DRAFT

A BOATING CAPACITY EVALUATION OF RAYSTOWN LAKE

by

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Report submitted to the U.S. Army Corps of Engineers,
Waterways Experiment Station, Vicksburg, Mississippi
and
Baltimore District Office, Baltimore, Maryland

February 1988

EXECUTIVE SUMMARY

This study examined peak boat use patterns and their effects on boating quality at Raystown Lake during summer, 1987. The objectives of the study included documenting use densities and visitor perceptions of the conditions they encountered during peak use periods. The information collected provides a baseline for: (1) evaluation of the acceptability of existing peak use boating conditions, and (2) prediction of the likely consequences of potential expansions in facility development on the lake. The study also provides a recommended procedure for monitoring boating conditions on Raystown Lake in the future.

Study Methods

A combination of survey procedures were used to measure boating use patterns and visitor perceptions about the conditions they encountered. Peak use boat densities were identified through aerial photography of the entire lake surface and ground counts of vehicles at all major access points. Visitor perceptions were obtained through on-site personal interviews conducted at all major access points on the same days as boat use was being measured. Since the study focused on the assessment of peak use conditions, data collection was conducted on selected weekends during the 1987 boating season. The sampling schedule was designed to represent the varying levels of peak weekend use and included a total of eight days of data collection, two of which fell during the Memorial Day and Fourth of July holiday weekends. A total of 1,170 boaters were interviewed during the course of the study

Major Findings

Overall use levels, determined through aerial photos taken between 1:00 and 3:00 P.M., ranged from 794 boats (10.5 acres per boat) to 1,101 boats (7.5 acres per boat). The lowest boating densities were found on sampling days during August, while the peak use level found in the study occurred during the Fourth of July holiday.

Results of the visitor survey suggest that Raystown Lake boaters were generally satisfied with their boating experiences. Questions related to perceptions of crowding revealed that boaters tended to feel most crowded while out on the lake and least crowded at the access areas at the start of their trips. Very few sampled boaters were dissatisfied with the amount of time they had to wait to get on the water. About one-fourth of the respondents reported being displaced from favorite parts of the lake because of the number of boats there. Similarly, 27% stayed off the lake during parts of the day and 23% did not participate in some boating activities because of crowded conditions on the lake. Very few boaters were bothered from noise from other boats, but nearly one-fourth reported that the behavior of other boaters interfered with the quality of their experiences. The most frequent types of behavior causing these reactions were boaters coming too close or going too fast, and boaters not observing no-wake zones. Although one-third of the sampled boaters reported that other boats came closer to them than they would like, only 17% felt there was an unsafe number of boats on the water.

Comparing the responses of three major user groups on the lake (campers, marina users, and day users) revealed few significant

differences, suggesting that these three types of users perceive their boating experiences very similarly.

Data analyses revealed that the number of boats on the lake was weakly correlated with certain indicators of impact on the boating experience. Indicators that were significantly associated with boat density included perceived crowding on the lake, perceptions of safety, and the various types of displacement. The perception that conditions on the lake were safe was the indicator that was most strongly associated with overall boating satisfaction.

Results suggest that current peak use conditions are acceptable to most Raystown boaters. Conditions could be improved, however, by focusing management on those indicators with the greatest influence on satisfaction. For example, increased enforcement and education of boaters may reduce the frequency of reports of boats coming too close or other objectionable behaviors.

The probable effects of facility expansion on Raystown Lake vary according to the type and magnitude of expansion considered. Additional parking spaces at boat ramps (as well as development of a new ramp) would have the most direct influence on peak use levels, because these areas would tend to fill up on peak days. Additional marina capacity would increase the number of boats on the lake to a lesser degree, as study results showed that only one-fourth to one-third of the boats stored in the marinas could be expected to be out at any time. Similarly, additional campsites would have relatively little impact on the total number of boats on the water, since many campers do not have

boats and those with boats have much flexibility in when they go out on the water.

Monitoring Recommendations

Results presented in this study represent a baseline against which future conditions can be compared. Future monitoring should include measures of both boating densities and selected impact indicators. Monitoring of boating densities should be incorporated into the routine duties of rangers stationed at major access points on weekends. Impact indicators can be monitored only through direct contacts with samples of exiting visitors. These contacts also can be made by rangers on patrol administering a brief (two to three minute) interview with selected boaters. Key indicators for future monitoring should include the ten-point satisfaction measure, perceived crowding while on the lake, perceptions of safety and boats coming too close, and the various types of displacement. On a less frequent basis (i.e. every five years), it would be useful to pursue a more in depth visitor survey to more fully examine the relationships between boating patterns and the quality of the boating experience.

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INTRODUCTION

Raystown Lake is an 8,500 acre reservoir located in central Pennsylvania and managed by the U.S. Army Corps of Engineers. The reservoir is unique among Corps water projects in that it was constructed primarily to provide recreation opportunities for residents in the region. Construction began in 1968 and recreational use began long before the completion of the project in 1978.

Raystown Lake stretches about 30 miles through the mountains of central Pennsylvania and is the major water-based recreation resource in the region. The lake's geographic location places it within easy driving distance of many boat owners in Pennsylvania and neighboring states. Raystown's physical dimensions make it especially attractive to owners of high performance and medium-sized to large freshwater boats. The lake does not appear to be desirable for sailing or canoeing. It is very popular among fishermen, however, and fishing accounts for most of the boating activity on the lake during the spring and fall seasons.

Recreation use at Raystown Lake has increased from 475,000 recreation days in 1975 (the first year of operation) to 1,421,000 visitor days in 1986. This visitation includes a wide variety of recreation activities. Increases in boating activity over the years have led to concerns about congestion and the impacts of the numbers of boats on the quality of the boating experience.

Use of the lake is currently limited by the capacity of the existing facilities providing access to the lake. It is anticipated, however, that pressures to increase lake access through new construction or expansion of existing facilities will continue to grow.

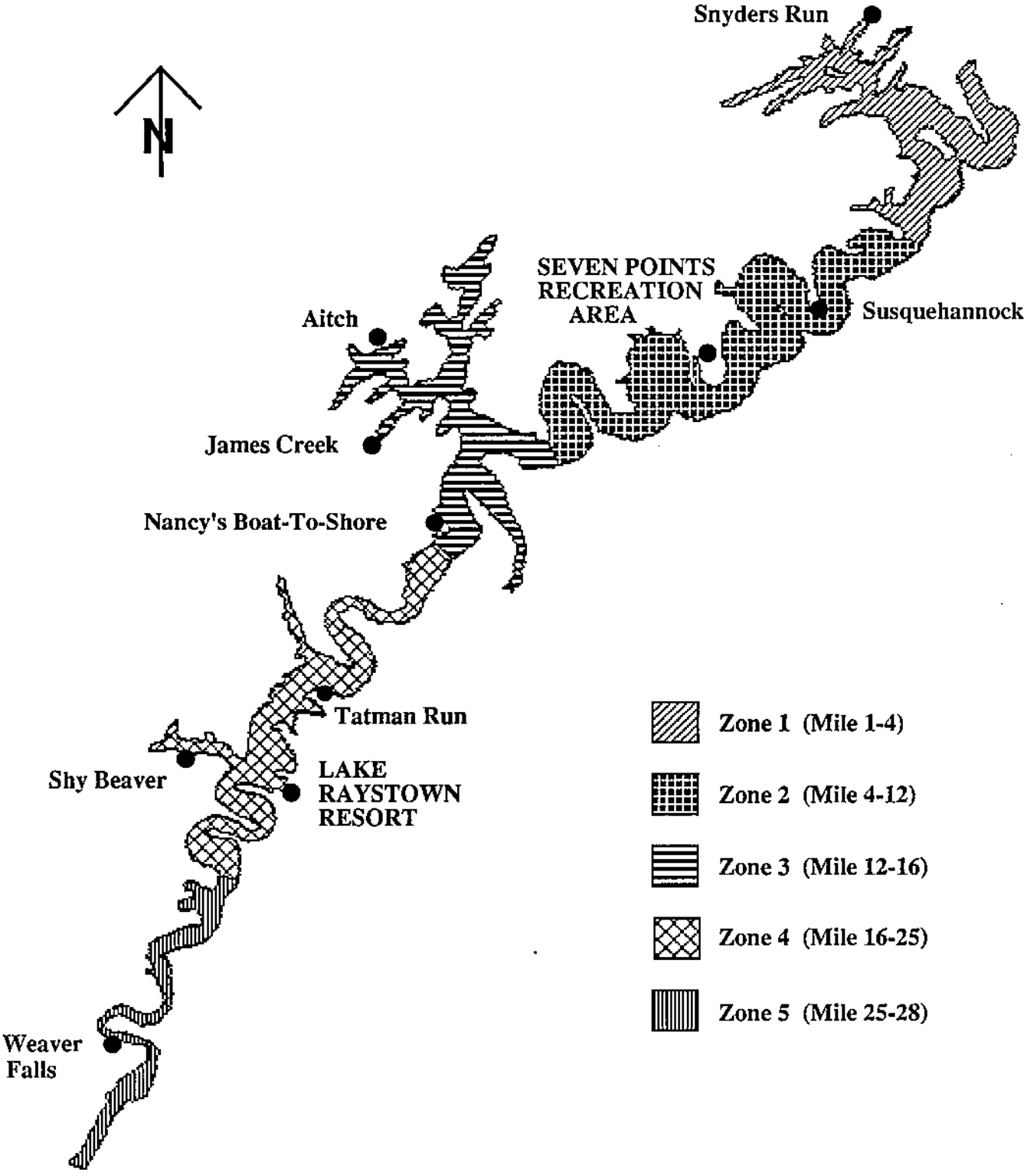
The objective of this study was to examine the relationship between boating densities on Raystown Lake during peak use periods and visitor perceptions of the conditions resulting from these peak use levels. The information collected will establish a baseline for evaluation of the acceptability of current conditions and the prediction of the likely consequences of potential expansions in access to the lake.

The Setting

Raystown Lake is a relatively large recreation area with a relatively small number of access points (Figure 1). There are two developed recreation complexes on the lake. The Seven Points Recreation Area contains some concessioner-operated facilities, including a marina providing wet and dry storage for about 800 boats, a restaurant, a fee launch area, and two tour boats. The Seven Points complex also includes several areas run by the Corps of Engineers: a public beach, numerous picnic areas, the Seven Points public boat ramp (capacity = 85 cars with trailers) and a Class A developed campground with about 170 campsites.

The Lake Raystown Resort is the other developed recreation complex on the lake. It is a concessioner-operated facility providing a range of activities somewhat different from those offered at Seven Points. The resort includes a marina complex with about 400 wet slips, boat rentals, a restaurant and snack bar, fee launching, banquet facilities, and a tour boat. The resort also includes the largest campground on the lake (about 275 sites). Campsites at the resort are the only sites on the lake that provide complete hookups for recreational vehicles. The

Figure 1
Raystown Lake



most unique feature of the Lake Raystown Resort, however, is its waterpark which offers several large slides, special events, and live entertainment during the summer season.

There are only two additional camping areas on Raystown Lake. Susquehannock is a free camping area with 62 individual campsites. The level of facility development is lower at Susquehannock than at the fee camping areas in Seven Points and at the resort. Nancy's Boat-to-Shore is a campground that is accessible only by boat. There is no fee to stay at Nancy's camp, which is a grassy peninsula with no designated campsites and facility development limited to pit toilets. Camping at Raystown is permitted only in these specified campgrounds; dispersed camping along the shoreline of the lake is prohibited.

Besides the public ramp in the Seven Points area, there are six additional public boat ramps on Raystown Lake. Snyders Run provides the only road access to the northern end of the lake. It offers parking for 65 vehicles with trailers and is the boat ramp that is closest to the city of Huntingdon and the major east-west traffic arteries in this part of the state. Aitch (capacity = 60 vehicles) and James Creek (capacity = 152 vehicles) provide access to the middle part of the lake. Most campers staying at Nancy's Boat-to-Shore use one of these boat ramps. Two ramps are located fairly close to the Lake Raystown Resort: Tatman Run, with parking for 51 cars and Shy Beaver, with a capacity of 153 vehicles. Weaver Falls is the smallest access area (capacity = 38 vehicles) and is the only boat ramp located at the southern end of the lake.

The facilities on Raystown Lake effectively limit use of the lake to the capacity of the parking lots, marinas, and campgrounds. There are no overflow parking areas and site design coupled with strict enforcement over the years have prevented people from parking in undesignated areas. Offsite storage and parking are available on some properties adjacent to the project, but most of these areas are located several miles from the lake. Only at Snyders Run is there private parking available immediately adjacent to the Corps parking lot.

For the purposes of this study, the lake was divided into five zones that correspond to somewhat distinct boating environments (Figure 1). Zones 1 and 5, at opposite ends of the lake, are both served by a single boat ramp access. These are remote areas that are likely to be appreciated for the naturalness and privacy they afford. Similarly, Zone 3 is a backwater area that has undergone minimum facility development. Boat ramps at Aitch and James Creek provide access to this zone. Zones 2 and 4 represent the areas containing the two developed recreation complexes on the lake.

Study Overview

This study focused on peak boat use patterns and their effects on boating quality at Raystown Lake during summer, 1987. Emphasis was placed on documenting actual use levels and boaters' perceptions of and reactions to these use levels. Quality in the boating experience was measured from the perspective of current users of Raystown Lake.

The approach taken in this study is consistent with recent trends in studies related to outdoor recreation management. Current models for evaluating the impacts of increasing recreational use emphasize the

identification and measurement of relevant *indicators* of quality in the recreation experience. This study investigated a broad range of potential indicators of quality in the boating experience. This report summarizes the measurement of these indicators during the 1987 boating season and considers their implications for the management of Raystown Lake.

STUDY METHODS

This study was designed to examine the relationship between boating densities during peak use periods and visitor evaluations of the conditions resulting from boating use patterns. Several types of data are needed to address this relationship. First, it is important to have accurate information about the number and distribution of boats using the lake at selected times. Secondly, it is necessary to measure boaters' perceptions and feelings about the conditions they encountered during these same time periods. This study used a combination of survey procedures to obtain these various types of information.

Two approaches were used to measure use patterns on Raystown Lake. These included aerial photography of the entire lake surface, coupled with ground counts of the number of vehicles at all major access points on the lake. Visitor perceptions were obtained through on-site personal interviews conducted at all major access points on the same days as boat use was being measured. Since the study was most concerned with evaluating peak use conditions, data collection was limited to selected sampling days on weekends during the summer, 1987 boating season. The approach taken was to obtain a very complete picture of what was happening at all points on the lake for a limited number of days, rather than to spread the sampling effort across access areas and the entire boating season.

The goal of the initial sampling schedule was to represent the varying levels of peak weekend use that occur throughout the summer. Four Saturdays and four Sundays between Memorial Day weekend and Labor Day, 1987 were tentatively selected for data collection. Alternate dates were

specified for each sampling day to allow for inclement weather that might influence use of the lake and/or the ability to obtain the aerial photos of the lake.

As the study progressed, it was necessary to reschedule three of the original sampling days to the alternate dates. The effects of these adjustments included obtaining a greater representation of Sundays (5 Sundays and 3 Saturdays) and extending the sampling later into the season than initially planned. The sampling did begin on schedule during Memorial Day weekend and was completed August 30, a week before Labor Day in 1987. The Fourth of July holiday weekend was also included in the final sample.

Measuring Boating Use

Several factors complicate the process of measuring use on a large recreation resource like Raystown Lake. The area is essentially a large, open system that is undergoing continuous change. Counting boats on Raystown, however, is somewhat simpler than it would be on some other water projects because all of the lake's shoreline is in public ownership and access to the lake is restricted to a limited number of marinas, campgrounds, and boat ramps. Thus, it was feasible to make ground counts of activity levels at major access points as one method of measuring boating use.

Ground Counts. On each sampling day, interviewers stationed at each access area spent part of their time counting several categories of vehicles. At the boat ramps, counts were made for the number of automobiles, the number of autos with trailers, and the number of

unattached trailers. At the two marinas, the number of vehicles in the parking lots were counted along with the number of empty boat slips. The ground counts were repeated at two hour intervals beginning at 2:00 p.m. and ending at 8:00 p.m. The data collected identified patterns of activity at the access points and, when added across all access areas, provided one indicator of the number of boats on the lake. The only boats not accounted for by these counts would be those coming from the campgrounds and any that might be "dropped off" at the lake with no on-site vehicular storage.

Aerial Photography. Ground counts indicate what is happening at access points but provide no information about boat use patterns on the lake. Aerial photography was used to measure this aspect of boating activity. Photographs (1:7200 scale) were taken of the entire lake surface for each sampling day except July 12, when intermittent thundershowers precluded the overflights. The photographic series were shot between 1:00 and 3:00 p.m. as this was expected to be the peak use period. The aerial photos were shot continuously as the aircraft followed the irregular, linear shape of the lake. Laterally overlapping flight lines were necessary to cover the wider areas of the lake.

The aerial photographs were shot at several different altitudes before a final preferred altitude was selected. After taking the first two sets of photos at 6,000 feet above mean sea level (msl), or 5,200 feet above the lake surface, and 5,000 feet (msl), respectively, the altitude for the remaining photographs was set at 4,000 feet (msl). This altitude resulted in the best balance between interpretability of the photographs and number of photos to be examined.

Aerial photography for each sampling day produced a series of between 75 and 150 photographs. Each shot of the lake was enlarged and processed as an 8x10 black and white glossy print. Each photo was overlaid with clear acetate and both the shoreline and boats visible in the photo were marked on the acetate.

The process of photo interpretation involved starting at one end of the lake and working towards the other end. The acetate sheets were arranged along the flightline to reconstruct the shape of the lake. This process of overlaying acetate sheets provided multiple perspectives that helped to reduce uncertainties and thus added to the accuracy of the count. Boats that appeared on more than one photo were identified and counted from the photo in which they appeared most clearly.

Boats were identified and counted according to four categories: 1) moving boats, recognizable by their wake; 2) waterskiers, recognizable by the second wake from the skier; 3) stationary boats, identified by the lack of any wake; and 4) boats pulled up or moored along the shoreline. Boats in each category were marked on the acetate sheet with a different color. For moving boats, the direction as well as the location of the boat was recorded. This aided in sorting out boats in adjacent photographs and helped to avoid missing or double counting boats. It should be noted that waterskiers were more difficult to identify than the other types of boats because of the smaller size of the skier and his/her wake. Some of the boats classified as moving may have been pulling undetected waterskiers and some classified as stationary may have been skiers who were not moving at the instant the photograph was taken. Thus, the counts of skiers are probably underestimates.

Once the lake was reconstructed with the acetate overlays, the number of boats in each category was counted. In addition to the total number of boats on the lake, subtotals were computed for five zones of the lake.

Boater Survey Methods

Several types of data were collected through on-site exit interviews conducted throughout the sampling days at all major access points on the lake. The interviews were conducted by a team of trained interviewers, generally graduate students from the Pennsylvania State University. The number of interviewers working each day ranged from 11 to 16.

Selection of Subjects. The population of Raystown Lake boaters can be grouped into three major user groups with different means of access to the lake: boat ramp users who trailer their boats to the lake for the day, those who store their boats for the season at one of the two marinas on the lake, and campers who launch their boats at a boat ramp when they arrive at Raystown and keep their boats at or near the campsite until the end of their visit. A sampling plan was devised to achieve a representative sample of boaters within each of these user groups during peak weekend use periods. A total of 1170 boat operators aged 18 years and older were sampled, including 373 campground users, 344 marina users, and 453 ramp users.

Four campground locations were sampled in order to tap the camping segment of the boating population. Boating parties staying in the campgrounds were sampled at the campsite they occupied. Campsites were sampled systematically, with the proportion of campsites selected based

on the number of sites in the campground. Since many camping parties did not participate in boating, sampled campsites occupied by non-boaters were replaced by the next campsite until a boating party was found. Unoccupied campsites were revisited up to two times to prevent biasing the sample towards inactive boaters. Ninety-six boaters were surveyed at Seven Points Campground, 146 at the Resort Campground, 63 at Nancy's Boat-to-Shore, and 38 at Susquehannock.

Sampling at the marinas and boat ramps involved contacting as many exiting boaters as possible during the course of the sampling day. To the extent possible, interviewers were stationed from about 1:30 p.m. until 8:00 p.m. or later at all boat ramps on the lake. Because the number of interviewers for any given day varied, some sites were not sampled every sampling day or were sampled for only part of the day.

Interviewers at both the marinas and boat ramps attempted to contact all parties departing from their access points. At busy times this was not always possible. In these instances, interviewers counted the number of "passes" (or parties that exited past them while they were conducting an interview) for possible later use in weighting results to eliminate any bias introduced by missing some boaters. One member of each party sampled was asked to participate in the interview. This member was randomly selected, using a table of random numbers, from all party members who had operated the boat that day.

Using these procedures, a total of 223 boat operators were interviewed at Seven Points Marina and 121 were surveyed at the Resort Marina. Seventy-five boaters were interviewed at Snyder's Run, 89 at Seven Points Ramp, 59 at Aitch, 62 at James Creek, 38 at Weaver Falls, 66 at Tatman Run, and 64 at Shy Beaver.

Instrumentation. The interview used in the study contained a combination of closed-ended and open-ended questions. Respondents were asked to reflect back on their just-completed experiences to provide information about their boats, basic patterns of recreating on the lake, levels of past boating experience, and perceptions of boating conditions.

To begin the survey, respondents were asked to provide some information on the time frame of that day's boating experience. The respondent then described the boat operated in the following ways: type of boat, type of power, total horsepower, length, and state of registration. Length of stay and overnight accommodations were next determined, followed by a section asking the respondent to rank his/her boating activities in the order of length of participation time. Within this section, detailed questions were asked of all fishermen, including open-ended questions about the type(s) of fish they were hoping to catch and their satisfaction with this catch.

The survey next determined the respondent's basic boating patterns on the lake, including launch point and farthest mile markers reached in either direction. Using a 10-point rating scale, boaters then evaluated the quality of that day's boating experience. As a follow-up, two open-ended questions were asked pertaining to the subject's most and least enjoyable aspects of the boat trip.

The next four questions measured the respondent's past boating experience. This section asked the respondent to estimate the number of days boated at Raystown and at any resource in the past year, the number of years boated, and a self-rating of skill level.

The interview next dealt with the respondent's perceptions of boating conditions on the lake. Using a 9-point crowding scale, visitors

were asked to describe the boating conditions at the launch area at the start and end of the trip, on the lake itself while boating, and at any stopping points on the lake. Interviewers then asked respondents to evaluate how the number of other boaters affected their experiences using a 9-point rating scale covering a range of three possible reactions: positive, neutral, and negative. The interviewer then read a total of 20 statements dealing with various aspects of boating conditions: satisfaction, safety, conflict with other boaters, and reasons for avoiding or not participating in boating activities. Respondents reacted to the statements using a 5-point agreement scale and in some cases answered follow-up questions (e.g., if the behavior of other boaters interfered with the experience, these behaviors were described; if they felt they waited too long to get on the water, they told how long they actually waited and were willing to wait; if they did not participate in an activity due to crowding, they listed which activity.)

Training and Pilot Test. Sixteen interviewers were trained at Penn State May 21, 1987 and on-site at Raystown Lake on May 23, 1987. This training included clarifying interviewer instructions, practicing administration of the instrument, and conducting on-site interviews. The initial interview guide was administered to 176 boaters at Raystown Lake on May 23, 1987. Other than a few minor word modifications and re-ordering of some of the questions, only one major change was made to the interview schedule. A final section was added to the interview which contained some questions designed to probe willingness to pay for boating at Raystown. Two hypothetical situations were presented to the respondent, who then played a bidding game with the interviewer to arrive at two indicators of willingness to pay: how much farther the person was

willing to travel to use a lake only 2/3 as crowded as Raystown, and the least amount the person would have to be paid in order to leave for the day and let someone else take his/her place. These additional questions were included for purposes beyond the scope of the original study; hence this report does not contain any results related to these questions.

Since few changes were made to the questionnaire as a result of the pilot test, interviews completed on May 23 were included in the study results that are presented in this report.

Data Analysis. For analysis purposes, respondents were classified by three important variables: user group (campground, boat ramp, or marina), sampling site (Resort Campground, Seven Points Campground, Susquehannock, Nancy's Boat-to-Shore, Snyder's Run, Seven Points Ramp, Aitch, James Creek, Tatman Run, Shy Beaver, Weaver Falls, Seven Points Marina, or Resort Marina), and primary activity (fishing, swimming, waterskiing, pleasure cruising, or other). For each of the three classification variables, statistical comparisons were made to determine if the relevant subgroups differed significantly from each other in responses to key study variables. The statistic used to detect these differences varied depending on the type of questions involved. The chi-square statistic was used when boaters were being compared on categorical variables, such as boat type, while analysis of variance was used when boaters were being compared on continuous variables, such as boat length or questions with response scales. If it was determined by analysis of variance that a significant difference did exist, a post hoc test (Scheffè) was used to pinpoint which subgroups actually differed from each other. The differences cited in the text are based on the results of these statistical tests. The results are also presented in the form of comparative tables when significant differences were found to exist.

BOAT USE PATTERNS

Boating activity on Raystown Lake was measured using aerial photography and counts of vehicles parked at all major access points around the lake. Overall use levels, determined from aerial photos taken between 1:00 and 3:00 p.m., ranged from 872 to 1101 boats on the lake (Table 1). The lowest boating densities were encountered on the last three sampling days (August 1st, 8th, and 30th). These lower use levels may reflect a normal tailing off of boating activity toward the end of the season, coupled with unseasonably cold weather on some of these sampling weekends. Two of these sampling days (August 1 and 8) were Saturdays, which typically receive lower use than Sundays. Only slightly higher boating densities were found on sampling days near the beginning of the boating season, including Memorial Day weekend (the day sampled, May 23, was the Saturday of this holiday weekend). The peak use level found in this study occurred during the 4th of July holiday. The other day sampled during July (the 19th) also received relatively high boating use.

With the exception of Zone 5, boating activity was fairly evenly distributed on the lake. Zones 2 and 4, which contain the two major developed areas on the lake, each tended to receive slightly more than one-fourth of the total boating activity. Zones 1 and 3 each generally received about one-fifth of the total use. Zone 5 is the most narrow and remote part of the lake. It is a smaller zone that includes the point where the Juniata River flows into (and becomes) Raystown Lake. Generally only about 7 percent of the total boats on the lake were counted in this zone.

TABLE 1
NUMBER OF BOATS COUNTED FROM AERIAL PHOTOGRAPHS BY DATE AND ZONE
(VALUES IN PARENTHESES ARE PERCENTS)

	5/23	6/28	7/5	7/19	8/1	8/8	8/30	AVG.	ST.DEV.
ZONE 1	177	207	206	179	174	165	156	180.6	19.4
	(19)	(23)	(19)	(17)	(20)	(21)	(18)		
ZONE 2	231	230	289	285	262	229	237	251.9	26.6
	(25)	(26)	(26)	(28)	(29)	(29)	(27)		
ZONE 3	152	176	189	197	182	146	174	173.7	18.7
	(16)	(20)	(17)	(19)	(20)	(18)	(20)		
ZONE 4	255	242	350	288	234	214	261	263.4	44.6
	(27)	(27)	(32)	(28)	(26)	(27)	(30)		
ZONE 5	120	38	67	87	40	40	44	62.3	31.3
	(13)	(4)	(6)	(8)	(5)	(5)	(5)		
TOTAL	935	893	1101	1036	892	794	872	931.9	104.2
	(100)	(100)	(100)	(100)	(100)	(100)	(100)		

In spite of the varying total use levels, the relative distribution of boats across zones was quite consistent. The percentage of boats accounted for by a given zone typically did not vary by more than 5 percent across sampling days.

Table 2 provides a further breakdown of boating activity by category of boats counted. The number of water skiers counted is low in all zones and, as noted earlier, is probably an underestimate of the total skiing activity. The number of moving boats was generally less than the number of boats stationary in the water or along the shoreline. Zones 2 and 4 were more likely to be characterized by a higher proportion of moving boats (generally about one-third of the total as compared to one-fourth for Zones 1 and 3). About one-third of the boats in any zone were typically found along the shoreline. Zone 5 was the exception to this pattern; only 15 percent of the boats counted in this zone, on the average, were located along the shoreline.

Vehicle counts at access points were made at two hour intervals between 2:00 and 8:00 p.m. As expected, peak use levels were found at 2:00 and the number of vehicles tapered off as the day went on. The pattern across all boat ramps found the number of vehicles at 4:00 to be 89%, on the average, of the 2:00 total. The 6:00 and 8:00 counts averaged 62 percent and 40 percent of the 2:00 counts, respectively.

A summary of the 2:00 daily counts is presented in Table 3. Data from May 23 is not included because counts of vacant slips at marinas would be misleading since many boats had not been put in the water by this time. The number of trailers parked at the boat ramps ranged from 369 to 565. Some parking lots were full or nearly full most of the

TABLE 2
NUMBER OF BOATS COUNTED FROM AERIAL PHOTOGRAPHS BY DATE, ZONE, AND TYPE OF BOAT

	5/23	6/28	7/5	7/19	8/1	8/8	8/30	AVG.	ST.DEV.
ZONE 1									
Moving	53	62	39	43	49	42	38	46.6	8.7
Stationary	73	75	86	91	70	57	66	74.0	11.6
Shoreline	51	66	76	42	47	60	42	54.9	12.9
Skiers	-	4	5	3	8	6	10	6.0	2.6
Total	177	207	206	179	174	165	156	180.6	19.4
ZONE 2									
Moving	83	69	100	100	62	83	98	85.0	15.3
Stationary	82	70	110	110	95	65	82	87.7	18.0
Shoreline	65	85	70	75	94	74	53	73.7	13.3
Skiers	1	6	9	-	11	7	4	6.3	3.6
Total	231	230	289	285	262	229	237	251.9	26.6
ZONE 3									
Moving	53	35	43	43	49	37	37	42.4	6.7
Stationary	64	75	79	81	61	46	68	67.7	12.2
Shoreline	33	64	56	72	63	59	67	59.1	12.6
Skiers	2	2	11	1	9	4	2	4.4	4.0
Total	152	176	189	197	182	146	174	173.7	18.7
ZONE 4									
Moving	128	75	138	93	79	59	93	95.0	28.6
Stationary	69	71	110	89	54	62	67	74.6	18.9
Shoreline	55	88	96	96	93	90	84	86.0	14.3
Skiers	3	8	6	10	8	3	17	7.9	4.8
Total	255	242	350	288	234	214	261	263.4	44.6
ZONE 5									
Moving	57	12	13	22	16	20	14	22.0	15.9
Stationary	49	21	35	51	17	13	17	29.0	16.0
Shoreline	13	4	14	11	4	6	10	8.9	4.2
Skiers	1	1	5	3	3	1	3	2.4	1.5
Total	120	38	67	87	40	40	44	62.3	31.3
TOTAL	935	893	1101	1036	892	794	872	931.9	104.2

TABLE 3
SUMMARY OF GROUND PARKING LOT COUNTS BY DATE AND SAMPLING SITE

	NUMBER OF TRAILERS IN PARKING LOT AT 2:00 P.M. ON:					
BOAT RAMP	6/28	7/5	7/19	8/1	8/8	8/30
Snyders Run	52	55	53	55	60	48
Seven Points	72	72	72	63	60	55
Aitch	35	44	50	46	46	31
James Creek	81	121	109	68	71	59
Tatman Run	37	33	37	37	33	35
Shy Beaver	75	112	112	100	86	80
Weaver Falls	31	34	34	25	16	13
Seven Points Marina	42	54	63	38	44	29
Resort Marina	33	40	31	18	26	19
SUBTOTAL	458	565	561	450	442	369
MARINAS (EMPTY SLIPS)						
Seven Points						
Wet Slips	216	184	206	161	155	130
Dry Stacks	44	48	47	48	51	44
Resort	141	184	162	118	122	115
SUBTOTAL	401	416	415	327	328	289
TOTAL BOATS ACCOUNTED FOR	859	981	976	777	770	658
TOTAL BOATS IN AERIAL PHOTOS	893	1101	1036	892	794	872
DIFFERENCE	34	120	60	115	24	214

days. The lots that varied the most were the two large double parking areas found at James Creek and Shy Beaver.

The two marinas on the lake provide storage for about 1,200 boats (400 at the Resort and 800 at Seven Points). The total number of empty boat slips at the marinas ranged from 289 on August 30th to 416 on the 5th of July. The number of empty slips was quite consistent across the first three sampling days. Thus, assuming full occupancy, even on these peak use days only about one-third of all the boats stored in the marinas were out on the lake at 2:00 p.m. On lower use days later in the season, this proportion of marina-based boats actually out on the water decreased to about one-fourth of all boats stored in the marinas. In sum, wet and dry storage at the two marinas generally accounted for slightly fewer boats on the lake than all of the boat ramps combined.

The total number of boats accounted for by trailers parked in parking lots and empty marina slips ranged from 658 to 981. This number was always smaller than the number of boats counted from the aerial photos, as would be expected since the aerial photos also include boats that originate from the campgrounds as well as boats launched from trailers that are stored offsite. The difference between the counts from aerial photos and the total ground counts was, with one exception, 120 boats or less. These differences seem like reasonable numbers of boats to attribute to these other sources. Hence, the ground counts help to validate the estimates of total numbers of boats on the lake derived from the aerial photos.

BOATER SURVEY RESULTS

The following sections summarize the data gathered through the interviews conducted with boaters on Raystown Lake. The data are presented under several major headings, including activity participation, boating travel patterns, boat characteristics, boater characteristics, and boating impact variables. All questions were examined in relation to three important classification variables: user group (campground, marina, boat ramp), sampling site and primary activity. Comparative tables are included in all instances where there were significant differences between user groups, sampling sites, and primary activities. Data for the entire sample of boaters is presented in those cases where significant differences were not found.

Sampling Summary

During the summer of 1987, 1170 boaters were interviewed at Raystown Lake. Of the eight peak weekend days sampled, July 19 and May 23 (Memorial Day Weekend) accounted for almost one-third of the interviews collected (193 and 176 interviews, respectively). An average of 134 respondents were surveyed on each of the other six sampling days (Table 4).

Thirty percent (344) of the interviews were gathered at marina sites, including 223 at Seven Points Marina and 121 at the Resort Marina. Another 32 percent (373) of the interviews took place in the campgrounds, with 146 responding in the Resort Campground, 96 in the Seven Points Campground, 63 at Nancy's Boat-to-Shore, and 38 at Susquehannock. The

TABLE 4
NUMBER OF INTERVIEWS COMPLETED BY SAMPLING SITE AND USER GROUP

	DATE								TOTAL
	5/23	6/28	7/5	7/12	7/19	8/1	8/8	8/30	
CAMPGROUNDS									
Seven Points	15	9	17	16	17	22	20	10	96
Resort	15	18	24	19	27	16	19	8	146
Susquehannock	4	6	4	5	6	5	7	1	38
Nancy's	10	3	3	0	16	18	10	3	63
SUBTOTAL	44	36	48	40	66	61	56	22	373
MARINAS									
Seven Points	35	27	23	12	43	27	29	27	223
Resort	27	24	12	18	7	8	13	12	121
SUBTOTAL	62	51	35	30	50	35	42	39	344
BOAT RAMPS									
Snyder's Run	17	10	3	0	12	13	15	5	75
Seven Points	19	12	20	10	8	0	4	16	89
Aitch	8	5	5	11	17	6	1	6	59
James Creek	6	9	8	3	17	4	2	13	62
Weaver Falls	1	0	3	3	10	8	8	5	38
Tatman Run	11	5	3	21	8	4	3	11	66
Shy Beaver	8	11	8	13	5	4	9	6	64
SUBTOTAL	70	52	50	61	77	39	42	62	453
TOTAL	176	139	133	131	193	135	140	123	1170

remaining 39 percent of the surveys were administered at seven ramp access points, with an average of 65 boaters being interviewed at each site. Of the 453 boat ramp surveys, 89 took place at the Seven Points Ramp, 75 at Snyder's Run, 66 at Tatman Run, 64 at Shy Beaver, 62 at James Creek, 59 at Aitch, and 38 at Weaver Falls.

Activity Participation

Survey reposondents were shown a list of boating activities and asked to indicate which activities they had participated in that day, in order of how much time they spent on each activity. Of the 1164 individuals who responded, 419 (36 percent) ranked pleasure cruising as their number one activity (Table 5). Approximately one-fifth (261) ranked waterskiing first while another fifth (241) had been swimming longer than any other activity. Although 16 percent (186) ranked still fishing as their primary activity, only 2 percent (21) spent most of their time trolling. Just one person ranked sailing first, with an additional 35 (3 percent) listing their primary activity as "other" (e.g., jet skiing, sitting on the boat, picnicking, skidooing, etc.).

Both trolling and swimming were mentioned more often as a secondary activity than as a primary one. Three times as many respondents (63) ranked trolling second as opposed to first, while 264 ranked swimming second (10 percent more than the 241 who ranked it first). More respondents also mentioned "other" activities as ranking second or third as opposed to being primary activities.

The number of individuals participating in multiple activities decreased rapidly as number of activities increased. Of the 1164

TABLE 5
NUMBER OF BOATERS PARTICIPATING IN VARIOUS BOATING ACTIVITIES,
IN ORDER OF TIME SPENT ON EACH ACTIVITY

	RANK ORDER BY LENGTH OF TIME LONGEST TO SHORTEST				
	1	2	3	4-6	TOTAL
FISHING	186	76	45	26	333
TROLLING	21	63	19	14	117
SWIMMING	241	264	125	14	644
WATERSKIING	261	189	59	15	524
PLEASURE CRUISING	419	266	187	29	901
SAILING	1	1		2	4
OTHER	35	54	42	29	160
TOTAL	1164	913	477	129	2683

respondents who reported participating in one activity, 75 percent (913) also participated in a second activity. However, only half of these 913 reported taking part in a third activity. Just one-quarter of these remaining 477 respondents (129) participated in a fourth, fifth, and/or sixth activity.

In all, more than three-quarters of the 1164 respondents (901) reported participating in pleasure cruising sometime during their visits. More than half (644) had been swimming, while 45 percent of all respondents (524) had waterskiied. Almost 40 percent fished, with 333 participating in still fishing and another 117 spending some time trolling. Approximately 15 percent (164 respondents) had done "other" activities during their visits, including just 4 who had been sailing.

Activity participation varied among campground, marina, and ramp users (chi-square = 73.1, $p \leq .01$) (Table 6). Ramp users were more likely to be fishermen; 24 percent of them spent most of their time fishing, compared to 19 percent of the campground users and just 8 percent of those using marinas. Waterskiing was more popular among ramp users and campers. Nearly twice as many campground and ramp users spent most of their time waterskiing (28 and 24 percent, respectively) as compared to marina users (14 percent). Marina based boaters spent more time just cruising and swimming. Forty-six percent of the marina users listed pleasure cruising as their primary activity and an additional 27 percent listed swimming, while only 32 percent of those at both ramps and campgrounds listed pleasure cruising first and 18 percent spent most of their time swimming.

TABLE 6
PRIMARY ACTIVITY PARTICIPATION BY SAMPLING SITE AND USER GROUP
(VALUES IN PERCENT)

	PRIMARY ACTIVITY					
	FISHING (n=205)	SWIMMING (n=240)	WATER SKIING (n=261)	PLEASURE CRUISING (n=418)	OTHER (n=36)	n
CAMPGROUNDS						
Seven Points	22	16	23	37	2	135
Resort	16	20	30	30	4	135
Susquehannock	34	21	11	32	3	38
Nancy's	11	16	43	25	5	63
SUBTOTAL	19	18	28	32	3	371
MARINAS						
Seven Points	10	31	15	41	4	220
Resort	6	18	13	55	8	120
SUBTOTAL	8	27	14	46	5	340
BOAT RAMPS						
Snyder's Run	34	23	14	30		74
Seven Points	21	14	31	33	1	87
Aitch	40	22	12	26		58
James Creek	25	19	29	24	3	63
Weaver Falls	21	11	8	58	3	38
Tatman Run	11	14	45	31		65
Shy Beaver	14	25	25	33	3	64
SUBTOTAL	24	18	24	32	1	449
TOTAL	18	21	23	36	3	1160

Boating Travel Patterns

The average distance respondents covered from north to south on Raystown Lake was 9.5 miles. Although 5 percent (56) reported traveling zero miles, 22 of these respondents actually boated within a cove (e.g., Aitch and James Creek, Shy Beaver, Snyder's Run) and never ventured into the main channel of the lake. Another 18 of these 56 respondents spent time on their boats at a marina, but never left the docks. At the other extreme, 3 percent (39) of the 1124 respondents covered the entire length of the lake.

Almost two-thirds (692) of all surveyed boaters traveled 10 miles or less, with 320 respondents traveling between 1 and 5 miles and the other 372 covering 6 to 10 miles. Sixteen percent went 11 to 15 miles on the lake, 13 percent traveled 16 to 20 miles, and just 8 percent covered more than 20 miles of the lake.

At the northern end of the lake, boaters using Snyder's Run (n=67) covered an average of 8.6 miles of the lake. While 33 percent traveled less than 5 miles, 39 percent covered a 6 to 10 mile expanse of the lake. Three of the 67 boaters sampled never left the cove, but two traveled the entire length of Raystown Lake. Surprisingly, only 19 boaters (28 percent) boated to the dam while they were at that end of the lake. On the average, Snyder's Run respondents boated a half mile beyond mile marker 10, with Seven Points being the most popular destination for 40 percent of the boaters.

On the average, boaters interviewed in Zone 2, the Seven Points Area (including 83 from Seven Points Ramp, 216 from Seven Points Marina, 120 from Seven Points Campground, and 35 from Susquehannock), covered 8.8

miles of the lake. Seventy percent (316) boated on 10 miles or less of the lake, with 4 percent (20 boaters) actually covering less than 1 mile. Fourteen boaters (3 percent), however, traveled the entire length of the lake. While 37 percent (170) did not boat any farther north than the Seven Points Area, another 37 percent (168) traveled all the way to the dam. Almost half the boaters went no farther south than the Seven Points Area, but mile markers 14 (the James Creek Area) and 21 (the Resort Area) were popular destinations for 12 and 8 percent of the boaters contacted in this zone, respectively. Interestingly, Susquehannock boaters only covered an average of 5.6 miles of the lake (compared to 8.9 for Seven Points Ramp users and 9.1 for Seven Points Marina and Seven Points Campground users), with all 35 boaters traveling less than 18 miles. Seventy percent of the Susquehannock boaters went no farther south than the Seven Points Area. Since many of the respondents at Susquehannock were visiting Raystown for an extended period of time, these boaters may have done a majority of their boating during the weekdays and purposely avoided boating in the weekend crowds.

Boaters in the middle zone (53 from Aitch, 57 from James Creek, and 54 from Nancy's Boat-to-Shore) covered 9.9 miles of the lake on the average. Eleven percent (18 boaters) never left the cove area, and only 4 percent (7) covered the whole lake. Approximately one quarter of the 164 respondents traveled 0 to 5 miles of the lake, another quarter covered 6 to 10 miles, and a third quarter went between 11 and 15 miles on the lake. Although 37 percent (61) traveled no farther north than the James Creek Area, 24 percent (39) went as far as the Seven Points Area and an additional 21 percent (34) visited the dam. Nearly half of the boaters

did not venture any farther south, but a fifth (34) boated as far as the Resort and less than one-tenth (15) boated to Weaver Falls.

Boaters at the Resort Area (Zone 4), including 61 from Tatman Run, 117 from the Resort Marina, 125 from the Resort Campground, and 60 from Shy Beaver, also covered an average of 9.9 miles of the lake. While 4 percent traveled 0 miles, 3 percent covered the entire lake. Almost 60 percent (217) covered 10 miles or less of the lake, and half as many (117) traveled between 11 and 20 miles. While 29 percent boated no farther north than the Resort, 17 percent went as far as the James Creek Area, 11 percent went no farther than Seven Points, and 12 percent visited the dam. Forty-three percent did not boat any farther south than the Resort, but almost 20 percent boated as far as Weaver Falls.

Boaters from Weaver Falls, the only access point within Zone 5, traveled over the largest area, covering an average of 12.9 miles of Raystown Lake. Every boater interviewed covered at least 2 miles of the lake, with 14 percent (5) boating from one end of the lake to the other. While 25 percent of the 36 boaters covered 13 to 20 miles of the lake, another 22 percent boated more than 20 miles of the lake, with the remaining 21 boaters (58 percent) traveling 2 to 10 miles. Six respondents (17 percent) boated only as far as the Resort, 3 (8 percent) went as far as the James Creek Area, and 4 (11 percent) went to Seven Points.

Boat Characteristics

Boat Type. Nearly three-quarters of all Raystown Lake boaters were using runabouts. Another 10 percent were operating cabin cruisers,

followed by 6 percent using pontoon boats and 5 percent using bass boats. Seven percent were boating in other types of craft, including sailboats, houseboats, rowboats, canoes, and jet skis.

Boat types varied between marina, boat ramp, and campground users (chi-square = 216.4, $p \leq .01$) (Table 7). More than 25 percent of all marina users were operating cabin cruisers compared to just 4 percent of both campground and ramp users, and 12 percent of marina users were operating pontoon boats compared to 4 percent of campground users and 2 percent of ramp users. On the other hand, more than three-quarters of both campground and ramp users were operating runabouts while only half of the marina users were. Ramp users also operated more bass boats than those at either campgrounds or marinas, while respondents in campgrounds were nearly twice as likely to use "other" types of boats than those at either marinas or ramps.

Boat type also varied among the primary activity groups (chi-square = 122.3, $p \leq .01$) (Table 8). While a majority of all activity participants operated runabouts, almost 9 out of 10 waterskiers used these boats. Of the 205 respondents who spent most of their time fishing, 17 percent used bass boats and 11 percent operated "other" vessels. On the other hand, cabin cruisers were more likely to be used by swimmers (16 percent) and pleasure cruisers (13 percent). Nearly one-fifth of the 36 respondents who ranked "other" as their first activity also operated "other" types of crafts, while another 11 percent operated pontoon boats.

Boat Length. Of all boaters surveyed, 75 percent were operating boats 14 to 19 feet in length, with the average craft being 18.2 feet long. Marina boats (mean = 20.7), however, were significantly longer (F-value = 149.9) than boats of those surveyed at campgrounds (mean = 17.2)

TABLE 7
BOAT TYPE BY SAMPLING SITE AND USER GROUP
(VALUES IN PERCENT)

	TYPE OF BOAT					
	CABIN CRUISER (n=117)	RUNABOUT (n=841)	PONTOON (n=65)	BASS (n=64)	OTHER (n=79)	n
CAMPGROUNDS						
Seven Points	5	74	5	6	10	134
Resort	2	79	5	4	10	136
Susquehannock		79			21	38
Nancy's	7	77	2	5	10	63
SUBTOTAL	4	77	4	5	11	371
MARINAS						
Seven Points	20	58	15	2	6	221
Resort	38	48	7		8	120
SUBTOTAL	26	55	12	1	6	341
BOAT RAMPS						
Snyder's Run	7	85		8		75
Seven Points	1	83	3	8	4	90
Aitch	2	76	3	12	7	59
James Creek	2	73	2	19	5	63
Weaver Falls	11	84		3	3	37
Tatman Run		88	2	8	3	65
Shy Beaver	6	79	5	8	3	65
SUBTOTAL	4	81	2	9	4	454
TOTAL	10	72	6	5	7	1166

TABLE 8
BOAT TYPE BY PRIMARY ACTIVITY
(VALUES IN PERCENT)

	TYPE OF BOAT					
	CABIN CRUISER (n=117)	RUNABOUT (n=832)	PONTOON (n=65)	BASS (n=64)	OTHER (n=79)	n
FISHING	5	62	6	17	11	205
SWIMMING	16	71	6	2	5	239
WATERSKIING	5	87	2	2	4	260
PLEASURE CRUISING	13	69	7	4	7	417
OTHER	8	58	11	3	19	36
TOTAL	10	72	6	6	7	1157

and at ramps (mean = 17.1) (Table 9). While 85 percent of all boats sampled at campgrounds and at ramps fell between 14 and 19 feet in length, only 47 percent of the boats in the marinas were in these length categories and over 50 percent of all marina boats measured 20 feet or longer.

When mean boat lengths at the individual sampling sites were compared, some noteworthy differences were found (F-value = 28.6, $p \leq .01$). Boats at both marina sites were significantly longer than crafts at any other site. In addition, boats at the Resort Marina (mean = 21.8) were significantly longer than those at Seven Points Marina (mean = 20.1). The Resort Marina housed the longest boats of the entire lake, with 13 percent measuring over 25 feet. On the other hand, only 3 of the 11 campground or ramp sites (Seven Points Campgrounds, Resort Campgrounds, and James Creek) had any boats of that size. Of the

TABLE 9
LENGTH OF BOAT BY SAMPLING SITE AND USER GROUP
(VALUES IN PERCENT)

	BOAT LENGTH (FEET)						
	< 14 (n=26)	14-16 (n=349)	17-19 (n=506)	20-26 (n=251)	> 26 (n=30)	n	AVG.
CAMPGROUNDS							
Seven Points	6	39	44	10	2	134	17.2
Resort	4	30	56	10	1	136	17.2
Susquehannock	8	50	32	11		38	16.0
Nancy's	2	27	56	16		63	17.8
SUBTOTAL	5	35	49	11	1	371	17.2
MARINAS							
Seven Points	1	12	38	45	5	221	20.1
Resort		8	33	47	13	120	21.8
SUBTOTAL	0	11	36	45	8	341	20.7
BOAT RAMPS							
Snyder's Run	5	41	38	16		74	16.8
Seven Points		46	46	8		89	17.0
Aitch		36	43	21		58	17.6
James Creek	2	44	45	8	2	62	17.1
Weaver Falls	3	40	50	8		38	17.0
Tatman Run	3	45	47	5		64	16.5
Shy Beaver		32	46	22		65	17.8
SUBTOTAL	2	41	45	12	0	450	17.1
TOTAL	2	31	44	22	3	1162	18.2

campgrounds, Nancy's Boat-to-Shore tended to have the longest boats (mean = 17.8) while Susquehannock had the shortest, with an average of only 16 feet.

Fishermen tended to operate boats significantly shorter (mean = 16.7) than those of any other activity group (F-value = 15.1, $p \leq .01$) (Table 10). Boats used primarily for waterskiing (mean = 18.0) were slightly larger than the fishing boats, but not as large as those used primarily for swimming (mean = 19.0). While a majority of fishermen operated boats 14 to 16 feet long, the majority of waterskiers used 17 to 19 foot boats. Swimmers more than any other activity group used boats 20 to 26 feet long, while 11 percent of the participants in "other" activities (three times as many as any other activity) operated boats measuring 27 feet or longer.

TABLE 10
LENGTH OF BOAT BY PRIMARY ACTIVITY
(VALUES IN PERCENT)

	BOAT LENGTH (FEET)						
	< 14 (n=26)	14-16 (n=345)	17-19 (n=503)	20-26 (n=250)	> 26 (n=30)	n	AVG.
FISHING	5	58	23	13	1	205	16.7
SWIMMING	1	22	42	33	2	240	19.0
WATERSKIING		26	56	15	2	259	18.0
PLEASURE CRUISING	3	24	47	23	4	415	18.5
OTHER	3	20	40	26	11	35	19.4
TOTAL	2	30	44	22	3	1154	18.2

Total Engine Horsepower. While the average total engine horsepower of all boats sampled on the lake was 127.7, actual values ranged from 1 to 600. Sixty percent of those surveyed used engines with between 65 and 175 horsepower (Table 11). Marinas, however, had three times as many boats as either campgrounds or ramps with engine horsepower totaling 175 or more. With an F-value of 83.6 ($p \leq .01$), marina boats had a significantly higher mean horsepower, averaging 172.2 to campground boats' 109.9 and ramp boats' 108.7.

Susquehannock (mean = 89.5) had the lowest mean engine horsepower of all sites sampled, while the Resort Marina (mean = 196.9) had the highest. Supporting this finding, Susquehannock had less than 5 percent of its boats with total horsepower exceeding 174, while nearly 50 percent of all Resort Marina boats fell into this category. Boats at the Resort Marina had significantly higher average horsepower (F-value = 16.9, $p \leq .01$) than all sites except Seven Points Marina (mean = 158.7). With a lower average horsepower, Seven Points Marina differed significantly from all remaining sites but four: Shy Beaver (123.2), Nancy's Boat-to-Shore (121.9), Weaver Falls (111.7), and Aitch (108.2).

Among the boating activity groups, fishermen tended to operate boats with engines having the least horsepower (F-value = 28.4, $p \leq .01$) (Table 12). With an average of 75.5 horsepower, fishermen's boats differed significantly from the boats of all other activity groups by more than 50 horsepower. Supporting this, about half of all fishing boats used less than 65 horsepower while only 8 percent used 175 horsepower or greater. On the other hand, at least 20 percent of all swimmers, waterskiers, pleasure cruisers, and "other" activity participants used boats with at least 175 horsepower engines.

TABLE 11
TOTAL ENGINE HORSEPOWER BY SAMPLING SITE AND USER GROUP
(VALUES IN PERCENT)

	TOTAL HORSEPOWER						
	< 65 (n=208)	65-99 (n=236)	100-139 (n=230)	140-174 (n=215)	> 174 (n=243)	n	AVG.
CAMPGROUNDS							
Seven Points	30	19	24	15	12	127	100.7
Resort	17	23	23	24	14	133	117.7
Susquehannock	30	30	13	23	3	30	89.5
Nancy's	11	27	26	11	24	62	121.9
SUBTOTAL	22	23	23	18	14	352	109.9
MARINAS							
Seven Points	12	16	14	19	39	215	158.7
Resort	9	9	10	25	47	117	196.9
SUBTOTAL	11	14	13	21	42	332	172.2
BOAT RAMPS							
Snyder's Run	28	21	20	19	12	75	105.1
Seven Points	16	31	21	19	13	90	112.2
Aitch	26	18	29	9	18	55	108.2
James Creek	19	24	26	23	8	62	104.8
Weaver Falls	24	21	18	21	16	38	111.7
Tatman Run	28	23	23	20	5	64	95.8
Shy Beaver	13	30	28	14	16	64	123.2
SUBTOTAL	21	25	24	18	12	448	108.7
TOTAL	18	21	20	19	22	1132	127.7

TABLE 12
TOTAL ENGINE HORSEPOWER BY PRIMARY ACTIVITY
(VALUES IN PERCENT)

	TOTAL HORSEPOWER						
	< 65 (n=207)	65-99 (n=234)	100-139 (n=227)	140-174 (n=215)	> 174 (n=241)	n	AVG.
FISHING	50	24	8	10	8	194	75.5
SWIMMING	11	21	21	21	27	236	141.5
WATERSKIING	6	20	26	26	22	255	138.2
PLEASURE CRUISING	16	20	23	18	23	407	135.5
OTHER	16	16	19	19	31	32	159.4
TOTAL	18	21	21	19	21	1124	127.7

Boater Characteristics

Distance from Raystown Lake. Respondents traveled an average of 90.1 miles one-way to reach Raystown Lake (Table 13). While 20 percent traveled less than 35 miles, over 40 percent came from places at least 100 miles away. Campground users traveled significantly farther (F-value = 27.8, $p \leq .01$) than either marina or ramp boaters, averaging 112 miles to their 80. Less than 10 percent of all campground boaters came from a 35-mile radius, but approximately 25 percent of all marina and ramp users came from this area.

There were no significant differences in travel distance among primary activity groups, but four significant differences were found when individual site means were compared (F-value = 7.2, $p \leq .01$). Users from both Seven Points Campground (mean = 115.7) and the Resort Campground

TABLE 13
ONE-WAY DISTANCE TO RAYSTOWN LAKE BY SAMPLING SITE AND USER GROUP
(VALUES IN PERCENT)

	DISTANCE FROM RAYSTOWN (MILES)						
	< 35 (n=226)	36-60 (n=233)	61-99 (n=181)	100-129 (n=248)	> 129 (n=246)	n	AVG.
CAMPGROUNDS							
Seven Points	8	19	18	22	34	134	115.7
Resort	8	10	16	26	41	132	113.9
Susquehannock	13	18	16	24	29	38	96.5
Nancy's	15	11	23	19	32	62	106.9
SUBTOTAL	9	14	18	23	36	366	111.6
MARINAS							
Seven Points	27	21	10	27	15	214	81.0
Resort	18	29	18	24	12	118	78.1
SUBTOTAL	23	23	13	26	14	332	79.9
BOAT RAMPS							
Snyder's Run	17	20	21	27	16	71	84.3
Seven Points	13	9	22	31	26	82	108.4
Aitch	32	26	12	18	12	57	68.3
James Creek	38	21	16	11	14	63	68.6
Weaver Falls	37	29	8	13	13	38	60.8
Tatman Run	24	30	18	11	18	63	86.6
Shy Beaver	32	37	15	8	8	62	63.6
SUBTOTAL	26	23	17	18	16	436	79.8
TOTAL	20	21	16	22	22	1134	90.1

(mean = 113.9) traveled significantly farther than Shy Beaver users (mean = 63.6). Those using Seven Points Campground also traveled significantly farther than respondents at Seven Points Marina (mean = 81.0) and James Creek (mean = 68.6). Of the campground users, those at Susquehannock traveled the shortest distance (mean = 96.5). Weaver Falls boaters (mean = 60.8) traveled the shortest distance of all ramp users, while Seven Points Ramp users (mean = 108.4) traveled at least 20 miles farther than boaters at any other ramp.

Number of Years Boating. On the average, Raystown users had 10.1 years of boating experience. While 18 percent had been boating less than 3 years, another 20 percent had more than 15 years of boating experience. There were no significant differences in previous boating experience among those using different access points or between those sampled at campgrounds, boat ramps, or marinas. Fishermen (mean = 12.3), however, had been boating significantly longer (F-value = 3.6, $p \leq .01$) than either waterskiers (mean = 9.4) or pleasure cruisers (mean = 9.6) (Table 14). Half of all fishermen had boated at least 10 years, but at least 60 percent of all other activity groups had participated less than that. In addition, 20 percent of all waterskiers and pleasure cruisers had less than 3 years of boating experience.

Overall Boating Participation. On the average, respondents reported boating a total of 28 days on any resource in the past year. One fifth, however, had boated less than five days, while another fifth had boated more than 50 days (Table 15). Marina users boated significantly more often than either campground or ramp users (F-value = 13.6, $p \leq .01$), averaging 33.8 days compared to 25.5 and 25.8, respectively. Over half the marina users had boated at least 30 days in the past year.

TABLE 14
NUMBER OF YEARS BOATING BY PRIMARY ACTIVITY
(VALUES IN PERCENT)

	NUMBER OF YEARS BOATING						
	< 3 (n=211)	3-4 (n=252)	5-9 (n=192)	10-15 (n=263)	> 15 (n=228)	n	AVG.
FISHING	14	21	14	23	27	201	12.3
SWIMMING	17	22	17	27	18	237	10.1
WATERSKIING	20	22	18	22	19	258	9.4
PLEASURE CRUISING	21	23	16	23	18	414	9.6
OTHER	11	28	28	11	22	36	10.3
TOTAL	18	22	17	23	20	1146	10.1

TABLE 15
NUMBER OF ANNUAL DAYS BOATING BY SAMPLING SITE AND USER GROUP
(VALUES IN PERCENT)

	NUMBER OF DAYS BOATING OVERALL						
	< 5 (n=231)	6-19 (n=228)	20-29 (n=206)	30-49 (n=249)	> 49 (n=238)	n	AVG.
CAMPGROUNDS							
Seven Points	23	20	17	22	18	135	27.4
Resort	22	22	21	22	13	134	24.7
Susquehannock	18	37	16	13	16	38	23.9
Nancy's	23	19	18	26	15	62	23.9
SUBTOTAL	22	22	18	22	15	369	25.5
MARINAS							
Seven Points	13	15	21	22	30	219	33.9
Resort	15	13	18	24	31	118	33.7
SUBTOTAL	14	14	20	22	30	337	33.8
BOAT RAMPS							
Snyder's Run	27	16	15	23	20	75	26.1
Seven Points	30	21	15	13	21	86	24.2
Aitch	27	14	16	18	25	56	28.1
James Creek	16	32	25	19	8	63	22.0
Weaver Falls	11	18	5	37	29	38	34.3
Tatman Run	32	31	15	15	6	65	17.3
Shy Beaver	13	21	16	30	21	63	32.7
SUBTOTAL	23	22	16	21	18	446	25.8
TOTAL	20	20	18	22	21	1152	28.0

When individual site means were compared (F-value = 4.1, $p \leq .01$), just two areas differed significantly from each other. With an average of 33.9 days, Seven Points Marina users boated significantly more often than Tatman Run users. Averaging just 17.3 days, boaters at Tatman Run averaged at least five days less participation than those at any other site. Of the campgrounds, Seven Points Campgrounds users were the most active (27.4 days), while those at Weaver Falls (mean = 34.3) and Shy Beaver (mean = 32.7) boated most often out of the ramp users. The two marinas were nearly identical in frequency distribution, with Resort Marina boaters (mean = 33.7) averaging just two tenths of a day less than Seven Points Marina users.

The number of days boating at any resource also varied among activity participants (F-value = 2.5, $p \leq .05$) (Table 16). Waterskiers (mean = 24.5) tended to have participated in boating activities less

TABLE 16
NUMBER OF ANNUAL DAYS BOATING BY PRIMARY ACTIVITY
(VALUES IN PERCENT)

	NUMBER OF DAYS BOATING OVERALL						
	< 5 (n=230)	6-19 (n=226)	20-29 (n=206)	30-49 (n=248)	> 49 (n=238)	n	AVG.
FISHING	18	22	17	17	26	203	30.7
SWIMMING	17	18	19	24	23	238	30.3
WATERSKIING	20	24	20	22	14	260	24.5
PLEASURE CRUISING	23	18	17	21	21	411	27.5
OTHER	17	19	11	31	22	36	29.7
TOTAL	20	20	18	22	21	1148	28.1

often than fishermen (mean = 30.7) or swimmers (mean = 30.3). Approximately 25 percent of all fishermen and swimmers had boated at least 50 days during the past year, while less than 15 percent of all waterskiers had participated this often.

Frequency of Boating at Raystown Lake. A fifth of all boaters sampled were newcomers to Raystown and had not boated on Raystown Lake in the past year (Table 17). Another fifth reported over 31 days of participation last year. On the average, boaters had spent 19.4 days at Raystown Lake during the past year. Interestingly, all three user groups differed significantly from each other when average days were compared (F-value = 62.7, $p \leq .01$). With an average of 29.4 days, marina users more than doubled campground users' participation level (mean = 12.6) and had boated a dozen more days than ramp users (mean = 17.5).

Users at the Resort Marina (mean = 29.1) differed significantly (F-value = 11.8, $p \leq .01$) from those at Seven Points Campground (mean = 11.7), the Resort Campground (mean = 11.8), Tatman Run (mean = 13.6), and Seven Points Ramp (mean = 14.0). In addition to these four sites, Seven Points Marina users, with the highest average rate of participation (29.6 days), had significantly more participation than those at Nancy's Boat-to-Shore and James Creek (mean = 15.3 at both sites). Of the campground users, Nancy's Boat-to-Shore had the most active boaters, while the most active ramp users were found at Shy Beaver (mean = 23.4) and Weaver Falls (mean = 22.4).

Two activity groups differed from each other when participation at Raystown Lake during the previous year was compared (F-value = 4.1, $p \leq .01$) (Table 18). Swimmers (mean = 22.8) had used Raystown Lake significantly more often than waterskiers (mean = 16.6). More than 50

TABLE 17
NUMBER OF DAYS BOATING AT RAYSTOWN LAKE DURING PREVIOUS YEAR
BY SAMPLING SITE AND USER GROUP (VALUES IN PERCENT)

	NUMBER OF DAYS BOATING AT RAYSTOWN LAKE						
	0 (n=246)	1-7 (n=222)	8-19 (n=198)	20-31 (n=256)	> 31 (n=233)	n	AVG.
CAMPGROUNDS							
Seven Points	26	26	26	16	7	135	11.7
Resort	28	28	20	15	10	134	11.8
Susquehannock	26	29	24	8	13	38	13.9
Nancy's	15	31	19	26	10	62	15.3
SUBTOTAL	25	28	22	16	9	369	12.6
MARINAS							
Seven Points	13	10	12	29	37	220	29.6
Resort	17	5	11	29	39	119	29.1
SUBTOTAL	14	8	12	29	37	339	29.4
BOAT RAMPS							
Snyder's Run	28	16	15	20	21	75	17.6
Seven Points	33	26	19	9	14	86	14.0
Aitch	23	19	9	28	21	57	19.5
James Creek	16	27	25	21	11	63	15.3
Weaver Falls	18	11	13	42	16	38	22.4
Tatman Run	26	28	19	19	9	65	13.6
Shy Beaver	18	14	16	30	22	63	23.4
SUBTOTAL	24	21	17	22	16	447	17.5
TOTAL	21	19	17	22	20	1155	19.4

TABLE 18
NUMBER OF DAYS BOATING AT RAYSTOWN LAKE DURING PREVIOUS YEAR
BY PRIMARY ACTIVITY (VALUES IN PERCENT)

	NUMBER OF DAYS BOATING AT RAYSTOWN LAKE						
	0 (n=245)	1-7 (n=221)	8-19 (n=196)	20-31 (n=256)	> 31 (n=233)	n	AVG.
FISHING	28	23	15	16	19	203	17.2
SWIMMING	17	14	17	26	26	240	22.8
WATERSKIING	19	25	21	22	14	260	16.6
PLEASURE CRUISING	23	17	17	23	20	412	19.7
OTHER	17	19	3	31	31	36	26.5
TOTAL	21	19	17	22	20	1151	19.4

percent of all swimmers had been to Raystown at least 20 times in the past year, with 26 percent having participated at least 31 days. On the other hand, 65 percent of the waterskiers had been to Raystown less than 20 times in the past year, including 19 percent who had not been there at all. Similarly, more than 25 percent of the fishermen had not been to Raystown in the past year. More than 60 percent of those participating in "other" activities had at least 20 days of previous experience, including over 30 percent with 31 days or more.

Perceived Skill Level. When boaters rated their own levels of perceived skill, three-quarters of the 1151 respondents classified themselves as being either intermediate (39 percent) or advanced (37 percent). At one extreme, just 11 percent rated themselves as novices, but, at the other extreme, only 13 percent called themselves experts (Table 19). Perceived skill level did not vary among sampling sites,

TABLE 19
PERCEIVED SKILL LEVEL OF RAYSTOWN BOATERS

SKILL LEVEL	FREQUENCY	PERCENT
Novice	131	11
Intermediate	443	39
Advanced	428	37
Expert	149	13
TOTAL	1151	100

user groups, or activity groups.

Group Size. The average size group of Raystown Lake boaters included 4.5 people. Less than 2 percent boated alone, but nearly 20 percent recreated in pairs (Table 20). Exactly half of all boaters sampled were with groups of 3 to 5 people, with the remaining third being part of a group of 6 or more people. The most common party size for respondents from all three user groups was four people. Campground users (mean = 4.7) had significantly (F-value = 5.0, $p \leq .01$) more members in their groups than marina users (mean = 4.3), but ramp users (mean = 4.4) differed from neither. More than one-fifth of all marina and ramp users recreated in pairs, while more than one-fifth of all campground users boated with at least six other people.

Of the campgrounds, Resort Campground users reported the largest party sizes (5.1 people per group), with more than a quarter of all users recreating in groups of 7 or more. The size of boating groups at ramps ranged from 4.0 (Snyder's Run and James Creek) to 5.2 (Tatman Run). Of

TABLE 20
GROUP SIZE BY SAMPLING SITE AND USER GROUP
(VALUES IN PERCENT)

	NUMBER OF PEOPLE IN GROUP								
	1 (n=20)	2 (n=181)	3 (n=124)	4 (n=218)	5 (n=135)	6 (n=120)	> 6 (n=169)	n	AVG.
CAMPGROUNDS									
Seven Points	4	19	19	17	10	12	19	110	4.4
Resort		13	7	21	17	14	28	125	5.1
Susquehannock	3	12	12	32	15	9	18	34	4.5
Nancy's		12	8	37	10	16	18	51	4.7
SUBTOTAL	2	15	12	23	13	13	22	320	4.7
MARINAS									
Seven Points	4	21	14	19	15	14	14	183	4.3
Resort	1	23	14	24	14	12	13	93	4.2
SUBTOTAL	3	21	14	21	15	13	13	276	4.3
BOAT RAMPS									
Snyder's Run	2	30	9	18	18	14	9	56	4.0
Seven Points		21	7	25	15	12	21	68	4.7
Aitch	4	27	6	21	16	12	14	49	4.2
James Creek	2	18	22	29	9	11	9	55	4.0
Weaver Falls	5	22	11	27	14	8	14	37	4.1
Tatman Run		4	23	19	15	9	30	53	5.2
Shy Beaver	2	21	13	25	13	9	17	53	4.4
SUBTOTAL	2	20	13	23	14	11	16	371	4.4
TOTAL	2	19	13	23	14	12	17	967	4.5

all Tatman Run users, thirty percent boated in groups of 7 or more people, at least 9 percent more than any other ramp site.

Averaging just 3.4 people per group, fishermen participated in significantly smaller groups than any other activity group (F-value = 26.7, $p \leq .01$) (Table 21). Waterskiers, with an average group size of 5.5, also differed significantly from swimmers (mean = 4.6) and pleasure cruisers (mean = 4.3). Thirty percent of the waterskiers participated with at least 7 other people. Over 40 percent of all fishermen boated in pairs, while 23 percent of the swimmers and 26 percent of all pleasure cruisers were in groups of 4. Although 10 percent of those in "other" activities participated alone, more than 20 percent were with at least 6 other people.

TABLE 21
GROUP SIZE BY PRIMARY ACTIVITY
(VALUES IN PERCENT)

	NUMBER OF PEOPLE IN GROUP								
	1 (n=20)	2 (n=181)	3 (n=124)	4 (n=218)	5 (n=135)	6 (n=120)	> 6 (n=169)	n	AVG.
FISHING	4	41	16	17	8	6	8	154	3.4
SWIMMING	1	17	14	23	14	14	17	227	4.6
WATERSKIING		3	14	21	17	16	30	223	5.5
PLEASURE CRUISING	2	20	11	26	16	12	13	329	4.3
OTHER	10	13	7	19	13	16	23	31	4.7
TOTAL	2	19	13	23	14	12	18	964	4.5

Group Type. Of the 966 respondents who described their group type, more than 50 percent were boating with their families. Another 30 percent were participating with a combination of family and friends, while 12 percent boated with friends. Although group type did not vary among access sites or user groups, group type did vary among activities (chi-square = 77.1, $p \leq .01$) (Table 22). Approximately 60 percent of all fishermen, swimmers, and pleasure cruisers were with family members while almost 50 percent of the waterskiers boated with a combination of family and friends. Although only 2 percent of all respondents classified their group as something other than family, friends, or family and friends, 13 percent of those in "other" activities in turn described their groups as "other".

TABLE 22
TYPE OF GROUP BY PRIMARY ACTIVITY
(VALUES IN PERCENT)

	TYPE OF GROUP				
	FAMILY (n=530)	FRIENDS (n=118)	FAMILY & FRIENDS (n=297)	OTHER (n=21)	n
FISHING	65	18	15	3	153
SWIMMING	59	9	31	1	227
WATERSKIING	38	15	47		225
PLEASURE CRUISING	59	11	27	3	330
OTHER	48	10	29	13	31
TOTAL	55	12	31	2	966

Boating Impact Variables

This section of the report describes boater's responses to questions dealing with the quality of their experiences and various potential impacts that might reduce that quality.

Satisfaction. Raystown boaters appear to be quite satisfied with their boating experience overall. On a scale of one to ten (with ten being the perfect trip), 61 percent rated their experience an eight or higher (mean=7.5). Nearly one-fourth of the boaters rated their experience a ten. Of the three user groups, ramp and marina users reported the highest ratings (Table 23). Sixty-five and 63 percent of these users (means=7.7), respectively, rated their trips an eight or higher. Both of these user groups were significantly more satisfied (F-value = 8.0, $p < .01$) than those from campgrounds where only 54 percent rated their experience an eight or better (mean=7.1).

The average satisfaction among boaters at individual sites ranged from 6.1 to 8.2 out of the possible ten. The users from Synders Run were the most satisfied with 74 percent rating their experience as an eight or better (mean=8.2). This was significantly higher than the Susquehannock users (F-value = 3.9, $p = .00$) where only 30 percent considered their trips to be that satisfying (mean=6.1).

The questionnaire also included several other questions designed to serve as indicators of overall satisfaction (Table 24). In essence, these questions represent different ways of asking boaters how much they enjoyed their experience. Some of the questions were stated negatively; agreeing with the statements indicated lower, rather than higher, satisfaction. Including a variety of questions like these provides a more reliable and complete picture of how respondents perceived boating quality.

TABLE 23
RESPONSES TO TEN-POINT OVERALL SATISFACTION SCALE
BY SAMPLING SITE AND USER GROUP
(Values in Percent)

	OVERALL TRIP RATING										n	AVG
	1	2	3	4	5	6	7	8	9	10		
CAMPGROUNDS												
Seven Points	0	2	3	2	16	11	9	24	13	20	134	7.4
Resort	4	6	5	2	10	11	14	23	10	16	134	6.9
Susquehannock	3	5	8	11	16	8	21	11	11	8	38	6.1
Nancy's	0	0	3	5	5	5	9	31	20	22	59	7.8
SUBTOTAL	2	3	4	3	12	10	12	23	13	18	339	7.1
MARINAS												
Seven Points	1	1	2	1	14	5	14	25	12	26	220	7.7
Resort	1	1	1	3	11	8	11	21	16	28	119	7.9
SUBTOTAL	1	1	2	2	13	6	13	23	14	26	365	7.7
BOAT RAMPS												
Snyders Run	0	1	3	1	5	7	8	28	13	33	75	8.2
Seven Points	2	2	2	2	8	5	10	16	18	33	87	7.9
Aitch	5	4	0	5	11	2	14	21	21	18	57	7.3
James Creek	2	3	2	0	8	7	11	26	19	23	62	7.8
Weaver Falls	0	5	0	0	3	13	13	32	16	18	38	7.7
Tatman Run	3	6	0	0	11	11	16	27	16	11	64	7.1
Shy Beaver	0	3	5	2	8	8	13	29	10	24	63	7.6
SUBTOTAL	2	3	2	2	8	7	12	25	16	24	446	7.7
TOTAL	2	3	2	2	11	8	12	24	14	23	1150	7.5

Results shown in Table 24 support the responses to the ten-point overall trip rating by showing that boaters tended to be generally, though not completely, satisfied with their boat trips. More than 80% agreed that they thoroughly enjoyed the trip today, although only 17% agreed strongly. An even greater proportion of the boaters felt their trip was well worth the money it cost them, and very few indicated they did not want to go on more trips like the one they experienced that day. On the other hand, a majority of the respondents disagreed with the statement, "I cannot imagine a better boating trip." About one-third of the sample indicated that they were disappointed with some aspects of the experience. In sum, boaters tended to report relatively high satisfaction, although for many the experience did not measure up to their ideal or best ever boating outing.

TABLE 24
RESPONSES TO OTHER INDICATORS OF OVERALL SATISFACTION
(Values in Percent)

	RESPONSES					n	AVG
	Strongly Disagree	Dis-agree	Undec	Agree	Strongly Agree		
I thoroughly enjoyed my boating trip today.	1	8	7	68	17	1140	3.9
My boating experience was not as enjoyable as I expected it to be.	11	69	6	13	2	1141	2.2
I cannot imagine a better boating trip.	5	54	16	23	2	1138	2.6
I do not want to go on any more boat trips like this one.	23	69	3	4	1	1138	1.9
My boat trip was well worth the money I spent to take it.	0	5	4	77	14	1138	4.0
I was disappointed with some aspects of my boat trip.	4	60	5	30	2	1132	2.6

Crowding. Several questions explored feelings of crowding among Raystown boaters at various points during the boating experience (Table 25). Perceived crowding varied at different points during boat trips and did appear to be a problem for some users. Boaters felt most crowded while actually out on the lake. On a scale of one to nine, with nine being "extremely crowded", 36 percent considered crowding on the lake to be a seven or greater (mean=5.7 of a possible 9). Surprisingly, the least crowded part of most users trips was getting on the water. Only 15 percent ranked crowding here as a 7 or greater (mean=3.8). Perceived crowding at stopping places and at the end of the day was not as great as out on the lake but was greater than at the access areas at the start of the trip.

TABLE 25
PERCEIVED LEVEL OF CROWDING
AT VARIOUS POINTS DURING THE BOATING EXPERIENCE
(Values in Percent)

	PERCEIVED DEGREE OF CROWDING									n	AVG
	1 Not at all Crowded	2	3	4	5	6	7	8	9 Extremely Crowded		
"Crowding at the access area at the start of your trip."	20	17	20	9	7	14	5	4	6	1145	3.8
"Crowding out on the lake while boating."	4	5	10	10	12	23	14	13	9	1149	5.7
"Crowding at the places where you stopped today while boating."	12	13	15	11	11	13	9	10	7	675	4.6
"Crowding at the access area when you stopped boating."	17	17	15	8	10	13	8	6	7	1114	4.2

In every case where a significant difference between user groups occurred, ramp users felt the most crowded while those from marinas reported the least crowding. This is interesting considering the fact that ramp users (along with marina users) reported the highest satisfaction on the ten-point scale. The following discussion examines crowding perceptions at particular access points and for various user groups in more detail.

Crowding on the Lake. As noted above, boaters felt most crowded while actually out on the lake. This was particularly true of the ramp users (Table 26). Forty-one percent reported crowding as a seven or greater out of nine (mean=5.8). Marina users felt significantly less crowded (F-value = 3.1, $p < .05$). Only 29 percent of those from marinas considered crowding on the lake to be a seven or greater on the 9-point scale (mean=5.5).

The Aitch users considered the lake to be more crowded than did boaters from any other site. Fifty-seven percent reported 7 or higher out of 9 (mean=6.4). The Seven Points ramp users felt the least crowded while on the water. Only 32 percent rated crowding as 7 or greater (mean=5.3).

In terms of users engaged in different activities, swimmers considered the lake to be significantly more crowded than did fishermen (F-value = 2.6, $p = .03$) (Table 27). Forty-six percent of those listing swimming as their primary activity considered crowding to be a 7 or higher out of nine (mean=6.0) while only 35 percent of those fishing felt the lake was this crowded (mean=5.4).

TABLE 26
PERCEIVED LEVEL OF CROWDING OUT ON THE LAKE WHILE BOATING
BY SAMPLING SITE AND USER GROUP
(Values in Percent)

	PERCEIVED DEGREE OF CROWDING									n	AVG
	1 Not at all Crowded	2	3	4	5	6	7	8	9 Extremely Crowded		
CAMPGROUNDS											
Seven Points	9	2	5	10	13	22	18	14	8	135	5.7
Resort	4	6	6	14	10	26	14	13	8	133	5.6
Susquehannock	3	0	11	11	11	16	13	18	18	38	6.3
Nancy's	2	7	8	13	16	21	19	11	3	62	5.5
SUBTOTAL	5	4	7	12	12	23	16	14	8	368	5.7
MARINAS											
Seven Points	4	6	11	10	13	28	11	12	6	220	5.4
Resort	2	1	14	9	18	26	13	11	5	118	5.5
SUBTOTAL	4	4	12	10	15	27	12	12	5	338	5.5
BOAT RAMPS											
Snyders Run	0	6	7	8	21	25	19	10	6	73	5.8
Seven Points	3	9	14	13	14	15	9	9	14	87	5.3
Aitch	4	7	7	4	2	20	18	21	18	56	6.4
James Creek	5	11	8	8	6	19	10	16	18	63	5.8
Weaver Falls	3	5	5	11	11	24	16	21	5	38	5.9
Tatman Run	0	5	11	3	12	29	11	19	11	65	6.1
Shy Beaver	2	5	18	3	8	18	23	10	13	61	5.9
SUBTOTAL	2	7	10	7	11	21	15	14	12	443	5.8
TOTAL	4	5	10	10	12	23	14	13	9	1149	5.7

TABLE 27
PERCEIVED LEVEL OF CROWDING OUT ON THE LAKE WHILE BOATING
BY PRIMARY ACTIVITY
(Values in Percent)

	PERCEIVED DEGREE OF CROWDING									n	AVG
	1 Not at all Crowded	2	3	4	5	6	7	8	9 Extremely Crowded		
Fishing	7	6	13	12	11	18	11	12	12	200	5.4
Swimming	4	4	7	7	9	25	20	18	8	239	6.0
Waterskiing	2	5	10	12	11	25	14	13	9	257	5.7
Cruising	3	6	9	9	16	25	12	12	8	415	5.6
Other	3	3	11	3	23	23	23	3	9	35	5.7
TOTAL	4	5	10	10	13	23	14	13	9	1146	5.7

Crowding at Stopping Places. Stopping places during their trips were considered the second most crowded part of Raystown boater's experiences. Overall, 26 percent felt crowding was a 7 or greater on the 9-point scale (mean=4.6). There was no significant difference in the perception of crowding at stopping places between the three user groups (Table 28). Significant differences were found, however, when individual sampling sites were compared (F-value = 2.2, p = .01).

Of all locations, James Creek users felt most crowded when they stopped during their trip. Over half (52 percent) reported a 7 or greater on the 9-point scale (mean=6.4). Once again, the Seven Points ramp users felt the least crowded, with only 12 percent reporting 7 or greater (mean=3.8).

TABLE 28
PERCEIVED LEVEL OF CROWDING AT STOPPING PLACES WHILE BOATING
BY SAMPLING SITE AND USER GROUP
(Values in Percent)

	PERCEIVED DEGREE OF CROWDING									n	AVG
	1 Not at all Crowded	2	3	4	5	6	7	8	9 Extremely Crowded		
CAMPGROUNDS											
Seven Points	17	9	17	13	5	9	13	11	6	82	4.5
Resort	10	10	14	11	10	17	4	16	7	70	4.9
Susquehannock	12	29	12	12	0	12	12	0	12	17	4.1
Nancy's	8	16	16	10	4	22	12	12	2	51	4.7
SUBTOTAL	12	12	16	12	6	15	10	12	6	220	4.7
MARINAS											
Seven Points	18	9	15	15	12	11	7	6	6	140	4.3
Resort	10	7	18	12	18	21	2	12	2	61	4.6
SUBTOTAL	15	8	16	14	14	14	6	8	5	201	4.4
BOAT RAMPS											
Snyders Run	11	19	9	13	11	7	13	11	6	54	4.6
Seven Points	8	19	35	10	10	7	2	2	8	52	3.8
Aitch	0	16	16	10	16	3	16	10	13	31	5.3
James Creek	4	9	0	4	9	22	17	22	13	23	6.3
Weaver Falls	17	21	10	0	7	7	10	14	14	29	4.7
Tatman Run	4	15	12	4	23	4	12	15	12	26	5.3
Shy Beaver	13	13	10	0	10	21	10	13	10	39	5.1
SUBTOTAL	9	17	15	7	12	10	11	11	10	254	4.8
TOTAL	12	13	15	11	11	13	9	10	7	675	4.6

Crowding at Access Areas at Start of Trip. Crowding was not as much of a problem at the start or stop of the boating day. There were no significant differences in perceived crowding at the access point at the start of the trip among different user groups or sampling locations. However, there was a difference between users engaged in different primary activities (Table 29). Once again, swimmers felt significantly more crowded than did those who were fishing (F-value = 4.6, $p < .01$). Nineteen percent of the swimmers reported crowding as a 7 or greater (mean=4.3) compared with only 9 percent of those fishing (mean=3.4).

Crowding at Launch at Trip End. When asked how they would describe the boating conditions at the access area when they stopped boating, only 21 percent of everyone surveyed reported a 7 or greater (mean = 4.2). Ramp, marina, and campground users were not significantly different in their perceived degree of crowding at the end of their trips (Table 30).

At individual locations, however, mean ratings for "crowding at the access area when you stopped boating" ranged from 2.3 to 5.4 out of the possible 9 points (F-value = 3.9, $p < .01$). Interestingly, Seven Points Ramp users now felt the most crowded after reporting the least crowding on the lake and at stopping places. Thirty-six percent reported crowding at the end of their trips to be a 7 or greater. Weaver Falls users reported the lowest level of crowding at the end of the boating day (mean=2.3).

TABLE 29
PERCEIVED LEVEL OF CROWDING AT THE ACCESS AT THE START OF THE TRIP
BY PRIMARY ACTIVITY
(Values in Percent)

	PERCEIVED DEGREE OF CROWDING									n	AVG
	1 Not at all Crowded	2	3	4	5	6	7	8	9 Extremely Crowded		
Fishing	25	20	16	11	9	11	2	3	4	200	3.4
Swimming	17	10	19	9	7	18	8	3	8	238	4.3
Waterskiing	20	20	18	10	4	14	7	4	5	257	3.8
Cruising	18	17	23	8	7	13	8	5	5	410	3.8
Other	20	11	11	8	14	22	6	6	3	36	4.2
TOTAL	20	17	20	9	7	14	5	4	6	1141	3.8

Waiting Time to Get on The Lake. An additional question asked respondents how they felt about the amount of time they had to wait to get on the water. Raystown boaters appear to be quite satisfied with the amount of time they had to wait to begin their trips. Overall, only 6 percent of those sampled agreed or strongly agreed with the statement, "I did not like the amount of time I had to wait to get on the water today." (mean=2.0). Of the three user groups, those using ramps were least happy with their waits (Table 31). Eleven percent of ramp users felt they waited too long (mean=2.2). This was significantly higher (F-value = 26.5, $p < .01$) than campground or marina users of which only 4 and 1 percent, respectively, agreed or strongly

TABLE 30
PERCEIVED LEVEL OF CROWDING AT THE ACCESS AREA AT THE END OF THE DAY
BY SAMPLING SITE AND USER GROUP
(Values in Percent)

	PERCEIVED DEGREE OF CROWDING									n	AVG
	1 Not at all Crowded	2	3	4	5	6	7	8	9 Extremely Crowded		
CAMPGROUNDS											
Seven Points	24	10	8	11	10	13	9	6	9	135	4.3
Resort	22	15	12	6	8	18	11	4	4	132	4.0
Susquehannock	28	8	14	22	8	3	6	6	6	36	3.7
Nancy's	2	18	18	10	14	29	4	6	0	51	4.5
SUBTOTAL	20	13	12	10	10	16	9	5	5	354	4.2
MARINAS											
Seven Points	15	13	19	8	12	14	10	6	4	218	4.2
Resort	11	16	25	11	12	13	6	4	2	105	3.9
SUBTOTAL	14	14	21	9	12	14	8	6	3	323	4.1
BOAT RAMPS											
Snyders Run	14	33	11	3	10	6	7	6	12	73	4.1
Seven Points	5	10	17	10	10	13	9	6	21	82	5.4
Aitch	23	18	9	4	9	14	7	7	9	56	4.2
James Creek	21	19	11	5	8	10	10	10	8	63	4.2
Weaver Falls	16	68	5	5	0	0	0	5	0	37	2.3
Tatman Run	12	15	17	8	12	11	12	5	8	65	4.4
Shy Beaver	21	20	18	5	5	13	5	2	12	61	3.9
SUBTOTAL	15	23	13	6	8	10	8	6	11	437	4.2
TOTAL	17	17	15	8	10	13	8	6	7	1114	4.2

TABLE 31
RESPONSES TO "I DID NOT LIKE THE AMOUNT OF TIME I HAD TO WAIT TO GET ON THE WATER TODAY" BY SAMPLING SITE AND USER GROUP
(values in Percent)

	RESPONSES					n	AVG
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree		
CAMPGROUNDS							
Seven Points	18	73	2	6	2	135	2.0
Resort	11	84	2	2	1	132	2.0
Susquehannock	29	68	0	0	3	38	1.8
Nancy's	16	81	3	0	0	58	1.9
SUBTOTAL	16	78	2	3	1	363	2.0
MARINAS							
Seven Points	14	86	0	1	0	217	1.9
Resort	16	83	1	1	0	115	1.9
SUBTOTAL	15	85	0	1	0	332	1.9
BOAT RAMPS							
Snyders Run	4	76	4	13	3	71	2.3
Seven Points	9	80	1	7	2	85	2.1
Aitch	6	82	2	11	0	55	2.2
James Creek	5	94	0	2	0	62	2.0
Weaver Falls	3	81	0	16	0	37	2.3
Tatman Run	8	75	6	6	5	63	2.3
Shy Beaver	5	84	2	10	0	61	2.2
SUBTOTAL	6	81	2	9	2	434	2.2
TOTAL	12	81	2	5	1	1129	2.0

agreed that they had waited too long (means equal 2.0 and 1.9, respectively).

Snyders Run was the site where waiting time to get on the lake was the biggest problem. Sixteen percent of the users there felt they waited too long (mean=2.3). This was significantly higher than at both marinas (F-value = 6.0, p = .00) where only 1 percent reported having waited too long (means equal 1.9). Even at Snyders Run, however, there was still only a small proportion of boaters who reported that they had to wait too long. Among those few boaters who reported waiting longer than they would like to get on the lake, the average waiting time was about 28 minutes.

Influence of Others on Boating Experience. One final question related to crowding asked boaters directly how the number of boaters at the lake that day affected their overall boating experience. Over half of the respondents reported that the number of boaters had no effect on their experience (Table 32). Consistent with the previous crowding data, those who did report an influence of others were more likely to indicate that the number of boaters reduced, rather than increased, their enjoyment. Forty percent indicated some reduction in their enjoyment, although few of these reported a severe reduction. There were no significant differences in responses to this question among different user groups, sampling sites or primary activities.

TABLE 32
RESPONSES TO, "HOW DID THE NUMBER OF BOATERS AT THE LAKE TODAY AFFECT YOUR OVERALL BOATING EXPERIENCE."

	Increased My Enjoyment				No Effect			Reduced My Enjoyment	
	1	2	3	4	5	6	7	8	9
Number	13	18	29	29	581	131	208	79	39
Percent	1	2	3	3	52	12	18	7	3

Displacement. Four statements were included that attempted to measure the extent to which crowding was displacing boaters from Raystown Lake. Some displacement does seem to be occurring, although few boaters indicate that they might stay away from the lake altogether due to crowding. About one-fourth of the boaters reported being displaced from favorite parts of the lake and peak time periods as a result of crowds (Table 33). These types of adaptations are most evident in campground and boat ramp users, especially those from Aitch ramp, and least frequent among marina users and those from Snyders Run ramp.

Place Displacement. Responses to the question, "I avoided my favorite parts of the lake today because there were too many boats there" indicate that crowding is influencing the travel patterns of some boaters (Table 34). Overall, 25 percent agreed or strongly agreed with this statement (mean=2.5). Campground users were significantly more displaced (F-value = 3.4, $p < .04$) than those from marinas. Thirty percent of campground users agreed or strongly agreed compared to only 20 percent of marina users (means equal 2.6 and 2.4, respectively).

There was a wide range of responses to this statement from the individual sites. Nearly half (49 percent) of the Aitch ramp boaters agreed or strongly agreed that they had stayed away from their favorite parts of the lake (mean=3.1). This was significantly higher than the Snyders Run group (F-value = 2.9, $p < .01$) where only 13 percent reported this reaction (mean=2.3).

TABLE 33
SUMMARY OF RESPONSES TO INDICATORS OF VISITOR DISPLACEMENT,
(Values in Percent)

	RESPONSES					n	AVG
	Strongly Disagree	Dis-agree	Undec	Agree	Strongly Agree		
"I avoided my favorite parts of the lake today because there were too many boats there."	7	62	7	21	4	1142	2.5
"I stayed off the lake during parts of the day today because there were too many boats on the lake."	7	63	3	19	8	1141	2.6
"If I had known what it was going to be like here today, I would not have come on this visit."	16	77	2	4	1	968	2.0
"I did not participate in some boating activities today because of crowded conditions on the lake."	5	70	2	20	3	1134	2.5

In terms of the different user activity groups (Table 35), those listing fishing as their primary activity were significantly more likely to avoid their favorite parts of the lake due to crowding than were waterskiers (F-value = 2.8, p = .02). Thirty-two percent of fishermen agreed or strongly agreed with the statement for a mean score of 2.7. Only 21 percent of waterskiers, on the other hand, agreed as strongly for a mean of 2.4.

TABLE 34
RESPONSES TO "I AVOIDED MY FAVORITE PARTS OF LAKE TODAY BECAUSE THERE WERE TOO MANY BOATS THERE" BY SAMPLING SITE AND USER GROUP
(Values in Percent)

	RESPONSES					n	AVG
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree		
CAMPGROUNDS							
Seven Points	7	53	6	29	4	135	2.7
Resort	11	53	11	21	4	132	2.5
Susquehannock	3	50	11	26	11	38	2.9
Nancy's	5	61	8	23	3	62	2.6
SUBTOTAL	8	54	8	25	5	367	2.6
MARINAS							
Seven Points	7	67	6	16	4	219	2.4
Resort	3	72	3	17	4	117	2.5
SUBTOTAL	6	69	5	16	4	336	2.4
BOAT RAMPS							
Snyders Run	4	78	6	13	0	71	2.3
Seven Points	11	55	12	20	2	84	2.5
Aitch	7	37	7	37	12	57	3.1
James Creek	5	64	5	25	2	63	2.6
Weaver Falls	0	74	0	21	5	38	2.6
Tatman Run	6	64	8	19	3	64	2.5
Shy Beaver	3	69	5	16	7	62	2.5
SUBTOTAL	6	62	7	21	4	439	2.6
TOTAL	7	62	7	21	4	1142	2.5

TABLE 35
RESPONSES TO "I AVOIDED MY FAVORITE PARTS OF THE LAKE TODAY BECAUSE THERE WERE TOO MANY BOATS THERE" BY PRIMARY ACTIVITY

(Values in Percent)

	RESPONSES					n	AVG
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree		
FISHING	6	53	10	27	5	199	2.7
SWIMMING	6	59	6	25	4	237	2.6
WATERSKIING	8	64	8	18	3	257	2.4
CRUISING	6	66	6	18	5	411	2.5
OTHER	6	64	3	19	8	36	2.6
TOTAL	6	62	7	21	4	1140	2.6

Time Displacement. Twenty-seven percent of the boaters surveyed agreed or strongly agreed with the statement, "I stayed off the lake during parts of the day because there were too many boats on the lake" (Table 36) (mean=2.6). This statement again indicated that campground users are significantly more displaced than those from marinas (F-value = 5.9, $p < .01$). Thirty-three percent of campers stayed off the lake part of the day while only 22 percent of those from marinas were similarly displaced (means equal 2.7 and 2.4, respectively).

Turning to the individual sites, the Aitch users again reported being significantly more displaced than the Snyders Run users (F-value = 4.0, $p < .01$). Forty-nine percent from Aitch modified their boating schedules because of crowding while only 9 percent from Snyders Run stayed off part of the day (means equal 3.1 and 2.2, respectively).

TABLE 36
RESPONSES TO "I STAYED OFF THE LAKE DURING PARTS OF THE DAY TODAY BECAUSE THERE WERE TOO MANY BOATS ON THE LAKE" BY SAMPLING SITE AND USER GROUP
(Values in Percent)

	RESPONSES					n	AVG
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree		
CAMPGROUNDS							
Seven Points	10	60	3	16	12	135	2.6
Resort	8	57	5	23	8	132	2.7
Susquehannock	5	42	8	34	11	38	3.0
Nancy's	7	45	7	26	16	62	3.0
SUBTOTAL	8	55	5	22	11	367	2.7
MARINAS							
Seven Points	10	65	3	16	7	219	2.5
Resort	6	74	2	10	9	117	2.4
SUBTOTAL	8	68	2	14	8	336	2.4
BOAT RAMPS							
Snyders Run	4	82	6	6	3	71	2.2
Seven Points	8	67	2	17	6	84	2.5
Aitch	4	47	0	30	19	57	3.1
James Creek	6	70	5	18	2	63	2.4
Weaver Falls	0	73	0	22	5	37	2.6
Tatman Run	6	67	0	20	6	64	2.5
Shy Beaver	8	52	3	29	8	62	2.8
SUBTOTAL	6	66	3	19	7	438	2.6
TOTAL	7	63	3	19	8	1141	2.6

Activity Displacement. Twenty-three percent of the study subjects indicated they had forgone some boating activity because of crowding. Responses to the statement, "I did not participate in some boating activities today because of crowded conditions at the lake" did not differ significantly among user groups or sampling sites but did differ significantly between different activity groups (Table 37). Those listing swimming as their primary activity were significantly more displaced than fishermen, waterskiers, and "others" (consisting of sailing and several less common activities) (F-value = 2.5, p = .04). Thirty-one percent of swimmers agreed or strongly agreed (mean=2.6 out of 5) while the mean response for fishermen, waterskiers, and "others" was only 2.4 out of five. If respondents indicated they had given up some activity, they were asked what activity(ies) they had not done. For most of these individuals, waterskiing was the activity that had been displaced. Thus it appears that some Raystown visitors had planned on swimming and waterskiing but ended up participating only in swimming due to the crowded conditions.

Complete Displacement. There was little agreement with the statement, "If I had known what it was going to be like here today, I would not have come on this visit." Overall, only 5 percent agreed with this statement designed to measure the likelihood of complete displacement from the lake (Table 38). The ramp users were significantly more likely to be displaced than those from marinas or campgrounds (F-value = 12.2, p < .01). Seven percent of ramp users agreed or strongly agreed (mean=2.1) compared to 4 percent from campgrounds and 2 percent from marinas (means equal 1.9).

TABLE 37
RESPONSES TO "I DID NOT PARTICIPATE IN SOME BOATING ACTIVITIES BECAUSE OF CROWDED CONDITIONS AT THE LAKE" BY PRIMARY ACTIVITY

(Values in Percent)

	RESPONSES					n	AVG
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree		
FISHING	6	74	3	17	2	196	2.4
SWIMMING	5	64	1	26	5	236	2.6
WATERSKIING	6	70	2	21	1	254	2.4
CRUISING	4	72	2	18	4	411	2.5
OTHER	11	63	0	26	0	35	2.4
TOTAL	5	70	2	20	3	1132	2.5

Average scores from the individual sites ranged from a low of 1.9 (of a possible 5) at the Seven Points and Resort campgrounds to 2.1 at five of the ramps. The Seven Points ramp seemed to be the site where boaters were most likely to have stayed away, with 10 percent agreeing or strongly agreeing with the statement. Not a single boater from Weaver Falls agreed at all, however.

Several additional questions addressed other factors that may impact the boating experience. These include indicators of conflict between visitors, particularly noise from other boats and behavior of other boaters, and perceptions of safety on the lake.

Noise. Noise does not appear to be much of a problem on Raystown Lake. Noise from other boats reduced the enjoyment of only 5% of the boaters interviewed (Table 39). There were no significant differences in perceptions of noise between user groups or sampling locations. The noise

TABLE 38
RESPONSES TO "IF I HAD KNOWN WHAT IT WAS GOING TO BE LIKE HERE TODAY, I WOULD NOT HAVE COME ON THIS VISIT" BY SAMPLING SITE AND USER GROUP
(Values in Percent)

	RESPONSES					n	AVG
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree		
CAMPGROUNDS							
Seven Points	23	74	1	3	0	110	1.8
Resort	26	68	3	2	1	127	1.8
Susquehannock	21	68	3	6	3	34	2.0
Nancy's	19	75	4	2	0	52	1.9
SUBTOTAL	23	71	3	3	1	323	1.9
MARINAS							
Seven Points	17	81	1	1	0	185	1.9
Resort	18	74	2	4	1	93	2.0
SUBTOTAL	18	78	1	2	0	278	1.9
BOAT RAMPS							
Snyders Run	8	85	2	6	0	53	2.1
Seven Points	12	77	2	7	3	68	2.1
Aitch	8	77	8	6	0	48	2.1
James Creek	9	82	2	7	0	55	2.1
Weaver Falls	6	89	6	0	0	36	2.0
Tatman Run	9	83	2	6	0	54	2.0
Shy Beaver	8	85	0	6	2	53	2.1
SUBTOTAL	9	82	3	6	1	367	2.1
TOTAL	16	77	2	4	1	968	2.0

of other boats was considered significantly more of a problem, however, by fishermen than waterskiers or those who were cruising (F-value = 4.9, p<.01) (Table 40). When responding to the statement, "The noise of other boats reduced my enjoyment on the lake today", 10 percent of fishermen agreed or strongly agreed (mean=2.2 out of 5). Only 4 percent and 3 percent of waterskiers and cruisers, respectively, agreed with this statement (means equal 1.9 and 2.0, respectively).

TABLE 39
SUMMARY OF RESPONSES TO INDICATORS OF VISITOR CONFLICTS AND PERCEPTIONS OF SAFETY
(Values in Percent)

"The noise of other boats reduced my enjoyment on the lake today."	10	82	3	5	0	1140	2.0
"The behavior of other boaters interfered with the qaulity of my boating experience."	4	67	6	18	4	1140	2.5
"There was an unsafe number of boats on the water today."	5	67	11	14	3	1144	2.4
"Other boats came closer to my boat than I like."	2	60	4	27	7	1141	2.3
"Boating conditions on the lake were safe today."	1	11	10	75	3	1135	3.7

Behavior. More boaters expressed problems with the behavior than with the noise of other boaters (Table 39). Nearly one-fourth of the respondents indicated that the behavior of other boaters interfered with the quality of their boating experience. The most frequent types of behavior causing these reactions were boaters coming too close or going too fast, and boaters disobeying rules such as not observing speed limits in no-wake zones. Rude and careless behavior was also mentioned frequently as

an interference with boating quality. The responses to this question did not vary across user groups, sampling sites or primary activities.

Safety. Some boaters did feel that "There was an unsafe number of boats on the water today" (Table 39). Overall, 17 percent agreed or strongly agreed with this statement (mean=2.4 of a possible 5). There was no significant difference in the perceptions of the ramp users, campers, and marina users.

Of the individual sites, however, the Susquehannock boaters felt the most unsafe (Table 41). Twenty-four percent agreed or strongly agreed that there was an unsafe number of boats on the water (mean=2.8 of a possible 5). Nancy's Boat To Shore users reported feeling the safest on the water, with only 11 percent agreeing or strongly agreeing (mean=2.3).

TABLE 40
RESPONSES TO "THE NOISE OF OTHER BOATS REDUCED MY ENJOYMENT ON THE LAKE TODAY" BY PRIMARY ACTIVITY
(Values in Percent)

	RESPONSES					n	AVG
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree		
FISHING	6	80	5	9	1	198	2.2
SWIMMING	9	81	3	6	0	235	2.1
WATERSKIING	14	82	0	4	0	256	1.9
CRUISING	8	84	4	3	0	413	2.0
OTHER	14	69	11	6	0	35	2.1
TOTAL	10	82	3	5	0	1137	2.0

TABLE 41
RESPONSES TO "THERE WAS AN UNSAFE NUMBER OF BOATS ON THE WATER TODAY"
BY SAMPLING SITE AND USER GROUP
(Values in Percent)

	RESPONSES					n	AVG
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree		
CAMPGROUNDS							
Seven Points	6	70	10	10	4	135	2.3
Resort	7	66	8	15	4	132	2.4
Susquehannock	0	55	21	16	8	38	2.8
Nancy's	2	77	10	11	0	62	2.3
SUBTOTAL	5	68	10	13	4	367	2.4
MARINAS							
Seven Points	8	67	8	13	4	219	2.4
Resort	4	69	13	11	3	119	2.4
SUBTOTAL	7	68	10	12	3	338	2.4
BOAT RAMPS							
Snyders Run	3	69	14	13	1	71	2.4
Seven Points	5	73	11	11	1	85	2.3
Aitch	2	67	9	19	4	57	2.6
James Creek	5	78	3	14	0	63	2.3
Weaver Falls	0	51	27	22	0	37	2.7
Tatman Run	6	58	20	16	0	64	2.5
Shy Beaver	5	57	13	21	5	62	2.6
SUBTOTAL	4	66	13	16	2	439	2.5
TOTAL	5	67	11	14	3	1144	2.4

TABLE 42
RESPONSES TO "THERE WAS AN UNSAFE NUMBER OF BOATS ON THE WATER TODAY" BY PRIMARY ACTIVITY

(Values in Percent)

	RESPONSES					n	AVG
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree		
FISHING	4	67	9	16	4	199	2.5
SWIMMING	4	61	14	19	3	236	2.6
WATERSKIING	6	67	12	13	2	257	2.4
CRUISING	5	72	11	10	2	414	2.3
OTHER	8	64	6	19	3	36	2.4
TOTAL	5	67	11	14	3	1142	2.4

Swimmers were the activity group most likely to feel that there was an unsafe number of boats on the lake (Table 42). They were significantly more concerned than those who were cruising (F-value = 3.0, p =.02). Twenty-two percent of swimmers agreed or strongly agreed (mean=2.6 out of 5) while only 12 percent of cruisers were equally concerned (mean=2.3).

These results are supported by responses to the statement, "Boating conditions on the lake today were safe". More than three-fourths of the boaters agreed with this statement (Table 39). There was no significant difference among user groups or sampling sites, but a significant difference did emerge for users engaged in different activities (Table 43). Cruisers felt significantly safer than those engaged in fishing, swimming, and "other" activities excluding waterskiing (F-value = 2.5, p = .04). Eighty-two percent of the cruisers agreed or strongly agreed that the conditions were safe (mean=3.8). Only 76 percent of fishermen, 72 percent

of swimmers, and 77 percent of "others" felt conditions were safe (means equal 3.6).

Finally, one question directly asked respondents whether other boats came too close to their boat. More than a third of the sample felt that other boats had come closer than they would like (Table 39). This finding, coupled with the earlier observation that boats coming too close was one of the most frequent types of objectionable behavior, suggests that this may be the greatest safety concern among Raystown boaters. This concern was expressed equally, however, on all sampling days and among all respondents, with no significant differnces among user groups, location, or primary activity.

TABLE 43
RESPONSES TO "BOATING CONDITIONS ON THE LAKE TODAY WERE SAFE" BY PRIMARY ACTIVITY
(Values in Percent)

	RESPONSES					n	AVG
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree		
FISHING	4	11	10	73	3	197	3.6
SWIMMING	1	14	13	69	3	235	3.6
WATERSKIING	1	11	10	75	4	252	3.7
CRUISING	1	8	9	79	3	414	3.8
OTHER	3	14	6	74	3	35	3.6
TOTAL	1	11	10	75	3	1133	3.7

RELATIONSHIPS BETWEEN BOATING QUALITY AND KEY IMPACT VARIABLES

The following section describes a further examination of the relationships between key study variables. The main objective of this analysis is to identify the factors that have the greatest influence on boater perceptions of a quality boating experience.

As shown in the results already presented, this study included a variety of measures of quality in the boating experience. Some of these measures dealt with overall satisfaction while others dealt with particular aspects of the recreational experience. To understand overall boating quality, it is useful to know how these variables interact with each other. It is also important to develop the best possible measure of boating quality.

A first step in this analysis involved creating an index of overall boating satisfaction. This index was computed using the various satisfaction indicators examined earlier (Table 44). The index score is the mean of the responses to the six individual statements. Previous studies suggest that combining these six items provides a measure that is more reliable and sensitive than any single indicator of satisfaction. In this study, a reliability coefficient (Cronbach alpha) of .80 was computed for the satisfaction index. This high reliability resulted from the relatively strong correlations between the items comprising the index. The final column in Table 44 shows that the reliability of the index is at its highest when all six items are included.

In this study evaluating the current conditions at Raystown Lake, it is important to document the relationship between the number of boats on the lake and key measures of experiential quality. Consequently, boaters' responses to the various satisfaction measures and impact indicators were

Statistical Info should be converted to something for more meaningful

TABLE 44
RELIABILITY STATISTICS FOR OVERALL SATISFACTION INDEX

Satisfaction Statement	Item Mean	Standard Deviation	Corrected Item-Total Correlation	Alpha if Item Deleted
I thoroughly enjoyed my boat trip today	3.9	.78	.65	.73
My boating experience was not as enjoyable as I expected it to be*	3.8	.88	.61	.74
I cannot imagine a better boating trip	2.6	.97	.41	.80
I do not want to go on any more boat trips like this one*	4.1	.70	.57	.76
My boat trip was well worth the money I spent to take it	4.0	.62	.56	.76
I was disappointed with some aspects of my boat trip*	3.4	1.00	.54	.76

*Scoring for these items was reversed in computation of statistics because agreement with these items indicated lower satisfaction

broken down by sampling date (Table 45). This breakdown provided a comparison of how boaters encountering different boat density levels felt about their experiences. For most of the experiential variables, there were significant differences in responses across sampling days. Only four impact indicators (total displacement, noise, behavior, and boats coming too close) showed no significant differences on days with varying use levels.

Although scores for the two satisfaction measures did show statistically significant differences, there was no clear pattern in relation to boat density levels. The mean response to the ten-point satisfaction rating reached its highest *and* lowest levels on days with relatively low use. The average score on the satisfaction index varied by only two-tenths of a point on the five-point response scale.

Measures of perceived crowding varied more than any other impact indicators across sampling days. The data reflect a consistent pattern in which crowding was felt to be greater on the three heavier use days during July. This same pattern generally held true for the other impact indicators with significant F values, although the differences were not as pronounced. For example, visitors on peak use days reported only slightly higher scores for time, place and activity displacement.

The data provided in Table 45 demonstrate that the number of boats on the lake does influence several aspects of boating quality, but to a rather limited extent. To further explore the dynamics of boating quality, Table 46 presents a matrix of correlation coefficients measuring the strength of the relationships between the full set of key study variables. The final two columns at the right of the table show the correlations between all of the experience impact indicators and the two measures of overall

Formulas for Stat Values

TABLE 45
MEAN VALUES OF KEY IMPACT INDICATORS BY SAMPLING DAY

	5/23	6/28	7/5	7/12	7/19	8/1	8/8	8/30	F Value
Number of Boats	935	893	1101	---	1036	892	793	872	
Satisfaction									
Ten-Point Scale	7.5	7.1	7.6	7.6	7.2	7.8	7.8	7.9	2.2*
Index	3.7	3.6	3.6	3.5	3.5	3.6	3.7	3.7	2.2*
Crowding									
At Start of Day	3.2	3.5	4.3	4.3	4.6	3.6	3.6	3.4	7.5*
On the Lake	4.8	5.4	6.4	6.2	6.5	5.5	5.6	5.0	14.0*
At Stops	4.1	4.5	5.4	5.3	5.4	3.7	4.6	3.7	7.3*
At End of Day	3.9	3.7	4.5	4.3	4.5	4.2	4.2	4.1	2.1*
Waiting Time	1.9	1.9	2.1	2.1	2.1	2.0	2.0	2.0	2.7*
Influence of Others	5.4	5.5	5.7	5.7	6.0	5.7	5.6	5.6	2.2*
Time Displacement	2.3	2.6	2.8	2.7	2.7	2.7	2.5	2.4	2.6*
Place Displacement	2.4	2.5	2.6	2.7	2.7	2.6	2.4	2.4	2.6*
Activity Displacement	2.2	2.5	2.8	2.6	2.6	2.4	2.4	2.3	4.7*
Total Displacement	---	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.6
Noise	2.0	2.0	2.0	2.1	2.0	2.2	2.1	2.1	1.6
Behavior	2.4	2.4	2.6	2.6	2.6	2.5	2.5	2.4	1.4
Boats Too Close	2.6	2.7	2.8	2.7	2.9	2.6	2.9	2.9	1.9
Safe Conditions	3.7	3.7	3.6	3.6	3.6	3.7	3.8	3.8	2.3*
Unsafe Conditions	2.3	2.3	2.6	2.6	2.5	2.4	2.4	2.3	2.8*

*Differences are significant at the .05 level

TABLE 46
CORRELATION COEFFICIENTS BETWEEN KEY BOATING IMPACT VARIABLES
(DECIMAL POINTS ARE OMITTED)

	Noise	Behavior	Time Displace-ment	Place Displace-ment	Activity Displace-ment	Safe Conditions	Unsafe Conditions	Boats Too Close	Waiting Time	Number Of Boats	Crowding On Lake	Influence Of Others	Satis-faction Index	Satis-faction 10-point Rating
Noise		22	17	12	12	-18	17	16	12	NS	08	15	-23	-06
Behavior	22		29	30	35	-40	41	59	05	NS	29	33	-39	-24
Time Dis-Placement	17	29		50	46	-32	33	23	11	07	35	37	-41	-33
Place Dis-Placeant	12	30	50		37	-31	36	25	06	09	40	38	-39	-32
Activity Displace-Ment	12	35	46	37		-32	35	29	06	11	36	37	-40	-33
Safe Conditions	-18	-40	-32	-31	-32		-49	-38	-06	-11	-37	-38	48	34
Unsafe Conditions	17	41	33	36	35	-49		37	09	09	38	33	-41	-25
Boats Too Close	16	59	23	25	29	-38	37		07	NS	28	30	-37	-23
Waiting Time	12	05	11	06	06	-06	09	07		05	10	NS	-11	NS
Number Of Boats	NS	NS	07	09	11	-11	09	NS	05		20	06	-05	NS
Crowding On Lake	08	29	35	40	36	-37	38	28	10	20		46	-38	-30
Influence Of Others	15	33	37	38	37	-38	33	30	NS	06	46		-42	-37
Satis-faction Index	-23	-39	-41	-39	-40	48	-41	-37	-11	-05	-38	-42		56
Satis-faction 10-Point Rating	-06	-24	-33	-32	-33	34	-25	-23	NS	NS	-30	-37	56	

satisfaction. The correlation between the two satisfaction measures (.56) was relatively strong. Both satisfaction measures tended to be associated to some degree with nearly all of the impact variables, although the correlations were always stronger for the satisfaction index.

The variable most strongly related to the satisfaction index was the perception that conditions on the lake were safe (r=.48). Many of the impact indicators, however, had correlations with the satisfaction index that were near .4. The exceptions, or those variables most *weakly* associated with satisfaction, included noise from other boats, waiting time to get on the lake, and the actual number of boats on the lake.

Crowding-related variables played a somewhat more important role in influencing the ten-point satisfaction rating. How the number of boaters at the lake affected one's enjoyment of the experience was more strongly associated with the ten-point satisfaction rating (r=-.37) than any other impact indicator, even though the number of boats and waiting time were not significantly correlated with the ten-point rating.

Other values shown in Table 46 demonstrate a wide range of relationships between impact indicators. For example, noise was weakly associated with most other impacts, echoing the earlier finding that very few boaters were bothered by noise. The behavior of other boaters showed a stronger pattern of relationships, including the highest correlation of any in the matrix (r=.59) between behavior and agreement with the statement that other boats had come too close. The various types of displacement were moderately correlated with each other, suggesting that individuals who stayed off the lake at certain times also tended to avoid particular places or forego activities on the lake. As one would expect from the previous table, the number of boats showed a pattern of weak or insignificant

relationships with other impact indicators. The number of boats did contribute, however, to the level of perceived crowding on the lake, although not as strongly as other indicators of displacement or safety. Perceived crowding on the lake in turn was relatively strongly associated (r=.46) with the reported influence of the number of others on the boater's experience.

As a final step in exploring the interrelationships between study variables, a series of multiple regressions were conducted. The goals of these analyses were twofold: 1) to further clarify the individual and combined effects of various types of impacts on boaters' overall satisfaction, and 2) to identify the extent to which boater satisfaction can be explained in terms of the various impacts to the experience. Results are summarized in Table 47 and demonstrated graphically in Figure 2.

Separate regressions were done for three dependent variables: the satisfaction index, the influence of others on the experience, and perceived crowding on the lake. The most important predictors of the satisfaction index were staying off the lake part of the day (time displacement) and the perception that boating conditions were safe. Other variables contributing to overall satisfaction included the noise and behavior of other boaters and the influence of the number of boaters on the boating experience. Collectively, these variables accounted for 43 percent of the variance in boating satisfaction.

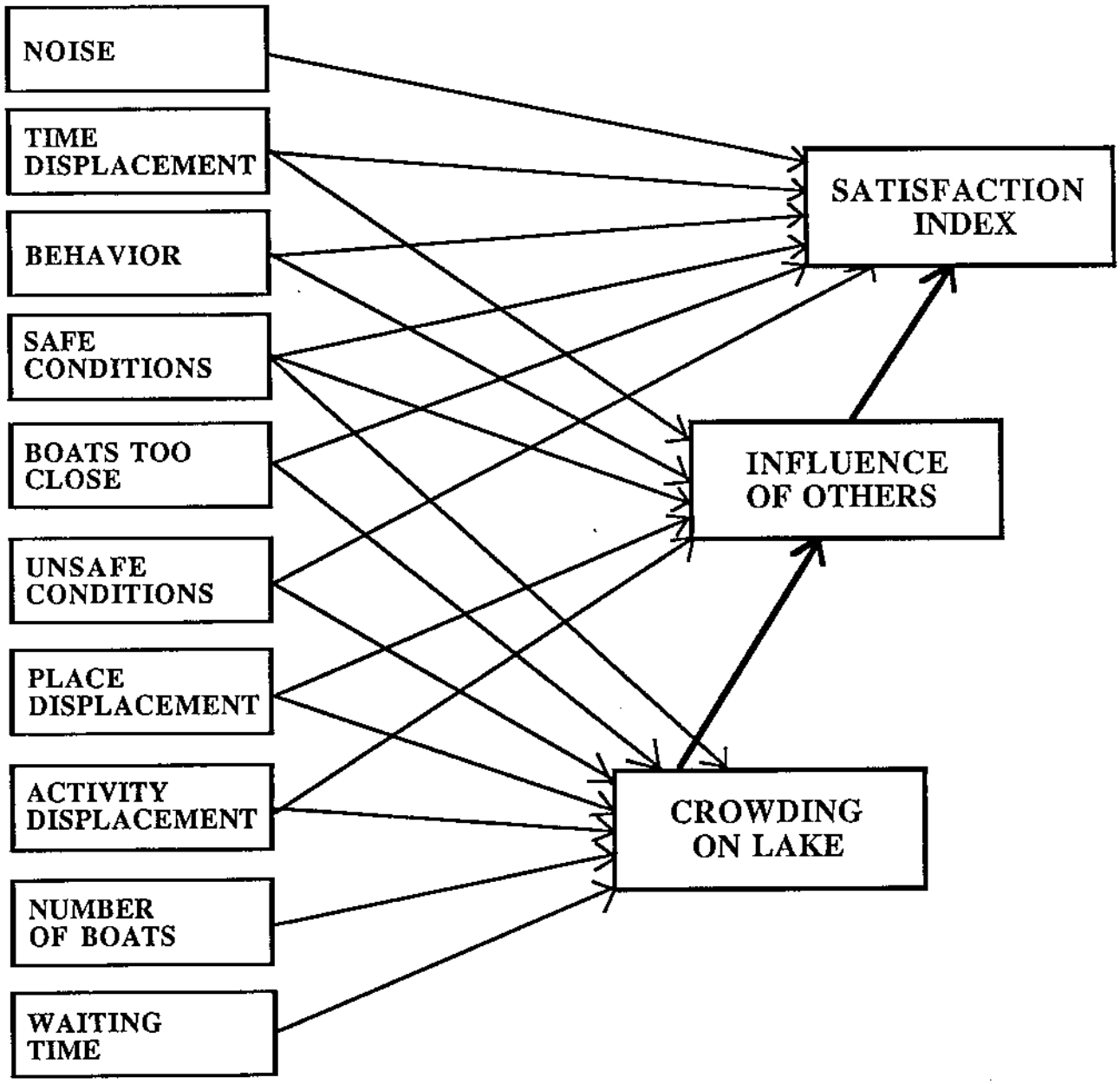
Some of these same types of impacts were also significant predictors of the influence of others on the boating experience. The strongest predictor in this case, however, was perceived crowding on the lake. In

Table 47
SUMMARY OF MULTIPLE REGRESSIONS OF BOATING IMPACT VARIABLES ON OVERALL BOATING SATISFACTION
(Values shown are Beta Coefficients)

INDEPENDENT VARIABLE	DEPENDENT VARIABLE: PERCEIVED CROWDING ON LAKE	INFLUENCE OF OTHERS ON EXPERIENCE	SATISFACTION INDEX
Enjoyment reduced by noise			-.14
Stayed off lake part of day because of too many boats		.12	-.23
Behavior of other boaters interfered with quality of boating experience		.12	-.09
Boating conditions on lake perceived to be safe	-.14	-.11	.21
Other boats came too close	.08		-.11
Perception of unsafe number of boats on the water today	.14		-.10
Avoided favorite parts of lake because of too many boats	.20	.14	
Did not do some activities because of crowded conditions	.15	.11	
Total number of boats on lake (from aerial photos)	.14		
Had to wait too long to get on the water today	.06		
Influence of number of boaters on overall boating experience			-.13
Perceived crowding on the lake		.19	
PERCENT OF VARIANCE EXPLAINED (R SQUARED)	.30	.30	.43

Figure 2

MODEL OF BOATING SATISFACTION ON RAYSTOWN LAKE



addition, place and activity displacement joined time displacement in affecting the influence of others.

Perceived crowding on the lake was similarly influenced by place and activity displacement along with perceptions of safety and other boats coming too close. Two additional variables that had not directly contributed to the other regression models did play a significant role in predicting perceived crowding on the lake. These variables were the number of boats on the lake and having to wait to get on the water.

These analyses taken together demonstrate that various experiential impacts may influence overall satisfaction either directly or indirectly. The arrows in Figure 2 represent the significant direct effects found through the multiple regression analyses. Some types of impacts influenced satisfaction both directly and indirectly through their effects on perceived crowding and/or the influence of others. The perception of safe conditions, for instance, influenced all three of these variables. Other impacts had more specific effects, such as noise, which had only a direct and weak effect on satisfaction, or the number of boats and waiting time, which influenced only the perception of crowding on the lake.

Perhaps the most important feature of Figure 2 is that it places the number of boats on the lake in perspective with other aspects of boating quality. The number of boats is *one* factor contributing to an interrelated series of impacts to the boating experience. It is not the sole, nor even the strongest, determinant of a quality boating experience.

IMPLICATIONS FOR MANAGEMENT

Results of this study may be used in a number of ways to assist in the management of Raystown Lake. The results, in and of themselves, do not require any particular management action or response. They do, however, provide information that can be helpful in addressing various management issues.

It is useful to consider study results in the context of a management framework or process. Figure 3 presents one framework that has been developed for managing impacts associated with increasing recreational use. This framework was derived from an extensive review of related studies and represents a state-of-the-art approach to management.

The process shown in Figure 3 describes a means of dealing with three basic issues inherent to resource management: 1) evaluation of the acceptability of existing conditions, 2) the determination of potential causal factors influencing current conditions, and 3) the selection of potential management strategies for reducing or eliminating unacceptable impacts. The first five steps in the process provide a systematic way of evaluating the conditions found in a given area. These steps might be considered a problem identification phase in which existing conditions are judged to be either acceptable or unacceptable.

The indicators of boating quality measured in this study could be used to evaluate the peak use conditions found at Raystown Lake during 1987. Some key indicators could be selected (Step 3) from all those measured and compared against standards that expressed acceptable values for these indicators (Step 5). The selection of such standards, of course, is a management decision rather than a research finding, but this decision can be based on or influenced by the measures of existing conditions. For

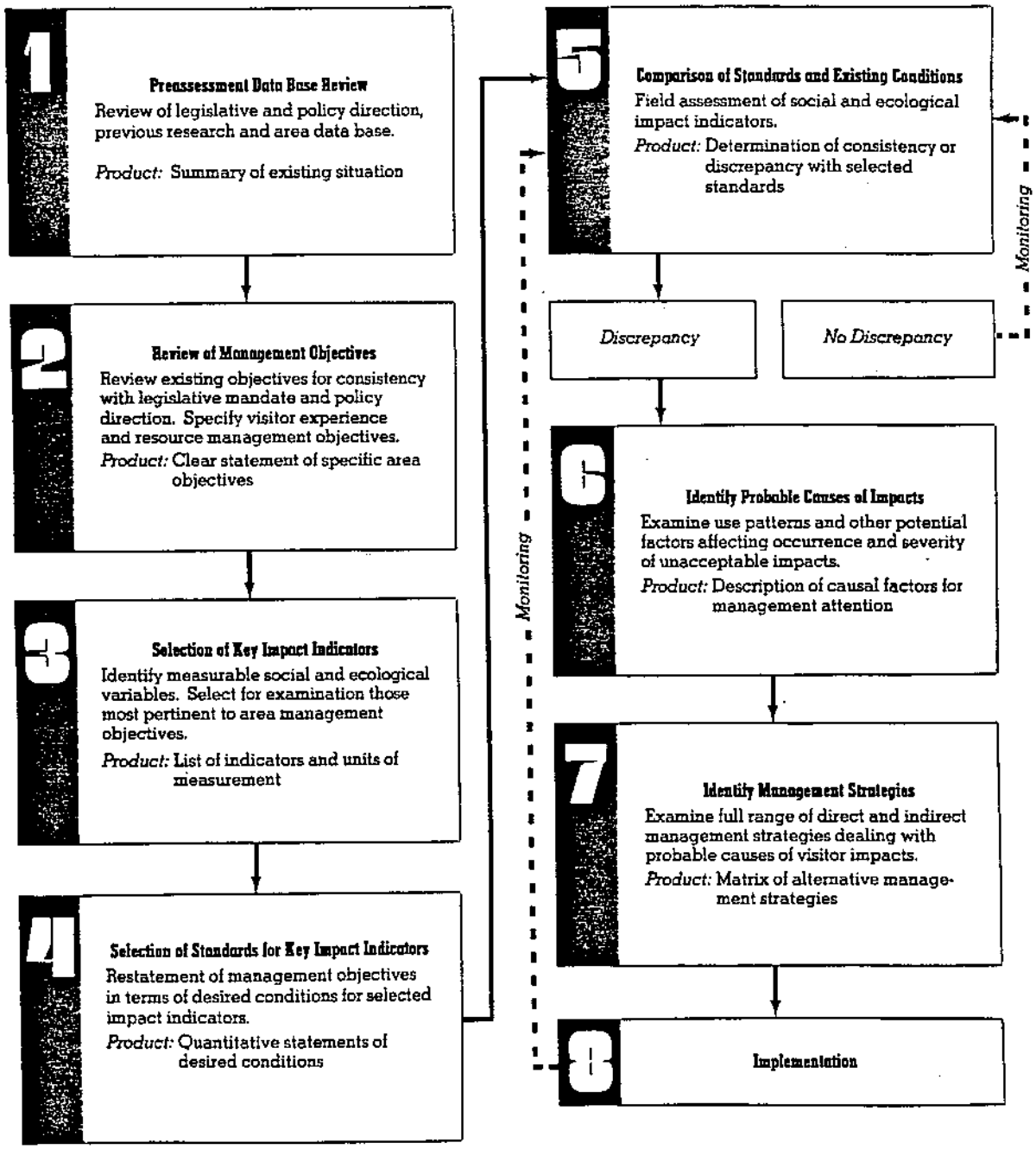
Figure 3

MANAGEMENT/PLANNING PROCESS

BASIC APPROACH—Systematic process for identification of impact problems, their causes, and effective management strategies for reduction of visitor impacts.

CONDITIONS FOR USE—Integrated with other planning frameworks or as management tool for localized impact problems.

STEPS IN PROCESS



instance, if the management objective for an area is to maintain conditions at or near their current levels, then measures of current conditions can suggest baseline standards against which future measures can be compared. In this hypothetical example, the comparison called for in step 5 would not be necessary because current conditions have been defined as acceptable. It is also possible to select standards based on other criteria, such as enabling legislation, policy documents, or common sense. If this is done, then current measures can be compared against the corresponding standards to determine whether or not the existing conditions represent a problem situation.

Since there are no predetermined standards for the boating experience at Raystown, a further hypothetical example may help to illustrate how study results could be applied. This example follows the scenario mentioned above, in which the goal of management is assumed to be maintaining current levels of quality, or preventing conditions from becoming any less desirable than they are at the present time. For this illustration, the following four boating impact indicators were selected for consideration: the ten-point satisfaction rating, the degree of perceived crowding on the lake, the percentage of boaters reporting some type of displacement in their boating activity, and the percentage of boaters who felt that boating conditions were unsafe due to the number of boats on the lake. These indicators were selected because of their relative importance in the previous analysis of factors affecting the quality of the boating experience. Table 48 summarizes the current measures for each of these indicators and suggests a set of standards that are based on the current peak use levels. According to these illustrative standards, an average satisfaction rating of less than 7 for any given day would be considered unacceptable deterioration in the

TABLE 48
SUMMARY OF CURRENT MEASURES AND ILLUSTRATIVE STANDARDS FOR KEY BOATING IMPACT INDICATORS

Indicator	Range of Responses For: 5 light days	3 peak days	Suggested Standard
Satisfaction Rating (Ten-Point Scale)	7.1-7.9	7.2-7.6	7
Perceived Crowding On the Lake	4.8-5.6	6.2-6.5	7
Percent of Boaters Displaced	17-25	31-34	33
Percent of Boaters Perceiving Unsafe Conditions	11-15	21-24	25

quality of the experience. Similarly, a mean score of 7 or greater for perceived crowding on the lake would be unacceptable as this would be a higher level of crowding than was found on peak days in 1987. Suggested standards for the other two indicators in Table 48 reflect the fact that about one-third of the boaters on peak days reported some displacement in their activity and nearly one-fourth tended to perceive conditions as unsafe.

It is important to note that the illustrative "suggested standards" given in Table 48 are based on the assumption that current peak use conditions are acceptable. Lake managers may not agree with this assumption. They may feel, for example, that having one-third of the boaters on any given day reporting some displacement in their activity is unacceptable. In this case, a more demanding set of standards could be selected. If the typical conditions found on the 5 lighter use days in this study were used as a guide, the resulting standards would change for all of the indicators except satisfaction. Then the standards might be set at 6 for perceived crowding on the lake and 25 percent and 15 percent, respectively, for the proportions of boaters reporting displacement and unsafe conditions.

Of course it is also possible to select standards based on criteria other than the perceptions of current visitors. Regardless of the basis on which standards are chosen, it is a good idea to select standards that can reasonably be achieved. Setting a standard for average satisfaction at 10 would not be useful because this standard could never be achieved and the comparison with the existing conditions will always indicate a problem situation.

The remaining steps in the management process (Figure 3) will vary depending on the outcome of the problem identification phase. If current conditions are found to be acceptable, it may be sufficient to simply monitor the key indicators for changes. Conditions judged to be unacceptable, on the other hand, call for management strategies aimed at the factors that are causing the unacceptable conditions.

Managers at Raystown Lake may want to address some types of visitor impacts even if they generally consider current conditions to be acceptable. It would be logical to focus on those indicators that had the greatest influence on satisfaction. For example, a considerable number of boaters reported that other boats had come too close to them, along with other types of objectionable behaviors by other boaters. Such incidents might be reduced through educational and interpretive activities and through increased enforcement of rules and regulations.

Different indicators of boating quality varied in the degree to which they were related to boat densities. Knowledge of these relationships is helpful when considering the potential impacts that might be created by an increase in the supply of access to the lake. Study findings suggest that the likely effects of an expansion of facilities would depend on the type of expansion considered. The impacts of a new boat ramp or additional parking at existing ramps would probably be most noticeable at peak times. Like all other access points on the lake, these areas would tend to fill up only on peak days and would increase the total number of boats on these days by the number of parking spaces provided for trailers. Additional marina capacity would also lead to a greater number of boats on the water at peak times, but not to as great an extent because only one-fourth to one-third of the boats stored in the marina could be expected to be out on the water at any given

time. Thus, while an additional 100 parking places at boat ramps could result in 100 additional boats on the water, 100 new marina slips would probably increase the number of boats on the lake by only 25 or 30 boats at any one time. In light of the range of densities represented in this study (roughly 800 to 1,100 boats), it is unlikely that facility expansion of this magnitude would cause major changes in the boating experience. Potential effects of a larger scale development proposal (such as another complex similar to Seven Points or the Lake Raystown Resort) are more difficult to predict because the additional boats resulting from such a facility would be well beyond the range of boats currently using the lake.

APPENDIX

OMB No. 0702-0016
Expires Oct. 31, 1989

RAYSTOWN LAKE BOATING STUDY 1987

NUMBER_____ __ __ __ __
LOCATION_____ __ __ __ __
DATE_____ __ __ __ __
START TIME_____ __ __ __ __
NUMBER OF PASSES___ __ __ __

INTRODUCE YOURSELF, SAY

I am with Penn State University. We are doing a study of boating at Raystown Lake for the Corps of Engineers. Will you answer a few questions about your experience here today.

IF RESPONDENT AGREES, CONTINUE, SAY

IF RESPONDENT REFUSES, SAY

My questions will only take 10-15 minutes. You were selected as part of a representative sample, so your answers are very important. Your answers are confidential and will only be reported as statistics.

Thank you. Now I must choose the person in your party who will actually answer the questions. I need to do that at random. Who in this party (18 years or older) actually operated the boat today?

IF RESPONDENT REFUSES AGAIN, COMPLETE BOX BELOW AND SAY

Thank you. Please enjoy your visit.

Boat Length (approximate) _____ feet

Boat type:

1. Cabin Cruiser	5. Row Boat
2. Runabout	6. Canoe
3. Houseboat	7. Pontoon Boat
4. Sailboat	8. Bass Boat
	9. Other_____

Power:

1. Outboard	4. Sail only
2. Inboard	5. Paddle/oar only
3. Inboard/Outboard	6. Other_____

Number in Party: ____ males ____ females

SELECT RESPONDENT FROM PARTY USING RANDOM NUMBERS TABLE

BEFORE QUESTIONS, SAY
So that the answers will be reliable, I need to read the questions exactly as they are written.

SELECT NEXT RESPONDENT

1. What time did you start boating today?
_____(time launching boat or earliest time on the water)

2. Have you finished boating for the day?
0 No 1 Yes

IF NO When do you plan to go out on the water again?_____

When do you plan to stop boating for the day?_____

OMB No. 0702-0016
Expires Oct. 31, 1989

RAYSTOWN LAKE BOATING STUDY 1987

NUMBER_____ __ __ __ __
LOCATION_____ __ __ __ __
DATE_____ __ __ __ __
START TIME_____ __ __ __ __
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1. Outboard	4. Sail only
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3. Inboard/Outboard	6. Other_____

Number in Party: _____ males _____ females

SELECT RESPONDENT FROM PARTY USING RANDOM NUMBERS TABLE

BEFORE QUESTIONS, SAY
So that the answers will be reliable, I need to read the questions exactly as they are written.

SELECT NEXT RESPONDENT

1. What time did you start boating today?
_____(time launching boat or earliest time on the water)

2. Have you finished boating for the day?
0 No 1 Yes

IF NO When do you plan to go out on the water again?_____

When do you plan to stop boating for the day?_____

IF AT RAMP, OBSERVE - OTHERWISE ASK:

3. What kind of boat do you have at the lake today?

1. Cabin Cruiser	5. Row Boat
2. Runabout	6. Canoe
3. House Boat	7. Pontoon Boat
4. Sailboat	8. Bass Boat
	9. Other_____

4. What kind of power, if any, does your boat use?

1. Outboard	4. Sail only
2. Inboard	5. Paddle/oar only
3. Inboard/Outboard	6. Other_____

IF NOT POWERED CONTINUE

IF POWERED, ASK

5. What is the total horsepower of your engine?

_____ horsepower

6. How many feet long is your boat? _____ feet

7. What state is your boat registered in? _____ (state)

IF INTERVIEWING IN CAMPGROUND, GO TO QUESTION 11

8. Is your boating trip today part of an overnight visit to Raystown Lake?
0 No 1 Yes

IF NO, GO TO QUESTION 12

9. Are you camping at or near Raystown?
0 No 1 Yes

IF NO, GO TO QUESTION 11

10. Where are you camping?
1. Seven Points
2. Susquehannock
3. Lake Raystown Resort
4. Nancy's Boat-to-Shore
5. Paradise Point
6. Private Campground(_____)
7. Private Cabin/Property

11. How many nights will you spend at Raystown Lake during this trip?

_____ nights

HAND RESPONDENT INFORMATION CARD

12. Here is a list of boating activities you might have participated in today. Please tell me which of these activites your boating group did. Tell me which activities you did in the order of how long you did each one, starting with the activity your group did the longest.
RECORD ACTIVITIES IN RANK ORDER: 1 FOR LONGEST, 2 FOR SECOND LONGEST, ETC.

_____ Still fishing
_____ Trolling
_____ Swimming from Boat
_____ Waterskiing
_____ Pleasure Cruising
_____ Sailing
_____ Other (what _____)
_____ Other (what _____)

IF RESPONDENT NOT FISHING GO TO QUESTION 16

IF FISHING, ASK

13. What were you fishing for today?
WRITE EXACT RESPONSE _____
_____

14. On a scale of 1 to 10 (with 10 being the perfect fishing trip), how would you rate your fishing today?
_____

15. Were you satisfied with what you caught?
0 No 1 Yes

RECORD ANY ADDITIONAL COMMENTS ABOUT FISHING
_____
_____

16. We would like to know something about where you went on the lake today.

Where did you begin boating today? **RECORD RAMP OR OTHER ACCESS POINT SHOW MAP IF NECESSARY**
_____

What is the farthest mile marker you reached in both directions?
_____ Northern Mile Marker _____ Southern Mile Marker

17. On a scale of 1 to 10 (with 10 being the perfect trip), how would you rate the quality of your boating experience today?
_____

18. What were the most enjoyable aspects of your boat trip today?
RECORD EXACTLY _____
_____

19. What were the least enjoyable aspects of your boat trip today?
RECORD EXACTLY _____
_____

20. How many days did you boat at this lake last year? _____ days

21. Including your boating at Raystown Lake, how many days did you boat in total last year? _____ days

22. How many years have you been a boater? _____ years

23. How would you rate yourself as a boater?
1 Novice 2 Intermediate 3 Advanced 4 Expert

24. Using the crowding scale on the card, how would you describe the boating conditions at each of the following areas today?

1	2	3	4	5	6	7	8	9
Not at all Crowded		Slightly Crowded			Moderately Crowded			Extremely Crowded

_____ At the access area at the start of your trip
_____ Out on the lake while boating
_____ At places where you stopped today while boating (**IF ANY**) **RECORD PLACES STOPPED IF APPLICABLE** _____
_____
_____ At the access area when you stopped boating

25. Using the enjoyment scale on the card, how did the number of boaters at the lake today affect your overall boating experience?

1	2	3	4	5	6	7	8	9
Increased my enjoyment				No effect				Reduced my enjoyment

26. I am going to read some statements about boating at this lake. Based on your experience here today, please rate your level of agreement or disagreement with each statement I read, using the final scale on the card.

I avoided my favorite parts of the lake today because there were too many boats there	SD	D	U	A	SA
I thoroughly enjoyed my boat trip today	SD	D	U	A	SA
I stayed off the lake during parts of the day today because there were too many boats on the lake	SD	D	U	A	SA
Children under 9 years old and nonswimmers should be required to wear personal flotation devices (PFDs) while boating	SD	D	U	A	SA
My boating trip was not as enjoyable as I expected it to be	SD	D	U	A	SA
There was an unsafe number of boats on the water today	SD	D	U	A	SA

I cannot imagine a better boating trip	SD	D	U	A	SA
Other boats came closer to my boat than I like	SD	D	U	A	SA
People should be required to take a boating safety course before being allowed to operate a boat	SD	D	U	A	SA
I do not want to go on any more boat trips like this one	SD	D	U	A	SA
The noise of other boats reduced my enjoyment on the lake today	SD	D	U	A	SA
My boat trip today was well worth the money I spent to take it	SD	D	U	A	SA
If I had known what it was going to be like here today, I would not have come on this visit	SD	D	U	A	SA
All boat operators should be tested and licensed like motor vehicle operators are	SD	D	U	A	SA
I was disappointed with some aspects of my boat trip	SD	D	U	A	SA
The behavior of other boaters interfered with the quality of my boating experience	SD	D	U	A	SA

IF AGREE WITH THIS STATEMENT
Can you describe how:

_____
_____

I did not like the amount of time I had to wait to get on the water today	SD	D	U	A	SA

IF AGREE How much time did you have to wait?

_____

How long are you willing to wait?

_____

Boating conditions on the lake today were safe	SD	D	U	A	SA
All boaters should be required to wear a personal flotation device (PFD) while boating	SD	D	U	A	SA
I did <u>not</u> participate in some boating activities today because of crowded conditions at the lake	SD	D	U	A	SA

IF AGREE Which activities?

_____

ASK ONLY IN CAMPGROUNDS

27. Which boat ramp did you use to launch your boat?
_____

28. Why did you use this particular boat ramp today?
_____
_____

ASK AT BOAT RAMPS AND CAMPGROUNDS

29. Where do you store your boat during the boating season?
1. At Home 2. Offsite near Raystown
3. Other _____

30. Where is your principal home residence?
_____ (state) _____ (town) _____ (county) _____ (zip)

31. About how many miles is it from your residence to Raystown Lake?
_____ miles **CHECK TO SEE THAT MILEAGE IS ONE-WAY**

32. How many people were in your boating group today? Include all the people who used the boat today?
_____ people

33. Which of the following best describes the people in your group?
1. Family
2. Friends
3. Family and Friends
4. Business Associates
5. Other_____

My final questions are of an unusual type. It is important that you try to imagine the situation I describe and believe that it is true so that you can answer the questions accurately. Take all the time you need to decide on your answers.

Try to put yourself in this situation . . . .

34. Suppose there were another lake <u>just like Raystown Lake</u> except that it would have only about 2/3 the number of boats and people using it. It would be as if we could take away one out of every three boats from Raystown Lake today. Try to imagine what that would be like. **PAUSE**

PROCEED SLOWLY - - GIVE RESPONDENT TIME TO CONSIDER

How many miles farther would you drive to use a lake only 2/3 as crowded as Raystown?

_____ First Bid
_____ Final Bid

INCREASE BID BY FIVE MILE INCREMENTS:
"Would you drive ____ miles?"

35. Suppose the number of boats and people allowed to use Raystown Lake were set at exactly the number here today. As soon as that many were at the lake, absolutely no one else would be allowed on the lake until someone else left.

Now, imagine that your group got to the lake just before the limit was reached and you are just about to launch (**SAY** go out **IF IN MARINA**). Suppose that you were told there was a group who wanted to boat and were willing to pay someone to leave so they could use the lake for the day.

a. What do you think your group would do for the day instead of boating here if you were paid enough money so you would leave? **RECORD EXACT RESPONSE** _____

_____

b. Please think about this carefully. If your group elected you to make the decision for the group, how much is the absolutely smallest amount you would have to be paid so that you would leave for the day and let them take your place?

_____ First Bid
_____ Final Bid

DECREASE BID BY FIVE DOLLAR INCREMENTS
"Would you take _____ dollars?"

That was the last question. Thank you very much for talking with me.

ADDITIONAL COMMENTS:

_____

_____

_____

_____

_____