	43

TABLE A-8

SUMMARY OF SWIMMING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Occasions swimming last 12 month on Green Bay								
None	88.5	87	87	85	94	91	92	82
1 or 2 times	4.0	4	3	4	5	6	3	3
3 - 7 times	3.5	5	4	5	0	2	3	4
8 -12 times	1.5	2	1	2	1	0	0	3
13-20 times	.8	1	1	2	0	0	0	2
21-30 times	.6	0	1	1	0	1	0	2
31-50 times	.2	0	0	0	0	0	1	0
Over 50 times	.8	0	1	2	0	0	1	2
Occasions swmming last 12 months elsewhere on Lake Michigan								
None	95.5	92	96	95	98	99	99	89
1 or 2 times	2.4	5	1	3	1	0	0	2

TABLE A-8 (cont'd)

SUMMARY OF SWIMMING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
3 - 7 times	1.3	2	1	1	1	0	0	3
8 -12 times	.4	0	0	1	0	0	0	2
13-20 times	.1	0	0	1	0	0	0	0
21-30 times	.2	0	1	0	0	0	0	2
31-50 times	.0	0	0	0	0	0	0	0
Over 50 times	.0	0	0	0	0	0	0	1
Occasions swimming last 12 months on inland lakes								
None	73.3	66	69	92	95	76	74	67
1 or 2 times	6.9	10	8	4	2	5	5	4
3 - 7 times	8.1	11	8	4	2	6	10	7
8 -12 times	4.6	4	7	1	0	5	7	7
13-20 times	2.6	4	3	0	0	2	1	6
21-30 times	1.9	2	3	0	0	2	1	4

TABLE A-8 (cont'd)

SUMMARY OF SWIMMING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
31-50 times	1.2	2	1	0	0	2	1	1
Over 50 times	1.4	1	1	0	0	2	1	5
Occasions swimming last 12 months on stream or river								
None	92.2	95	92	100	100	85	87	90
1 or 2 times	2.7	2	3	0	0	5	3	2
3 - 7 times	2.7	2	2	0	0	5	5	4
8 -12 times	1.1	0	2	0	0	2	4	1
13-20 times	.5	0	0	0	0	1	1	0
21-30 times	.4	0	1	0	0	1	0	2
31-50 times	.2	0	0	0	0	1	0	1
Over 50 times	.2	0	0	0	0	1	0	0
Occasions swimming last 12 months in pool								

TABLE A-8 (cont'd)

SUMMARY OF SWIMMING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
None	55.6	47	50	74	81	61	60	33
1 or 2 times	7.5	8	9	5	5	8	7	6
3 - 7 times	12.3	15	11	9	9	11	12	17
8 -12 times	6.1	8	7	3	2	4	9	7
13-20 times	5.7	7	6	3	2	5	5	9
21-30 times	4.3	6	5	1	1	3	2	8
31-50 times	3.4	3	6	2	1	4	2	6
Over 50 times	5.2	7	6	3	0	4	3	14
Total swimming occasions last 12 months								
None	55.6	47	50	74	81	61	60	33
1 or 2 times	7.5	8	9	5	5	8	7	6
3 - 7 times	12.3	15	11	9	9	11	12	17
8 -12 times	6.1	8	7	3	2	4	9	7

TABLE A-8 (cont'd)

SUMMARY OF SWIMMING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
13-20 times	5.7	7	6	3	2	5	5	9
21-30 times	4.3	6	5	1	1	3	2	8
31-50 times	3.4	3	6	2	1	4	2	6
Over 50 times	5.2	7	6	3	0	4	3	14
Location of most swimming								
Green Bay	7.7	7	9	13	5	5	7	15
Elsewhere on								
Lake Michigan	1.5	2	1	2	2	0	0	5
Inland lake	21.4	26	25	5	5	21	23	27
Stream, river	3.9	2	3	0	0	8	9	7

TABLE A-8 (cont'd)

SUMMARY OF SWIMMING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Pool	10.2	17	13	5	9	4	2	12
None	55.3	47	49	74	81	61	60	34
Swam in Green Bay last 12 months	11.8	13	13	15	5	10	7	18
Location of swimming on Green Bay								
Does not apply	88.2	87	87	85	95	90	93	81
1	2.1	3	5	0	1	1	1	0
2	2.3	3	4	1	0	0	5	4
3	2.9	2	2	10	2	0	0	13
4	3.5	3	1	3	1	9	0	2
5	.9	2	1	1	2	0	0	0

TABLE A-8 (cont'd)

SUMMARY OF SWIMMING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Reason for not swimming								
Does not apply (if 1 or 2 above)	45.0	54	50	27	19	39	41	67
Not interested	22.7	19	14	22	23	29	38	13
Don't know how to swim	10.7	8	15	20	29	6	5	7
Too old or poor health	15.4	12	13	18	18	24	12	12
Have to travel too far	2.3	4	3	3	4	0	0	2
Water too dirty	3.3	2	5	9	6	2	3	0
Good places too crowded	.6	1	1	0	1	1	0	0
Would have liked to swim more last year	43.5	52	47	43.5	64	63	67	50
Reason for not swimming								

TABLE A-8 (cont'd)

SUMMARY OF SWIMMING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
more often								
Does not apply (if no above)	55.6	51	46	57	63	63	67	50
Water is too cold	6.9	4	5	10	12	9	1	21
Must travel too far	12.4	20	19	6	5	4	7	7
Good spots too crowded	4.1	6	1	2	0	6	3	4
Too old or poor health	5.4	4	6	8	3	8	4	2
Water too dirty	6.8	6	9	11	5	4	8	8
Not a very good swimmer	4.5	4	6	4	10	2	6	6
Family not interested	4.3	5	6	3	2	4	4	2
Reason for swimming area preferred								
Does not apply (if none last 3 yrs.)	45.8	40	37	64	67	51	53	23

TABLE A-8 (cont'd)

SUMMARY OF SWIMMING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Close by	19.9	18	20	12	5	21	29	40
Cleaner water	22.8	31	34	11	20	13	14	17
Pretty spot	2.9	3	1	5	1	5	1	5
Not too crowded	3.2	4	2	2	1	3	1	7
Not too expensive	.4	1	0	1	0	0	0	0
Better facilities	3.1	3	4	3	3	4	0	2
Water is warm	2.0	1	2	3	3	3	0	4
Condition change since								
first swimming there								
Does not apply (if none last 3 yrs.)	45.8	40	37	64	67	51	53	23
No change	34.6	43	41	21	20	32	23	36
Better	4.1	3	7	2	2	5	3	6

TABLE A-8 (cont'd)

SUMMARY OF SWIMMING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Worse	15.5	14	15	14	12	12	20	35
Action if water conditions deteriorated								
Does not apply (if none last 3 yrs.)	45.9	40	37	64	67	51	53	23
Stay in same place- not swim as much	4.3	4	4	2	0	4	5	13
Move to somewhere on Green Bay	3.3	5	1	7	2	3	2	0
Go somewhere else, not Green Bay	30.3	36	41	13	14	28	22	37
Wouldn't bother me	1.6	1	3	2	0	2	1	2
Give up swimming	14.7	14	13	14	17	13	17	25

TABLE A-8 (cont'd)

SUMMARY OF SWIMMING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Are water conditions bad enough for above action								
Does not apply (none last 3 yrs.)	45.8	40	37	64	67	51	53	23
Already have	2.0	1	3	1	2	2	3	4
May have to soon	13.2	14	12	11	7	12	13	26
Not likely	39.0	45	48	24	24	35	30	47
Could swimming be harmful to your health								
Does not apply (if none last 3 yrs.)	45.8	40	37	64	67	51	53	23
Yes	9.5	9	11	9	9	9	8	13
No	44.7	51	52	28	24	40	39	63
Rashes, infections re-								

TABLE A-8 (cont'd)

SUMMARY OF SWIMMING DATA BY PLACE OF RESIDENCE: PERCENTS

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
ceived from water								
Does not apply (if none in last 3 yrs)	45.8	40	37	64	67	51	53	23
Yes	4.5	4	5	3	2	5	5	8
No	49.7	57	58	33	31	44	41	68
Know anyone besides yourself who has?								
Does not apply (if none last 3 yrs.)	45.8	40	37	64	67	51	53	23
Yes	9.1	8	8	8	4	11	10	14
No	45.1	52	55	29	29	38	37	63

TABLE A-9

CONDITION CHANGES REPORTED FOR FISHING, BOATING, AND SWIMMING BY PLACE OF RESIDENCE: FREQUENCIES*

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Fishing Conditions Reportedly Better								
More fish	44	12	3	8	13	6		2
Clean water	22	10	4	1	3	3	1	
Facilities	18	8	2	2	3	3		
Fishing Conditions Reportedly Worse								
Fewer fish	214	54	22	27	5	48	26	32
Dirty water	131	55	12	10	9	19	13	13
Crowded	94	28	9	5	1	16	19	16
Weeds	29	7	4		1	6	9	2
Dead fish	12	1	3	3		4		1
Suds, film and muck	11	5	1	1	1	2	1	

*Changes mentioned by fewer than 10 respondents not included

TABLE A-9 (cont'd)

CONDITION CHANGES REPORTED FOR FISHING, BOATING, AND SWIMMING BY PLACE OF RESIDENCE: FREQUENCIES

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Boating Conditions Reportedly Better								
Better landings and docks	41	9	2	4	5	14	2	5
Cleaner water	32	13	5	2	2	4	4	2
Higher water	25	3	6		1	1	1	13
Boating Conditions Reportedly Worse								
Dirtier water	156	70	15	14	5	22	22	8
Crowded	129	41	8	18	4	19	15	24
Weeds	40	9				12	18	1
Dead fish	16	4	2	2	2	3	1	2
Suds & film	13	4	2	2		5		
Odor	12	3	2	1		4	2	

TABLE A-9 (cont'd)

CONDITION CHANGES REPORTED FOR FISHING, BOATING, AND SWIMMING
BY PLACE OF RESIDENCE: FREQUENCIES

	Total N=2174	Green Bay & Suburbs N=706	Brown County N=335	Door County N=192	Kewaunee County N=129	Marinette County N=462	Oconto County N=230	Seasonal Residents N=120
Swimming Conditions Reportedly Better								
Facilities	37	18	1		1	11	4	2
Clean water	31	8	10	1	1	5	3	3
Higher water	11	1	3	1		4	1	1
Swimming Conditions Reportedly Worse								
Dirty water	176	63	12	23	10	19	29	20
Crowded	59	21	2		3	21	4	8
Weeds	29	4	3			10	10	2
Dead fish	18	5		1	2	3	2	5

APPENDIX B

TABLE B-1

TEST - RE-TEST RESPONSE CONSISTENCY (N=27)

Question	Percent Agreement
Years lived in 5-county area	89
Own a camp or cottage	81
Age of household head	93
Number of children	100
Age of youngest child	100
Years of formal education	93
Description of Green Bay waters	70
Times respondent went fishing in last year	78
Times respondent went sailing in last year	93
Times respondent went skiing in last year	70
Times respondent went pleasure boating in last year	81
Participation in tent or trailer camping not near water	81
Respondent participated in fishing on Green Bay	100
Respondent participated in pleasure boating on Green Bay	100
Respondent participated in swimming in Green Bay	96
Number of cars in household	81
Number of snowmobiles in household	96
Number of fishing rods and reels in household	70
Number of water skis (pr) in household	93
Number of camping trailers or units in household	93
Number of boats in household	93
Type of boat	100
Length of boat	93
Materials boat is made of	96
Boat is transported or moored	96
More launch sites are needed	96
The reason for not going boating last year	78
Would like to have done more boating last year	85
Reason for choosing area of pleasure boating	85
Change in conditions of area where pleasure boating took place	93
Action taken by respondent if water conditions deteriorated	89

TABLE B-1 (cont'd)

Question	Percent Agreement
Will water condition deteriorate enough for action	89
The reason for not going fishing last year	85
Would like to have done more fishing last year	93
Why respondent did not do more fishing last year	85
Reason for choosing area where most fishing took place	89
Change in conditions of area where most fishing takes place	85
Action taken by respondent if water conditions deteriorate in area of most fishing	74
Will water conditions deteriorate enough for action	85
Fish are safe to eat	85
Reason for not going swimming last year	70
Would like to have done more swimming last year	81
Reason for choosing area where most swimming takes place	85
Change in conditions of area where most swimming takes place	63
Action taken by respondent if water conditions deteriorate in an area where swimming takes place	67
Will water conditions deteriorate enough for action	70
Could swimming in favorite area be harmful	78
Any rash, infection, upset stomach, or other illness from water	78
Know anyone who has been ill from water	78

APPENDIX C

GREEN BAY RESEARCH PROJECT
SEA GRANT PROGRAM

1
2
3
4
5 1
6

What is (is this) your year around address?

_____ / _____ / _____
city, village, town/ county / state

7
1....Brown Co.
2....Door Co.
3....Kewaunee Co.
4....Marinette Co.
5....Oconto Co.
6....Green Bay and suburbs
7....Milwaukee, Chicago and suburbs
8....Other Wisconsin
9....All other

8
1....In 5-county area
2....Outside 5-county area

9
1....Urban
2....Rural

How many years have you lived in the 5-county area? (B,D,K,O,M)

10
1....None
2....0 to 3
3....4 to 10
4...11 to 20
5...21 to 35
6....Over 35

Do you own a camp or cottage for weekend or seasonal use?

11
1....Yes
2....No

Where is it located?

_____ / _____ / _____
city, village, town/ county / state

12
0....Does not apply (if no to above question)
1....Brown Co.
2....Door Co.
3....Kewaunee Co.
4....Marinette Co.
5....Oconto Co.
6....Other Wisconsin
7....All other

13
0....Does not apply
1....In 5-county area
2....Outside 5-county area

How many days per year do you use it?

14
0....Does not apply
1....1 - 7 days
2....8 - 14
3...15 - 21
4...22 - 30
5...31 - 45
6....Over 45

What is the age of the head of the household (how old are you)? ___

15
1....18 - 24
2....25 - 34
3....35 - 44
4....45 - 54
5....55 - 64
6....65 or Over

16
1....Male
2....Female

17
1....Married
2....Single

How many children do you have? ___

18
0....Does not apply (never married)
1....None
2....1
3....2
4....3
5....4
6....5
7....6
8....7 or more

How old is the youngest child? ___

19
0....Does not apply
1....Under 5
2....5 - 14
3...15 - 21
4....Over 21

How much formal education (schooling) have you had?

20
1....Grade school (1-6)
2....Some high school (7-11)
3....Completed high school (12)
4....Some college (1-3)
5....Completed college (4 or more)

How would you describe the waters of Green Bay?

1....Clean
2....Reasonably clean
21 3....Somewhat dirty
4....Dirty
5....Depends on location

What is (your) the employment status of the head of the house?

1....Employed full time
2....Student
22 3....Housewife
4....Retired
5....Not presently employed full time

For whom (do you) does the household head work?

0....Does not apply (if 2,3,4, or 5 above)
1....Private enterprise
23 2....Public-gov't. agency at all levels
3....Non-profit agency
4....Self-employed

What type of work (do you) does he/she do?

0....Does not apply
1....Professional-Technical
2....Manager, Official, Proprietor
3....Clerical
24 4....Sales
5....Craftsman, Foreman
6....Skilled, semi-skilled
7....Service worker, laborer
8....Farmer

25

During the last 12 months, how many times did you go fishing?
[write in code]

26 ____ On Green Bay ___

Code

27 ____ Elsewhere L. Mich. ___

28 ____ Inland Lake ___

29 ____ Streams or Rivers ___

1 = None
2 = 1 or 2
3 = 3 - 7
4 = 8 - 12
5 = 13 - 20
6 = 21 - 30
7 = 31 - 50
8 = Over 50

30 ____ Total ____

During the last 12 months, how many times did you go sailing?
[write in code]

31 ____ On Green Bay ___

Code

32 ____ Elsewhere L. Mich. ___

33 ____ Inland Lake ___

34 ____ Streams or Rivers ___

1 = None
2 = 1 or 2
3 = 3 - 7
4 = 8 - 12
5 = 13 - 20
6 = 21 - 30
7 = 31 - 50
8 = Over 50

35 ____ Total ____

During the last 12 months, how many times did you go water skiing?
[write in code]

36 ____ On Green Bay ___

Code

37 ____ Elsewhere L. Mich. ___

38 ____ Inland Lake ___

39 ____ Streams or Rivers ___

1 = None
2 = 1 or 2
3 = 3 - 7
4 = 8 - 12
5 = 13 - 20
6 = 21 - 30
7 = 31 - 50
8 = Over 50

40 ____ Total ____

During the last 12 months, how many times did you go pleasure boating?
[write in code]

41 ___ On Green Bay ___
42 ___ Elsewhere L. Mich. ___
43 ___ Inland Lake ___
44 ___ Stream or River ___
45 ___ Total ___

Code
1 = None
2 = 1 or 2
3 = 3 - 7
4 = 8 - 12
5 = 13 - 20
6 = 21 - 30
7 = 31 - 50
8 = Over 50

During the last 12 months, how many times did you go swimming?
[write in code]

46 ___ On Green Bay ___
47 ___ Elsewhere L. Mich. ___
48 ___ Inland Lake ___
49 ___ Stream or River ___
50 ___ Pool ___
51 ___ Total ___

Code
1 = None
2 = 1 or 2
3 = 3 - 7
4 = 8 - 12
5 = 13 - 20
6 = 21 - 30
7 = 31 - 50
8 = Over 50

During the last 12 months, how many times did you go duck hunting?
[write in code]

52 ___ On Green Bay ___
53 ___ Elsewhere L. Mich. ___
54 ___ Inland Lake ___
55 ___ Stream or River ___
56 ___ Total ___

Code
1 = None
2 = 1 or 2
3 = 3 - 7
4 = 8 - 12
5 = 13 - 20
6 = 21 - 30
7 = 31 - 50
8 = Over 50

During the last 12 months, how many times did you go picnicking, walking, or just relaxing along the shore?
[write in code]

57 ___ Of Green Bay ___
58 ___ Elsewhere L. Mich. ___
59 ___ Inland Lake ___
60 ___ Stream or Lake ___
61 ___ Sub-Total ___

Code
1 = None
2 = 1 or 2
3 = 3 - 7
4 = 8 - 12
5 = 13 - 20
6 = 21 - 30
7 = 31 - 50
8 = Over 50

How many times did you go picnicking, walking or just relaxing, but not near some body of water? ___
(do not code)

62 ___ Grand Total ___
Code

How many times during the last 12 months, did you go camping in a tent or trailer?
[write in code]

63 ___ On Green Bay ___
64 ___ Elsewhere L. Mich. ___
65 ___ Inland Lake ___
66 ___ Stream or River ___
67 ___ Sub-Total ___

Code
1 = None
2 = 1 or 2
3 = 3 - 7
4 = 8 - 12
5 = 13 - 20
6 = 21 - 30
7 = 31 - 50
8 = Over 50

How much tent or trailer camping did you do, but not near water? ___
(do not code)

68 ___ Grand Total ___
Code

69
70
71
72
73
74
75
76 G
77 D
78 G
79 B
80 I

1
2
3
4
5 2 Did you fish on Green Bay during the last 12 months?
6

7 1....Yes
2....No

0....Does not apply
1....
2....
8 3.... Location (from map)
4....
5....

Did you go pleasure boating on Green Bay during the last 12 months?

1....Yes
9 2....No

0....Does not apply
1....
2....
10 3.... Location (from map)
4....
5....

Did you go swimming on Green Bay during the last 12 months?

1....Yes
11 2....No

0....Does not apply
1....
2....
12 3.... Location (from map)
4....
5....

13 How many cars do members of this household own?
14 [write in code]

		Code
15	Cars	1 = None
16	Snowmobiles	2 = 1
17	Fishing rods & reels	3 = 2
18	Water skiis (pr.)	4 = 3
19	Camping trailer or unit	5 = 4
		6 = 5
		7 = 6, 7
		8 = 8, 9
		9 = 10 or more

Where do you use it mostly?

0....Does not apply
20 1....In 5-county area
2....Outside 5-county area

21 How many boats do you own? ____ [If 2 or more, which boat is most important to you?] ____

Code
1 = None
2 = 1
3 = 2
4 = 3 or more

0....Does not apply (if none)
1....Sail
2....Inboard
22 3....Outboard
4....Canoe
5....Other

How long is it?

0....Does not apply
1....Up to 17'
23 2....17' - 25'
3....Over 25'

What is it made of?

0....Does not apply
1....Wood
2....Aluminum
24 3....Fiberglass
4....Other

Do you usually transport it (trailer) or leave it moored?

0....Does not apply
25 1....Transport
2....Leave moored

Are more launch sites needed?

1....Yes
26 2....No

Where? (see map)

0....Does not apply (If no above)
1....Marinette
2....Oconto-North of Pensaukee
3....Oconto-South of Pensaukee
4....Brown-West side
27 5....Brown-East side
6....Door-South of Sturgeon Bay
7....Door-North of Sturgeon Bay
8....Elsewhere on Lake Michigan
9....Inland Lake, River

How many times during the last 12 months did you rent:

		Code
28	A fishing charter ___	1 - None
		2 - 1
		3 - 2
29	Boat, not charter___	4 - 3
		5 - 4
		6 - 5
30	Snowmobile ___	7 - 6
		8 - 7
		9 - 8 or more

Did you rent a camp or cottage during the last 12 months?

1....Yes
31 2....No

Where was it located?

0....Does not apply (if no)
1....Brown Co.
2....Door Co.
3....Kewaunee Co.
32 4....Marinette Co.
5....Oconto Co.
6....Elsewhere in Wisconsin
7....Mich., Minn., Ill.
8....All other

0....Does not apply
33 1....In 5-county area
2....Outside 5-county area

Did you rent a camping trailer or unit during the last 12 months?

1....Yes
34 2....No

Where was it used mostly?

0....Does not apply
35 1....In 5-county area
2....Outside 5-county area

At present time, less than one cent out of each federal dollar goes for improving water quality. How much do you think this should be increased?

1....None
2....A little
36 3....Quite a bit
4....A lot

If more were to be spent on improving water quality without raising taxes, the money would have to be taken from some other government program. Which of these programs would you take the money from?

1....Education
2....Transportation
3....Defense
37 4....Health (see back of map) A
5....International Aid
6....Space
7....Agriculture
8....Community Development

Which of these do you think is most important in determining where people go on the bay for water recreation?

1....Area is close by
38 2....Not too expensive (see back of map) B
3....Good facilities
4....Area is not too crowded

Which of these do you think is the biggest problem for people who use the bay for water recreation?

1....Water is too cold
2....Unpleasant smell
39 3....Winds (see back of map) C
4....Waves
5....Junk on the bottom
6....Too many weeds

Which of these things do you dislike most about the bay?

1....Water is cloudy
2....Chemicals
40 3....Harmful bacteria (see back of map) D
4....Suds, film, or foam on water
5....Dead fish

How many times did you go pleasure boating last year?

41
1....Many times
2....A few times
3....None--If none:

What is the main reason you did not go boating last year?

42
0....Does not apply (if 1 or 2 above)
1....Not interested
2....Too old or poor health
3....Water is too dirty
4....Don't own a boat
5....Have to travel too far
6....Too expensive

Would you like to have gone pleasure boating more often than you did last year?

43
1....No
2....Yes--If yes, why didn't you?

44
0....Does not apply (if no above)
1....Don't own a boat
2....Places too crowded
3....Water is too dirty
4....Not popular with family
5....Too expensive
6....Have to travel too far

When did you last go boating?
___years ago. (do not code)

Thinking only of the area where you do most of your pleasure boating, why do you prefer that area to some other area?

45
0....Does not apply (if none in last 3 yrs.)
1....Good launch or marina facilities
2....Close by
3....Water is cleaner there
4....Pretty place
5....Not too crowded
6....Friendly people

How have conditions changed where you usually go boating since you started going there?

46
0....Does not apply (if none in last 3 yrs.)
1....No change
2....Better
3....Worse

If better or worse, in what way? _____

_____

What would you do if water conditions deteriorated at the place you usually go pleasure boating?

47
0....Does not apply (if none in last 3 yrs.)
1....Stay in same place but not boat as much
2....Move to someplace on Green Bay
3....Go someplace, but not on Green Bay
4....Wouldn't bother me
5....Give up boating

Do you think water conditions will become bad enough that you will have to make that decision soon?

48
0....Does not apply (if none in last 3 yrs.)
1....Already have
2....May have to soon
3....Not likely

How many times did you go fishing last year?

49
1....Many times
2....A few times
3....None--If none:

What is the main reason you did not go fishing last year?

50
0....Does not apply (if 1 or 2 above)
1....Not interested
2....Never catch anything
3....Have to travel too far
4....Good spots too crowded
5....Too old or poor health
6....Too expensive
7....Water is too dirty
8....Don't own a boat

Would you like to have gone fishing more often than you did last year?

51
1....No
2....Yes--If yes, why didn't you?

52
0....Does not apply (if no above)
1....Too old or poor health
2....Too far to travel
3....Don't own a boat
4....Good spots are too crowded
5....Never catch anything
6....Too expensive
7....Water is too dirty
8....Family not interested

When did you last go fishing?
___years ago. (do not code)

Thinking only of the area where you do most of your fishing, why do you prefer that area to some other area?

0....Does not apply (if none in last 3 yrs.)
1....Close by
2....Catch more fish
53 3....Not too crowded
4....Good launch or marina facilities
5....Cleaner water
6....Pretty spot

How have conditions changed where you usually go fishing since you started going there?

0....Does not apply (if none in last 3 yrs.)
1....No change
54 2....Better If better or worse, in what
3....Worse way? _____
_____

What would you do if water conditions deteriorated at the place you usually go fishing?

0....Does not apply (if none in last 3 yrs.)
1....Stay in same place, but not fish as much
2....Move to some place on Green Bay
55 3....Go someplace else, but not on Green Bay
4....Wouldn't bother me
5....Give up fishing

Do you think water conditions will become bad enough that you will have to make that decision soon?

0....Does not apply (if none in last 3 yrs.)
1....Already have
56 2....May have to soon
3....Not likely

Is it safe to eat the fish you catch at this spot?

0....Does not apply (if none in last 3 yrs.)
57 1....Yes
2....No

How many times did you go swimming last year?

1....Many times
58 2....A few times
3....None--If none:
What is the main reason you did not go swimming last year?

0....Does not apply (if 1 or 2 above)
1....Not interested
2....Don't know how to swim
59 3....Too old or poor health
4....Have to travel too far
5....Water is too dirty
6....Good places too crowded

Would you like to have gone swimming more often than you did last year?

1....No
60 2....Yes--If yes, why didn't you?

0....Does not apply (if no above)
1....Water is too cold
2....Have to travel too far
61 3....Good spots too crowded
4....Too old or poor health
5....Water is too dirty
6....Not a very good swimmer
7....Family not interested

When did you last go swimming?
____years ago. (do not code)

Thinking only of the place you do most of your swimming, why do you prefer that place to other places?

0....Does not apply (if none in last 3 yrs.
1....Close by
2....Cleaner water
62 3....Pretty spot
4....Not too crowded
5....Not too expensive
6....Better facilities
7....Water is warm

How have conditions changed at the place you usually go swimming since you started swimming there?

0....Does not apply (if none in last 3 yrs.
1....No change
63 2....Better If better or worse, in what
3....Worse way? _____
_____

What would you do if water conditions deteriorated at the place you usually go swimming?

0....Does not apply (if none in last 3 yrs.)
1....Stay in the same place, but not swim as much
64 2....Move to somewhere on Green Bay
3....Go somewhere else, but not on Green Bay
4....Wouldn't bother me
5....Give up swimming

76	G
77	D
78	G
79	B
80	I

Comments: Respondent

Do you think water conditions will become bad enough that you'll have to make that decision soon?

0....Does not apply (if none in last 3 yrs.)
1....Already have
65 2....May have to soon
3....Not likely

Could swimming at the place you usually go be harmful to a persons health?

0....Does not apply (if none in last 3 yrs.)
66 1....Yes
2....No

At the place you usually swim, have you ever gotten a rash, infection, upset stomach or other illness from the water?

0....Does not apply (if none in last 3 yrs.)
67 1....Yes
2....No

Comments: Interviewer

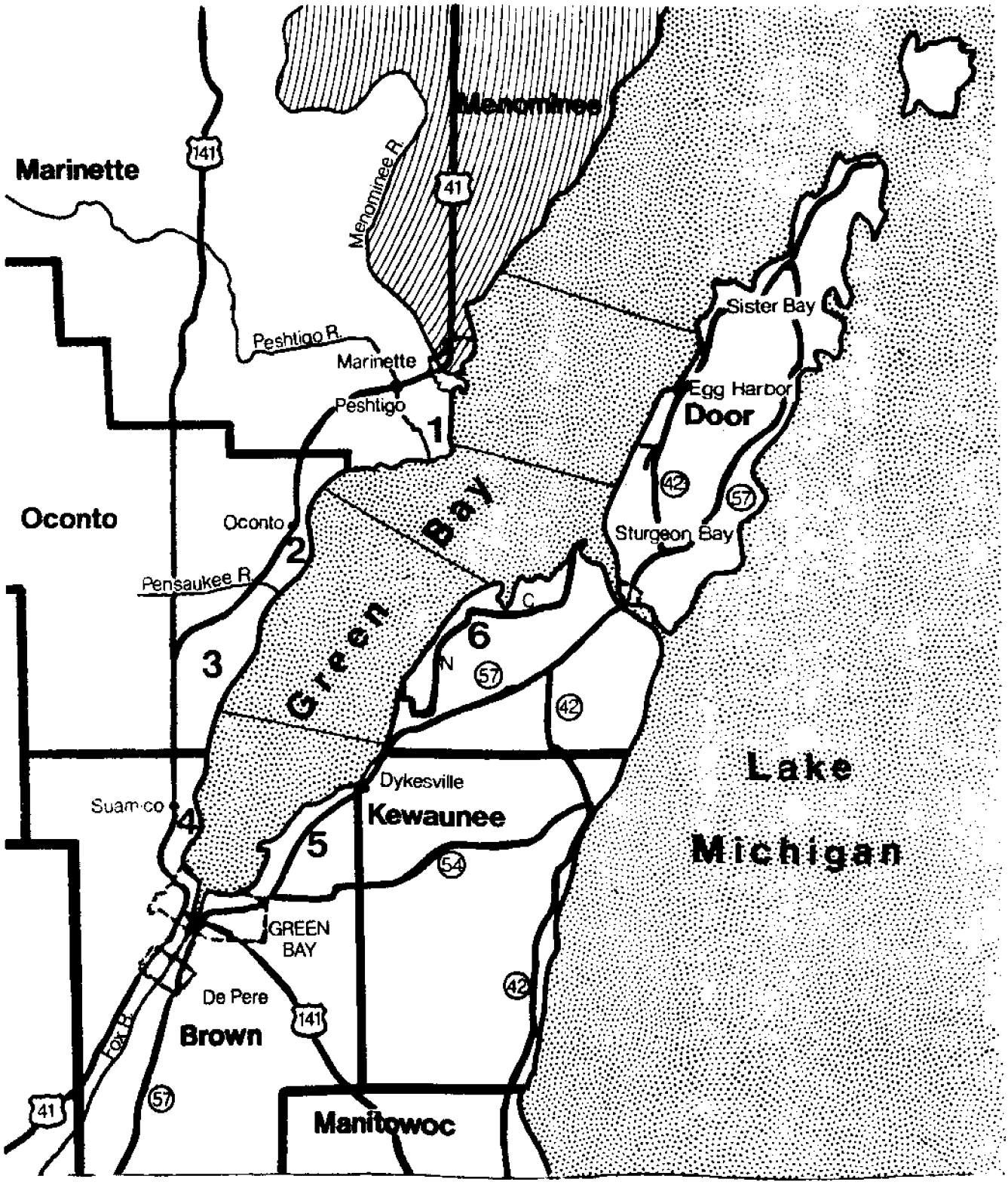
Do you know anyone besides yourself who has?

0....Does not apply (if none in last 3 years)
68 1....Yes
2....No

If you had a perfect summer day and no work or other obligations, what would you most like to do with it.

1....Go fishing
2....Go sailing
3....Go canoeing
4....Go pleasure boating
69 5....Go swimming
6....Picnic or hike, relax next to water
7....Other water related activity
8....Go for a drive
9....Other non-water related activity

1....All water related activities
70 2....All other activities (8 or 9 above)


Marinette
Menominee
Menominee R.
141
41
Peshtigo R.
Marinette
Peshtigo
1
Sister Bay
Egg Harbor
Door
42
57
Oconto
Oconto
2
Pensaukee R.
Green Bay
Sturgeon Bay
3
6
N
57
42
Lake
Michigan
Dykesville
Kewaunee
Suamico
4
5
54
GREEN
BAY
De Pere
Brown
141
42
Fox R.
41
57
Manitowoc

APPENDIX D

CHRONOLOGY OF EVENTS REGARDING BAY BEACH PARK

1892 Bay Beach conceived and developed as a private venture by Mitchell Nejedlo

1903 Green Bay Yacht Club began at Bay Beach

1910 Bay Beach facilities completed

1912 With the advent of the automobile, interest in the Green Bay Yacht Club waned and the club disbanded

1920 Frank Murphy and Fred A. Rahr announced the free gift of the Bay View Beach to the City of Green Bay (eleven and one-half acres east of Irwin Avenue containing all the buildings). After an additional land purchase, Bay Beach Park was a reality.

1929 An additional 222.09 acres was purchased from John Marsch to increase park property to approximately 243 acres.

1931 Bay Beach was closed during the summer by order of the State Board of Health "after the water there had been found so highly polluted as to constitute a menace to public health."

As a result of a legal action brought by eleven hundred petitioneers, the Green Bay Metropolitan Sewerage District was established by the Order of the County Court for Brown County.

1932 Bay Beach was closed during the summer by order of the State Board of Health. Pool at Bay Beach location is subsequently under consideration by the Green Bay Park Board as an alternative swimming location.

1933 Wisconsin Supreme Court gave favorable decision clearing away legal entanglements blocking the construction of interceptor sewers along the East River as well as a sewage treatment plant.

Bids let for construction of interceptors and waste treatment plant

1934 Bay Beach Park was the center of activities for Green Bay's 300th anniversary. Newspaper accounts do not indicate anything regarding the usability of the lower Bay for recreation.

First Green Bay Metropolitan Sewerage District facilities completed

1938 A wildlife sanctuary was established at the Bay Beach area with W.P.A. assistance.

1941 Green Bay Board of Health reorganized. Since public health concerns were previously undertaken by one man, the creation of the board was much more than a reorganization. Board now had the staff to undertake a comprehensive water sampling program.

1942 The Green Bay Board of Health cited continuous contamination in their minutes as the reason for closing Bay Beach for the remainder of the summer.

1943 Upon the recommendation of the Green Bay Board of Health, the Bay Beach swimming area was closed permanently. The beach was subsequently covered over to prevent unsanctioned use.

1951 First pool facility constructed in Green Bay by the Green Bay Park and Recreation Department (not at Bay Beach area).

1967 The Green Bay Park Board shelved plans for an artificial lake swimming area for Bay Beach. Filtration system would be unable to handle polluted waters of the Bay.

1970 "I think swimming [at Bay Beach Park] might be possible by 1972, but you might not like it" Thomas G. Frangos, Administrator, Division of Environmental Protection, Wisconsin Department of Natural Resources, Thursday, December 17, 1970.

1971 Sharp decreases in fecal coliforms in lower Bay due to chlorination of effluent by the Green Bay Metropolitan Sewerage Plant. Bay Beach still closed due to high total coliform counts and plate counts.

APPENDIX E

PUBLIC ACCESS FACILITIES ON GREEN BAY, 1971

Name of Facility	Location T.	R.	S.	Area (Acres)	Frontage (Feet)	Type of Access Facility[1]	Car Capacity	Number of Ramps	Other Facilities[2]	Owned By
Marinette County										
Stephenson Island*	30	24	6- 4	9.1	4,224	B,C	50	2	A, D	City
Unnamed	30	24	9- 3	0.1	36	C	--	1	None	City
Red Arrow Park	30	24	9- 9	7.5	2,000	C	200	1	A,B,C,D	City
Unnamed	30	24	8-15	0.1	36	E	--	-	None	City
UW-GB Marinette Campus	30	24	17- 8	6.0	1,056	E	7	-	D	State
Public Boat Landing	30	24	30- 1	0.1	60	C	--	1	None	Town
Unnamed	30	24	30- 4	4.8	700	E	75	-	None	County
Michaelis Park	30	24	30-13	1.7	300	E	--	-	A, D	County
Access to Bay-- Town of Peshtigo	30	24	31- 2	0.2	36	E	--	-	None	Town
Peshtigo Harbor PHG	29	24	18-15	3,096.5	24,288	E	--	-	None	State

From: R. L. Fassbender, "Lake Michigan Access: A Comprehensive Survey of Public Access Facilities on Lake Michigan Shoreline" (Madison, Wisconsin: Wisconsin Department of Natural Resources, 1971, (mimeo).

PUBLIC ACCESS FACILITIES ON GREEN BAY, 1971

Name of Facility	Location T.	R.	S.	Area (Acres)	Frontage (Feet)	Type of Access Facility[1]	Car Capacity	Number of Ramps	Other Facilities[2]	Owned By
Peshtigo Harbor PHG	29	23	24- 6	3,096.5	24,288	C	25	1	None	State
Peshtigo Harbor PHG	29	23	14- 5	3,096.5	24,288	C	10	1	None	State
Oconto County										
North Bay Shore Recreation Area	29	22	23-16	2,563.4	5,280	C	50	1	A,B,C,D	County
D.E. Hall County Park	29	22	27- 3	12.0	500	C	100	1	A, C,D,	County
Rush Point Wildlife Area	29	22	33- 1	80.0	3,170	E	--	-	None	State
Harbor Road Public Boat Landing*	28	22	16-15	0.3	240	A, C,D	20	1	None	City
Public Boat Landing*	28	22	21- 8	4.8	465	C	100	3	A, D	City
Oconto City Park	28	22	32- 3	20.0	660	E	--	-	C,D	City
Unnamed	27	22	6-14	0.1	50	E	5	-	None	Town
Unnamed*	27	21	11-14	0.1	48	C	--	1	None	Town
Pensaukee Wildlife Area	27	21	Sev.	270.4	9,500	C	10	1	None	State

PUBLIC ACCESS FACILITIES ON GREEN BAY, 1971

Name of Facility	Location T.	R.	S.	Area (Acres)	Frontage (Feet)	Type of Access Facility[1]	Car Capacity	Number of Ramps	Other Facilities[2]	Owned By
Charles Pond Green Bay Shores	26	21	3	30.4	11,620	E	--	-	None	State
Brown County										
Norfield Road	25	21	7- 6	0.1	60	E	--	-	None	Town
None	25	20	24- 1	0.2	60	E	15	-	None	Town
Sunset Beach Public Access*	25	20	24- 2	299.7	660	C	100	1	None	State
Brown County Public Boat Ramp	24	20	15- 5	1.5	330	C	100	1	None	County
Bylsby Street	24	20	24- 1	0.1	60	E	--	-	None	City
Mason Street*	24	20	36- 9	0.3	200	C	18	1	None	City
Diener Drive Access*	24	21	19-10	2.5	220	B,C	125	4	None	City
Bay Beach Park	24	19	-	285.0	1,590	E	300	-	A, D	City
Kentucky Lane	24	21	28- 6	0.1	48	E	--	-	None	City
Texas Lane	24	21	28- 5	0.1	48	E	--	-	None	City
Wayside--UW-- Green Bay Campus	24	21	23	5.7	800	E	--	-	None	County
Point Comfort Road	25	22	20	0.2	60	E	10	-	None	Town

PUBLIC ACCESS FACILITIES ON GREEN BAY, 1971

Name of Facility	Location T.	R.	S.	Area (Acres)	Frontage (Feet)	Type of Access Facility[1]	Car Capacity	Number of Ramps	Other Facilities[2]	Owned By
Kewaunee County										
Red River	25	23	5- 6	6.4	540	C,D	20	1	A, C,D	County
Door County										
Unnamed	26	23	28-11	0.1	50	E	--	-	None	Town
Unnamed	26	23	16-11	0.1	50	E	--	-	None	Town
Chaudoir's Dock	26	23	10- 6	10.0	1,000	A,B,C,D	20	1	A, D	County
Sugar Creek County Park	27	23	25- 7	40.8	800	C	--	1	A, D	County
County Highway N	27	23	24- 4	0.1	60	C	10	1	None	County
Claflin Memorial Park	27	24	2- 5	0.1	50	E	--	-	D	County
Riley Bay Road	28	25	31-11	0.1	50	E	--	-	None	Town
Sandy Bay Lane	28	25	31-12	0.1	50	E	2	-	None	Town
Haines Town Park	28	25	31- 4	1.6	350	E	10	-	C	Town
Unnamed	28	25	31- 2	0.2	50	E	--	-	None	Town
Sandy Point Road	28	25	32- 7	0.2	50	C	10	1	None	Town
Unnamed	28	25	32-13	0.1	50	E	--	-	None	Town
Potawatomi State Park	28	25	Sev.	1,126.0	15,300	C	20	2	A,B,C,D	State

PUBLIC ACCESS FACILITIES ON GREEN BAY, 1971

Name of Facility	Location T.	R.	S.	Area (Acres)	Frontage (Feet)	Type of Access Facility[1]	Car Capacity	Number of Ramps	Other Facilities[2]	Owned By
Otumba City Park	27	25	7- 2	3.1	440	E	--	-		
Sunset Park	27	25	6- 3	56.0	2,000	A, C,D	40	2	A, C,D	City
Public Boat Ramp	28	26	18- 7	0.2	60	C	8	1	None	County
Stone Quarry Point	28	25	12-13	38.4	1,000	C,D	100	1	A, D	County
Lady Slipper Pond	29	26	29- 5	0.2	60	E	2	-	None	Town
Sunset Lane	29	26	17-14	0.1	36	E	--	-	None	Town
Frank E. Murphy County Park	29	26	3- 9	25.6	1,500	C,D	33	1	A, C,D	County
Sunset Lane	30	26	26-12	0.4	200	E	--	-	None	Town
Egg Harbor Beach	30	26	25- 9	2.5	540	D,E	10	-	C	Village
Village Dock Park	30	26	25- 3	2.1	300	A,B,C,D	20	2	A, D	Village
Unnamed	30	26	24- 3	0.1	50	E	--	-	None	Town
Unnamed	30	27	18- 9	0.2	75	E	5	-	None	Town
Unnamed	30	27	18- 2	0.1	50	E	--	-	None	Town
Unnamed	30	27	7-15	0.1	60	E	--	-	None	Town
Unnamed	30	27	7- 2	0.1	50	E	--	-	None	Town

PUBLIC ACCESS FACILITIES ON GREEN BAY, 1971

Name of Facility	Location T.	R.	S.	Area (Acres)	Frontage (Feet)	Type of Access Facility[1]	Car Capacity	Number of Ramps	Other Facilities[2]	Owned By
Sunset Beach Public Park	31	27	29- 9	2.5	135	E	--	-	D	Town
Fish Creek Harbor and Beach	31	27	29-15	5.0	1,250	A,B,C,D	15	1	A, C,D	Town
Peninsula State Park	31	27	Sev.	3,767.0	43,300	A, C,D	88	2	A,B,C,D	State
Ephraim Municiple Beach	31	27	23- 4	0.8	350	E	29	-	C	Village
Ephraim Municiple Boat Landing	31	27	23- 4	0.4	160	C	60	1	None	Village
Anderson Dock	31	27	24- 7	1.4	200	A,B,C,D	14	1	A	Village
Sister Bay Landing and Beach	31	28	5- 8	1.4	315	A,B,C,D	115	2	None	Village
Ellison Bay Bluff County Park	32	28	16	87.1	2,750	E(?)	--	-	None	County
Ellison Bay Municiple Ramp	32	28	15- 3	0.4	150	A,B,C,D	30	1	A, D	Town
Door Bluff Headlands County Park	33	28	35	122.7	6,900	E(?)	--	-	None	County
Garret Bay	32	28	1- 6	0.1	50	C	--	1	None	Town

PUBLIC ACCESS FACILITIES ON GREEN BAY, 1971

Name of Facility	Location T.	R.	S.	Area (Acres)	Frontage (Feet)	Type of Access Facility[1]	Car Capacity	Number of Ramps	Other Facilities[2]	Owned By
Unnamed	33	29	15- 3	0.1	50	E	--	-	None	Town
Unnamed	33	29	13-10	0.3	36	E	--	-	None	Town
Old School House Beach Park	34	29	25-10	33.9	600	E	--	None	A,B,C,D	Town
Rock Island State	34	30	Sev.	783.0	29,000	A, C	80	1	A,B, D	State

*sites located on major tributaries to Lake Michigan or Green Bay

Location:
1st number: Township North
2nd number: Range East
3rd number: Section
4th number: Forty #

[1]
A - Small Boat Harbor
B - Boat Mooring
C - Boat Launching
D - Fishing Pier or Breakwater
E - Walk-in Access

[2]
A - Toilets
B - Camping
C - Swimming
D - Picnicing
E - Other

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