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WATER QUALITY CRITERIA FOR SELECTED RECREATION USES

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ABSTRACT

WATER QUALITY CRITERIA FOR SELECTED RECREATION USES

Four types of outdoor recreationists were investigated to determine whether they differed in their attitudes, beliefs, and behavior regarding various water characteristics at Central Illinois water-based recreation sites. Using an attitude model derived from social-psychological research, the recreationists' attitudes toward the sites were estimated from their attitudes and beliefs about water characteristics. The site attitudes were regarded as indicators of the quality of the respondents' recreation experiences resulting from characteristics of the water.

The major analyses were comparisons of the recreationist groups' perceptions of the water, attitudes toward water characteristics, the site attitudes held because of water characteristics, reports of decreased site use because of water characteristics, and reports of probable termination of site use because of water characteristics. The relationships between site attitude components resulting from selected water characteristics and the reports of decreased site use and probable termination of use were also investigated.

The results indicated that the four types of recreationists differed in their perceptions of the water, attitudes toward water characteristics, site attitudes, and the reported water characteristics that had caused or might cause decreased site use. In addition to these group differences, there were strong individual differences among the recreationists within the various groups. Site attitudes were not highly related to reported behavior.

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TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

PROJECT OBJECTIVES

A. To compare four groups of outdoor recreationists -- swimmers, boaters, fishermen, and sightseers -- on their attitudes, beliefs, and behavior with regard to various characteristics of the water at ten water-based recreation sites in Central Illinois. To estimate the recreationists' attitudes toward the recreation sites from their attitudes and beliefs about the water at those sites and determine whether site attitudes will predict decreased or terminated site use. Information about the attitudes, beliefs, and behavior of the different recreationists in relation to water characteristics should be useful in a program of planning and managing recreational water for the different groups.

B. To determine whether recreationists' attitudes, beliefs, and behavior concerning water-quality characteristics can be generalized to all water based recreation sites within a region. To determine whether users' preferences for some sites over others are related to the sites' water-quality characteristics. To determine whether different sites within a region are perceived by users to pose different threats to equipment, health, and safety because of water-quality characteristics. This objective has implications for the development of regional water-quality criteria, because if the attitudes, beliefs, and behaviors

of a given type of recreationist differ among sites, then water-quality criteria based upon these factors might not be generalizable for a given recreation activity.

C. To determine whether recreationists' attitudes, beliefs, and behavior at various sites can be predicted from physical and chemical measurements of the water-quality at those sites. This relationship will indicate whether existing water-quality criteria can be used to estimate the quality of recreationists' experiences, without the need for independent measures of these experiences.

Although the three objectives are logically interrelated, the present report deals only with objective A. The research dealing with objectives B and C will be reported in subsequent publications. Objective B will be dealt with in Robert Aukerman's doctoral dissertation at the University of Illinois. The data related to objective C were collected late in the project period and are not yet ready for analysis; the research relating to it will be prepared for journal publication.

The present report deals with the major objective of the project, the one which the investigators believe to be of primary importance to the establishment of water-quality criteria for recreation uses.

INTRODUCTION

General Statement of the Problem

The "Quiet Crisis" of which Stewart Udall wrote only a few short years ago, has been recognized, and almost overnight a cacophony of concern has arisen, which promises to lead to an all-out battle for survival against the pollution of our environment. Rapidly multiplying population and increasing technological demands have endangered the life-supporting resources of this planet. If in fact we have recognized this, and admit that a serious terminal crisis faces us, then history has shown that our "crisis-oriented society" will utilize every means available to meet the challenge. However, never before have we faced a crisis like the one before us. The enemy is ourselves and in order to begin our battle for survival, we must first conquer our innermost weaknesses. It is not a matter of scientific knowhow or the technology necessary to retard population growth, clean up pollution, or curb the rape of our resources--we have this. What is needed is concerned, intelligent, forceful leadership throughout the world, not only in government, but in religion, and every other area of influence. We need a reordering of priorities. Above all, we need to conquer ignorance, distrust, and our own selfishness and greed. Can we do all this? Can we survive? First impressions would indicate, "no." However, man's strongest instinct is for survival, and if he can act before he reaches a non-reversible, terminal stage, and no catastrophe eliminates him, then he may just survive the environmental crisis. However, surviving is not enough. We must also assure that our environmental surroundings

are not so ugly and degenerate that they degrade the quality of our lives to the point where we are just surviving.

Experience indicates that given certain environmental conditions, such as ugliness, dirt, crowding, there is an increase in mental illness, crime, suicide, and other social deformities of our society. If we continue to accept progressively uglier surroundings, it is conceivable that our expectations will decrease concurrently. Therefore, the quality of our surroundings will continue to decrease. The ultimate catastrophe would be a society of "man" without expectations, unable to perceive ugliness because he knows nothing else, unable to perceive beauty, unable to re-create, hopelessly doomed to survive as something less than an animal. Hopefully, this stage will never be reached or even approached. Actually, however, it is somewhat alarming to see just how far we have "progressed" towards this point.

Our cities are prime examples, being overcrowded, dirty, and ugly. They are areas of high pollution, increasing crime rates, and increasing social problems. Our small towns and country sides are not far behind the cities. Even our recreation areas are endangered. Seeing that these recreation areas are now beginning to experience almost every problem that our cities have, including overcrowding and pollution, and realizing that these parks, woods, forests, and water areas are our last bastions of natural beauty and recreation, it becomes apparent that something has to be done to preserve the quality and beauty of these areas in order to avert further degradation of our lives.

Criteria need to be developed for the preservation and improvement of our surroundings:

> The environmental squeeze from technology and population pressures is more than the mere loss of mineral reserves, air and water quality, and forest resources. These are

> losses that can be measured -- in used tons of ore, in coliform bacteria count, in felled board feet -- and these measurements suffice to describe what is happening to the parts of our world we must breathe and drink and feed on. But we have yet to devise a satisfactory index to measure the diminishing quality, the creeping vulgarity and ugliness, of those environmental components which man must look at, listen to, work with, and play in.[1]

The criteria for recreation surroundings should be based partly upon people's perceptions of the environment at this time, for it is assumed that we are still capable of judging quality since the pollution of our recreation areas is recent; and we have hopefully not become so accustomed to it that we are unaware of its presence. Any standard that purports to gauge the quality of the environment must ultimately be based upon the value judgments of people acting in some capacity; the judgments might be by expert researchers or technologists (using highly scientific measures such as coliform count or DO to guide them) or they might be made by the non-expert user of the environment who simply wants to have a pleasant experience in the outdoors on a Sunday afternoon. As Kneese[2] has stated: "Optimum rules, standards, or other techniques for controlling environmental quality must result from analysis of values, contrary to the usual approach which is still narrowly focused on physical effects and objectives."

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1. U.S. Department of the Interior. Conservation Yearbook No. 4, Man - An Endangered Species. Washington, D. C.: Government Printing Office, 1968, p. 7.

2. Allen V. Kneese, "Research Goals and Progress Toward Them," Environmental Quality in a Growing Economy, Henry Jarrett (Ed.), Baltimore: Johns Hopkins Press, 1966, p. 69.

How people perceive their surroundings and the value judgments they make are frequently based upon their intended uses of the environment. It is easy to see that a person using the environment for exploitation will perceive it differently from a person using it for recreation. When we consider specific actions, the number of uses of some part of the environment is probably in the hundreds, or even thousands. Obviously, it would be costly and probably ineffective to try to implement different standards for all of these uses. At the other extreme are broad categories of use that probably oversimplify the various uses of the environment. In the case of water, for example, we might consider drinking, cooking, cleaning, manufacturing, and recreating as the major uses. Somewhere between these two extremes probably lies a useful approach to the development of standards based upon values, which in turn are based upon uses of the environment.

This study was an investigation of the values that recreationists place upon water at outdoor recreation sites, as indicated by their attitudes, beliefs, and reported behavior with regard to various features of the water. The study was designed to investigate four different categories of recreationists - swimmers, boaters, fishermen, and sightseers. It was assumed that these groups might differ in their value judgments because of their different uses of the water.

Our goal was to provide information that could be used as input to a systematic approach to the development of water-quality criteria for recreation. It was not our goal to develop water-quality standards themselves. Successful development of water-quality standards for recreational uses will depend upon more than an understanding of users' value judgments,

important as these are. Other factors (which also involve value judgments) will frequently need to be considered as well: economic costs, availability of land and water, projected population growth, and public health and safety, to name only a few. It would be easy to take a narrow viewpoint of the problem and elevate recreationists' values to a position of supreme importance for the development of water-quality standards. It is more difficult and sometimes painful but also realistic, however, to recognize that the quality of the recreationist's experience will often need to be balanced with other goals that some people might consider equally important.

Our goal, then, was a relatively modest one: to provide information about recreationists' attitudes, beliefs, and behavior with regard to selected characteristics of recreational water, information that might be useful as one component of a systematic plan for recreational water quality. If the various components can eventually be brought to bear on the problem of recreational water quality, there are numerous practical improvements that can be achieved: deciding which and how much of various pollutants to remove from the water to increase site use to an established level; planning site locations to achieve optimum uses; zoning of lakes to achieve efficient and satisfying multiple uses, increasing social pressure for an improved environment; promoting pollution control and abatement for economic purposes; and improving the quality of the recreation experience and perhaps of life in general.

Need for the Study

"Recreation use is the most rapidly growing demand on water."[3] The Outdoor Recreation Resources Review Commission (ORRRC) has stated that "the major portion of outdoor recreation activities takes place in water or adjacent thereto...and 44% of the population prefers water-based recreation activities over any others."[4] The participation in water-oriented outdoor recreation activities is growing at a spectacular rate.

Some recent figures collected by the Bureau of Outdoor Recreation show that, "By the year 2000 our participation in major forms of outdoor activities will be four times greater than it was in 1960."[5] An evaluation of major water-related activities fortells an almost overwhelming demand upon the available resources to meet these activity needs. By the year 2000, people in the United States will swim 2,982 million times, as compared to 672 million times in 1960. This is an increase of 344%.[6] Figures equally enlightening are given for other water-oriented recreation activities. The fact is that already overcrowded and over-used water bodies are in rapidly increasing demand by the people seeking to fill the void created by the increase in leisure time and by people seeking to escape the urban environmental dilemma.

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3. Earnest F. Gloyna, "Major Research Problems in Water Quality," in Water Research, Allen V. Kneese and Stephen C. Smith (Eds.), Johns Hopkins Press: Baltimore, Md., 1966.

4. Outdoor Recreation Resources Review Commission, Study Report #10, Water for Recreation - Values and Opportunities, Washington, D. C.: Government Printing Office, 1962.

5. Department of the Interior, Bureau of Outdoor Recreation, Outdoor Recreation Trends, Washington, D. C.: Government Printing Office, April 1967, p. 5.

6. Ibid., p. 14.

While the demand for water-oriented recreation opportunities is rapidly increasing, the amount of water available has decreased, and "the pollution of recreation waters has increased at an alarming rate."[7] "Although few surveys have been made of waters available for recreation, widespread evidence indicates that water pollution is diminishing the number of recreation waters. The closing of bathing beaches has been widely reported."[8]

"Indicators at public recreation areas that substantiate this viewpoint are high bacteria counts, large masses of algae and aquatic plants, mass die-off of fish, oil slicks, debris, offensive odors, scum, and turbidity."[9]

Some examples of "alarming" pollution of recreation waters are: the 1968 Summer closing of the Chicago beaches on Lake Michigan; the large oil slicks which closed beaches, ruined fishing, and killed wildlife in New England and California in 1967, 1968, and 1969; the obnoxious condition of Lake Erie, causing people to avoid recreation activities on or near the lake; the many small lakes and reservoirs, such as Lake Decatur and Lake Vermillion, so highly silted and polluted that some people cannot, or choose not to, use them; and the innumerable rivers and streams, such as portions of the Sangamon River, Vermillion River and Illinois River, which, according to State Public Health records, are little more than highly-silted open sewers.

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7. Outdoor Recreation Resources Review Commission, Study Report #10, Water for Recreation - Values and Opportunities.

8. Ibid., p. 17.

9. Water Resources Center, University of Illinois, Special Report #2 (prepared for the U. S. Army Corps of Engineers), Feasibility of Evaluation of Benefits from Improved Great Lakes Water Quality, May 1968.

"Nearly all streams in the State of Illinois have bacterial contents in excess of the level considered desirable for body contact."[10] In The President's Message on Natural Beauty, President Johnson stated:

> Every major river system is now polluted. Waterways that were once sources of pleasure and beauty and recreation are forbidden to human contact and objectionable to sight and smell.[11]

The ORRRC reports:

> The quality of water is as important as the amount of surface acres, miles of banks, or location. Polluted water ...is of little use for recreation. Pollution by human or industrial wastes is only one aspect of quality which conditions the available supply. The silt load, bottom condition, and temperature and aquatic plants also affect the usability of water for recreation.[12]

Thus, a major problem is created. Less usable and acceptable water is available to meet a substantial increase in our participation in major forms of water-oriented recreation activities.

How can we cope with this problem? One way is to increase the usable and acceptable water for recreation. This can be done by cleaning up and controlling pollution on our water bodies, or by classifying bodies of water to make optimum use of the resource. The latter would mean classifying the water according to its usefulness for specific recreational activities, based on water quality. Preferably a combination of these methods would be used. The success of both methods depends upon the establishment of usable water quality criteria.

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10. Illinois Technical Advisory Committee on Water Resources, Report of the Committee, Water for Illinois - A Plan for Action, State of Illinois: Springfield, March, 1967, p. 139.

11. President Johnson, In Pursuit of Greatness, The President's Message on Natural Beauty (prepared by the United Automobile Workers of America), Washington, D. C.: National Publishing Co., 1965.

12. Outdoor Recreation Resources Review Commission, A Report to the President and to the Congress, Outdoor Recreation for America, Washington, D. C.: Government Printing Office, January, 1962, p. 70.

At present, recreation water quality criteria are found interspersed through a hodge-podge of state, regional agency, and association publications. Over half of the states have set no meaningful quality standards for recreation. Those states which have set criteria have done a bare minimum and have certainly not thoroughly covered the gamut of water-oriented recreation activities. The lack of definite water-quality criteria for recreation is probably due to the fact that few criteria have been proven through research to be useful. The only consistently used standard has been the coliform level for swimming. Even the validity of this public health standard is questionable and more research is needed. As important as the public health criteria are standards based upon people's perceptions of the water. Even if public health standards are developed and met, there is no guarantee that people will use the recreation area. Maybe the silt, algae, debris, or scum in the water is objectionable to the user and degrades his recreation experience. A water body that is not used or enjoyed because it is obnoxious to the recreator is as useless as an area which has been closed for public health purposes.

No recreation water quality criteria based upon users' attitudes, beliefs, and behaviors now exist. The need for such criteria is critical, as evidenced by a few selected cases. A recent example of utmost importance to outdoor recreation is related to the 1965 Water Pollution Control Bill. This legislation set the strategy for a cooperative nation-wide attack on the water pollution problem. "The 1965 Act provides that each state adopt water quality standards for all interstate and coastal waters and

formulate a plan to implement and enforce these standards."[13]

Due to the 1965 Act, quality standards covering varying uses of water have been set by all fifty states. Detailed criteria have been set for most water uses except recreation. The majority of the states have used the coliform count for swimming waters as their major, and often only, criterion for recreation waters. Thus, recreation, the fastest growing use of water, has all but been bypassed in the nation-wide attack on water pollution, because according to Public Health officials, meaningful water quality criteria for recreation do not exist.

Another recent example which exemplifies the need for water quality criteria for recreation is seen in a study of the Feasibility of Evaluation of Benefits from Improved Great Lakes Water Quality. That interdisciplinary study was undertaken for the U. S. Army Corps of Engineers by The Water Resources Center of the University of Illinois. The evaluation of recreational benefits from improved water quality was an important aspect of the overall study. The first step of the recreation methodology was to "establish water quality parameters to describe the suitability of water to support specific recreation uses."[14] Without these water quality parameters, recreational benefits could not be established. The report went on to recommend: "Intensive research is needed on

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13. J. I. Bregman, "Remarks on Man's Health and Environment," Department of the Interior, news release, December 6, 1968.

14. Water Resources Center, University of Illinois, Special Report #2, Feasibility of Evaluation of Benefits from Improved Great Lakes Water Quality, p. 53.

water quality parameters for recreation, and particularly upon the effect on recreation participation of multiple pollutants acting at the same time in the same location."[15]

Pollution abatement programs are based upon economic valuation. Inasmuch as perceived pollutants affect recreationists' use of sites, a decline in use means an economic loss, and an economic loss is justification for pollution control. Until we can identify and predict the effect of perceived pollutants upon a person's use, it will be nearly impossible to justify pollution control for recreation from an economic standpoint.

Probably the most important need which this study might help to satisfy is that of offering a high quality environment to the individual. By not developing and utilizing, for the clean-up and control of polluted waters, water quality criteria based upon recreationists' beliefs, attitudes and behaviors, we may force the degradation of the quality of the recreation experience. President Johnson put the situation in perspective:

> The purpose of protecting the life of our Nation and preserving the liberty of our citizens is to pursue the happiness of our people. Our success in that pursuit is the test of our success as a Nation. For a century we labored to settle and subdue a continent. For half a century we called upon unbounded invention and untiring industry to create an order of plenty for all our people. The challenge of the next half century is whether we have the wisdom to use that wealth to enrich and elevate our national life, and to advance the quality of American civilization.[16]

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15. Ibid., p. 66.

16. President Johnson, op. cit.

Related Literature

Much literature has been published relating to water quality criteria, but very little of this literature deals with criteria for recreation. An even smaller portion deals with water quality criteria based upon beliefs, attitudes, and behavior.

A report by the National Technical Advisory Committee to the Department of the Interior is one of the most recent publications dealing with water quality criteria for recreation. This volume, entitled Water Quality Criteria, "constitutes the most comprehensive document on water quality requirements to date, and as such, will be used as a basic reference by groups and agencies engaged in water quality studies and standards-setting activities."[17] Unfortunately, yet expectedly, the quality criteria for aesthetics and recreation are incomplete and inadequate, as was the case in preceding reports. The lack of any additional systematic research into the identification of meaningful criteria is evident.

The purposes of the report were: "(1) to recommend water quality criteria for recreation and aesthetic use; and (2) to identify research needs and priorities relating to water quality for recreation and aesthetic uses."[18]

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17. U. S. Department of the Interior, Water Quality Criteria, Report of the Committee on Water Quality Criteria, Federal Water Pollution Control Administration, Washington, D. C.: Government Printing Office, April 1, 1968, p. i.

18. Ibid., p. 2.

The recommended criteria for recreation activities were physical in nature. Measures for fecal coliforms, pH, clarity, and temperature were given. The recommendations were in the form of minimum levels which "still constitute a severe limitation on the potential recreation value of surface waters."[19]

The suggested criteria for aesthetics seem to be of little value. The recommendations were admittedly, "a series of descriptive rather than numerical criteria."[20] Moreover, descriptive criteria can be interpreted in ways which may be undesirable. The value of the report lies in the fact that aesthetic qualities were at least considered important for the development of water quality criteria.

Study Report #10 of the Outdoor Recreation Resources Review Commission, Water for Recreation - Values and Opportunities, is another Department of the Interior publication which has some relevance to the present study. Water quality criteria were outlined for three activities: body contact, boating, and fishing. Although a greater variety of pollutants were considered than in the previously mentioned study, the criteria outlined were no more detailed or useful.

No criteria were considered from an aesthetic standpoint. In fact, people's beliefs, attitudes, and behaviors regarding aesthetic qualities of the water, were given little consideration.

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19. Ibid., p. 9.

20. Ibid., p. 6.

Probably the most comprehensive listing of water quality criteria now available is McKee and Wolf's, Water Quality Criteria.[21] It contains a detailed listing of state and regional criteria throughout the country. Aesthetic criteria, in most cases, are not considered. The criteria found in the publication are probably outdated since enactment of the 1965 Water Pollution Control Bill, requiring that all states develop quality criteria for varying uses of inter-state and coastal waters.

Three research studies that are more closely related to the present study than any of the afore-mentioned literature are: Munson's doctoral dissertation, Opinions of Providers and Users About Site Quality for Water-Oriented Recreation on Eight Small Lakes in Arkansas,[22] in which he found general pollution to be one of the most important considerations affecting users' opinions towards a site. This lends support for the importance of the present study. This study, however, goes beyond Munson's study by trying to determine if attitudes do, in fact, affect behavior at sites, and by trying to determine if common attitudes toward identifiable water characteristics do exist.

Charles C. Stott, in Criteria for Evaluating the Quality of Water Based Recreation Facilities,[23] considered pollution as one general

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21. State Water Quality Control Board, Water Quality Criteria, Jack Edward McKee and Harold W. Wolf (Eds.), 2d. Ed., Sacramento, State of California, 1963.

22. Karl Munson, Opinions of Providers and Users about Site Quality for Water-Oriented Recreation on Eight Small Lakes in Arkansas, Dissertation: University of Illinois, 1968.

23. Charles C. Stott, Criteria for Evaluating the Quality of Water Based Recreation Facilities, Raleigh, North Carolina: North Carolina State University, 1965.

characteristic of a water-based facility. Criteria were suggested, based upon beliefs and attitudes of users.

The study which is most closely related to the present investigation is a recently-completed dissertation entitled, Effects of Water Pollution in San Francisco Bay.[24] The principal research objective was to determine whether the recreation activities of San Francisco Bay area adults were, in any way, affected by their perceptions of bay water quality.

The study consisted of a sample survey of 914 households in the nine-county Bay area. It was found that boating, sailing, and fishing were not at all affected by bay pollution. Swimming was the activity affected, with approximately one-fifth of the adult population saying that they had modified their swimming habits in the Bay or refrained from swimming in the bay because of pollution. Five percent of water skiers refrained from using the bay because of pollution. The information from the study has limited application for the development of water quality criteria for recreation. Interviews were given only at home, not on sites, and pollution was treated as a general category, without examining its components.

Purposes of the Study

This study was concerned with various characteristics of water that collectively are believed to affect water quality for recreation uses. We wanted to know how much the respondents in four recreation user

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24. Gene E. Willeke, Effects of Water Pollution in San Francisco Bay, Ph.D. dissertation, Stanford University, 1968 (information and questionnaires available through correspondence with author - full study not yet received).

groups were concerned about water that possesses these characteristics, i.e., whether they generally disliked water that has such characteristics. We also wanted to know the respondents' beliefs about the water at the sites where interviews were conducted, i.e., to what degree did the water possess each of the characteristics?

Using the above two items of information - the respondent's generalized attitude toward a water characteristic and his belief in its existence at the interview site - it was possible to define the respondent's attitude toward the water at the interview site for that particular characteristic. Figure 1 summarizes the model by which this definition was derived. The essential feature of the attitude model in Figure 1 is that it is based on a principle, not of logic, but of "psycho-logic". Several attitude theorists have proposed that such a principle operates, in one form or another, in the development and change of people's attitudes toward any object (Cf. Newcomb,[25] Fishbein,[26] and Rosenberg,[27]). In essence, these theories state that in order to know a person's attitude toward any object, we must know what he believes about that object (i.e.,

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25. Theodore M. Newcomb, Ralph H. Turner, and Philip E. Converse, Social Psychology, New York: Holt, Rinehart & Winston, 1965.

26. Martin Fishbein, "A Consideration of Beliefs, Attitudes, and Their Relationship," in Current Studies in Social Psychology, Ivan Steiner and Martin Fishbein (Eds.), New York: Holt, Rinehart, and Winston, 1965, p. 107.

27. Milton J. Rosenberg, "Inconsistency Arousal and Reduction in Attitude Change," in Current Studies in Social Psychology, Ivan Steiner and Martin Fishbein (Eds.), New York: Holt, Rinehart and Winston, 1965, p. 121.

Respondent's General Attitude (A_i) Toward Characteristic i		Respondent's Belief (B_i) about Characteristic i at Interview Site		
		Believes Water Has None of Characteristic i ($B_i = -1$)	Believes Water Has a Little of Characteristic i ($B_i = +1$)	Believes Water Has a Lot of Characteristic i ($B_i = +2$)
	Dislikes Characteristic i ($A_i = -1$)	Respondent Has Positive Attitude Toward Interview Site ($A_i = +1$)	Respondent Has Negative Attitude Toward Interview Site ($A_i = -1$)	Respondent Has Extreme Negative Attitude Toward Interview Site ($A_i = -2$)
	Does Not Care About Characteristic i ($A_i = 0$)	Respondent Has Neutral Attitude Toward Interview Site ($A_i = 0$)	Respondent Has Neutral Attitude Toward Interview Site ($A_i = 0$)	Respondent Has Neutral Attitude Toward Interview Site ($A_i = 0$)

Figure 1: Model of Attitude Toward Water-Based Recreation Sites Resulting From A Given Water Characteristic.

what characteristics he perceives it to have), and we must know how he feels attitudinally about each of the characteristics. For a given characteristic, the person's attitude toward an object will be enhanced (made more positive) if either of two conditions exist: he believes that the object possesses the characteristic and he likes the characteristic or he believes that the object does not possess the characteristic and he dislikes the characteristic. Disliking a characteristic that the object possesses or liking a characteristic that it does not have will produce a more negative attitude toward the object. Characteristics which the person feels neutral about (neither likes nor dislikes) will have no effect on his attitude toward the object, regardless of what he believes about them.

The above model of attitude is simplistic both in the sense that it is uncomplicated and in the sense that it is probably "intuitively reasonable" to most readers (i.e., it fits their "psycho-logic" about how attitudes are formed and changed). Despite its apparent simplicity, the model is an improvement on some of the older theories of attitude, which often treated it as an undifferentiated affective feeling toward an object. The present model attributes a degree of rationality to people's attitudes and links them to properties of the attitude object. (The rationality, however, lies not in the reasonableness of the person's beliefs or feelings about characteristics, but in the manner in which he manipulates them in thought. One theory of attitudes, in fact, claims that the apparent irrationality of believing that a positively valued object possesses a disliked characteristic is psychologically painful and motivates the person to

reduce such "dissonance" - Festinger[28]). The present model would seem to be especially useful in investigations of water quality or environmental quality in general because it does provide a systematic way of relating properties of the environment to people's perceptions, feelings, and behavior regarding that environment. As already noted, the point of view of this report is that there are many uses of the environment (recreational uses of water in particular) for which physical and biological (e.g., health) quality standards are not enough if the social and psychological welfare of human beings is to be one of the goals of environmental management. The present attitude model obviously cannot provide these necessary additional standards directly, but it can provide information that should be helpful in attempts to establish such standards.

Another kind of information that we sought was whether a change in a given characteristic of the water would induce the respondent to stop using the water for the recreation activity in question. Such information, like the rest of our data, cannot be taken entirely at face value because it was based on the respondent's report of what he thinks he would do if certain conditions existed. Our goal, however, was to determine whether some water characteristics were mentioned more frequently than others as potential influences on respondents' uses of the water. The identification of a small number of such characteristics could form the basis for

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28. Leon Festinger, A Theory of Cognitive Dissonance, New York, Rowe, Peterson, 1957.

more extensive and rigorous studies, which perhaps could manipulate the water environment in order to determine more clearly the effects of the characteristics on curtailment of use. Information about those water characteristics that cause reduced recreational use would obviously be helpful in establishing water quality standards for human satisfaction. It could also be useful in estimating economic gains and losses from recreational uses of water sites.

We also tried to find out, for each characteristic, whether the respondents had already decreased recreational use of the water because of it. Again, we wondered whether there were selected water characteristics that were already causing dissatisfaction to the point of non-use. In addition to being self-report, another limitation of this kind of information as an indicator of dissatisfaction is that it is confounded by the number and quality of water-recreation opportunities available to the respondent. He might well be dissatisfied with the site he is at, but because there is no other conveniently accessible to him or because an accessible site might be as dissatisfying as the present one, he remains dissatisfied but continues to use it. It was for this reason that we relied heavily on the attitude scores discussed previously as indicators of dissatisfaction due to particular water characteristics. While we did not expect too many cases where dissatisfaction had reached the point of decreased use, we wanted to identify those cases where it had and determine whether particular water characteristics were reportedly causing it.

Finally, we obtained information about the demographic characteristics of our respondents - age, sex, income, education, urban vs. rural residence, population of home community, years of residence in Illinois, and state where they resided previously. We also determined how long it took the respondent to travel to the interview site and how often he engaged in the given recreation activity at the site. The purpose of collecting the demographic and site use data was to use them for control and interpretation of the main findings for the four recreation activity groups. We were not interested in the present information directly as a step toward water quality standards (it would probably be impractical, for example, to try to implement different quality standards for various age groups or for the two sexes). The question of whether to design and implement the same or different quality standards for different recreation activities, however, is not an impractical one. As we stated earlier, the decision to design the same or different standards would depend in part on knowledge of the effects of various water characteristics on the attitudes, beliefs, and behaviors of recreationist groups. But identifying a recreation group in this study (as it would be in any study) was an ex post facto definition. As in any ex post facto research, if we wanted to attribute similarities or differences in attitudes, beliefs, or behaviors among our four groups to differences in their primary water recreational activities, then we needed some assurance that other variables that happened to be associated with recreation activity grouping were not accounting for the results. For example, if the groups that we identified as boaters and swimmers differed in their attitudes but also

differed in average age, then such factors as maturation, background experiences, cultural values, and the like become rivals to the explanation that people who go boating differ in their attitudes toward water from those who go swimming. As in any ex post facto research, it was impossible to control all of the possible rival explanations. But we tried to control some of the more obvious ones using the demographic, site use, and travel data.

Although not the subject of this report, it should also be mentioned that several other major kinds of data were also collected. These will be presented in two subsequent reports.

Problems Investigated in This Report

To summarize, the overall purpose of this project was to study the attitudes, beliefs, and reported present and future recreation behavior of four groups of outdoor recreationists at ten water-based recreation sites in Central Illinois and to relate this information to various specific water and site characteristics and other variables. Our goal was to provide data that could be used to help develop water-quality criteria for recreation uses.

In order to meet these objectives, a number of specific research problems were chosen for investigation in this and two future reports. The research questions investigated in the present report are:

(1) What are the characteristics that swimmers, boaters, fishermen, and sightseers use to describe the water and their likes and dislikes about the water at a recreation site when they are asked to do so in their own words? How frequently is each characteristic mentioned by each recreationist group, what is the group's attitude toward the characteristic, and to what degree does it believe that the characteristic is present at water-based recreation sites in Central Illinois?

The importance of this problem is that it deals directly with respondents' perceptions of their recreation waters, under conditions where external influences on those perceptions were presumably reduced. In other words, the problem gets at how people usually think about and describe the water that they use for outdoor recreation. Such information could be valuable to planners and managers of water-based recreation sites because it tells them about the properties of water that users are likely to notice. This information could be especially valuable if it were found that a few perceived characteristics were common within or among various recreationist groups (common in the sense that a large number of respondents report them).

(2) What is the relative importance to water quality of each of nineteen water characteristics, as indicated by recreationists' attitudes toward it and their beliefs about the degree to which it is present at water-based recreation sites in Central Illinois? What is the rank order of importance of the nineteen characteristics in each recreationist group, and which characteristics significantly discriminate among the attitudes and beliefs of the four recreationist groups?

The nineteen water characteristics were selected a priori by the investigators on the basis of our estimates as to which properties of water the different recreationists would be likely to notice and be concerned about. Our selection of characteristics to be studied was also guided by a consideration of how frequently a given characteristic seemed to be mentioned in literature dealing with recreational uses of water. Thus, an investigation of the present problem permitted a quantitative analysis of the degree to which recreationists' attitudes and beliefs about their recreational water are related to water properties that are often believed to affect the quality of water related recreation.

(3) What is the relative importance of each of nineteen water characteristics in terms of its effect on recreation user behavior? How much is a given water characteristic, assuming that it became more perceptible, likely to cause recreationists to stop using the water site for the recreation activity in question? How much has the presence of a given characteristic already decreased recreationists' use of the water site? Which characteristics significantly discriminate among the four recreationist groups, in terms of reported existing and potential decreased use?

The importance of finding out whether selected water characteristics affect the probability that recreationists will or will not use a water-based recreation site does not need to be emphasized. It should be remembered, however, that the present investigation did not necessarily measure actual, but instead dealt with reported behavior. Obviously, sound water-quality planning and management must be based on more than what people say they do or will do. But reports of behavior that are related to certain properties of water can suggest which characteristics of water need to be carefully watched for their effects on actual recreation use and can provide a starting point for more controlled studies that measure those effects.

(4) To what extent can a person's recreation behavior at a water-based recreation site be predicted from the components of his overall attitude toward that site? What is the relationship between the nineteen components of a person's attitude toward the site and his tendency to have already decreased his recreational use of the site and his report that he would be likely to stop using the site in the future because of water quality?

The nineteen components of a person's overall attitude toward the site were obtained from the person's generalized attitudes toward the nineteen water characteristics and his beliefs about their existence at the site, using the attitude model described previously. The component of an attitude is defined more explicitly in a later section.

Knowing about the relationship between attitudes and beliefs about water characteristics and probable recreation behavior could be of great importance in water-quality management. This relationship might permit, for example, predictions of probable use of new water sites or probable reductions in use of existing sites without going through the time-consuming and perhaps economically-expensive process of actually observing such behavior before action is taken to alter the environment. Knowing that attitudes and beliefs about certain water characteristics relate to recreation behavior could also be used to encourage greater recreation use of a water site for certain activities. Knowing, for example, that recreationists in a particular area are concerned about "harmful bacteria" in the water at nearby recreation sites, one could emphasize the assurance that that characteristic does not exist to a significant degree. Assuming that recreationists' attitudes toward the sites were related to their probable use of the sites and that harmful bacteria were one of the components of overall attitude, then convincing people to change the belief aspect of this component should change their behavior.

One caveat about attaching too much significance to a possible relationship between attitudes and behavior, which was mentioned earlier, needs to be emphasized again here. The tendency to cease or continue using a recreation water site is not necessarily indicative of the quality of the user's experience at that site. In other words, even if attitudes toward a site that derived from the perceived site water quality were not related to recreational use of the site, it would not mean

that the attitudes themselves were not useful as indicators of the quality of recreationists' experiences. On the other hand, it is necessary to recognize the reality of often having to translate qualitative factors (whether quality of water or of recreation experience) into quantitative factors such as monetary costs and benefits. And, while actual recreation behavior (e.g., frequency of use) can probably be translated into dollar amounts, we do not foresee the day when the same can be done with recreationists' subjective experiences. The latter, however, may be more important than actual behavior for the development of water quality standards. We raise this issue again as a way of saying that the relationship between attitudes toward water and increased or decreased recreation site use, while important, is probably not critical to the eventual development of water quality criteria for recreation.

(5) Do the four recreation groups, swimmers, boaters, fishermen, and sightseers, differ significantly in selected demographic characteristics, in travel time to the interview site, or in frequency of participation in the given recreation activity? Are any such differences related to group differences in attitudes, beliefs, or reported behavior?

As noted earlier, the reason for investigating these questions was to find out whether other variables besides the nature of the recreation activity per se could account for any obtained group differences on the main variables. Linking people's perceptions of and reactions to the water to their recreation activities seems, at this time, ultimately more useful than linking them to demographic characteristics that happen to be associated with recreation activities.

II. METHODOLOGY

Subjects

The subjects were 606 adults, eighteen years of age or older, divided as follows among the four recreation activity groups: 218 swimmers, 83 boaters, 165 fishermen, and 140 sightseers. The variation in the number of cases within the groups is due both to the inequalities in opportunities for the four types of recreation among the ten interview sites and to difficulties in locating and interviewing the different types of recreationists. Power-boating, for example, is possible at only a few of the ten interview sites, and it was more difficult for interviewers to locate and interview boaters than it was for the other three types. The age of respondents was somewhat arbitrarily restricted to over eighteen in the hope of obtaining many respondents with established recreation habits and with sufficient experiences at many water sites, in and out of Illinois, so as to have definite attitudes toward water characteristics. A respondent was defined as a swimmer, etc., simply on the basis of what he was doing at the time of the interview. This obviously does not mean that the respondent never engages in the other activities, nor that his perceptions and behavior toward water might not be influenced by them. Most of our respondents, however, reported being "regulars" at the given activity, and the context of the interview made it clear that the questions referred to the person as a swimmer, boater, etc.

Interview Sites

Interviews were conducted at ten water-based recreation lakes in Central Illinois during the late Spring and Summer of 1969. The ten sites were Crystal Lake, Lake Charleston, Lake Dawson, Lake Decatur, Lake Kickapoo, Lake Mattoon, Lake Springfield, Lake Vermillion, Weldon Springs Lake, and Lake of the Woods. Table 1 gives the number of interviews taken for each activity group at each site. An empty cell in the table means that the given activity was not permitted at that site or was not a primary activity there.

Interview Questionnaire

The questionnaire was basically the same for the four recreation activity groups. Five major types of questions were included: (1) demographic and background information designed to identify the type of respondent and his recreational habits and experiences with regard to the given activity, such as frequency of participation, travel time to the interview site, how often he has used water sites outside of Illinois, etc.; (2) questions about site preferences and comparisons among the lakes included in the study; these questions were designed to investigate some of the factors which affect the user's preferences and actual choices among sites and whether water quality in particular affected these decisions and to what degree; (3) questions dealing with the respondent's attitudes and beliefs about the water and water-related characteristics of the site; (4) questions about the effects which the

Table 1

Number of Interviews Obtained at Each Site

Site	Swimmers	Boaters	Fishermen	Sightseers
Charleston	35	7	14	5
Crystal				20
Dawson			20	
Decatur		15	19	10
Kickapoo			18	16
Mattoon	30	16	7	5
Springfield	68	30	33	29
Vermillion	34	15	22	14
Weldon Springs			32	26
Lake of the Woods	51			15
Total	218	83	165	140

presence or change of water-related characteristics of the site have had or are likely to have upon the respondent's use of the site for the given recreation activity; (5) miscellaneous questions which the investigators routinely included out of curiosity or a desire to explore their relevance to the main variables of the study.

Questions of a given type were not always grouped together on the interview questionnaire itself. The different types of questions occurred at various places in the interview.

Most of the questions were the closed-response type, for which the possible answers are pre-determined by the investigator, and the respondent selects one. Some of the questions dealing with perceptions were open response because we wanted to know how the respondents thought about and described their recreation water without being prompted or forced to answer in selected terms. The response formats for specific questions are described later as the results are presented.

Pilot Studies

Two pilot studies were conducted in order to "de-bug" the questionnaire, refine the sampling and interview procedures, and revise the content of the questionnaire to answer questions raised by the initial returns. The first pilot study, which served to "de-bug" the questionnaire and interview procedures, was conducted in the Summer of 1968. Revisions were made in the questionnaire and interviewing process, and a larger, pilot-wave study was conducted in late Summer

and early Fall. An analysis of the pilot-wave data suggested that some new questions be added to the questionnaire and that some old ones be dropped because they did not seem to be very informative. The final questionnaire was developed and the main-wave data were collected during the Summer of 1969.

Sampling and Interview Procedures

The sampling, interviewing, and coding of questionnaires were done by the Survey Research Laboratory, University of Illinois. The sampling was not, strictly speaking, random because the interviews were conducted at the site while the respondent was engaging in the activity. This made it difficult to identify precisely a priori the target population and to select respondents from it by a single random sampling process. The population was roughly defined to be all recreationists eighteen years of age and older in Central Illinois who were participating in one of the four recreation activities during the 1969 Summer recreation season. Field interviewers from SRL, who lived in areas near the interview sites, would go to the sites on selected days and conduct the interviews. A particular interviewer, on a given day and at a given site, would interview respondents from one of the four recreation activity groups. When at the site, the interviewer had the responsibility of actually selecting the persons to be interviewed. Each interviewer did this by a random sampling procedure as much as possible. Persons who were chosen to be interviewed but who left the site, refused to be interviewed, or, occasionally in the case of swimmers, boaters or boat fishermen, "put out to sea" before they could be interviewed were replaced by other randomly chosen respondents. In some cases, the

interviewer actually accompanied a boater on a boat ride while conducting the interview. Fortunately, only a few persons refused to be interviewed. Interviews were distributed over days of the week, with an emphasis on weekend days, and over times of the day.

The investigators believe that the final sample obtained by the above procedures was, for practical purposes, a random sample that probably represents the views and characteristics of the target population.

Data Analysis Procedures

All questionnaires were hand coded and the data were punched onto data processing cards and verified. The data from each activity group were then processed by a special computer program that was designed to "clean" the data by checking for keypunching and coding errors and discovering missing data. Many questions, primarily those dealing with perceptions, were then recoded in order to obtain scores that could be used in the attitude model discussed previously and that had no missing data. The amount of missing data for a given question never amounted to more than five percent. In some cases where data were missing, the mean score for the given question was assigned. This procedure avoided the necessity of excluding a respondent from the final analysis simply because he had an item or two missing, even though his data were over ninety-nine percent complete.

Although the data analysis techniques that were used will become more clear in the results section, it can be noted here that three kinds of statistical presentations of data will be made: (1) two-way frequency

tables showing the relationship between membership in the recreation activity groups and other variables, such as generalized attitude toward a given characteristic of the water, (2) rank orders of water characteristics within the four activity groups, in terms of strength of attitudes or beliefs about them, for example, and (3) multiple correlations which indicated the degree to which recreationists' site attitudes are related to use or non-use of the sites. The Chi Square and F ratio statistics were used to test the reliability of the various relationships and differences.

Definitions of Terms

Recreationist: Generally, one who engages in some form of recreation. In this study, a person who was engaged in one of four recreation activities - swimming, boating, fishing, or sightseeing - at the time that he was interviewed.

Generalized attitude toward a water characteristic: The recreationist's answer to the question, "At any lake, do you dislike water that (is) (has) _____, or doesn't it matter to you?" A dislike answer was scored -1; a doesn't matter answer was scored 0. This is called a generalized attitude because it presumably represents how the respondent would feel about the water characteristic anywhere and not just at the particular site where he was interviewed.

Belief toward a water characteristic: A score indicating the degree to which the recreationist believes that the water characteristic was present at the interview site at the time of interview. The score was derived from the respondent's answers to two questions: "Do you think the water here (is) (has any) _____?" If the person said no to this

question, his belief score was -1; if he said yes, he was asked one of two questions, depending on which phrasing was appropriate for the given characteristic: "Are (is) there a little or a lot of _____?" or "Is the water here moderately or very _____?" If the person's answer was a little or moderately, his belief score was +1; if his answer was a lot or very, his belief score was +2. Thus, possible belief scores were -1 to indicate the respondent's belief that the characteristic was not present, +1 to indicate that it was present to a moderate degree, and +2 to indicate that it was present to a great degree.

Attitude toward the site for a given water characteristic: The product of the respondent's generalized attitude and belief scores for the given characteristic. The possible values for this score are -2 and -1, indicating negative attitudes, 0 for a neutral attitude, and +1 for a positive attitude. The rationale for this product of generalized attitude and belief scores was given in the attitude model discussed previously. The present score will also be referred to as a site attitude or attitude component.

Recreation user behavior - decreased use of the site: The recreationist's answer to the question, "Has your use of this lake for (activity) already decreased because of the (characteristic) (in) (of) the water?" Scores are 1=yes, 2 = no.

Recreation user behavior - probable termination of site use: The recreationist's answers to two questions: (1) "Would you stop coming here to (activity) if the water (was) (had) a little more (characteristic)?"

If the respondent said yes, his score was 1; if he said no he was asked, (2) "Would you stop coming here to (activity) if the water (was) (had) moderately more (characteristic)?" If the respondent said yes, his score was 2; if he said no, his score was 3. Thus, the possible scores are 1, 2, and 3, indicating increasing probabilities of the respondent continuing to use the site.

The above two indexes of user behavior were obtained for each characteristic of the water or the site that the respondent was asked about. For each type of behavior, the respondent's scores were summed over all characteristics to give indexes of total decreased use and probable termination.

Characteristic of the water (or site): In the case of open-response descriptions by the respondent, virtually any attribute or property of the water or surroundings that he chose to mention. In the case of closed-response questions, the following nineteen characteristics were investigated: Clearness (or unclearness) of the water, cleanliness (or dirtiness) of the water, odor, color, algae, dead fish, litter and debris, weeds and plants, fertilizers, soaps and detergents, mud and silt, sharp stones, broken glass, oil and grease and gasoline, insecticides, chemicals, bacteria, sewage, and manure and animal wastes. These characteristics will also be referred to later as attributes, properties or pollutants.

III. RESULTS

Problem (1)

> What are the characteristics that swimmers, boaters, fishermen, and sightseers use to describe the water and their likes and dislikes about the water at a recreation site when they are asked to do so in their own words? How frequently is each characteristic mentioned by each recreationist group and what is the rank order of characteristics by frequency of mention?

Five open-response questions were asked to investigate this problem. The most general of these was: "Suppose a friend asked you about the water here, how would you describe it to him?" The second and third questions were, "What is there about the lake that adds to the attractiveness of this place?" (for those respondents who first said that the lake did add to the attractiveness) or, "What is there about the lake that subtracts from the attractiveness of this place?" (for those respondents who first said that the lake subtracted from the attractiveness). The fourth and fifth questions were: "What do you like most about the water here?" and "What do you like least about the water here?"

Table 2 shows the descriptions of the water given by members of the four activity groups in response to the first question. Although a variety of characteristics were used to describe the water, it is obvious that in all activity groups three or four properties of water accounted for the majority of mentions. They were cleanliness, clarity, muddiness in the case of unfavorable descriptions, temperature (primarily in the swimmers group), and calmness of the water (primarily in the fishermen

Table 2

Open-Response Descriptions of the Water
by Swimmers, Boaters, Fishermen and Sightseers
(percentages)

Favorable Descriptions	(N = 218) Swimmers	(N = 83) Boaters	(N = 165) Fishermen	(N = 140) Sightseers
Clear	11.5(6)	10.8(5)	15.2(5)	10.0(5.5)
Clean	33.9(1)	25.3(3)	20.6(1.5)	22.8(1)
Pleasant Temperature	20.2(4)	6.0(8.5)	1.8	2.1
Attractive Color	0.4	0.0	3.6	3.6
Smooth, Calm	5.5(7)	8.4(7)	15.8(4)	12.1(3.5)
Large Lake	1.4	10.8(5)	1.8	10.0(5.5)
Deep	2.8(10.5)	2.4	10.9(6)	2.1
Not Stagnant	3.2(9)	2.4	2.4	0.7
Scenic	1.4	0.0	1.2	7.1(7)
Fresh	4.1(8)	3.6(10.5)	4.8(9)	1.4
Relaxing	0.5	0.0	0.0	2.9
Good Fishing	0.5	1.2	10.3(7)	2.9
Safe	1.8	0.0	0.0	0.0
Not Crowded	0.5	0.0	1.2	0.0
Spring Fed	0.0	0.0	1.2	1.4
No Weeds	1.0	0.0	0.6	0.7
Good Size	0.5	0.0	0.0	0.7
Good Facilities	1.0	0.0	0.0	0.0
Well Maintained	0.5	2.4	0.6	0.0
Convenient	0.0	1.2	0.0	0.0
No Obstructions	0.0	1.2	0.0	0.0
Shady	0.0	0.0	0.6	0.0
Percentage of Descriptions Given That Were Favorable	51.9	45.0	55.1	45.5

Table 2 (cont.)
(Open-Response Descriptions)

Unfavorable Descriptions	Swimmers	Boaters	Fishermen	Sightseers
Unclear	11.9(5)	10.8(5)	4.2(11)	5.0(8.5)
Dirty	22.5(3)	28.9(2)	20.6(1.5)	21.4(2)
Unpleasant Temperature	2.4	0.0	0.0	1.4
Unpleasant Odor	2.4	1.2	2.4	4.3(10)
Unattractive Color	1.4	1.2	0.6	5.0(8.5)
Muddy	30.3(2)	30.2(1)	18.8(3)	12.1(3.5)
Littered with Debris	0.5	3.6(10.5)	4.2(11)	2.9
Too Much Algae	2.4	2.4	6.0(8)	1.4
Too Many Weeds, Plants	0.0	0.0	4.2(11)	1.4
Murky	1.4	2.4	0.6	3.6
Too Shallow	2.8(10.5)	6.0(8.5)	3.6	1.4
Polluted	0.5	0.0	0.6	2.1
Slimy, Scum	0.5	0.0	3.0	1.4
Too Crowded	1.8	1.2	0.6	0.7
Rough	0.0	0.0	0.0	1.4
Too Small	0.0	0.0	0.0	1.4
Stagnant	0.0	1.2	0.6	0.7
Dangerous	0.5	0.0	0.6	1.4
Has Wastes, Sewage	1.4	0.0	0.6	0.0
Foamy	0.0	1.2	0.6	0.0
Poor Fishing	0.0	0.0	1.8	0.0
Many Bugs	0.0	1.2	0.6	0.0
Percentage of Descriptions Given That Were Unfavorable	47.3	54.3	44.2	53.1
Neutral Descriptions	4.1	1.2	1.2	2.1

Note.--Numbers in parentheses are ranks of characteristics in terms of frequency of mentions.

and sightseer groups). Descriptions of the water as being "muddy" were kept separate from the "unclear" and "dirty" descriptions because it was difficult to tell which of the latter two the person might have meant by "muddy".

Perhaps the most notable finding in Table 2 is that when all descriptions are considered, approximately half are favorable and half are unfavorable, although swimmers and fishermen are slightly more likely to give favorable rather than unfavorable descriptions whereas boaters and sightseers are slightly more likely to give unfavorable descriptions. The only descriptions for which this finding might not hold involve cleanliness and clarity, assuming that we took "muddy" to mean either "dirty" or "unclear". If we combine "muddy" with "dirty", then approximately twice as many people would have described the water as "dirty" as compared to those describing it as "clean". If we take "muddy" to mean "unclear", then about four times as many swimmers and boaters said "unclear" as said "clear", while the ratio for fishermen and sightseers was about 1.5. Making the above assumption about "muddiness", then, suggests that cleanliness and clarity of water are frequent concerns of all activity groups and that Central Illinois recreational water is far more likely to be described as "dirty" or "unclear" rather than "clean" or "clear" by all recreationists, and especially by swimmers and boaters.

Considering some of the differences among the activity groups, Table 2 shows that swimmers and boaters are more likely to mention unclearness and muddiness than are fishermen and sightseers. Fishermen,

more than the other groups, are likely to notice algae, the depth of the water, and as we might expect, whether the fishing is good. Boaters and especially swimmers are more likely than the other two groups to mention the temperature of the water, whereas fishermen and sightseers are slightly more likely to notice weed and plant growth and the color of the water. Finally, boaters and sightseers are somewhat more likely than swimmers and fishermen to mention the largeness of a lake.

Some of the above differences seem obvious, but the reasons for others are not entirely clear. Some might result from the fact that certain groups are simply more likely to come into contact with the water and are thus more likely to notice particular characteristics. Another possibility is that a given group has higher expectations or demands of the water with regard to a particular characteristic and is more likely to take notice when these expectations are not met. In any case, if people's impromptu descriptions of the sample lakes can be taken as evidence of their concerns and demands about recreational water, the above differences should be worth close consideration in water quality planning and management for recreation.

Despite the above systematic differences among activity groups, we feel that one of the most outstanding facts in Table 2 is the finding that there are strong individual differences in descriptions of the water, even within activity groups. When all descriptions are considered, there was almost an even split between favorable and unfavorable characteristics. Even for a single abstract property of the water, such as clarity,

there were large numbers of people who gave completely opposite descriptions of the water. A closer inspection of the data also indicated that this was not due to the fact that we had combined descriptions from all lake sites. In other words, the individual differences remained, even when we considered one site at a time, although they were somewhat reduced.

The fact that people can look at the same object and perceive it to have opposite characteristics raises a real problem for those concerned with water quality planning and management for recreation uses. It is a problem that has been troubling generations of psychologists when they attempt to account for differences among people. Stated simply, the problem is that people differ in many ways that we often cannot explain. As long as we cannot explain such strong individual differences in perceiving the same recreational waters, it will probably be difficult to apply a given standard of water quality and have much assurance that it will have the same effect on most people's perceptions and therefore the quality of their recreational experiences.

In future investigations, one way of reducing individual differences in perceptions might be to use more experimental methods of eliciting people's descriptions. For example, one might be able to expose all respondents to a standard lake site, either in the natural or an artificial environment, and then have them make comparative descriptions between that standard and the lake site of interest. All of our perceptions are in a sense comparative ones because we have to reference the sensory input of the moment to the past experiences stored in our brains in order to

have a perception. People's perceptions can differ, then, not because they are "seeing" different things, but because their past experiences, their "standards" are different. Forcing everyone to use the same standard (i.e., "How would you describe this water in comparison to that water?") might sharply reduce the individual differences in perception of the water that we found here.

Table 3 shows the open-response mentions of the attractive features of the lake site by the four activity groups. A relatively large number of people in each group attributed attractiveness of the site to some characteristic of the water; this was especially true of sightseers, forty-nine percent of whom mentioned some feature of the water. Most people, however, do not mention the water as an essential contributor to the esthetics of the site. Also receiving frequent mentions were other features of the natural surroundings and more utilitarian features which made it possible for the person to have certain facilities or activities available to him. Many people could only repeat that the site was generally attractive but could not give a specific reason.

Among those people who were asked for unattractive features of the site (Table 4), a large percentage mentioned some characteristic of the water, especially in the swimming and fishing groups. It should be noted, however, that the percentages in Table 4 are spuriously high because of the small N's. Comparing Tables 3 and 4, it is apparent that more people thought the sites were attractive than thought them unattractive. To the respondents, the water accounted for a substantial, though not major, part of the attractiveness.

Table 3

Open-Response Mentions of Attractive Features of the Lake Site by Swimmers, Boaters, Fishermen and Sightseers (percentages)

Attractive Feature	(N = 167) Swimmers	(N = 55) Boaters	(N = 111) Fishermen	(N = 126) Sightseers
Water Characteristic	31.7(2)	45.4(1)	41.5(2)	49.2(1)
Natural Surroundings	29.4(3)	20.1(3)	29.7(3)	28.6(3)
Facilities and Man-made Surroundings	20.4(4)	12.7(4)	9.1(5)	15.9(5)
Opportunities for Specific Activities	14.3(5)	5.4(5)	17.1(4)	18.2(4)
Generally Attractive or Pleasant	34.1(1)	36.4(2)	44.1(1)	38.9(2)

Note.--The various features are independent, not mutually exclusive; each respondent could mention more than one attractive feature, so the percentages in a given activity group do not necessarily add up to 100. N is the number in each group who first said the lake site was attractive.

Table 4

Open-Response Mentions of Unattractive Features of the Lake Site by Swimmers, Boaters, Fishermen and Sightseers (percentages)

Unattractive Feature	(N = 14) Swimmers	(N = 4) Boaters	(N = 16) Fishermen	(N = 22) Sightseers
Water Characteristic	71.6	50.0	87.7	45.2
Natural Surroundings	21.8	25.0	18.6	8.9
Facilities and Man-made Surroundings	28.0	50.0	18.6	18.5
Lack of Opportunities for Specific Activities	0.0	0.0	0.0	8.9
Generally Unattractive or Unpleasant	21.8	0.0	6.2	22.9

Note.--The various features are independent, not mutually exclusive; each respondent could mention more than one unattractive feature, so the percentages in a given activity group do not necessarily add up to 100. N is the number in each group who first said the lake site was unattractive.

When respondents were asked what they liked most and what they liked least about the water at the lake sites, the responses shown in Tables 5 and 6 were obtained. It is instructive to consider both tables simultaneously. Again strong individual differences are noticeable in the respondents' tendency to give opposite likes and dislikes, especially for clean-dirty, clear-unclear, no odor-odor, and unpolluted-polluted. Since a given person never used the same property (such as clarity) in describing what he liked most and least, these results again suggest that people differ greatly in their perceptions of the water.

It is also interesting to note in Table 5 that the top-ranked, liked-most features in all activity groups had nothing to do with quality of the water per se, but were such things as the presence or availability of activities, the general attractiveness of the water, and the convenience of it. On the other hand, in Table 6, the liked-least features were directly concerned with water quality itself, particularly its dirtiness and lack of clarity. The implication of these results for water-quality planning and management might be that the recreationist will not necessarily notice the water itself when it is of good quality but will notice its poor quality. Or to state the conclusion somewhat more broadly (and more cautiously since it is not given directly by the data), those properties of water which, when present, would cause recreationists to be satisfied are not necessarily the same ones that would cause dissatisfaction if they were absent. In attempting to develop water-quality standards to enrich the recreation experience, then, it might be useful to approach

Table 5

Open-Response Mentions of What is Liked Most About the Water by Swimmers, Boaters, Fishermen and Sightseers (percentages)

What is Liked Most	(N = 218) Swimmers	(N = 83) Boaters	(N = 165) Fishermen	(N = 140) Sightseers
Clear	7.3(7.5)	6.0(8)	10.9(4)	7.9(8)
Clean	21.1(2)	13.2(4)	20.6(3)	16.4(3.5)
No Odor	6.4(10.5)	3.6	1.2	2.9
Warm Temperature	14.7(4)	4.8(10)	0.6	1.4
Cool Temperature	7.3(7.5)	3.6	1.8	10.7(5.5)
Largeness of Lake	5.5	26.5(3)	7.9(7)	7.1(9)
Deep	3.2	7.2(7)	9.1(6)	2.1
Unpolluted	6.4(10.5)	10.8(6)	3.0	0.0
Convenient	10.1(6)	30.1(1)	10.3(5)	2.9
Simply the Presence of Water	6.9(9)	4.8(10)	4.8(9.5)	16.4(3.5)
Natural Surroundings	3.2	4.8(10)	7.3(8)	10.0(7)
Availability of Activities, Facilities	29.8(1)	28.9(2)	30.3(1)	28.6(2)
Generally Attractive or Pleasant	15.1(3)	12.0(5)	24.2(2)	40.7(1)
Other	11.9(5)	0.0	4.8(9.5)	10.7(5.5)

Note.--The various features are independent, not mutually exclusive; each respondent could mention more than one feature that was "liked most."

Table 6

Open-Response Mentions of What is Liked Least About the Water by Swimmers, Boaters, Fishermen and Sightseers (percentages)

What is Liked Least	(N = 218) Swimmers	(N = 87) Boaters	(N = 165) Fishermen	(N = 140) Sightseers
Unclear	11.0(2)	13.2(2)	11.5(3)	6.4(3)
Dirty	20.6(1)	36.1(1)	12.1(2)	19.3(1)
Poor Bottom Quality	6.9(3)	3.6(7)	1.8	1.4
Odor	3.7(7.5)	0.0	3.6	5.7(4.5)
Temperature	1.9	2.4	1.8	0.0
Too Small	4.1(4.5)	10.8(3)	2.4	7.1(2)
Too Shallow	3.8(6)	6.0(5.5)	5.4(6)	0.7
Weeds, Algae, Plants	1.8	2.4	10.9(4)	3.6(8)
Other Pollutants	4.1(4.5)	6.0(5.5)	6.1(5)	3.6(8)
Surroundings	0.5	2.4	4.2(7)	1.4
Lack of Activities, Facilities	3.7(7.5)	8.4(4)	14.5(1)	4.3(6)
Generally Unattractive, Unpleasant	2.8(9)	2.4	1.8	5.7(4.5)
Other	2.3(10)	1.2	0.6	3.6(8)

Note.--The various features are independent, not mutually exclusive; each respondent could mention more than one feature that was "liked least."

the problem from this dual perspective of "satisfiers" and "dissatisfiers", recognizing that these might be entirely different components of the recreationist's experience. Further research will be needed to confirm this satisfier-dissatisfier concept, but it is consistent with other research showing the duality of human happiness. Herzberg,[29] for example, has shown that there are certain job characteristics that will make workers dissatisfied if they are absent but will not necessarily make them satisfied if they are present. Also, Bradburn and Caplovitz[30] and Hacker, Gaitz, and Hacker[31] have demonstrated that the absence of symptoms of mental illness does not necessarily mean that a person can be considered mentally healthy and vice versa.

Tables 5 and 6 also show major differences among the four activity groups in their patterns of likes and dislikes. Looking at the top four likes and dislikes in each group, the results show that what swimmers like most are the availability of activities (which almost always meant simply that one could swim there), the cleanliness of the water, the general attractiveness, and the warm temperature of the water; liked least were dirtiness of the water, unclearness, the poor

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29. F. Herzberg, B. Mausner, and Barbara Snyderman, The Motivation to Work, New York: Wiley, 1959.

30. Norman Bradburn and D. Caplovitz, Reports on Happiness, Chicago: Adline Publishing Co., 1965.

31. Sally Hacker, C. M. Gaitz, and B. C. Hacker, "Measuring Mental Health and Illness: Analysis of Empirical Relationships Between Measurements of Concepts," Unpublished Manuscript, Texas Research Institute of Mental Sciences, Houston, Texas, 1970.

bottom quality, and various pollutants (including weeds and algae growth). Boaters said that they liked most the convenience of the lake, availability of the activity, largeness of the lake, and cleanliness of the water; they liked least the dirtiness and unclearness of the water, the smallness of the lake, and the lack of activities or facilities. Fishermen liked most the availability of the activity, the general attractiveness, the cleanliness, and the clarity of the water; they liked least the lack of activities and facilities, the dirtiness and unclearness of the water, and the growth of weeds, algae and plants (most mentions in this category were of algae). Sightseers reported liking most the general attractiveness of the lake, the availability of activities and facilities, the cleanliness of the water, and simply the presence of the water itself (i.e., for no specific reason other than the fact that it was there). This last category, "simply the presence of the water", did not receive a high rank in the other activity groups but was mentioned relatively frequently. The frequent mention of this category seems to confirm that mystical pleasure of being around water that outdoorsmen often mention informally.

To summarize the results for Problem (1): (a) There are strong individual differences in how people perceive the water and in what they like most and like least about it; for example, many people perceive the water as clean whereas many other people perceive the same water as dirty, or many people report that clarity is what they like most about the water whereas many others at the same site say

that it is the water's unclearness that they like least. (b) Most respondents find Central Illinois lake sites attractive and various features of the sites are perceived as contributing to the attractiveness; the water is believed to contribute significantly to site attractiveness, with approximately forty percent of the respondents mentioning a water characteristic. (c) Those aspects of the water that respondents like most tend to be different types of features from those that are liked least; the former are likely to involve availability of opportunities, general attractiveness, and convenience, whereas the latter are likely to involve the quality of the water itself. (d) The four activity groups have different patterns of perceptions and likes and dislikes with regard to various characteristics of the water and site.

The last finding is important to water-quality planning and management, since it indicates that different features of the water and site will need to be considered for different recreation activities at a water-based recreation area. The other findings suggest, however, that more than this will need to be done if recreational water management is to be maximally effective. Other factors besides the nature of the activity itself are evidently involved in recreationists' reactions to the water.

Problem (2)

> What is the relative importance to water quality of each of nineteen water characteristics, as indicated by recreationists' attitudes toward it and their beliefs about the degree to which it is present at water-based recreation sites in Central Illinois? What is the rank order of importance of

the nineteen characteristics in each recreationist group, and which characteristics significantly discriminate among the attitudes and beliefs of the four recreational groups?

This problem was investigated by asking the respondents two closed-response questions about each characteristic: how much they disliked it and to what degree they believed it was present at the site (generalized attitude and belief).

Table 7 gives the results for generalized attitudes. For most characteristics, over fifty percent of the respondents in all activity groups reported disliking them; this was particularly true for the more obvious pollutants. We fully expected to get this result, but we were less interested in the total percentages and more interested in the relative percentages among the four activity groups. These relative percentages are important because it seems unlikely that water-quality planning for recreation will always proceed according to an ideal plan. Priorities will undoubtedly have to be set and decisions made to control some characteristics for some recreation activities and to ignore others. Thus, for example, knowing that fifty percent of fishermen might be antagonized by a given characteristic whereas over eighty percent of swimmers would be, could be useful information in these less-than-ideal situations. On the other hand, some of the characteristics in Table 7 showed ninety percent or more "dislike" responses in all activity groups; in these cases relative percentages would seem to be of little practical significance, even though they are statistically significant.

Twelve of the nineteen characteristics had statistically reliable differences among the activity groups in percentages of "dislike" and

Table 7

Percentages of Swimmers, Boaters, Fishermen, and Sightseers Reporting Negative and Neutral Generalized Attitudes Toward Selected Water Characteristics

	Swimmers	Boaters	Fishermen	Sightseers
Unclear Water				
Unclear Water Disliked	54.6	36.1	51.5	46.9
Unclear Water Doesn't Matter	35.3	50.6	38.8	42.2
	$\chi^2 = 8.26$ ($p < .05$)			
Dirty Water				
	(N = 206)	(N = 83)	(N = 165)	(N = 140)
Dirty Water Disliked	63.6	50.6	55.7	60.7
Dirty Water Doesn't Matter	29.6	36.2	29.1	25.7
	$\chi^2 = 3.20$ (N.S.)			
Odor of Water				
Odor Disliked	74.7	60.2	59.4	80.7
Odor Doesn't Matter	13.3	30.1	29.6	11.4
	$\chi^2 = 15.7$ ($p < .01$)			
Color of Water				
	(N = 190)	(N = 83)	(N = 150)	(N = 132)
Unattractive Color Disliked	21.5	27.7	8.0	19.7
Unattractive Color Doesn't Matter	73.2	67.5	84.7	70.5
	$\chi^2 = 11.3$ ($p = .01$)			

Table 7 (cont.)

(Generalized Attitudes)

Algae

	(N = 187)	(N = 58)	(N = 123)	(N = 122)
Algae Disliked	78.7	55.1	49.6	59.0
Algae Doesn't Matter	17.6	41.3	50.4	39.4

$\chi^2 = 37.7$ ($p < .01$)

Dead Fish

Dead Fish Disliked	90.3	87.9	91.9	92.7
Dead Fish Doesn't Matter	2.7	10.3	6.4	5.7

$\chi^2 = 5.5$ (N.S.)

Litter, Debris

Litter, Debris Disliked	90.5	86.7	95.1	96.8
Litter, Debris Doesn't Matter	1.0	8.6	4.6	3.2

$\chi^2 = 10.2$ ($p < .02$)

Weeds, Plants

(N = 175)

Weeds, Plants Disliked	81.1	63.8	56.8	63.9
Weeds, Plants Doesn't Matter	16.6	31.1	43.0	35.2

$\chi^2 = 25.6$ ($p < .01$)

Fertilizers

(N = 175)

Fertilizers Disliked	93.2	79.3	86.9	86.9
Fertilizers Doesn't Matter	5.7	15.5	13.0	11.5

$\chi^2 = 7.2$ (N.S.)

Table 7 (cont.)

(Generalized Attitudes)

Soaps, Detergents

Soaps, Detergents Disliked	86.6	84.4	95.9	91.0
Soaps, Detergents Doesn't Matter	4.8	12.0	4.0	7.3

$\chi^2 = 5.2$ (N.S.)

Mud, Silt in Water

(N = 175)

Mud, Silt Disliked	80.6	75.0	79.3	81.3
Mud, Silt Doesn't Matter	18.3	24.3	20.8	18.5

$\chi^2 = 0.9$ (N.S.)

Sharp Stones

	(N = 161)	(N = 58)	(N = 108)	(N = 114)
Sharp Stones Disliked	88.1	86.1	77.8	74.5
Sharp Stones Doesn't Matter	8.6	12.0	20.3	23.7

$\chi^2 = 16.8$ ($p < .01$)

Broken Glass

	(N = 161)	(N = 58)	(N = 108)	(N = 114)
Broken Glass Disliked	90.7	84.4	91.7	92.1
Broken Glass Doesn't Matter	0.7	13.7	5.5	6.1

$\chi^2 = 15.2$ ($p < .01$)

Table 7 (cont.)

(Generalized Attitudes)

Oil, Grease, Gasoline

Oil, Grease, Gasoline Disliked	89.9	84.4	95.2	92.7
Oil, Grease, Gasoline Doesn't Matter	1.0	10.3	2.4	4.9

$\chi^2 = 12.3$ ($p < .01$)

Insecticides

Insecticides Disliked	89.4	86.1	92.7	89.4
Insecticides Doesn't Matter	2.7	12.0	5.6	9.0

$\chi^2 = 8.3$ ($p < .05$)

Chemicals

Chemicals Disliked	88.4	82.7	97.5	92.7
Chemicals Doesn't Matter	5.4	12.1	2.4	4.9

$\chi^2 = 8.0$ ($p < .05$)

Bacteria

Bacteria Disliked	89.8	86.1	95.9	92.7
Bacteria Doesn't Matter	4.8	10.3	3.2	5.7

$\chi^2 = 4.1$ (N.S.)

Sewage

Sewage Disliked	90.3	96.5	98.4	97.6
Sewage Doesn't Matter	2.1	1.7	1.6	0.8

$\chi^2 = 0.9$ (N.S.)

Table 7 (cont.)

(Generalized Attitudes)

Manure

(N = 175)

Manure Disliked	97.2	93.2	89.4	95.9
Manure Doesn't Matter	1.7	4.1	9.8	2.4

$\chi^2 = 12.9$ ($p < .01$)

Note.--Unless otherwise specified the N^s are 218, 83, 165, and 140. N^s vary because data were combined from the 2nd pilot, main wave, and an experimental questionnaire that was tried out late in the main-wave data collection period, and the same questions were not always asked on these different versions of the questionnaire.

"doesn't matter" responses. These characteristics were unclearness; odor; color; algae; litter, debris; weeds, plants; sharp stones; broken glass; oil, grease and gasoline; insecticides; chemicals; and manure, wastes. Only half of these statistically-significant differences appeared to be of any practical value for differential planning because those in the other half were based on "dislike" percentages that were already extremely high in all groups. Those characteristics for which practical differences among the attitudes of the four groups might exist are: unclearness, odor, color, algae, weeds and plants, and sharp stones.

Unclear water was disliked more intensely by swimmers, fishermen, and sightseers and was disliked least by the boaters, over fifty percent of whom said it "doesn't matter". Odor in or around the water was disliked most by sightseers and swimmers and disliked least by boaters and fishermen, about thirty percent of the latter two groups saying that it "doesn't matter". (In Table 7 and all later tables involving percentage breakdowns, the fact that the percentages in a given group do not add to 100 is accounted for by the fact that there were "don't know" answers and missing data; since the percentage of these was about the same in all groups, the relative percentages for the categories of interest should not be affected). Although most respondents in all groups said that color of the water does not matter to them, the boaters disliked unattractive color the most, swimmers and sightseers disliked it somewhat less, and fishermen showed the least dislike for it, eighty-five percent of the fishermen saying that it does not matter to them. Swimmers had a very strong dislike for algae compared to the other

groups, seventy-nine percent reporting that they disliked it; fishermen showed the least dislike for algae, with fifty percent saying they disliked it and the other fifty percent saying it does not matter to them. Attitudes toward weeds and plants in the water were distributed about the same as they were for algae (both categories might, in fact, represent the same basic category, such as plant growth); eighty-one percent of the swimmers reported disliking weeds and plants; as was the case for algae, fishermen again showed the least dislike for weeds and plants, with forty-three percent saying, "doesn't matter". The distribution of attitudes toward sharp stones and rocks in the water appears to be a borderline case as far as practical importance is concerned although the outcome is highly statistically significant; here, swimmers and boaters were about equal and had greater negative attitudes, while fishermen and sightseers were also about equal and had lesser negative attitudes.

Although we did not have time to do so, since we felt that we were already near the limit of our respondents' cooperativeness, it might be informative to find out why members of a given group say that a characteristic is disliked or does not matter. The different attitudes within an activity group might be due to different perceptions and expectations as discussed earlier. With regard to stones and rocks, for example, some types of fishermen might perceive them as potential locations of fish, whereas other types of fishermen might perceive them as a nuisance because they snag and break fishing lines. In any case, it is clear, as it was for the open-response data, that there were strong individual differences in attitudes within the various activity groups,

and these differences will need to be more completely understood before we can make the fullest use of recreationists' attitudes as guides to water-quality standards.

It also is important to emphasize again that even though the percentage of dislike responses was high, in an absolute sense, in all groups for most characteristics, the relative distribution of percentages among the activity groups might still be useful in recreational water management. Because of the great demand for water-oriented recreation and the scarcity of resources in many areas, recreational water management will probably frequently have to involve a "minimax" strategy, a strategy which recognizes that we probably cannot satisfy all recreationists, at all places, at all times. Instead, the goal will often need to be to maximize the number of people whose recreation experience will be enhanced by water management, while minimizing the number who will be discontented. Under this kind of strategy, especially when funds, time, and other resources are limited, the relative distribution of attitudes among recreationist groups could become quite meaningful, irrespective of the absolute level of percentages that is involved. Using the kinds of attitudes reported here as guides for water-quality decisions and a minimax strategy, as the population of users of a site increases, the relative percentages of various attitudes among activity groups become more important. The difference, for example, between seventy percent negative attitudes in one group and eighty-five percent in another could represent an extremely large number of people who would be affected by a particular water-management decision.

Table 8 shows each activity group's rank order of the nineteen characteristics by percentage of dislike responses. If we consider the top third of the ranks, two characteristics, sewage and litter, ranked high in all four groups. Manure and wastes; dead fish; bacteria; and oil, grease, and gasoline ranked high in three of the four groups. Also ranking in the upper third for individual groups were broken glass and fertilizers for swimmers; stones and insecticides for boaters; and soaps, insecticides, and chemicals for fishermen. Unclearness and dirtiness were ranked low in all groups even though they were mentioned relatively frequently in the open-response mentions of what is liked least. This is not too surprising because unclearness and dirtiness are more obvious properties of the water that many respondents might think about without prompting, whereas some of the more severe pollutants in the closed-response list might not be thought about ordinarily but could be strongly disliked when a person is reminded of them. It should also be remembered that different rank positions in Table 8 might be based on very small percentage differences from Table 7.

Table 9 shows the percentage distributions of respondents' beliefs about the nineteen water characteristics, in terms of the degree to which they are present at the sites. In most cases, over fifty percent of the respondents believed that the characteristic was not present at the site. In many cases, however, there was still a significant number of respondents believing that the characteristic was present to a moderate or very great degree. And for a few

Table 8

Rank Order of Nineteen Water Characteristics
in Each Activity Group by Percentage of Disliked Responses

Characteristic	Swimmers	Boaters	Fishermen	Sightseers
Unclear Water	18	18	17	18
Dirty Water	17	17	16	16
Odor of Water	16	15	14	13
Color of Water	19	19	19	19
Algae	15	16	18	17
Dead Fish	5.5	3	8	5.5
Litter, Debris	4	4	5.5	2
Weeds, Plants	13	14	15	15
Fertilizers	2	12	11	11
Soaps, Detergents	12	9	3.5	9
Mud, Silt	14	13	12	12
Sharp Stones	11	6	13	14
Broken Glass	3	9	9	8
Oil, Grease, Gasoline	7	9	5.5	5.5
Insecticides	9	6	7	10
Chemicals	10	11	2	5.5
Bacteria	8	6	3.5	5.5
Sewage	5.5	1	1	1
Manure, Wastes	1	2	10	3

Table 9

Percentages of Swimmers, Boaters, Fishermen, and Sightseers Reporting Various Perceived Amounts of Selected Water Characteristics

	Swimmers	Boaters	Fishermen	Sightseers
Unclear Water				
Not Unclear	24.8	16.8	29.7	37.9
Somewhat Unclear	53.2	48.2	52.1	40.0
Very Unclear	14.2	25.3	13.3	17.1
	$\chi^2 = 18.6$ ($p < .01$)			
Dirty Water				
	(N = 206)			
Not Dirty	29.1	28.9	38.8	42.1
Somewhat Dirty	49.3	40.9	36.3	40.0
Very Dirty	11.2	18.1	13.4	8.6
	$\chi^2 = 13.9$ ($p < .05$)			
Odor in Water				
No Odor	66.5	67.5	70.0	73.6
Some Odor	22.9	26.5	22.4	19.3
A Lot of Odor	1.8	0.0	1.8	3.5
	$\chi^2 = 6.0$ (N.S.)			
Color				
No Unattractive Color	21.1	26.8	37.8	30.7
Some Unattractive Color	45.0	46.3	41.8	47.1
A Lot of Unattractive Color	29.8	22.0	15.8	17.1
	$\chi^2 = 20.6$ ($p < .01$)			

Table 9 (cont.)

(Beliefs)

Algae

No Algae	57.3	38.6	41.2	50.7
Little Algae	26.6	43.4	34.5	26.4
Lot of Algae	3.7	13.2	12.7	5.7

$\chi^2 = 26.3$ ($p < .01$)

Dead Fish

No Dead Fish	67.9	62.7	70.3	74.3
Some Dead Fish	17.5	33.8	20.6	12.1
Lot of Dead Fish	2.3	1.2	2.2	0.7

$\chi^2 = 14.5$ ($p < .05$)

Litter, Debris

No Litter	62.8	48.2	59.4	60.0
Some Litter	25.2	42.1	32.7	27.8
Lot of Litter	3.3	8.4	7.2	7.8

$\chi^2 = 12.6$ ($p < .05$)

Weeds, Plants

(N = 206)

No Weeds	64.1	45.8	46.7	52.9
Some Weeds	23.3	42.2	36.4	27.1
A Lot of Weeds	5.4	8.4	8.5	5.7

$\chi^2 = 17.0$ ($p < .01$)

Fertilizer

(N = 206)

No Fertilizer	73.8	71.1	75.2	69.3
Some Fertilizer	7.8	15.7	9.1	5.7
Lots Fertilizer	2.5	1.2	3.6	1.4

$\chi^2 = 6.0$ (N.S.)

Table 9 (cont.)

(Beliefs)

Soaps, Detergents

No Soap	82.6	78.3	83.0	76.4
Some Soap	6.5	14.5	8.5	6.4
Lot Soap	.5	0.0	2.4	2.9

$\chi^2 = 6.0$ (N.S.)

Mud, Silt, Sand

	(N = 178)	(N = 59)	(N = 126)	(N = 140)
No Mud	52.8	52.5	56.3	51.4
Some Mud	27.5	22.0	22.2	22.1
Lot Mud	16.8	13.6	16.7	10.0

$\chi^2 = 3.0$ (N.S.)

Sharp Stones

	(N = 210)	(N - 83)	(N = 150)	(N = 124)
No Sharp Stones	65.7	69.9	64.7	73.4
Some Sharp Stones	16.2	13.3	14.7	11.3
Lot Sharp Stones	4.8	7.2	10.7	6.5

$\chi^2 = 6.0$ (N.S.)

Broken Glass

	(N = 190)	(N = 83)	(N = 150)	(N = 132)
No Broken Glass	85.3	68.7	71.3	69.7
Some Broken Glass	9.5	15.7	12.7	14.4
Lot Broken Glass	1.0	6.0	3.3	5.3

$\chi^2 = 11.5$ (N.S.)

Table 9 (cont.)

(Beliefs)

Oil, Grease, Gas				
No Oil, Grease, Gas	83.0	61.4	81.2	75.0
Some Oil, Grease, Gas	9.7	31.4	12.2	9.3
Lot Oil, Grease, Gas	1.4	0.0	2.4	5.0
	$\chi^2 = 35.7$ ($p < .01$)			
Insecticides				
No Insecticides	82.1	73.5	76.4	70.0
Some Insecticides	4.7	15.7	7.9	7.8
Lot Insecticides	1.4	0.0	2.4	1.4
	$\chi^2 = 11.0$ (N.S.)			
Chemicals				
No Chemicals	81.2	63.7	64.5	71.4
Some Chemicals	8.2	8.4	9.7	8.6
Lot Chemicals	0.9	3.6	6.0	2.1
	$\chi^2 = 11.7$ (N.S.)			
Bacteria				
No Bacteria	68.8	66.3	77.6	69.3
Some Bacteria	14.2	12.1	4.9	6.4
Lot Bacteria	1.4	4.8	3.0	3.6
	$\chi^2 = 15.4$ ($p < .02$)			
Sewage				
No Sewage	74.3	62.7	78.8	68.6
Some Sewage	12.4	18.1	10.3	12.9
Lot Sewage	1.4	7.2	5.4	5.7
	$\chi^2 = 13.2$ ($p < .05$)			

Table 9 (cont.)

(Beliefs)

Manure

(N = 206)

No Manure	79.6	73.5	86.1	72.9
Some Manure	9.2	15.7	4.9	10.0
Lot Manure	0.5	1.2	2.4	3.5

$\chi^2 = 16.0$ ($p < .02$)

characteristics, primarily unclearness, dirtiness, algae, litter and debris, and weeds and plants, a relatively large percentage of respondents believed that the characteristic was present in moderate amounts or more.

The differences among the activity groups in their beliefs about the water were striking and too complicated to describe taking one characteristic at a time. There were eleven characteristics for which significant differences were found among the groups; unclearness, dirtiness, unattractive color, algae, dead fish, litter and debris, weeds and plants, oil-grease-gasoline, bacteria, sewage, and manure. Table 10 summarizes these differences by listing those characteristics that a given group believed to be present in lesser amounts and those it believed to be present in greater amounts, compared to other groups. Table 11 summarizes the same differences in a slightly different way.

The most noticable result in Tables 10 and 11 is that boaters always tend to be strong, compared to other groups, in their beliefs that these characteristics are present at the sites. There was no characteristic for which boaters had the highest percentage of beliefs that the characteristic was not present. This finding might be a reality effect because boaters are likely to observe larger areas of a lake and therefore might see (or infer from what they see) larger amounts of any characteristic. On the other hand, boaters probably do not encounter greater amounts of any characteristic per unit of water area observed. So an alternate interpretation might be that boaters have a more critical orientation or higher expectations with regard to the

Table 10

Summary of What Groups Believed About Various Water Characteristics

	Swimmers	Boaters	Fishermen	Sightseers
Characteristics Believed to be Present in Lesser Amounts Relative to One or More Other Groups	Algae Litter, Debris Weeds, Plants Oil, Grease Sewage Manure *		Unclear * Dirty Unattractive Color Dead Fish Litter, Debris Oil, Grease Bacteria Sewage Manure	Unclear Dirty Unattractive Color * Algae * Dead Fish Litter, Debris Oil, Grease *
Characteristics Believed to be Present in Greater Amounts Relative to One or More Other Groups	Unclear * Dirty Unattractive Color Dead Fish * Bacteria	Unclear Dirty Unattractive Color * Algae Dead Fish Litter, Debris Weeds, Plants Oil, Grease Bacteria Sewage Manure	Algae Weeds, Plants	Weeds, Plants * Bacteria Sewage * Manure

* Indicates that the group's percentage is intermediate to the high and low groups, but closer to the high or low category in which it was placed for the given characteristic.

Table 11

Summary of What Groups Believed About Various Water Characteristics

Characteristic	Relatively High Amounts Perceived By	Relatively Low Amounts Perceived By
Unclear	B	SS
Dirty	S, B	F, SS
Unattractive Color	S, B	F, SS
Algae	B, F	S
Dead Fish	B	SS
Litter, Debris	B	S, F, SS
Weeds, Plants	B, F	S
Oil, Grease, Gasoline	B	S, F
Bacteria	S, B, SS	F
Sewage	B	F
Manure	B, SS	F

Note.--The table lists only those characteristics for which the groups had significant differences. If a group is not listed for a given characteristic, that group tended to be intermediate to the low and high groups. S = swimmers, B = boaters, F = fishermen, SS = sightseers.

water than the other groups and have a lower perceptual threshold, which would tend to exaggerate the amount of a characteristic that they believe to be present. In either case, one might describe boaters as being more sensitive to water-quality characteristics, and if conservative descriptions of water quality are wanted, the opinions of boaters should be sought.

The beliefs that a recreationist group has about a given characteristic are less important than the way in which those beliefs combine with the group's generalized attitudes toward the characteristic to form a component of the group's attitude toward the recreation sites. (It might be helpful at this point to refer back to the introduction and the definitions of terms to see how generalized attitudes and beliefs were combined). Table 12 gives the nineteen attitudinal components for the four groups. Each attitude score is based on the -2 to +1 scale described previously, with -2 indicating an extremely negative attitude, -1 a moderately negative attitude, 0 a neutral attitude, and +1 a positive attitude.

All groups had slightly to moderately negative attitudes toward the sites because of the unclearness, dirtiness, and color of the water. All groups had slightly to moderately positive attitudes toward the sites based on extreme dislikes for but perceived absences of odor, dead fish, fertilizers, soaps and detergents, sharp stones, broken glass, oil and gasoline, insecticides, chemicals, bacteria, sewage, and manure and animal wastes. The remaining characteristics showed both positive and negative attitudes among the four groups:

Table 12

Attitudes of Swimmers, Boaters, Fishermen, and Sightseers Toward Central Illinois Lake Sites, Based on Generalized Attitudes and Beliefs about Nineteen Water Characteristics (Mean Scores)

Characteristic	Swimmers	Boaters	Fishermen	Sightseers	F	W
Unclear	-.31	-.30	-.25	-.17	1.12	.00
Dirty	-.27	-.24	-.13	-.09	2.06	.07
Odor	.30	.25	.26	.41	2.66*	.09
Color	-.18	-.18	-.03	-.10	4.95**	.14
Algae	.18	-.18	-.09	.08	6.91**	.17
Dead Fish	.41	.23	.42	.56	2.86*	.10
Litter, Debris	.28	-.09	.12	.16	2.78*	.09
Weeds, Plants	.24	-.08	-.04	.09	5.72**	.15
Fertilizers	.57	.42	.51	.53	146.78**	.65
Soaps, Detergents	.65	.54	.67	.58	<1	.00
Mud, Silt	-.07	.02	.01	.08	<1	.00
Sharp Stones	.35	.36	.22	.37	18.64**	.28
Broken Glass	.67	.35	.48	.41	72.63**	.51
Oil, Grease, Gasoline	.63	.25	.61	.52	5.02**	.14

Table 12 (cont.)

(Attitudes Toward Central Illinois Lake Sites)

Characteristic	Swimmers	Boaters	Fishermen	Sightseers	F	W
Insecticides	.67	.50	.59	.53	1.96	.07
Chemicals	.63	.44	.42	.54	3.30*	.11
Bacteria	.47	.38	.64	.52	3.47*	.11
Sewage	.53	.29	.56	.43	1.01	.00
Manure	.67	.52	.68	.54	157.76	.66
Mean Attitude Toward Central Illinois Sites	.34	.18	.30	.32	7.21**	.17

Based on their attitudes and beliefs about algae and about weeds and plants, boaters and fishermen had slightly negative (almost neutral) attitudes toward the sites, whereas swimmers and sightseers had slightly positive attitudes. Boaters had a slightly negative site attitude because of litter and debris. Attitudes and beliefs about mud and silt produced essentially neutral site attitudes in all groups.

Twelve cases showed significant differences among the four groups in the site attitudes produced by generalized attitudes and beliefs about the characteristic. Only in a few of these cases, however, was the relationship between recreationist grouping and site attitudes a strong one (as indicated by the value of w, which is essentially a correlation coefficient ranging from zero to indicate no relationship to a +1 to indicate a perfect relationship between activity grouping and site attitude). In a sense, these low relationships might be considered desirable because they indicate that on the average the four groups can be regarded as pretty much the same in their site attitudes. In many practical situations, however, we are often less concerned with what happens on the average and more concerned with what happens in the aggregate - to the total number of people involved. In the case of site attitudes changing as a result of a change in a particular water characteristic at the site, a low relationship could indicate large differential effects among the activity groups, in terms of the numbers of people affected by that change. An example would be the case of oil and gasoline in Table 12 where the relationship between activity groupings and mean site attitudes was only w = .14. If large numbers of people in all four

activity groups developed negative site attitudes as a result of an increase in oil and gasoline, it is obvious that a majority of boaters could become disenchanted with the site, whereas presumably large numbers of recreationists in the other groups would remain satisfied, or at least not dissatisfied.

It will be recalled from the results on generalized attitudes that for many characteristics, large numbers of people reported strong dislikes. This suggests that the differences in site attitudes among the characteristics and activity groups in Table 12 are largely due to differences in what people believe about the presence or absence of the various characteristics at the sites. This in turn suggests that the site attitudes considered here are pliable in the sense that they could be manipulated by the manipulation of water characteristics, or more accurately, people's perceptions of water characteristics.

According to the site attitudes in Table 12, those water characteristics which at present need the most attention from water specialists (perhaps with both physical and psychological methods) are unclearness, dirtiness, color, algae, litter and debris, weeds and plants, and mud and silt. And it should be remembered that, despite the low relationships in Table 12, action on some of these characteristics will have differential effects on site attitudes among the four recreationist groups.

The remaining characteristics in Table 12 apparently do not need action so much as they need monitoring to see whether recreationists' beliefs about them are changing, which would produce changing site attitudes.

One further precaution about interpreting the site attitude data: we have been saying that positive scores indicate positive attitudes. But since a positive score results from the perceived absence of a disliked characteristic, one might more properly interpret it as an indicator of a non-negative, but not necessarily favorable, attitude toward the site. With this interpretation we would conclude that the mean scores at the bottom of Table 12 indicate that, on the average, recreationists do not dislike Central Illinois lake sites, but do not necessarily like them. It was not our purpose in this study to focus on this distinction, but other researchers might want to.

Problem (3)

> What is the relative importance of each of nineteen water characteristics in terms of its effect on recreation user behavior? How much has the presence of a given characteristic already decreased recreationists' use of the water site? Assuming that it became more perceptible, how much is a given water characteristic likely to cause recreationists to stop using the water site? Which characteristics significantly discriminate among the four recreational groups, in terms of reported existing and potential decreased use?

This problem was investigated by asking the respondents two closed-response questions about each characteristic: whether its presence had already caused them to decrease their use of the site and whether a small or moderate increase in it would cause them to stop using the site altogether. The question about decreased use is obviously only relevant for people who already said that the characteristic was present to some degree and was only asked of such

respondents. The question on possible termination of site use is relevant regardless of the respondent's belief about the characteristic, but because of a misunderstanding by our interviewers this question was also only asked of respondents who first said the characteristic was present to some degree. For both questions, then, the number of cases on which the percentages reported in this section are based is sometimes relatively small. This must be kept in mind when interpreting some of the percentages.

Table 13 shows the results for reports of decreased use. It is apparent that for all of the characteristics most respondents said that their use of the sites has not decreased at all. In some cases, however, the percentages reporting decreased use were relatively large. Some of the more prominent characteristics that reportedly caused decreased site use in all groups were unclearness, dirtiness, odor, dead fish, litter and debris, and soaps and detergents.

For six of the nineteen characteristics there were significant differences among the four recreation groups in their reported reductions in site use: unclearness, dirtiness, fertilizers, mud and silt, sharp stones, and broken glass. For unclearness, stones, and broken glass, swimmers reported greater decreased use than the other groups. For dirtiness and mud and silt, swimmers and fishermen reported more decreased use than boaters and sightseers. Thirty-two percent of the fishermen reported that their use of the sites had decreased because they believed that fertilizers were contaminating the water (and the fish), whereas nobody in the other three groups reported decreased use because of fertilizers.

Table 13

Percentages of Swimmers, Boaters, Fishermen, and Sightseers Reporting that Their Use of the Site Has Decreased Because of Selected Water Characteristics

Unclear Water

	(N = 149)	(N = 67)	(N = 122)	(N = 91)
Use Decreased	19.5	3.0	7.4	4.4
Use Not Decreased	62.4	62.7	72.1	82.4

$\chi^2 = 20.1$ ($p < .01$)

Dirty Water

	(N = 119)	(N = 58)	(N = 102)	(N = 78)
Use Decreased	21.8	3.4	15.7	3.8
Use Not Decreased	53.0	55.1	57.8	74.4

$\chi^2 = 20.9$ ($p < .01$)

Odor in Water

	(N = 60)	(N = 31)	(N = 49)	(N = 38)
Use Decreased	13.3	6.5	14.3	13.2
Use Not Decreased	55.0	54.8	57.1	57.9

$\chi^2 = 2.4$ (N.S.)

Color

	(N = 175)	(N = 83)	(N = 149)	(N = 123)
Use Decreased	10.9	0.0	0.7	0.0
Use Not Decreased	71.4	71.1	68.4	76.4

$\chi^2 = 3.2$ (N.S.)

Algae

	(N = 67)	(N = 49)	(N = 83)	(N = 48)
Use Decreased	7.5	4.1	4.8	4.1
Use Not Decreased	71.6	63.3	75.9	87.5

$\chi^2 = 1.7$ (N.S.)

Table 13 (cont.)

(Use Decreased)

Dead Fish

	(N = 49)	(N = 32)	(N = 51)	(N = 21)
Use Decreased	16.3	3.1	19.7	4.7
Use Not Decreased	61.2	75.0	62.7	57.1

$\chi^2 = 6.1$ (N.S.)

Litter, Debris

	(N = 72)	(N = 43)	(N = 73)	(N = 51)
Use Decreased	13.9	2.3	12.3	5.9
Use Not Decreased	56.9	72.1	74.0	78.4

$\chi^2 = 5.4$ (N.S.)

Weeds, Plants

	(N = 63)	(N = 45)	(N = 79)	(N = 52)
Use Decreased	12.7	0.0	7.5	1.9
Use **Not** Decreased	66.7	64.3	72.1	84.5

$\chi^2 = 7.5$ (N.S.)

Fertilizers

	(N = 27)	(N = 17)	(N = 25)	(N = 16)
Use Decreased	0.0	0.0	31.8	0.0
Use Not Decreased	55.5	58.6	56.2	62.2

$\chi^2 = 10.5$ ($p < .05$)

Soaps, Detergents

	(N = 21)	(N = 15)	(N = 26)	(N = 18)
Use Decreased	5.2	6.7	11.4	5.4
Use Not Decreased	47.8	53.1	80.7	61.4

$\chi^2 = 0.8$ (N.S.)

Table 13 (cont.)

(Use Decreased)

Mud, Silt in Water

	(N = 82)	(N = 26)	(N = 53)	(N = 53)
Use Decreased	12.2	0.0	13.2	1.9
Use Not Decreased	74.4	76.9	75.5	79.1

$\chi^2 = 8.0$ ($p < .05$)

Sharp Stones

	(N = 44)	(N = 20)	(N = 41)	(N = 24)
Use Decreased	18.2	0.0	7.3	0.0
Use Not Decreased	61.4	55.2	85.4	87.5

$\chi^2 = 9.7$ ($p < .05$)

Broken Glass

	(N = 23)	(N = 24)	(N = 27)	(N = 29)
Use Decreased	30.4	4.1	11.1	0.0
Use Not Decreased	39.1	51.0	63.0	79.3

$\chi^2 = 12.5$ ($p < .01$)

Oil, Grease, Gasoline

	(N = 29)	(N = 30)	(N = 34)	(N = 24)
Use Decreased	17.3	0.0	8.7	4.1
Use Not Decreased	55.3	60.0	76.8	74.8

$\chi^2 = 6.6$ (N.S.)

Insecticides

	(N = 18)	(N = 14)	(N = 24)	(N = 17)
Use Decreased	6.1	0.0	8.3	5.8
Use Not Decreased	49.9	71.7	83.2	71.0

$\chi^2 = 1.0$ (N.S.)

Table 13 (cont.)

(Use Decreased)

Chemicals

	(N = 22)	(N = 14)	(N = 32)	(N = 20)
Use Decreased	9.1	0.0	21.8	4.9
Use Not Decreased	63.6	64.1	62.6	74.8

$\chi^2 = 2.3$ (N.S.)

Bacteria

	(N = 34)	(N = 16)	(N = 21)	(N = 18)
Use Decreased	14.7	6.2	14.3	5.4
Use Not Decreased	61.3	50.0	66.7	77.8

$\chi^2 = 1.0$ (N.S.)

Sewage

	(N = 35)	(N = 26)	(N = 32)	(N = 29)
Use Decreased	20.0	0.0	15.6	24.1
Use Not Decreased	54.3	61.5	71.9	69.0

$\chi^2 = 4.8$ (N.S.)

Manure

	(N = 24)	(N = 17)	(N = 25)	(N = 24)
Use Decreased	8.3	0.0	12.0	12.5
Use Not Decreased	66.6	58.9	72.0	70.9

$\chi^2 = 1.3$ (N.S.)

Although most of the recreationists had not already decreased their use of the sites, Table 14 indicates that the number of people who are prepared to stop using the sites altogether if undesirable characteristics of the water increase is potentially quite large. For most characteristics, relatively large percentages of respondents said that they would stop using the site if there were a small or moderate increase in the amount of the characteristic. If we sum, within each group and for each characteristic, the percentage who would stop because of a small increase in the characteristic and the percentage for a moderate increase, the smallest percentage who would stop using the sites occurs for fishermen because of the color of the water (11%). The largest percentage that would stop also occurs for fishermen because of insecticides (87%). Considering all characteristics and all recreation groups, the median percentage reporting that they would stop using a site was 43%.

For sixteen of the nineteen characteristics, the differences among the four activity groups in their probabilities of stopping site use were statistically significant. And for most of these cases, the differences were quite large. Table 15 was constructed to summarize these differences; it shows, for each group, the characteristics that would have a high, medium, or low probability of causing the recreationist to stop using a site, relative to what was true of other groups (and in most cases, relative to the median of 43%).

If we assume, for a given site, that there were increases in the amounts of all of the characteristics, Table 15 suggests that swimmers

Table 14

Percentages of Swimmers, Boaters, Fishermen, and Sightseers Reporting That Various Increased Amounts of Selected Water Characteristics Would Cause Them to Stop Using the Site

	Swimmers	Boaters	Fishermen	Sightseers
Unclear Water				
Would Stop if Little More Unclear	48.9	8.9	32.0	18.0
Would Stop if Moderately More Unclear	15.6	9.6	9.7	11.4
Would Continue Using Site	30.3	66.2	58.2	60.8
	$\chi^2 = 27.6$ ($p < .01$)			
Dirty Water				
	(N = 206)			
Would Stop if Little Dirtier	34.0	15.6	26.1	16.4
Would Stop if Moderately Dirtier	17.9	12.0	9.1	20.7
Would Continue Using Site	37.4	60.3	45.5	52.9
	$\chi^2 = 20.9$ ($p < .01$)			
Odor of Water				
Would Stop if Little More	41.3	16.9	24.8	37.8
Would Stop if Moderately More	16.1	25.3	21.2	20.7
Would Continue Using Site	29.8	47.0	37.0	32.1
	$\chi^2 = 23.9$ ($p < .01$)			

Table 14 (cont.)

(Stop Using Site)

Color of Water

	(N = 190)	(N = 23)	(N = 150)	(N = 132)
Would Stop if Color Little More Unattractive	21.6	9.6	8.0	7.6
Would Stop if Color Moderately More Unattractive	8.4	6.0	3.3	7.6
Would Continue Using Site	60.5	78.3	70.7	70.4

$\chi^2 = 28.6$ ($p < .01$)

Algae

	(N = 73)	(N = 49)	(N = 83)	(N = 48)
Would Stop if Little More	31.6	12.2	20.5	18.7
Would Stop if Moderately More	19.1	18.3	21.7	12.6
Would Continue Using Site	34.2	61.2	48.1	60.4

$\chi^2 = 14.1$ ($p < .05$)

Dead Fish

	(N = 53)	(N = 32)	(N = 51)	(N = 21)
Would Stop if Little More	62.3	9.3	51.1	38.0
Would Stop if Moderately More	15.1	18.7	21.7	4.7
Would Continue Using Site	9.5	65.6	19.5	38.0

$\chi^2 = 38.9$ ($p < .01$)

Table 14 (cont.)

(Stop Using Site)

Litter, Debris

	(N = 74)	(N = 43)	(N = 73)	(N = 51)
Would Stop if Little More	51.4	32.7	41.1	27.5
Would Stop if Moderately More	18.9	16.3	19.2	25.5
Would Continue Using Site	13.6	46.6	30.1	31.4

$\chi^2 = 14.4$ ($p < .05$)

Weeds, Plants

	(N = 63)	(N = 45)	(N = 79)	(N = 52)
Would Stop if Little More	40.3	22.1	22.8	5.7
Would Stop if Moderately More	14.3	19.9	22.8	17.2
Would Continue Using Site	38.1	48.9	50.6	61.6

$\chi^2 = 18.3$ ($p < .01$)

Fertilizers

	(N = 27)	(N = 17)	(N = 25)	(N = 16)
Would Stop if Little More	29.6	11.7	39.7	50.0
Would Stop if Moderately More	7.4	11.7	15.8	0.0
Would Continue Using Site	23.3	58.6	31.8	18.4

$\chi^2 = 9.3$ (N.S.)

Table 14 (cont.)

(Stop Using Site)

Soap, Detergents

	(N = 21)	(N = 15)	(N = 26)	(N = 18)
Would Stop if Little More	29.1	6.6	65.4	38.9
Would Stop if Moderately More	18.7	6.6	11.4	0.0
Would Continue Using Site	23.5	73.1	22.8	33.4

$\chi^2 = 18.5$ ($p < .01$)

Mud, Silt in Water

	(N = 82)	(N = 26)	(N = 53)	(N = 53)
Would Stop if Little More	47.6	15.4	43.4	24.6
Would Stop if Moderately More	17.1	23.1	11.3	9.5
Would Continue Using Site	31.7	42.3	37.7	50.8

$\chi^2 = 11.2$ (N.S.)

Sharp Stones

	(N = 48)	(N = 26)	(N = 41)	(N = 24)
Would Stop if Little More	45.8	14.9	19.5	25.0
Would Stop if Moderately More	14.6	5.0	14.6	4.2
Would Continue Using Site	31.2	65.2	56.1	62.5

$\chi^2 = 16.3$ ($p < .05$)

Table 14 (cont.)

(Stop Using Site)

Broken Glass

	(N = 24)	(N = 24)	(N = 27)	(N = 29)
Would Stop if Little More	66.7	16.6	22.2	17.2
Would Stop if Moderately More	0.0	8.3	3.7	13.0
Would Continue Using Site	16.7	62.6	51.9	55.2

$\chi^2 = 20.6$ ($p < .01$)

Oil, Grease, Gasoline

	(N = 29)	(N = 30)	(N = 34)	(N = 24)
Would Stop if Little More	48.5	13.3	56.0	16.9
Would Stop if Moderately More	24.0	29.9	17.5	12.2
Would Continue Using Site	10.5	39.9	11.6	50.3

$\chi^2 = 21.4$ ($p < .01$)

Insecticides

	(N = 18)	(N = 14)	(N = 24)	(N = 17)
Would Stop if Little More	44.4	21.3	58.4	29.8
Would Stop if Moderately More	11.6	21.3	28.9	0.0
Would Continue Using Site	10.9	49.8	4.1	46.9

$\chi^2 = 20.4$ ($p < .01$)

Table 14 (cont.)

(Stop Using Site)

Chemicals

	(N = 25)	(N = 14)	(N = 32)	(N = 20)
Would Stop if Little More	56.1	14.3	68.8	35.1
Would Stop if Moderately More	16.2	0.0	9.3	9.9
Would Continue Using Site	7.5	64.1	12.4	34.7

$\chi^2 = 26.0$ ($p < .01$)

Bacteria

	(N = 39)	(N = 16)	(N = 21)	(N = 18)
Would Stop if Little More	69.4	24.9	71.5	38.9
Would Stop if Moderately More	10.4	6.2	9.4	0.0
Would Continue Using Site	7.8	56.0	0.0	44.3

$\chi^2 = 28.9$ ($p < .01$)

Sewage

	(N = 38)	(N = 26)	(N = 32)	(N = 29)
Would Stop if Little More	70.9	23.0	68.8	58.4
Would Stop if Moderately More	7.8	3.8	12.4	13.6
Would Continue Using Site	2.6	53.7	18.6	20.4

$\chi^2 = 16.7$ ($p < .05$)

Table 14 (cont.)

(Stop Using Site)

	Manure			
	(N = 24)	(N = 17)	(N = 24)	(N = 24)
Would Stop if Little More	70.8	29.3	50.2	45.6
Would Stop if Moderately More	8.3	11.8	16.5	12.2
Would Continue Using Site	8.3	46.9	24.8	25.1

$\chi^2 = 6.9$ (N.S.)

Table 15

Summary of Characteristics that Have High, Medium, and Low Probabilities of Causing Different Recreationists to Stop Using Sites

	Swimmers	Boaters	Fishermen	Sightseers
Characteristics That Have a High Probability of Stopping Site Use	Unclearness Dirtiness Odor Algae Dead Fish Litter Weeds, Plants Mud, Silt Stones Broken Glass Oil, Grease Insecticides Chemicals Bacteria Sewage Manure, Wastes		Dead Fish Litter Fertilizers Soaps, Detergents Mud, Silt Oil, Grease Insecticides Chemicals Bacteria Sewage Manure, Wastes	Odor Fertilizers Sewage Manure, Wastes
Characteristics That Have a Medium Probability of Stopping Site Use	Color Fertilizers Soaps, Detergents	Odor Litter, Debris Weeds, Plants Mud, Silt Oil, Grease Insecticides Manure, Wastes	Unclearness Dirtiness Odor Algae Weeds, Plants Stones	Unclearness Dirtiness Dead Fish Litter Soaps, Detergents Mud, Silt Chemicals
Characteristics That Have a Low Probability of Stopping Site Use		Unclearness Dirtiness Color Algae Dead Fish Fertilizers Soaps, Detergents Stones Broken Glass Chemicals Bacteria Sewage	Color Broken Glass	Color Algae Weeds, Plants Stones Broken Glass Oil, Grease Insecticides Bacteria

would be highly likely to terminate their use of the site; fishermen would have a moderate to high probability of terminating; sightseers would have a moderate probability of doing so, and boaters would be least likely to terminate, with a low to moderate probability.

These results suggest that swimmers could be "turned off" by virtually any undesirable change in the quality of water. It should be noted, though, that most of the characteristics that we asked about are potentially pathogenic or a threat to the safety of someone making body contact with the water. It is not too surprising, therefore, to find that swimmers are highly sensitive to such characteristics.

Fishermen were almost as likely as swimmers to terminate site use because of increases in the characteristics although the fishermen had more medium-probability characteristics and two low-probability ones. Many of the medium-probability characteristics for fishermen appear to be ones that many devout fishermen could disagree about as to their importance to the quality of the fishing experience.

Apparently sightseers are most likely to be turned off by characteristics that are objectionable to the senses, particularly conditions that can create odor; unsightly visual conditions are evidently less likely than odorous ones to terminate sightseeing uses, and some of the characteristics with low probabilities might be considered esthetic by some sightseers.

Boaters were the most surprising group with their overall low to moderate probability of terminating use; for most characteristics, over fifty percent of the boaters indicated that, despite undesirable changes, they would continue to use the sites. It would be interesting to know whether this result is related to the scarcity of boating areas in Central Illinois or whether the characteristics of boaters make them a hardy lot who would continue to boat as long as there is some kind of liquid on which to float.

It is interesting to note that the indication we get of the effects of water quality on the quality of the recreation experience is quite different for the behavioral indicators of this section and the attitude indicators discussed previously. Boaters tended to have less positive attitudes toward the sites than swimmers did, yet boaters are evidently far less likely to terminate site use because of water characteristics. This suggests that the effects that water conditions have on the recreationist's feelings about his experience will not necessarily be reflected in his behavior. This conclusion is consistent with more basic psychological research, which has shown that people's emotions have both a cognitive and a behavioral aspect, and the two are often not congruent. This disparity between attitudes and potential behavior also supports the frequent claim of recreation professionals that quantity (of use) is not an index of quality (of the experience).

To summarize the effects of water characteristics on recreation behavior: (a) Most of the respondents indicated that their use of the sites had not decreased because of water characteristics although a

significant percentage did report reduced use. (b) Large percentages of the respondents did say that they would stop using the sites if the amounts of various water characteristics were to increase. (c) There were major differences in the above percentages among the four types of recreationists, and the kinds of characteristics that would cause decreased or terminated use were different for the four groups.

We again caution the reader about the self-report nature of the present data and the small number of cases on which many of the percentages were based. We hasten to add, however, that for many characteristics, even if we made very conservative estimates of the percentage of recreationists in a given region who would actually change their behavior, the number of people doing so would still be very large. And when we speak of environmental quality and human satisfaction, we ought to speak in terms of numbers and not percentages.

Problem (4)

> To what extent can a person's recreation behavior at a water-based recreation site be predicted from the components of his overall attitude toward that site? What is the relationship between the nineteen components of a person's attitude toward the site and his tendency to have already decreased his recreational use of the site and his report that he would be likely to stop using the site in the future because of water quality?

This problem was investigated by multiple regression analysis using the nineteen components of each person's site attitude as predictors (where each component is that part of the person's attitude toward the site that is attributable to a given water characteristic; the means of these components were presented earlier in Table 12). The two criteria were (a) the sum of the person's reports that his use of the site had decreased for any reason, which is an index of his total

decreased use, and (b) the sum of his reports that he would stop using the site if there were changes in water characteristics, which is an index of the probability that he would terminate his use of the site. Because of the way the data were coded for processing, the higher the scores on the criteria, the less the person has decreased his use of the site and the less likely he is to stop using it. Because of this method of scoring, a positive correlation between a site-attitude component and the criteria can be interpreted directly to mean that people with a favorable site attitude are more likely to use or continue using the site, and people with an unfavorable site attitude are less likely to use or continue using it.

In essence, the multiple regression analysis will give a rough indication of whether the effects of water quality on recreationists' behavior can be reliably estimated from the site attitudes that they hold because of water quality. The regression analyses of the two indexes of behavior are shown in Tables 16 and 17. Each regression coefficient is a partial correlation coefficient between the given attitude component and the criterion, while holding constant the relationship between that component and the other attitude components. The regression coefficient, therefore, is a direct index of the degree of relationship between the site attitude component and reported behavior. A glance at the regression coefficients in the two tables shows that most of them are unimpressive in their magnitudes and are not statistically reliable.

Although the multiple correlations, and therefore the proportions of variance in behavior that can be attributed to site attitudes, seem to be high, several factors must be kept in mind when interpreting these

Table 16

Multiple Regression Analysis of Nineteen Site Attitude Components as Predictors of Decreased Site Use

Site Attitude Component	Regression Coefficients			
	Swimmers	Boaters	Fishermen	Sightseers
Unclear	.19*	.19	.12	-.07
Dirty	.10	.11	.18*	-.05
Odor	.00	.06	.12	.06
Color	.18*	-.17	-.15*	.02
Algae	-.06	.36*	-.10	.07
Dead Fish	.10	-.10	.25*	.00
Litter, Debris	.14*	-.02	.11	.09
Weeds, Plants	.11	-.07	.00	-.01
Fertilizers	-.10	-.09	.08	.30*
Soaps, Detergents	.04	.02	-.06	.48*
Mud, Silt	-.03	-.06	-.02	.01
Sharp Stones	.17*	-.07	.08	.10
Broken Glass	.13	.06	.13	-.01
Oil, Grease	.07	-.08	.00	.34*
Insecticides	-.08	.11	.18*	-.22*
Chemicals	-.01	-.06	.11	.18
Bacteria	-.12	.45*	-.12	-.08
Sewage	.05	-.30	-.06	.19
Manure, Wastes	.08	-.05	.22*	.17
Multiple Correlation	.64*	.57	.73*	.63

* Statistically significant at $p < .025$.

Table 17

Multiple Regression Analysis of Nineteen Site Attitude Components as Predictors of Probable Terminated Site Use

Site Attitude Component	Regression Coefficients			
	Swimmers	Boaters	Fishermen	Sightseers
Unclear	.15*	.08	.14	.05
Dirty	.02	.01	.08	.01
Odor	.02	.17	.11	.14
Color	.07	-.01	-.14	.14
Algae	-.15*	.16	-.03	-.03
Dead Fish	.26*	-.18	.06	-.15
Litter, Debris	.17*	.11	.03	-.13
Weeds, Plants	.10	-.20	.02	-.04
Fertilizers	-.13	-.06	.08	.38
Soaps, Detergents	-.07	-.01	-.04	-.02
Mud, Silt	.18*	.21	.11	.04
Sharp Stones	.03	.11	.06	.21
Broken Glass	-.06	-.23	-.19*	.08
Oil, Grease	.12	.08	.07	.02
Insecticides	-.03	.15	.33*	-.14
Chemicals	.14	-.08	-.06	-.06
Bacteria	.08	-.08	.04	-.02
Sewage	.01	-.35	.06	.37
Manure, Wastes	.16*	-.16	.08	.28
Multiple Correlation	.66*	.56	.64*	.56

* Statistically significant at $p < .025$.

correlations. First, the multiple correlations are derived from regression coefficients, most of which we already know to be unreliable; if we used only the site attitude components with statistically-significant regression coefficients to derive the multiple correlations, the latter would be much smaller than they are in Tables 16 and 17. Second, even statistically reliable regression coefficients tend to be somewhat unstable, and there is often a noticable reduction in the amount of criterion variance accounted for when regression coefficients derived from one sample of data are used to predict criterion scores in an independent sample of data. In psychometrics, this is known as the shrinkage problem in multiple regression and occurs because a regression coefficient, even though reliable by a statistical test, is still partly determined by the sampling error that is associated with the particular sample from which the coefficient was obtained. Third, we were here correlating self-report attitudes with self-reports of existing and probable behavior. The correlations, therefore, are likely to be inflated by method variance, i.e., by the fact that our measurements of attitudes and behavior were obtained from the same, potentially biased, source. The correlations would probably be lower had we correlated self-report attitudes with a more objective assessment of the person's behavior.

Taken together, the above factors mean that the multiple correlations in Tables 16 and 17 are probably overestimates of the true relationship between recreationists' attitudes and their behavior. Even under the most ideal conditions, assuming that the above factors were not at

work, the amount of variance in recreationists' behavior that could be attributed to their site attitudes would be only about fifty percent; this would occur for fishermen's decreased use of sites. The percentage of actual behavior that is associated with site attitudes is probably much lower than this, and it is almost certainly lower for the other activity groups.

We must conclude, therefore, that the behavior of recreationists because of the quality (or lack of quality) of their recreational water cannot be predicted very accurately from the site attitudes that are produced by water-quality factors. This lack of relationship appears to become more important if we view it in terms of behavior failing to predict attitudes. If we take site attitudes to be indicative of the quality of the recreational experience, then our data suggest that the latter cannot be estimated very well from increased or decreased attendance figures and the like, which are often used to justify planning and management decisions about recreational water.

Problem (5)

> Do swimmers, boaters, fishermen, and sightseers differ significantly in selected demographic characteristics, in travel time to the interview site, or in frequency of participation in the given recreation activity? Are any such differences related to group differences in attitudes, beliefs, or reported behavior?

Table 18 shows the demographic and experience characteristics of the four activity groups. There were significant differences among the groups on eight of the eleven variables. On the average, boaters lived somewhat closer to the sites than the other groups (as indicated by travel

Table 18

Demographic and Experience Characteristics of Swimmers, Boaters, Fishermen, and Sightseers

Variable	Swimmers	Boaters	Fishermen	Sightseers	X^2
Mean Minutes of Travel Time to Site	30.0	26.9	31.8	35.4	19.7*
% High School in Illinois	80.0	85.8	85.3	75.9	6.5
Mean Years Education	12.6	12.4	10.0	11.5	57.7*
% Male	42.2	88.0	87.3	47.9	117.4*
Mean Frequency of Site Use	6.6	9.1	5.9	4.2	58.8*
Mean Age	30.4	32.5	42.7	39.1	84.8*
Mean Population of Hometown (in Thousands)	32.2	37.5	31.8	33.1	11.2
% Urban Dwellers	85.7	86.1	85.6	82.3	0.4
% Living in Illinois over 4 Years	87.9	92.4	95.6	90.2	15.4*
Mean Frequency/Year Travel to Water Site Outside Illinois	0.8	0.8	0.5	0.7	25.3*
Mean Income in Thousands	7.9	8.2	6.9	7.4	18.3*

* Value of Chi square statistically significant at $p < .01$.

time), whereas sightseers lived the farthest distance. Swimmers and boaters reported more years of education than did sightseers and fishermen; swimmers and boaters were also younger, had larger incomes, and traveled more often to water sites outside of Illinois. Boaters reported using the sites more often than the other groups. The strongest difference among the groups was in sex of the participant: boaters and fishermen were mostly males, but there was approximately an even distribution of males and females in the swimming and sightseeing groups.

Only three of the above variables appear to be possible correlates of some of the group differences in attitudes and behavior presented above. The short travel time and high frequency of site use by boaters could be related to their tendency to have less positive site attitudes and yet be reluctant to stop using the sites if water quality became poorer. In other words, people who live close to a site and who use it frequently might be more likely to view it unfavorably and yet refuse to stop using it, regardless of the type of recreation they engage in. Perhaps the convenience of the site simply overrides the negative attitudes produced by perceptions of poor water quality, and so the person would continue to use the site. In the case of boaters, this speculation is consistent with the fact that convenience of the water was the liked-most characteristic that was mentioned most frequently by them.

The other demographic variable that might be related to group differences on some of the site attitude components is sex of participant. The pattern of sex ratios shown in Table 18 is similar to the patterns of

group differences in site attitudes resulting from odor, algae, weeds and plants, and chemicals in the water. Boaters and fishermen, who also happened to be mostly males, had more negative site attitudes because of these characteristics than swimmers and sightseers. Since these four characteristics were the only cases involving this relationship with sex of respondent, it is possible that the relationship was only coincidental. But we should not ignore the possibility that sex of participant would be another confounding variable in any attempts to base water-quality standards on the nature of recreation activities.

It should be noted that some of the variables in Table 18 that intuitively might seem to be important determinants of people's perceptions of the water could not be critically investigated in this study because of their low variance (thus making them more like constants than variables). The person's experience with water sites as a youngster, for example, or the frequency with which he can compare Illinois sites to those in other regions, might be important determinants of the personal standards for recreational water that he develops. But most of our respondents had attended high school in Illinois, had lived in the state most of their lives, and seldom traveled to water sites outside the state. Thus, there was evidently not much variation in the respondents' background experiences with recreational waters, which made it impossible to assess accurately the importance of this factor.

IV. GENERAL SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Because the results are somewhat detailed and complicated and because various interpretations and conclusions were made as the results were presented, this last chapter will present only highlights of the major findings and some very general conclusions and recommendations that seem to be warranted.

Summary of Major Findings

Open-response descriptions and attitudes about water. There were major differences among the four recreation activity groups in the kinds of things that they noticed about the water at Central Illinois, outdoor recreation sites. The four groups also differed in their patterns of likes and dislikes of various characteristics of the water. In addition to these major group differences, there were strong individual differences among the respondents within activity groups in their descriptions and likes and dislikes about the water; many people gave opposite descriptions of the water (e.g., clean and dirty) and had opposing likes and dislikes of the water based upon these opposite perceptions.

Generalized attitudes toward specific water characteristics. Most respondents reported disliking most of the specific pollutants and (presumably negative) characteristics of water that we asked

about. For most characteristics, however, there were still significant percentages of people who said that the characteristics "did not matter" to them. Again, there were differences among the four activity groups in their patterns of generalized attitudes toward water characteristics. For some characteristics, there were also notable individual differences within activity groups in people's generalized attitudes.

Beliefs about specific water characteristics. There were particularly strong differences among the four activity groups in what they believed about the water at Central Illinois lake sites. In terms of overall strength of beliefs, boaters were strongest in that they were more likely than the other groups to believe that the various pollutants and undesirable characteristics were present. Although most people believed that the more severe pollutants were not present at the sites, there were still notable individual differences in people's beliefs in addition to the group differences noted above.

Site attitudes produced by specific water characteristics. For each water characteristic, the respondent's generalized attitude toward it was combined with his belief about it to estimate a component of his attitude toward the site because of that water characteristic. For some of the water characteristics, the average site attitudes estimated in this way were negative in all activity groups. For many other characteristics, the average site attitudes were positive, or at least non-negative; many of these positive average scores were not markedly high, however, indicating that many people held negative, or at best

neutral, site attitudes. There were significant differences among the activity groups in their site attitudes. When the site attitude components for all water characteristics are considered in total, boaters tended to have less positive site attitudes than the other groups.

Reported behavior in relation to specific water characteristics. Most respondents indicated that their use of the sites had not decreased because of the quality of the water; for some water characteristics, however, there nevertheless was a significant percentage of people who said their use had decreased. For most water characteristics, large percentages of people did indicate that they would be likely to stop using the site if conditions got worse. There were major differences among the four activity groups in the kinds of water characteristics that had caused them to decrease their use of sites or that might cause them to stop altogether. Assuming there were a general increase in undesirable water conditions, swimmers and fishermen would have high probabilities of terminating site use; sightseers would have a moderate probability, and boaters a low probability of stopping.

Relation between site attitudes and behavior. There were two indications that recreationists' attitudes toward sites because of water quality are not highly related to site-use behavior. First, there was a tendency for the groups with more negative site attitudes to give few or moderate reports of decreased use or probable termination of use. Second, a multiple regression analysis of individual scores within groups, using site attitude components as

predictors, and the total reports of decreased use and probable termination as criteria, suggested that site attitudes are not accurate indicators of behavior.

Other differences among groups. The four activity groups also differed significantly in several demographic and site-use characteristics. Only three of these (travel time to the site, frequency of site use, and sex of respondent) appeared to be possible, and then only partial, explanations of group differences in attitudes, beliefs, and behavior with regard to water characteristics.

Possible Uses of the Data

The goal of this study was to provide information that could be used in a systematic program of developing water-quality criteria for recreation uses. The focus has been on testing the hypothesis that different types of recreationists, because they have different uses of recreational water, will differ in their values with regard to water and consequently will differ in their attitudes, beliefs, and behavior toward various characteristics of the water. Our results are consistent with this hypothesis, in many instances very strongly so. Some of the differences among the four activity groups clearly suggest that different standards will need to be employed in providing and maintaining recreational water for these groups.

It is in deciding which particular standards should be applied, where, and by whom that caution prevents us from making specific suggestions about the uses of our data. We say this, not to retreat from the responsibility of saying something about the significance of

our findings, but to emphasize the complexities involved in establishing and implementing water-quality standards for any purpose. The present research findings are probably best regarded as information which, when combined with information about numerous other factors, could be used as a guide to water-quality planning and management for recreation. It is with these cautions in mind that we hazard the following suggestions.

Planners and administrators could use some of the findings to optimize the uses of recreational water and the satisfactions of its users. Lake zoning for multiple uses could be attempted, for example, by taking into account how various activity groups feel and behave with regard to various water characteristics and then zoning the uses of the lake accordingly.

In water management, some of the findings could be used to establish priorities for controlling undesirable water conditions (or implementing desirable ones). By knowing how the different activity groups feel and behave with regard to these conditions, one could estimate which types of recreationists would benefit most and which the least from these priorities. The priorities might then hinge on the projected number of site users in each activity group. In other words, a "minimax" strategy of water management.

In some instances, knowledge of people's attitudes and beliefs about water quality could be used in educational campaigns to enhance attitudes, allay fears, or simply to establish communication with water users. In many cases, user dissatisfaction might result from

a "communications gap" as much as it does from the quality of the environment itself, i.e., the user's perception that the providers and managers of a resource are not concerned about the same things that he is.

Finally, planners and administrators of recreational water should take seriously the distinction between attitudes and behavior (or more specifically for recreation purposes, the distinction between quality of the users' experiences and the quantity of their attendance and use of sites). Managers of water-based recreation areas need to make greater efforts to sample the attitudes of users (in addition to head counts per unit of time) and to partially use the obtained knowledge in their decision-making.

Hopefully, some readers will find other, more specific uses, of the present results. It should be emphasized again, however, that our findings are limited, that the answers to many questions are incomplete, and that more research into recreational water standards is needed.

Recommendations for Further Research

The first recommendation we would make is that the present study be replicated with several new features incorporated into it. Different sets of pollutants and water characteristics could be studied and recreationists could be categorized in different ways. The attitudes, beliefs, and behavior of recreationists in different regions of the country should be compared to determine the importance of background and experience factors in affecting perceptions and behavior.

More research is needed to try to explain some of the strong individual differences that we found in people's attitudes, beliefs, and behavior within activity groups. We might not be able to design water standards on the basis of the factors that produced these individual differences. But we could discover some of the variables that would confound attempts to set standards and that limit the application of the standards. Convenience of the site, frequency of site use, the availability of alternative sites and facilities, and sex of the respondent probably deserve further investigation to determine their relations with water-related attitudes, beliefs, and behavior.

Methods are needed to study people's comparative judgments of water. In order to develop complete recreational water standards, we will probably need to provide people with standards by which they can tell us about their experiences. In other words, we need better measurement techniques so that we can calibrate different persons' perceptions of water and compare them to the same "zero point" on the scale. One way of doing this might be to expose people systematically to different water bodies in the field and elicit their comparative judgments. Another way might be to use experimental methods, which could involve techniques as simple as the judgment of photographs of different water scenes or as complicated as an artificial, controlled environment in which the water is manipulated and the reactions of people obtained.

We also need more intensive research on people's attitudes in relation to their water-based recreation experiences. Especially

useful would be attitude indicators that are refined and simplified enough to be used by the practitioner in the field, yet reliable enough to give accurate information about users' feelings.

Finally, if we want to be truly precise in developing water-quality standards based on recreationists' attitudes and behavior, it might be necessary to manipulate experimentally the characteristics of recreation lakes and reservoirs and then measure people's reactions. While it would probably be both immoral and illegal to pollute a lake deliberately, we could certainly improve one of two similar lakes, neglect the other, control other extraneous factors, and then observe the effects on recreationists' attitudes and behavior. This sounds like an extraordinarily expensive procedure. But the costs may be well worth the payoff in increased human happiness.

V. APPENDIX

SURVEY QUESTIONNAIRE

The following questionnaire was used to interview the swimmers. The questionnaires for boaters, fishermen, and sightseers were essentially the same as this one.

Interviewer
I.D. sticker

Place of Interview

- ☐ Lake of the Woods
- ☐ Lake Springfield
- ☐ Lake Mattoon
- ☐ Lake Charleston
- ☐ Lake Vermilion

UNIVERSITY OF ILLINOIS
SURVEY RESEARCH LABORATORY

WATER QUALITY CRITERIA STUDY

SWIMMING QUESTIONNAIRE

(Time started_____) *(Date of interview_____)*

(INTRODUCTION)
My name is_____, and I'm representing the University of Illinois. We're doing a study of recreation at lakes such as this in Illinois.

1. How often during the summer do you usually come here to swim? *(Card A)*

   ☐ a. 1 or 2 times
   ☐ b. 3-5 times
   ☐ c. 6-10 times
   ☐ d. More than 10 times

2. How often during the summer do you usually go to a swimming pool to swim? *(Card B)*

   ☐ a. Never
   ☐ b. 1 or 2 times
   ☐ c. 3-5 times
   ☐ d. 6-10 times
   ☐ e. More than 10 times

3. I'd like to know what you think of this place from a scenic point of view.

   a. What do you find attractive about the scenery here?

   _____

   _____

   _____

   b. What do you find unattractive about the scenery here?

   _____

   _____

   _____

   c. Overall, do you find this place attractive, so-so, or unattractive from a scenic point of view?

   ☐ Attractive ☐ So-So ☐ Unattractive

4a. Again looking at this place from a scenic point of view, does this lake in any way add to the attractiveness of this place?

☐ Yes ☐ No → *(Skip To Q. 6a)*

b. What is there about the lake that adds to the attractiveness of this place? _____

_____

c. What else? _____

_____

_____

(Fill in and ask for each attractive feature)

	1. _____	2. _____	3. _____	4. _____
5a. Does the _____ of the lake add to the attractiveness of this place a little.	☐	☐	☐	☐
or a lot?.	☐	☐	☐	☐
b. Does it personally matter to you that the lake is _____?				
No.	☐	☐	☐	☐
Yes. . . . . ↓	☐ ↓	☐ ↓	☐ ↓	☐ ↓
(If yes)				
c. Do you sometimes decide to come here because of the _____ of the lake?				
Yes.	☐	☐	☐	☐
No.	☐	☐	☐	☐

6a. Again looking at this place from a scenic point of view, does the lake in any way subtract from the attractiveness of this place?

☐ Yes ☐ No → *(Skip to Q. 8)*

b. In what way does it subtract? _____

_____

c. In what other ways? _____

_____

	(Fill in and ask for each unattractive characteristic)			
	_____	_____	_____	_____
7a. Does the _____ of the lake subtract from the attractiveness of this place a little. . . .	☐	☐	☐	☐
or a lot?. . . .	☐	☐	☐	☐
b. Does it personally matter to you that the lake is _____?				
No.	☐	☐	☐	☐
Yes.	☐ ↓	☐ ↓	☐ ↓	☐ ↓
(If yes)				
c. Do you sometimes decide not to come here because of the _____ of the lake?				
Yes.	☐	☐	☐	☐
No.	☐	☐	☐	☐

8. From this card, what is your age? *(Card C)*

☐ a. Under 18

☐ b. 18-24 ☐ d. 35-54
☐ c. 25-34 ☐ e. 55 and over

(Skip to Q. 17a)

9. Would you say that the water here is. . .

. . .very clear, ☐ → *(Skip to Q.11a)*
somewhat unclear, ☐
or very unclear? ☐

10. Do you like or dislike the fact that the water is unclear, or doesn't it matter to you?

☐ Like
☐ Dislike
☐ Doesn't matter

11a. Would you stop coming here to swim if the water was a <u>little</u> more unclear (less clear)?

☐ Yes ☐ No

b. What if it was <u>moderately</u> more unclear (less clear), would you stop coming here to swim?

☐ Yes ☐ No

(Skip to Q. 13 if "very clear" in Q. 9)

12. In your opinion what is in the water that makes it unclear?_____

_____

_____

_____

13. Would you say the water here has. . .

. . .no odor, ☐→ *(Skip to Q. 15a)*

some odor, ☐

or a lot of odor? ☐

14a. Does the odor of the water bother you at all?

☐ No ☐ Yes

↓

b. Does it bother you. . .

. . .a little, ☐

moderately, ☐

or a lot? ☐

15a. Would you stop coming here to swim if the water had a <u>little</u> more odor?

☐ Yes ☐ No

↓

b. What if it had <u>moderately</u> more odor, would you stop coming here to swim?

☐ Yes ☐ No

(Ask, if Q. 13 was answered "some odor" or "a lot of odor")

16. In your opinion what is in the water that causes the odor?_____

_____

_____

(Terminate interview for those under 18 years of age)

Check sex of respondent

☐ Male ☐ Female

Time interview ended_____

17a. During this summer or last summer did you go swimming at. . .
(Cross out Lake at which you are interviewing)

	Yes	No	b. Was the quality of the water, involved with your not swimming at Lake ——? No	b. Was the quality of the water, involved with your not swimming at Lake ——? Yes	c. What don't you like about the water? did'nt you
. . . Lake of the Woods?	☐	☐→	☐	☐→	
. . . Lake Springfield?	☐	☐→	☐	☐→	
. . . Lake Mattoon?	☐	☐→	☐	☐→	
. . . Lake Charleston?	☐	☐→	☐	☐→	
. . . Lake Vermilion?	☐	☐→	☐	☐→	

(If "No", to all Lakes ask b and c then skip to Q.18a)

(If "Yes" fill in Lakes)

	1. _____	2. _____	3. _____
d. About how many times during the summer do you usually go swimming at Lake _____? *(Card A)*			
a. 1 or 2 times	☐	☐	☐
b. 3-5.	☐	☐	☐
c. 6-10	☐	☐	☐
d. More than 10	☐	☐	☐
e. Would you rather swim here or at Lake _____?			
Here	☐	☐	☐
Lake_____.	☐	☐	☐
Like both the same	☐	☐	☐
f. *(Ask if "Here" or "Lake___")* Why? *(Indicate which Lake comments refer to)*			
g. About how long does it take you to travel from your home to Lake _____?			

18a. Is this Lake here a good place. . .

	Don't know	Yes	No
. . . to water ski?	☐ ↓	☐	☐
. . . to go swimming?	☐ ↓	☐	☐
. . . to fish?	☐ ↓	☐	☐
. . . to go boating?	☐ ↓	☐	☐
. . . to picnic, camp or sightsee?.	☐ ↓	☐	☐

(If "Yes" or "No," ask)
b. Why?

19. During this summer or last did you ever come to this Lake. . .

	Yes	No
. . . to water ski?	☐	☐
. . . to fish?	☐	☐
. . . to go boating?	☐	☐
. . . to picnic, camp or sightsee?	☐	☐

20a. Suppose a friend asked you about the water at this lake, how would you describe it?

Characteristic	Favorable	Unfavorable
_____	☐	☐
_____	☐	☐
_____	☐	☐
_____	☐	☐

b. What else? *(Record above)*

	(Record characteristics)		
	1._____	2._____	3._____
21a. For swimming at any lake, do you like or dislike ___ water or doesn't it matter?			
Like.	☐	☐	☐
Dislike	☐	☐	☐
Doesn't matter. . . .	☐	☐	☐
b. Is the water here. . .			
. . .moderately ____ . . .	☐	☐	☐
or very _____? . . .	☐	☐	☐
c. Would you stop coming here to swim if the water was a little . . .			
(☐ *Unfavorable)* more____?			
(☐ *Favorable)* less____?			
Yes, would stop . . .	☐	☐	☐
No, would continue .	☐	☐	☐
d. *(If "No", ask)* Would you stop coming here to swim if the water was moderately . . .			
(☐ *Unfavorable)* more____?			
(☐ *Favorable)* less____?			
Yes, would stop . . .	☐	☐	☐
No, would continue . .	☐	☐	☐
(If "Dislike" in Q.21a above)			
e. Has your use of this lake for swimming already decreased because of the _____ of the water?			
Yes, has decreased. .	☐	☐	☐
No.	☐	☐	☐

(If any of the following characteristics, CLEAR OR UNCLEAR, CLEAN OR DIRTY, NO ODOR OR ODOR, WARM OR COLD, COLOR, were mentioned in the preceeding question, they should not be asked again.)

(Clarity)

22a. For swimming at any lake, do you dislike water that is somewhat unclear or doesn't it matter?

☐ Dislike ☐ Doesn't matter

b. Would you say that the water here is. . .

. . . clear, ☐
somewhat unclear, or ☐
very unclear? ☐

c. Would you stop coming here to swim if the water was . . .

	No	Yes, would stop
. . .a little more unclear *(less clear)?*	☐	☐→*(Skip to Q.22d)*
. . .moderately more unclear *(less clear)?*	☐	☐

(If "Unclear" in Q.22b. above)

d. Has your use of this lake for swimming already decreased because of the unclearness of the water?

☐ Yes, has decreased ☐ No

(Cleanliness)

23a. For swimming at any lake, do you dislike water that is somewhat dirty or doesn't it matter?

☐ Dislike ☐ Doesn't matter

b. Aside from clarity, would you say that the water here is. . .

. . .clean, ☐
... somewhat dirty or ☐
very dirty? ☐

c. Would you stop coming here to swim if the water was. . .

	No	Yes, would stop
. . .a little dirtier *(less clean)*?	☐	☐→ *(Skip to Q.23d)*
. . .moderately dirtier *(less clean)*?	☐	☐

(If "Dirty" in Q.23b. above)

d. Has your use of this lake for swimming already decreased because of the dirty water?

☐ Yes, has decreased ☐ No

(Odor)

24a. For swimming at any lake, do you dislike water with some odor or doesn't it matter?

☐ Dislike ☐ Doesn't matter

b. Would you say that the water here has. . .

...no odor ☐
some odor, or ☐
a lot of odor? ☐

c. Would you stop coming here to swim if the water had. . .

	No	Yes, would stop
. .a little more odor?	☐	☐→ *(Skip to Q.25)*
. . .moderately more odor?	☐	☐

(If "Odor" in Q.24b. above)

d. Has your use of this lake for swimming already decreased because of the odor of the water?

☐ Yes, has decreased ☐ No

(Temperature)

25a. Would you say that the water here is. . .

. . . quite warm, ☐
somewhat warm, ☐
somewhat cold, ☐
or quite cold? ☐

b. For swimming at any lake, do you like or dislike water that is somewhat (warm) (cold) or doesn't it matter?

☐ Like
☐ Dislike
☐ Doesn't matter

c. Would you stop coming here to swim if the water was. . .

	No	Yes, would stop
. . .a little (warmer) (colder)?	☐	☐ →*(Skip to Q.25d)*
. . .moderately (warmer) (colder)?	☐	☐

d. Has your use of this lake for swimming already decreased because of the (warmness) (coldness) of the water?

☐ Yes, has decreased ☐ No

(Color)

26a. For swimming at any lake, do you like or dislike water with some color, or doesn't it matter?

☐ Like
☐ Dislike
☐ Doesn't matter

b. What is the color of the water here? _____

c. Would you stop coming here to swim if the water was . . .

	No	Yes, would stop
. . . a little _____er?	☐	☐ →*(Skip to Q.26d)*
. . . moderately_____er?	☐	☐

d. Has your use of this lake for swimming already decreased because of the color of the water?

☐ Yes, has decreased ☐ No

You mentioned you went swimming at Lake _____

(Fill in Lakes from Q.17a if none, skip to q.28)

	1. _____	2. _____	3. _____
27a. Is the water clearer here or at Lake _____?			
Clearer here	☐	☐	☐
Clearer at Lake____ . . .	☐	☐	☐
Same.	☐	☐	☐
b. Aside from clarity, is the water cleaner here than the water at Lake _____?			
Cleaner here.	☐	☐	☐
Cleaner at Lake_____. . .	☐	☐	☐
Same.	☐	☐	☐
c. Is the color of the water more attractive here or at Lake _____?			
More attractive here. . .	☐	☐	☐
More attractive at Lake____	☐	☐	☐
Same.	☐	☐	☐
d. What is the color of the water at Lake_____?	_____	_____	_____
e. Does the water have less odor here or at Lake_____?			
Less odor here.	☐	☐	☐
Less odor at Lake___. . .	☐	☐	☐
Same.	☐	☐	☐
f. How else is the water at Lake_____ different than the water here?	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

28a. What things do you like most about the water here?

_____

_____

b. What else? *(Record above)* Nothing → *(Skip to Q. 30a)*

29a. What things do you like least about the water here?

_____

_____

b. What else? _____

c. If it were possible to correct these things, that you liked least, by an increased fee or a tax, would you be willing to pay the additional charge for this purpose?

☐ Yes ☐ No → *(Skip to Q. 30)*

d. Assuming they made this charge each year to improve the water in this way, about how much per year would you be willing to pay? *(Card D)*

a. ☐ $1 or $2

b. ☐ $3 - 5

c. ☐ $6 - 10

d. ☐ $11 - 20

e. ☐ More than $20

30a. Do you feel that swimming in the water here could be harmful to a person's health in any way, even in a small way?

☐ No ☐ Yes

☐ Don't know

b. How harmful do you think that it could be. . .

. . . only slightly harmful, or ☐

moderately harmful? ☐

c. In what way do you think it could be harmful?

_____

_____

d. Has this happened to you?

☐ Yes ☐ No

31a. Do you think that swimming in the water here could cause. . .

(If not already mentioned)

	Don't know	No	Yes	*(If "Yes," ask)* b. Has this happened to you? Yes	No
. . . skin rash or irritation?	☐	☐	☐ →	☐	☐
. . . sickness?	☐	☐	☐ →	☐	☐
. . . eye, ear, nose or throat infection?	☐	☐	☐ →	☐	☐

c. What kind of an infection?

☐ eye ☐ ear

☐ nose ☐ throat

32a. Aside from these health effects, do you feel that swimming here is physically dangerous in any way? Could it result in bodily injury or an accident, even in a small way?

☐ No ☐ Yes

☐ Don't know

b. What might be likely to happen?

_____

_____

c. Has this happened to you?

☐ No ☐ Yes

33. How often have you seen or heard anything about water pollution in general, has it been. . .

. . .frequently, ☐

occasionally, ☐

or never? ☐

34. What would you look for, to tell whether or not water is polluted?

What would be the signs of pollution? _____

_____

_____

35a. How often have you seen or heard anything about water pollution at this lake, has it been. . .

. . .frequently, ☐

occasionally, ☐

or never? ☐ → *(Skip to Q.37)*

b. Where did you hear about pollution in this lake?

_____

c. From what other source? _____

36. What did you hear about pollution in this lake?

_____

_____

_____

37. Do you <u>think</u> that the water in this lake is polluted. . .
. . .a little, ☐
a lot, or ☐
not at all? ☐ →*(Skip to Q. 40)*

38. What is in the water that makes it polluted?_____

_____

_____

What else?_____

	(Record pollutant)		
	1._____	2._____	3._____
39a. For swimming at any lake, do you dislike water with some_____ or doesn't matter?			
Dislike. . . .	☐	☐	☐
Doesn't matter. . . .	☐	☐	☐
b. Is there a little or a lot of _____ in the water at this lake?			
Little. . . .	☐	☐	☐
Lot. . . .	☐	☐	☐
c. Would you stop coming here to swim if there was a <u>little</u> more _____ in the water?			
Yes, would stop. . . .	☐	☐	☐
No, would continue. . . .	☐	☐	☐
d. *(If no, ask)* Would you stop coming here to swim if there was <u>moderately</u> more_____ in the water?			
Yes, would stop. . . .	☐	☐	☐
No, would continue. . . .	☐	☐	☐
e. Has your use of this lake for swimming already deceased because of the _____ of the water?			
Yes, has deceased. . . .	☐	☐	☐
No. . . .	☐	☐	☐

(If any of the following items were mentioned in the preceeding question, they should not be asked again here)

	(Items)			
	1. Algae	2. Dead fish	3. Litter or debris	4. Weeds or other water plants
40a. For swimming at any lake, do you dislike water with some _____ or doesn't it matter?				
Dislike	☐	☐	☐	☐
Doesn't matter	☐	☐	☐	☐
b. Do you think there are any _____ in the water here?				
Yes	☐	☐	☐	☐
No *(go to next item)*	☐	☐	☐	☐
Don't know *(go to next item)*	☐	☐	☐	☐
c. Are *(is)* there . . .				
. . . a little . . .	☐	☐	☐	☐
or a lot?	☐	☐	☐	☐
d. Would you stop coming here to swim if there were a <u>little</u> more _____ in the water?				
Yes, would stop	☐	☐	☐	☐
No, would continue	☐	☐	☐	☐
e. *(If no, ask)* Would you stop coming here to swim if there were <u>moderately</u> more _____ in the water?				
Yes, would stop	☐	☐	☐	☐
No, would continue	☐	☐	☐	☐
f Has your use of this lake for swimming already decreased because of the _____ in *(on)* the water?				
Yes, has decreased	☐	☐	☐	☐
No	☐	☐	☐	☐

	(Items)			
	1. Fertilizer	2. Soap or detergents	3. Mud silt or sand in the water	4. Mud or silt on the bottom
41a. For swimming at any lake, do you dislike water with some _____ or doesn't it matter?				
Dislike.	☐	☐	☐	☐
Doesn't matter . .	☐	☐	☐	☐
b. Do you think there are any _____ in the water here?				
Yes.	☐	☐	☐	☐
No *(go to next item)* . . .	☐	☐	☐	☐
Don't know *(go to next item)*	☐	☐	☐	☐
c. Are *(is)* there. . .				
. . .a little. . . .	☐	☐	☐	☐
or a lot? . . .	☐	☐	☐	☐
d. Would you stop coming here to swim if there were a <u>little</u> more _____ in the water?				
Yes, would stop. . .	☐	☐	☐	☐
No, would continue. .	☐	☐	☐	☐
e. *(If no, ask)* Would you stop coming here to swim if there were <u>moderately</u> more _____ in the water?				
Yes, would stop	☐	☐	☐	☐
No, would continue . . .	☐	☐	☐	☐
f. Has your use of this lake for swimming already decreased because of the _____ in *(on)* the water?				
Yes, has decreased. . .	☐	☐	☐	☐
No	☐	☐	☐	☐

	(Items)			
	1. Sharp stones	2. Broken glass	3. Oil, grease or gasoline	4. Insecticides or other insect poisons
42a. For swimming at any lake, do you dislike water with some _____ or doesn't it matter?				
Dislike.	☐	☐	☐	☐
Doesn't matter . .	☐	☐	☐	☐
b. Do you think there are any _____ in the water here?				
Yes.	☐	☐	☐	☐
No *(go to next item)* . . .	☐	☐	☐	☐
Don't know *(go to next item)*	☐	☐	☐	☐
c. Are *(is)* there. . .				
. . .a little. . . .	☐	☐	☐	☐
or a lot? . . .	☐	☐	☐	☐
d. Would you stop coming here to swim if there were a <u>little</u> more _____ in the water?				
Yes, would stop. . .	☐	☐	☐	☐
No, would continue. .	☐	☐	☐	☐
e. *(If no, ask)* Would you stop coming here to swim if there were <u>moderately</u> more _____ in the water?				
Yes, would stop . . .	☐	☐	☐	☐
No, would continue . .	☐	☐	☐	☐
f. Has your use of this lake for swimming already decreased because of the _____ in *(on)* the water?				
Yes, has decreased. . .	☐	☐	☐	☐
No	☐	☐	☐	☐

	(Items)			
	1. Harmful chemicals	2. Harmful bacteria	3. Sewage	4. Manure or animal wastes
43a. For swimming at any lake does it bother you to have some _____ in the water?				
Yes.	☐	☐	☐	☐
No	☐	☐	☐	☐
b. Do you think there are any _____ in the water here?				
Yes.	☐	☐	☐	☐
No *(go to next item)*. . .	☐	☐	☐	☐
Don't know *(go to next item)*	☐	☐	☐	☐
c. Are *(is)* there. . .				
. . .a little.	☐	☐	☐	☐
or a lot?	☐	☐	☐	☐
d. Would you stop coming here to swim if there were a <u>little</u> more _____ in the water?				
Yes, would stop. . .	☐	☐	☐	☐
No, would continue. .	☐	☐	☐	☐
e. *(If no, ask)* Would you stop coming here to swim if there were <u>moderately</u> more _____ in the water?				
Yes, would stop . . .	☐	☐	☐	☐
No, would continue . .	☐	☐	☐	☐
f. Has your use of this lake for swimming already decreased because of the _____ in *(on)* the water?				
Yes, has decreased. .	☐	☐	☐	☐
No	☐	☐	☐	☐

44. Are you. . .

. . .single *(never married)*, . ☐ → *(Skip to Q.46)*
married,. . . . . ☐
divorced, ... ☐
widowed or. . . . . ☐
separated?. . . . . ☐

45a. Are there any children living with you?

☐ No ☐ Yes
↓

b. Do the children normally come with you when you go swimming?

☐ Yes ☐ No → *(Skip to Q. 46)*

c. Do you or your spouse normally take the initiative in deciding <u>when</u> to go swimming, or do the children?

☐ Parents ☐ Children ☐ Depends

d. Do you or your spouse normally take the initiative in deciding <u>where</u> to go swimming, or do the children?

☐ Parents ☐ Children ☐ Depends

46. What city or town do you live in or near? _____

_____ State *(If not Illinois)*
↓
(Skip to Q.51)

47. Do you live in or near the town, or in the countryside?

☐ In or near town ☐ In countryside

48. About how long does it take you to travel from your home to this lake? _____

49. How long have you lived in Illinois? _____

50a. Do you ever travel to a lake or river or other water site to vacation or sightsee, outside of Illinois?

☐ Yes ☐ No → *(Skip to Q.51)*

b. How often do you do this, is it. . .

. . .Less than once a year, ☐
once or twice a year, or ☐
more than twice a year? ☐

c. I would like to ask about the water site outside of Illinois <u>that you go to most often</u>. What is there about the place that makes it attractive?

_____

_____

d. Is the water at that lake or water site, cleaner, clearer and of generally better quality than the water at this lake?

- ☐ Yes, water better at that lake
- ☐ No, water better at this lake
- ☐ About the same

51. In what city or town did you live when you were of high school age?

_____ City or town

_____ State → [redacted]

52a. Is there a lake or other water site [redacted] where you went to swim, boat, fish, picnic, camp, or sightsee? At that time?

- ☐ No
- ☐ Yes ↓
- ☐ Don't know

b. Considering the water site there that you went to most often around the time when you were in high school, would you say that it was an attractive place, or so-so, or not very attractive?

☐ Attractive ☐ So-so ☐ Not very attractive

c. Was the water at that lake or water site, cleaner, clearer and of generally better quality than the water at this lake?

- ☐ Yes, water better at that lake
- ☐ No, water better at this lake
- ☐ About the same

53. What was the last grade of regular school you completed? *(Put "X" in box)*

Never attended school ☐

	1	2	3	4	5	6	7	8
Elementary	☐	☐	☐	☐	☐	☐	☐	☐

	1	2	3	4
High school	☐	☐	☐	☐

Vocational school ☐ → (No. of years attended ____)

	1	2	3	4	5+
College	☐	☐	☐	☐	☐

54. What is your present occupation? _____

55. What was your previous occupation? _____ ☐ None

56a. Are you the head of your household?

☐ Yes ☐ No

b. What is the occupation of the head of the household? _____

_____

57. From this card please tell me which letter comes closest to your yearly total family income, before taxes. This includes such sources as wages, rents, pensions, profits, interest, etc. *(Card E)*

☐ a. Under $3,000

☐ b. $3,000 - 5,999

☐ c. $6,000 - 9,999

☐ d. $10,000 - 14,999

☐ e. $15,000 or more

THANK YOU

Check sex of respondent: ☐ Male ☐ Female

Time interview ended _____

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