NIAGARA POWER PROJECT

RELICENSING

A RECREATIONAL FISHING SURVEY OF LEWISTON RESERVOIR IN 2002

Volume 1: Public

Volume 2: Non-Internet Public

Niagara Power Project
FERC No. 2216

Prepared for:

New York Power Authority

Prepared by:

Stantec Consulting Services, Inc.

Copyright © 2005 New York Power Authority

August 2005

New York Power Authority

TABLE OF CONTENTS

EXECUTIVE SUMMARY ..... **iv**

ABBREVIATIONS ..... **vi**

1.0 INTRODUCTION **1-1**

2.0 METHODS **2-1**

2.1 Investigation Area 2-1
2.2 Field Data Collection Schedule and Effort 2-1
2.3 General Field Data Collection Procedures 2-2
2.4 Calculation of Effort, Catch, Catch per Unit Effort (CPUE), and Harvest Results 2-4
2.5 Database Management 2-9

3.0 RESULTS **3-1**

3.1 Instantaneous Angler Counts and Interview Data 3-1
3.2 Angling Effort 3-2
3.3 Catch, Harvest and Catch Per Unit Effort 3-3
3.4 Fish Total Length Data 3-5
3.5 Angler Demographics 3-5

4.0 DISCUSSION **4-1**

REFERENCES **1**

TABLES

Table 3.1-1 ..... **3-6**

Number of Instantaneous Angler Counts and Sum of Anglers Counted by Month and Day-Type for Lewiston Reservoir in 2002 3-6

Table 3.1-2 ..... **3-7**

Number of Instantaneous Angler Counts and Sum of Anglers Counted by Season and Day-Type for Lewiston Reservoir in 2002 3-7

Copyright © 2005 New York Power Authority

Table 3.1-3 3-8

Number of Anglers Interviewed by Month and Day-Type for Lewiston Reservoir in 2002.....3-8

Table 3.1-4 3-9

Number of Anglers Interviewed by Season and Day-Type for Lewiston Reservoir in 2002 3-9

Table 3.1-5 3-10

Number of Anglers Targeting a Species by Month and Day-Type for Lewiston Reservoir in 2002 3-10

Table 3.1-6 3-11

Number of Anglers Targeting a Species by Season and Day-Type for Lewiston Reservoir in 2002....3-11

Table 3.2-1 3-12

Mean Daily and Total Angler Effort Expressed in Hours Rounded to the Nearest Hour (with Standard Errors) by Month for Lewiston Reservoir in 2002 3-12

Table 3.2-2 3-13

Mean Daily and Total Angler Effort Expressed in Hours Rounded to the Nearest Hour (with Standard Errors) by Season for Lewiston Reservoir in 2002.....3-13

Table 3.2-3 3-14

Mean and Total Species-Specific Angler Effort Values in Hours (with Standard Errors) by Month for Lewiston Reservoir in 2002.....3-14

Table 3.2-4 3-16

Mean Daily and Total Species-Specific Angler Effort Values in Hours (with Standard Errors) by Season for Lewiston Reservoir in 2002 3-16

Table 3.3-1 3-17

Mean Daily CPUE, Catch, and Harvest with Estimated Total Catch and Harvest (with Standard Errors) for the Entire Survey for Lewiston Reservoir in 2002.....3-17

Table 3.3-2 3-18

Mean Daily CPUE, Catch, and Harvest with Estimated Total Catch and Harvest (with Standard Errors) By Month for Lewiston Reservoir in 2002 3-18

Table 3.3-3 3-26

Mean Daily CPUE, Catch, and Harvest with Estimated Total Catch and Harvest (with Standard Errors) by Season for Lewiston Reservoir in 2002 3-26

Copyright © 2005 New York Power Authority

Table 3.3-4 3-30

Estimated Targeted CPUE (with Standard Errors) for Yellow Perch By Month and Season for Lewiston Reservoir in 2002 3-30

Table 3.3-5 3-31

Estimated Targeted CPUE (with Standard Errors) for Smallmouth Bass By Month and Season for Lewiston Reservoir in 2002 3-31

Table 3.4-1 3-32

Number of Fish in a Length-Frequency Range by Species and Month for Measured Fish (Total Length in mm) in Lewiston Reservoir in 2002 3-32

Table 3.4-2 3-33

Number of Fish in a Length-Frequency Range by Species and Season for Measured Fish (Total Length in mm) in Lewiston Reservoir in 2002 3-33

Table 3.5-1 3-34

Angler Residence by Season, State, and County (New York only) for the 2002 Lewiston Reservoir Angler Survey Study 3-34

FIGURES

Figure 2.1-1 2-11

Investigation Area 2-11

APPENDICES

Appendix A 4

NYSDEC Fish Species Codes 4

Appendix B 11

Example Calculations 11

Appendix C 15

Instantaneous Angler Counts on Lewiston Reservoir in 2002 15

Copyright © 2005 New York Power Authority

EXECUTIVE SUMMARY

An angler survey of the Lewiston Reservoir was conducted from April 5, 2002 to November 30, 2002. Anglers at the reservoir were counted and interviewed three weekdays and both weekend days each week. From the count and interview data, the total number of hours that anglers fished at the reservoir and their catch and harvest were estimated for each month, season, and species of fish.

Anglers spent an estimated 8,032 hours fishing at the Lewiston Reservoir between April 5 and November 30, 2002. Most (63 %) fishing effort occurred in the spring (April 5 – June 21), principally in April, and the majority (93%) of the April anglers interviewed were fishing for yellow perch. Fifty-two percent of May anglers were fishing for yellow perch. In the summer (June 15 – September 2), anglers most often targeted smallmouth bass (38% of interviewed anglers) and "any species" (34%), with only 8% of anglers targeting yellow perch. Smallmouth bass (33%) and "any species" (38%) were also the primary targets for anglers in the fall (September 3 – October 31), with 23% of the anglers targeting yellow perch. Only two anglers were counted and interviewed in winter (November 1 – November 30). The greatest amount of effort was applied towards yellow perch, and the majority of this effort occurred during April and the spring season.

Eight species were targeted and twelve species were caught (see table below). Yellow perch dominated the estimated total catch and harvest accounting for 68% (15,330) of the fish caught and 87% (12,783) of the fish harvested, with the highest targeted catch-per-unit-effort (CPUE, calculated using data from only those anglers that targeted the species) occurring in summer (2.33 fish/hour) and June (3.63 fish/hour). Smallmouth bass accounted for 12% (2,652) of the fish caught and 4% (586) of the fish harvested, with a targeted CPUE of 1.16 fish/hour in the summer and 1.95 fish/hour in June. The targeted CPUE for yellow perch and smallmouth bass was similar to the targeted CPUE for these species in the upper Niagara River in 1999. The other species each accounted for <6% of the total catch. Few channel catfish and very few largemouth bass, bluegill and brown bullhead were caught. No white sucker, freshwater drum, round goby, brown bullhead or largemouth bass were harvested. The greatest number of fish were caught and harvested in April and the spring season. Yellow perch was the most caught and

Copyright © 2005 New York Power Authority

harvested species in all seasons. In summer and fall, smallmouth bass was the second most caught species.

Estimated Total Catch and Harvest for the Entire Survey for Lewiston Reservoir in 2002

		Estimated Totals		
Species	**Raw Total Catch***	**Total Catch**	**Total Harvest**	**Total Released**
Yellow perch	1,067	15,330	12,783	2,547
Smallmouth bass	165	2,652	586	2,066
Northern pike	25	1,127	6	1,120
White bass	31	1,367	1,245	122
Rock bass	59	920	11	909
White sucker	3	490	0	490
Freshwater drum	21	501	0	501
Round goby	16	179	0	179
Channel catfish	6	68	59	9
Brown bullhead	2	53	0	53
Largemouth bass	1	11	0	11
Bluegill	1	9	9	0
Totals	1,397	22,707	14,699	8,007

*Raw catch total is the sum of each species that anglers indicated during the interview they had caught on the day of the interview.

Copyright © 2005 New York Power Authority

ABBREVIATIONS

Agencies

NYSDEC	New York State Department of Environmental Conservation

Units of Measure

cfs	cubic feet per second
hr	hour
m	meter
mm	millimeter
MW	megawatt

Environmental

CPUE	Catch per unit effort
N	Number of data points
SE	Standard Error

Miscellaneous

QA/QC	Quality Assurance/Quality Control

Copyright © 2005 New York Power Authority

1.0 INTRODUCTION

The New York Power Authority (NYPA) is engaged in the relicensing of the Niagara Power Project in Lewiston, Niagara County, New York. The present operating license of the plant expires in August 2007. As part of its preparation for the relicensing of the Niagara Project, NYPA is developing information related to the ecological, engineering, recreational, cultural, and socioeconomic aspects of the Project.

The 1,880-MW (firm capacity) Niagara Power Project (NPP) is one of the largest non-federal hydroelectric facilities in North America. The Project was licensed to the Power Authority of the State of New York (now the New York Power Authority) in 1957. Construction of the Project began in 1958, and electricity was first produced in 1961.

The Project has several components. Twin intakes are located approximately 2.6 miles above Niagara Falls. Water entering these intakes is routed around the Falls via two large low-head conduits to a 1.8-billion-gallon forebay, lying on an east-west axis about 4 miles downstream of the Falls. The forebay is located on the east bank of the Niagara River. At the west end of the forebay, between the forebay itself and the river, is the Robert Moses Niagara Power Plant (RMNPP), NYPA's main generating plant at Niagara. This plant has 13 turbines that generate electricity from water stored in the forebay. Head is approximately 300 feet. At the east end of the forebay is the Lewiston Pump Generating Plant (LPGP). Under non-peak-usage conditions (i.e., at night and on weekends), water is pumped from the forebay via the plant's 12 pumps into the 22-billion-gallon Lewiston Reservoir, which lies east of the plant. During peak usage conditions (i.e., daytime Monday through Friday), the pumps are reversed for use as generators, and water is allowed to flow back through the plant, producing electricity. The forebay therefore serves as headwater for the RMNPP and tailwater from the LPGP. South of the forebay is a switchyard, which serves as the electrical interface between the Project and its service area.

The information to be provided from this survey is an evaluation of recreational fishing (angling). Fisheries surveys on the Reservoir were conducted for the NYPA in 1975 (IA 1975) and 1982-83 (Ecological Analysts 1984) and 2000 (Environnement Illimité 2001). A limited recreational angler

Copyright © 2005 New York Power Authority

(creel) survey was conducted during a 1982-83 fisheries study. In 2002, a more intensive shoreline angler survey, the subject of this report, was conducted. The objectives of the 2002 survey were to:

- Determine when fishing occurred;
- Determine what fish species were caught and harvested;
- Estimate fishing effort by month and season;
- Estimate catch per unit effort by species;
- Estimate harvest;
- Determine angler residency;
- Collect total length data of fish-catch; and
- Compare the 2002 to other studies as appropriate.

Copyright © 2005 New York Power Authority

2.0 METHODS

2.1 Investigation Area

Lewiston Reservoir is located five miles north of the City of Niagara Falls, New York and is part of the NYPA Niagara Power Project (Figure 2.1-1). The Lewiston Reservoir covers approximately 1,900 acres and is surrounded by a steep man-made dike protected from wave action by large rip-rap.

2.2 Field Data Collection Schedule and Effort

Interviews and collection of other data at the Lewiston Reservoir were conducted from April 5 through November 30, 2002. One technician collected data five days a week during a specified time of day (shift). The survey was carried out on three randomly selected weekdays and on both weekend days each week during the investigation period. Angler data were also collected on all Federal holidays during the period. Angler interviews were conducted during one of two periods of the day, designated as a morning shift or afternoon shift. Random selection methods were used to determine the weekdays to sample each week, and the shift for each weekend day and weekday to be sampled. When Eastern Standard Time was in effect, all morning shifts began at 7:30 AM and ended at approximately 1:00 PM. During Daylight Saving Time, morning shifts ended at 2:30 PM. Accordingly, afternoon shifts began at either 1:00 PM or 2:30 PM, and for safety reasons, ended no later than one hour after sunset.

On every day selected to conduct angler counts and interviews from April 5 through May 6, 2002, the entire shift was spent at the Reservoir. The schedule and scope for the Reservoir were revised on May 7, when a lower Niagara River angler survey began, of which the Reservoir survey became an integral part. From May 7 through November 30, the Reservoir became a site along a bus route that included several sites along the lower Niagara River. Two, one-hour interview-periods were spent at the reservoir during each morning or afternoon shift. The start-time of the one-hour periods varied within and among shifts. After finishing the one-hour visit at a randomly selected site, the technician visited the other sites as efficiently as possible. However, by procedure, the two Reservoir visits each day were never back-to-

Copyright © 2005 New York Power Authority

back, and the intervals between Reservoir visits were typically separated by two to four hours. The results of the angler survey of the lower Niagara River are presented in a separate report.

2.3 General Field Data Collection Procedures

When arriving at the reservoir, and again when leaving, a technician recorded "instantaneous" data on the number of vehicles in the parking lot on the southwest side of the Reservoir adjacent to a NYPA perimeter access gate. When possible, the types of non-fishing related recreational activities occurring were also recorded. This data collection effort was conducted in conjunction with a Recreational Facility Use and Capacity Investigation on the lower Niagara River, the results for which will be included in a recreational report.

Soon after arriving and following the instantaneous vehicle counts, the entire reservoir perimeter was visually surveyed as rapidly as possible to determine the number of anglers along the shoreline. This provided an instantaneous angler count. Anglers were typically counted while the technician traversed the NYPA perimeter roadway by vehicle. When the entire road could not be accessed and counts had to be made from a distance, binoculars were used to complete the instantaneous angler counts. Prior to May 7 an entire shift was completed at the Reservoir. Following that date the procedure was modified so that two, one-hour site visits were completed with one instantaneous count obtained on each arrival. On June 6 another modification added an instantaneous count on departure from the site. Given that the Reservoir site visits could not be concurrent, and the second visit each was scheduled to maintain travel efficiency, the second visit to the Reservoir was often the last visit to any site each day. As a result, the second count was often completed in twilight.

Typically, the southwestern corner and southern perimeter were traversed by vehicle or on foot, while the northern and eastern shore was accessed by vehicle or inspected with binoculars. Much of the western shore was not traversed at all, since NYPA had signed or gated it to exclude public access for safety and security.

The technician typically interviewed all accessible anglers and avoided interviewing individual anglers more than once per day. However, the technicians did update interview data (e.g., catch/time

Copyright © 2005 New York Power Authority

fishing) as appropriate if an angler was encountered a second time during a visit. If an angler arrived on site and had not begun fishing when the technician was leaving, the angler was only polled to determine their target species for the day, and his or her place of residence. An interview consisted of asking the angler several questions, designed to determine:

- Whether the angler had fished only at the reservoir on that day;
- Whether the angler was finished fishing at the reservoir that day;
- How long the angler had fished the reservoir that day;
- What species the angler was targeting that day;
- How many individuals of each species the angler had caught, released or harvested at the reservoir that day; and
- What the size of fish were and if there were any fin clips, and if the angler would allow the technician to see the fish they had not released, and to collect total length, check for fin clips or tags, and note any diseased fish.

The technician's primary objective was to interview anglers individually while the angler was still actively fishing (known as a roving survey, or an incomplete trip interview survey). However, anglers who had finished fishing were also interviewed as they were encountered (a complete trip interview). Interviews were categorized as complete or incomplete trip data and handled as appropriate in the analytical procedures (see Section 2.3). In some instances, the technician was present when an angler was about to release a fish, and, when given permission by the angler, measured the total length of the fish prior to the release. When possible, total length measurements were also obtained from fish that anglers were harvesting.

Anglers often fished in pairs or small groups and in some cases used the same container to collectively hold fish they caught. When there was uncertainty as to which fish belonged to which angler in a group, they were interviewed as a group. This approach allowed the anglers to achieve consensus relative to details such as the number of fish the group had caught or released, and the length of time they had fished. These group data were identified as having been collected as such, so that the information could be properly used in the data analysis.

Copyright © 2005 New York Power Authority

Anglers were also asked to provide their state of residence and, in the case of anglers living in New York State, they were also asked for the county of residence. Weather information was recorded upon arrival at the Reservoir.

Common and scientific names of fish species referred to in this report are provided in Appendix A.

2.4 Calculation of Effort, Catch, Catch per Unit Effort (CPUE), and Harvest Results

Summary data for individual fish species are discussed in terms of strata, monthly or seasonal estimates. The field sampling effort extended from April 5 through November 30, 2002. Holiday data were considered as weekend day data within the week in which it fell. The seasons, which were of unequal length and were developed to reflect New York State fishing regulations, were defined as follows:

- Spring April 1 – June 14
- Summer June 15 – September 2
- Fall September 3 – October 31
- Winter November 1 - November 30

The formulae and methods of Pollock et al. (1994) were used for analysis. Examples of the calculations used are presented in Appendix B. A single instantaneous angler count (i.e., the count-value of anglers present at the Reservoir when a creel technician arrived at the site) was used in the calculations. The method used to obtain the count value changed beginning on May 7, 2002. Prior to this date, there was only one visit each day and only one arrival count value each day. Beginning May 7, the Reservoir was visited twice daily and a count was completed when arriving each time. To provide a single count value for the summary calculations, the mean of these two instantaneous counts was used for each day. Throughout this report, several statistical terms are used. "Mean" is the arithmetic average of several values. "Standard error" (SE) is the estimated standard deviation of a statistic. It is a measure of the amount of variation present in the data (large SE values indicate more variability). Two other terms,

Copyright © 2005 New York Power Authority

"Catch per unit effort" and "harvest per unit effort" (CPUE or HPUE) are used. CPUE (or HPUE) is the number of fish caught (or harvested) per angler hour. For example, if an angler fished for one hour and caught two fish, the CPUE would be 2 fish/hour. Equation numbers from Pollock et al (1994) are in parentheses following the formulae.

The period effort **($P\hat{e}_i$,)** was calculated as:

$$(P\hat{e}_i) = I_i \times T \qquad (15.4)$$

where I_i is the average daily instantaneous count and T is the technicians shift length on that day.

The daily effort estimates ($\hat{e}_i$) were calculated as:

$$\hat{e}_i = \sum (P\hat{e}_i / \pi_i) \qquad (15.5)$$

where π_i is the proportion of possible daylight angling hours (0730 hours to one hour after sunset) surveyed each day. The possible daylight angling hours were different each month, and was set to 13 hours for April, 14 hours for May, 15 hours for June, 15 hours for July, 15 hours for August, 12.5 hours for September, 12 hours for October, and 10 hours for November.

The total effort for a stratum ($\hat{E}_{stratum}$) was calculated as:

$$\hat{E}_{stratum} = \sum(\hat{e}_i / \pi_{stratum}) \qquad (15.5)$$

where $\hat{e}_i$ is the daily effort, π_i is the proportion of days sampled in the stratum. The strata were month, season, and entire survey (April through November).

Table 15.23 in Pollock et al. (1994) was the example followed for the effort calculations in this study (see also Appendix B).

Copyright © 2005 New York Power Authority

The total effort standard errors (SE) were determined according to Table 15.21 in Pollock et al. 1994. These were the calculated as the:

$$\mathbf{S\hat{E}(\hat{E}) = \sqrt{((Var(\hat{E}_1) + Var(\hat{E}_2))}}$$

Where the effort variance for each day type is:

$$\mathbf{Var(\hat{E}_i) = N^2_i * (s^2_i / n_i))}$$

And the sample variance for each day type is:

$$\mathbf{s^2_i = 1/(n_i-1)*\sum(\hat{e}_i-\bar{e}_i)^2}$$

For each day type, N_i is the number of days in the stratum, n_i is the total number of days sampled, $\hat{e}_i$ is the daily effort, $\bar{e}_i$ is the mean daily effort. Weekdays [$\mathbf{Var(\hat{E}_1)}$] and weekend days [$\mathbf{Var(\hat{E}_2)}$] variance values were calculated separately because the number of each day type differs.

The species-specific angler effort estimates, as discussed in Section 3, use the total daily angler effort that is then modified using the proportion of anglers targeting a species surveyed that day (see Appendix B). For example, on a given day there may have been an estimated 100 angler hours expended and four interviews conducted. If three of the four (0.75) anglers interviewed were seeking yellow perch and all four anglers expended equal effort, the daily effort for yellow perch would be 0.75(100) = 75 angler hours. The remaining effort calculations (daily mean, monthly and seasonal values) were calculated in the same way as the total hour parameters.

Catch (C) was estimated using,

$$\hat{C} = \hat{E} \times \hat{R}$$

Copyright © 2005 New York Power Authority

where R (catch per unit effort, CPUE) was calculated differently depending on the interview type, complete or incomplete. For completed angler trips, (R) was calculated as the sum of the catches (c_i) divided by the sum of the trip lengths (L_i) for each species on each day,

$$\hat{R}_1 = \sum_{i=1}^{n} c_i / \sum_{i=1}^{n} L_i$$

With incomplete trip interviews, the CPUE per species was calculated as,

$$\hat{R}_2 = \frac{\sum_{i=1}^{n} (c_i / L_i)}{n}$$

where (n) is the number of anglers targeting or capturing a species. The value was the mean of the individual angler catch rates by species on a given date.

In some cases anglers in groups could not be interviewed as individuals, such as when anglers pooled their catch into a common container and could not recall who caught which fish. They were then interviewed as a group if they could provide their cumulative time spent fishing. In the analysis this was treated as a single interview and the time spent acquiring the collective catch of fish was adjusted appropriately. As an example, if there were three anglers who caught 75 of species X in one hour, their CPUE for this species was calculated by dividing 75 by 3 hours. However, the anglers in the group were considered as individual interviewees relative to the number of interviews obtained during the study.

To calculate catch and harvest estimates for each stratum, calculations of CPUE were done using the data from all anglers within the stratum, regardless of the species of fish each targeted. That is, the CPUE is that for all anglers, not for only those anglers that indicated they targeted the species in question. The daily species-specific catch is the product of the species-specific CPUE and the estimated total angler

Copyright © 2005 New York Power Authority

effort for that date, using the C = E * R equation described above. The harvest estimates were generated similarly, except that the number of fish kept was substituted for the number caught. The CPUE was also calculated for yellow perch and smallmouth bass using only data from those anglers targeting each of those species; this CPUE value is defined in this report as the "targeted CPUE". The targeted CPUE estimates were calculated to provide CPUE information comparable to the angler survey of the upper Niagara River conducted by NYSDEC in 1999, and because these two species received considerably more angling effort than the other species. The targeted CPUE values are also presented by month and season. The standard errors for catch and harvest were generated as:

$$\mathbf{S\hat{E}(\hat{C}) = \sqrt{((Var(\hat{C}_1) + Var(\hat{C}_2))}}$$

Where the catch variance for each day type is:

$$\mathbf{Var(\hat{C}_i) = N^2_i * Var(\overline{c_i})}$$

And the sample catch variance for each day type is:

$$\mathbf{Var(\overline{c_1}) = (s^2_i)/n_1}$$

$$\mathbf{s^2_i = 1/(n_i-1)*\sum(c_{ii}-\overline{c_1})^2}$$

For each day type, N_i is the number of days in the stratum, n_i is the total number of days sampled, $\mathbf{c}_{ii}$ is the daily catch, $\bar{e}_i$ is the mean daily catch. Weekdays **[Var($\hat{C}_1$)]** and weekend days **[Var($\hat{C}_2$)]** variance values were calculated separately because the number of each day type differs.

The complete trip interview (136 anglers) and incomplete trip interview (395 anglers) data were pooled to obtain the mean daily CPUE. The mean CPUE values for each species for each month or season were calculated as follows:

Copyright © 2005 New York Power Authority

$$\textbf{Mean CPUE} = (\Sigma R_i / n_i)$$

The standard error value for each mean value was also calculated as an indication of sample variance. The calculation was completed as follows:

$$SE = (\sqrt{(\Sigma (x_i - x_{mean})^2 / n-1)}) / (\sqrt{n})$$

The seasonal, monthly, and total catch and harvest estimates were obtained by multiplying the mean daily catch (C) and harvest (species-specific) by the total number of days in the sampling period as appropriate.

The number of instantaneous angler counts (weekday and weekend/holiday), the total number of angler-interviews, and the number of anglers seeking specific species were calculated as the sums of the respective parameters.

2.5 Database Management

Quality assurance and quality control (QA/QC) measures began in the field to insure that accurate information was gathered. Experienced creel technicians were routinely used, and as necessary, they trained and supervised new technicians for at least two full shifts prior to a new technician completing a shift independently. As an additional quality assurance measure, Stantec senior staff that had a thorough knowledge of the Standard Operating Procedures completed 15 unannounced onsite visits. The onsite visits were to insure that creel technicians were following the standard procedures. Additionally, each technician was provided with a cell phone such that they could call senior staff at any time to ask for guidance if an unusual situation arose in the field.

Prior to leaving the Reservoir, technicians examined datasheets for completeness. Datasheets were double-counted and signed-in at the office to insure that all were accounted for. The appropriate technician clarified any questionable data values prior to database entry. Any corrections that needed to be made to the original datasheet were dated and initialed by the person responsible.

Copyright © 2005 New York Power Authority

Microsoft Access was used as the database program for this project. A relational database was constructed with user friendly and efficient data input forms. As part of the QA/QC program, two individuals entered the same data from each data sheet (double-entry). After the second entry, the two tables were exported into an Excel spreadsheet and electronically compared. Any discrepancies were highlighted, the data in question compared to the original datasheet, and the database corrected as necessary. The date of the initial data entry and the second QA/QC were recorded on the datasheet.

Copyright © 2005 New York Power Authority

Non-Internet Public (NIP) information has been removed from the following page(s).

This material is contained in:
Volume 2
Section: A Recreational Fishing Survey of Lewiston Reservoir in 2002

FIGURE 2.1-1

INVESTIGATION AREA

[NIP – General Location Maps]

Copyright © 2005 New York Power Authority

3.0 RESULTS

This section presents the results of the 2002 angler survey and general comparisons to the results of historical surveys conducted on the Reservoir or upper Niagara River. These historical surveys include traditional fisheries studies and angler surveys and were conducted at various times between 1975 and 2000. (NYPA 1984, NYSDEC 1984a, 1984b and 2002, Environnement Illimité 2001). Only general comparisons to the 2002 results are possible since the objectives, methods, period of study, or environmental factors varied among studies.

3.1 Instantaneous Angler Counts and Interview Data

During the survey, April 5 through November 30, the total number of instantaneous angler counts completed was 303 (173 occurred on weekdays and 130 on weekend/holidays). These data are presented by day type, and for monthly and seasonal periods, respectively in Table 3.1-1 and Table 3.1-2. Factors such as the procedural change that started on May 7, which increased the number of instantaneous counts completed each visit and the number of visits each day after that date, or the relative difference in length of a period (e.g., the shorter winter period) affected the number of counts within strata. The number of anglers counted in each of the instantaneous counts is presented in Appendix C.

A total of 531 anglers were interviewed during the 2002 creel survey (136 of these were complete trip interviews). In perspective, a total of 470 interviews were completed during a 1999 pilot shore/pier angler survey conducted on the upper Niagara River by the NYSDEC (NYSDEC 2002). Several anglers became known to the technicians, and because of the recognition factor and repeated conversations with anglers some insights on angling habits were determined (i.e., anecdotal/ancillary angler information). This information indicated it was probable that many anglers fished at the Reservoir, and it was common for anglers to fish the Reservoir more than once a week in spring.

Although not quantified, the consensus among the technicians was that angling generally occurred the most on the southern and southeastern shore of the Reservoir (relatively close to the parking

Copyright © 2005 New York Power Authority

lot), while the perimeter adjacent to the Tuscarora Nation land on the east was estimated to be the second most used.

The number of anglers interviewed in 2002 is presented by day type, within months and seasons (Tables 3.1-3 and 3.1-4). Of the 531 interviews, 316 (or ~60% of the interviews) were obtained on weekend-holidays, and 215 (~40%) on weekdays. This ratio was observed despite the fact that there were fewer weekend days sampled (only 71 days, or ~42% of all sampled days) relative to weekdays (97 days or ~58% of all sampled days). The numbers of anglers targeting specific species are presented in Tables 3.1-5 and 3.1-6. For the entire survey more anglers indicated they were fishing for yellow perch than other species, followed by "anything" (i.e., any species that angler could catch) and smallmouth bass.

3.2 Angling Effort

The estimated mean daily angler effort for all months and species combined was 33 hours/day and the total estimated effort was 8,032 hours (Table 3.2-1). It was clear that the majority of angling effort occurred from April to September. The highest mean daily angler effort by month for all species combined occurred in April (140 hours/day), followed by May (36 hours/day). The remaining mean daily efforts ranged between 1 (November) and 28 hours/day (August). The highest estimated total effort by month was 4,199 hours in April and the least was in November (22 total hours).

Seasonally, the mean daily angling effort for all species combined was highest at 71 hours/day in spring with an estimated total effort of 5,040 hours (Table 3.2-2). The least angling effort by season was observed in the short winter season, with a mean of 1 hour/day and a season total of 22 hours. Estimated mean daily efforts for summer and fall were, respectively, 22 and 17 hours/day.

Estimated monthly angling efforts, by species, are presented in Table 3.2-3. Ninety-five percent (3,969 hours) of the angling effort in April and 64% (551 hours) of the effort in May was applied toward yellow perch. Effort for the next two most targeted species, smallmouth bass and any-species, was much lower in all months, neither exceeding 325 angler hours in any month. Anglers targeted smallmouth bass mostly from June through September. Estimated seasonal angling effort, by species is presented in Table 3.2-4. Eighty-six percent (4,253 angler hours) of the angling effort in spring was for yellow perch. Effort

Copyright © 2005 New York Power Authority

for smallmouth bass and any-species were the next highest, but neither exceeded 510 angler hours in any season. Most effort for smallmouth bass was in summer and fall. The effort for any-species was similar for spring, summer, and fall, with no effort in winter. Compared to yellow perch, smallmouth bass, and any-species, little effort was applied to other species.

3.3 Catch, Harvest and Catch Per Unit Effort

This section presents the estimates of catch, harvest, catch per unit effort (CPUE), and harvest per unit effort (HPUE) as estimated for the entire survey, by month and by season. For all strata, these values were calculated using data from all anglers (i.e., the CPUE values were calculated as an average CPUE for all anglers regardless of the species they targeted or caught) within the stratum. Therefore, the sum of the monthly catch or harvest for the entire survey may not be equal to the estimated catch or harvest as calculated for the entire survey. This is due to the nature of estimating catch and harvest, which was done by calculating the mean daily catch and harvest within the respective time stratum, then multiplying that value by the total number of days within the time stratum. The CPUE for yellow perch and smallmouth bass for each month and season was also calculated using data only from those anglers that specifically targeted these two species, defined as "targeted CPUE". The targeted CPUE estimates were calculated to provide CPUE information comparable to the angler survey of the upper Niagara River conducted by NYSDEC in 1999, and because these two species received considerably more angling effort than the other species. The targeted CPUE values are also presented by month and season.

The estimated total catch and harvest for each species for the entire survey is presented in Table 3.3-1. Yellow perch dominated the catch and harvest accounting for 68% of the fish caught and 87% of the fish harvested, with a mean CPUE (calculated using data from all anglers) of 0.99 fish/hour. Smallmouth bass accounted for 12% of the fish caught and 4% of the fish harvested, with a mean CPUE (calculated using data from all anglers) of 0.34 fish/hour. Northern pike accounted for 5% of the fish caught and nearly 0% of the fish harvest, with a mean CPUE (calculated using data from all anglers) of 0.11 fish/hour. The other species each accounted for typically <6% of the total catch. Of these species, only the white bass accounted for more, about 8% of the harvest. The estimates for white bass are based on few interviews of anglers who caught white bass, and have high standard error values relative to the estimate indicating a large variation in the CPUE. Therefore, the catch and harvest estimates for white

Copyright © 2005 New York Power Authority

bass are not likely to be accurate. The CPUE for rock bass was relatively high at 0.17 fish/hour. Few channel catfish and very few largemouth bass, bluegill and brown bullhead were caught. No white sucker, freshwater drum, round goby, brown bullhead or largemouth bass were harvested.

The estimated catch for all species on a monthly basis using all data, was the highest in April with an estimated 16,685 fish caught, while the fewest fish were caught in November (only one angler was interviewed, was targeting a yellow perch, and incidentally caught a northern pike) (Table 3.3-2). Most of the catch occurred from April – September, and the majority was comprised of yellow perch. The greatest number of fish (84% of the total based on monthly estimates) was harvested in April, with 7% of the total harvested in May. Seventy-six percent of the April catch and 52% of the May catch was harvested. Yellow perch accounted for the majority of this harvest. Yellow perch were caught and harvested in all months except November. The yellow perch CPUE was always ≥0.3 fish/hour, with the greatest CPUE occurring in April, June and October. The CPUE for other species was generally <0.3 fish/hour, but rock bass and smallmouth bass had CPUE values >0.3 fish/hour in several months, white bass had a CPUE of 0.37 fish/hour in September and northern pike had a CPUE of 0.43 fish/hour in October.

The highest estimated total catch of the four seasons was in the spring (17,853 fish), with the estimated catch for summer being 3,438 fish, and only 1,528 fish for fall (Table 3.3-3). Yellow perch was caught and harvested in the greatest numbers and had the highest CPUE in all seasons except the short winter season. The species with the next highest CPUE was white bass in the spring and smallmouth bass in the summer and fall. Rock bass CPUE in summer was 0.40 fish/hour and northern pike and white bass CPUE in fall was 0.31 and 0.24 fish/hour respectively. The CPUE for all other species in spring, summer and fall was ≤0.13.

The targeted CPUE of yellow perch and smallmouth bass by anglers that specifically targeted each of these species is presented in Tables 3.3-4 and 3.3-5. The targeted yellow perch CPUE was highest in June, with relatively high values in April and October. May had the lowest targeted CPUE for yellow perch. November was excluded because only one angler, who targeted yellow perch, was interviewed. The targeted CPUE was highest in summer. The targeted smallmouth bass CPUE was greatest in June and summer, with a targeted CPUE of zero in May.

Copyright © 2005 New York Power Authority

3.4 Fish Total Length Data

Lengths were obtained from five species of fish, yellow perch (451 fish); smallmouth bass (41 fish); northern pike (7 fish); white bass (11 fish); and channel catfish (4 fish). The measurements are presented in length frequency categories by species, and by month (Table 3.4-1) and season (Table 3.4-2).

The yellow perch lengths ranged across nine length frequency categories. The smallest fish were in a 180-200 mm length category (17 of 451 fish), the largest in a 341-360 mm category (2 of 451 fish). However, the lengths were skewed to three length frequency categories (80% of the measured fish) that ranged from 201 to 260 mm.

The smallmouth bass measurements were spread across 21 length frequency categories ranging from 80-100 mm to 481-500 mm. Most smallmouth bass (78% of the measured fish) were contained within six categories that ranged from 301 mm through 420 mm. There was another modal group (10% of the total measured) that fell between 80 and 140 mm, and a third group (7% of the total) between 460 and 500 mm.

The seven northern pike measurements ranged across 18 length frequency categories (from 460-820 mm). The lengths were relatively evenly dispersed.

3.5 Angler Demographics

Five-hundred-twenty-four (524) of the anglers interviewed provided demographic information (Table 3.5.1). Most anglers were from New York State (>98%) though anglers fishing at the Reservoir also represented four other states (Alabama, Georgia, Michigan and Virginia). Anglers from New York State were from Niagara County (~72% of the anglers), Erie County (~26%), with < 2% representing Steuben, Monroe, and one unidentified county.

Copyright © 2005 New York Power Authority

TABLE 3.1-1

NUMBER OF INSTANTANEOUS ANGLER COUNTS AND SUM OF ANGLERS COUNTED BY MONTH AND DAY-TYPE FOR LEWISTON RESERVOIR IN 2002

Month	# Weekday Counts	# Weekend Counts	Total Number of Counts*	Sum of Anglers Counted in all Counts*
April	11	8	19	205
May	24	16	40	56.5
June	22	22	44	28.5
July	28	20	48	34
August	20	14	34	30
September	23	20	43	43
October	25	16	41	13.5
November	20	14	34	2
Total	**173**	**130**	**303**	**413**

* Procedural changes resulted in a shorter visit, but more visits/day and counts/visit beginning May 7. The sum of anglers counted beginning May 7 is the sum of the average of the number of anglers counted each sample day, and therefore is not necessarily a whole number.

Copyright © 2005 New York Power Authority

TABLE 3.1-2

NUMBER OF INSTANTANEOUS ANGLER COUNTS AND SUM OF ANGLERS COUNTED BY SEASON AND DAY-TYPE FOR LEWISTON RESERVOIR IN 2002

Season	# Weekday Counts	# Weekend Counts	Total Number of Counts*	Sum of Anglers Counted in all Counts*
Spring	47	34	81	275.5
Summer	58	50	108	79.5
Fall	48	32	80	55.5
Winter**	20	14	34	2
Totals	**173**	**130**	**303**	**413**

*Procedural changes resulted in a shorter visit, but more visits/day and counts/visit beginning May 7. The sum of anglers counted beginning May 7 is the sum of the average of the number of anglers counted each sample day, and therefore is not necessarily a whole number.
**Winter = November only.

Copyright © 2005 New York Power Authority

TABLE 3.1-3

NUMBER OF ANGLERS INTERVIEWED BY MONTH AND DAY-TYPE FOR LEWISTON RESERVOIR IN 2002

Month/Day type*	# Interviews
April WE	68
April WD	119
April (all)	187
May WE	60
May WD	16
May (all)	76
June WE	49
June WD	19
June (all)	68
July WE	35
July WD	16
July (all)	51
August WE	43
August WD	17
August (all)	60
September WE	40
September WD	18
September (all)	58
October WE	19
October WD	10
October (all)	29
November WE	2
November WD	0
November (all)	2
Total	531
Weekend Total	316
Weekday Total	215

* WD and WE = weekdays and weekend days, respectively.

Copyright © 2005 New York Power Authority

TABLE 3.1-4

NUMBER OF ANGLERS INTERVIEWED BY SEASON AND DAY-TYPE FOR LEWISTON RESERVOIR IN 2002

Month/Day-Type*	# Interviews
Spring WD	140
Spring WE	157
Summer WD	47
Summer WE	100
Fall WD	28
Fall WE	57
Winter** WD	0
Winter** WE	2
Total	531
Season	**# Interviews**
Spring	297
Summer	147
Fall	85
Winter**	2
Total	531

* WD and WE = weekdays and weekend days, respectively.
** Winter = November only.

Copyright © 2005 New York Power Authority

TABLE 3.1-5

NUMBER OF ANGLERS TARGETING A SPECIES BY MONTH AND DAY-TYPE FOR LEWISTON RESERVOIR IN 2002

Target Species Identified	April		May		June		July		August		September		October		November		Totals
	*WD	*WE	*WD	*WE	*WD	*WE	*WD	*WE	*WD	*WE	*WD	*WE	*WD	*WE	*WD	*WE	
Yellow perch	95	61	10	27		5	3	7			6	5	8	2		2	231
Anything	6		4	14	14	37	2	8	8	19	7	20	1	8			148
Smallmouth bass	1	2	5	5	7	6	9	22	3	19	11	9	5	5			109
Largemouth bass			3	1	4		1	4									13
Northern pike				2		5		2			2			2			13
Freshwater drum	1	1								4							6
Rock bass						2				5							7
White bass							2	1			1						4
Channel catfish								1		3							4
Total	103	64	22	49	25	55	17	45	11	50	27	34	14	17		2	535**

* WD and WE = weekdays and weekend days, respectively.
**Several of the 531 anglers interviewed indicated they were targeting >1 species.

Copyright © 2005 New York Power Authority

TABLE 3.1-6

NUMBER OF ANGLERS TARGETING A SPECIES BY SEASON AND DAY-TYPE FOR LEWISTON RESERVOIR IN 2002

Target Species Identified	Spring		Summer		Fall		Winter		Total
	*WD	*WE	*WD	*WE	*WD	*WE	*WD	*WE	
Yellow perch	105	90	3	10	14	7		2	231
Anything	15	41	19	39	8	26			148
Smallmouth bass	6	9	19	45	16	14			109
Largemouth bass	3	1	5	4					13
Northern pike		2		7	2	2			13
Freshwater drum	1	1		4					6
Rock bass				7					7
White bass			2	1	1				4
Channel catfish				4					4
Total	130	144	48	121	41	49	0	2	535**

* WD and WE = weekdays and weekend days, respectively.
**Several of the 531 anglers interviewed indicated they were targeting >1 species.

Copyright © 2005 New York Power Authority

TABLE 3.2-1

MEAN DAILY AND TOTAL ANGLER EFFORT EXPRESSED IN HOURS ROUNDED TO THE NEAREST HOUR (WITH STANDARD ERRORS) BY MONTH FOR LEWISTON RESERVOIR IN 2002

Month	Effort* (whole hrs)	S.E.
April daily mean	140	28
April total	4,199	991
May daily mean	36	16
May total	902	370
June daily mean	19	5
June total	329	118
July daily mean	21	4
July total	574	94
August daily mean	28	7
August total	775	149
September daily mean	26	6
September total	791	199
October daily mean	7	3
October total	198	64
November daily mean	1	1
November total	22	22
Entire survey mean	33	5
Entire survey total**	8,032	723

*See sample calculations in Appendix B. Effort can also be calculated using Equation 15.5 in Pollock et al. 1994.

**The total effort for the entire survey was calculated by aggregating the data over the entire survey. Therefore, the summation of the monthly or seasonal effort estimates does not equal the total effort estimate.

Copyright © 2005 New York Power Authority

TABLE 3.2-2

MEAN DAILY AND TOTAL ANGLER EFFORT EXPRESSED IN HOURS ROUNDED TO THE NEAREST HOUR (WITH STANDARD ERRORS) BY SEASON FOR LEWISTON RESERVOIR IN 2002

Season	Effort* (whole hrs)	S.E.
Spring daily mean	71	14
Spring total	5,040	1,154
Summer daily mean	22	3
Summer total	1,589	199
Fall daily mean	17	4
Fall total	860	189
Winter daily mean	1	1
Winter total	22	22
Entire survey mean	33	5
Entire survey total**	8,032	723

*See sample calculations in Appendix B. Effort can also be calculated using Equation 15.5 in Pollock et al. 1994.

**The total effort for the entire survey was calculated by aggregating the data over the entire survey. Therefore, the summation of the monthly or seasonal effort estimates does not equal the total effort estimate.

Copyright © 2005 New York Power Authority

TABLE 3.2-3

MEAN AND TOTAL SPECIES-SPECIFIC ANGLER EFFORT VALUES IN HOURS (WITH STANDARD ERRORS) BY MONTH FOR LEWISTON RESERVOIR IN 2002

	Yellow perch				Smallmouth bass				Freshwater drum				Northern pike				Rock bass			
Month	Mean Hrs.	SE	Total Hrs*	SE	Mean Hrs.	SE	Total Hrs*	SE	Mean Hrs.	SE	Total Hrs*	SE	Mean Hrs.	SE	Total Hrs*	SE	Mean Hrs.	SE	Total Hrs*	SE
April	133	28	3,969	970	2	2	57	41	1	1	38	29	0	0	0	0	0	0	0	0
May	22	13	551	299	2	1	57	23	0	0	0	0	1	1	26	26	0	0	0	0
June	1	0.5	15	11	3	2	110	65	0	0	0	0	1	1	17	12	0.2	0.2	5	3
July	2	1	70	28	8	2	218	63	0	0	0	0	0.5	0.4	12	8	0	0	0	0
August	0	0	0	0	7	3	171	70	1	1	13	13	0	0	0	0	1	1	16	16
September	4	2	125	60	7	3	258	125	0	0	0	0	0.4	0.4	16	15	0	0	0	0
October	2	1	57	24	2	1	44	27	0	0	0	0	1	1	14	14	0	0	0	0
November	1	1	22	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

See sample calculations in Appendix B. Mean hrs. = mean daily angler hours.

*Total effort can also be calculated using Equation 15.5 in Pollock et al. 1994.

Copyright © 2005 New York Power Authority

TABLE 3.2-3 (CONT.)

MEAN AND TOTAL SPECIES-SPECIFIC ANGLER EFFORT VALUES IN HOURS (WITH STANDARD ERRORS) BY MONTH FOR LEWISTON RESERVOIR IN 2002

	Largemouth bass				White bass				Channel catfish				Any-species			
Month	Mean Hrs.	SE	Total Hrs*	SE	Mean Hrs.	SE	Total Hrs*	SE	Mean Hrs.	SE	Total Hrs*	SE	Mean Hrs.	SE	Total Hrs*	SE
April	0	0	0	0	0	0	0	0	0	0	0	0	3	2	109	60
May	1	1	26	18	0	0	0	0	0	0	0	0	9	6	202	130
June	1	1	19	19	0	0	0	0	0	0	0	0	13	5	299	93
July	0.8	0.5	21	12	0.6	0.4	19	16	0.4	0.4	9	9	2	1	46	23
August	0	0	0	0	0	0	0	0	0	0	10	10	11	5	325	144
September	0	0	0	0	0.1	0.1	3	3	0	0	0	0	12	4	281	92
October	0	0	0	0	0	0	0	0	0	0	0	0	3	2	82	37
November	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

See sample calculations in Appendix B. Mean hrs. = mean daily angler hours.

*Total effort may also be calculated using Equation 15.5 in Pollock et al. 1994.

Copyright © 2005 New York Power Authority

TABLE 3.2-4

MEAN DAILY AND TOTAL SPECIES-SPECIFIC ANGLER EFFORT VALUES IN HOURS (WITH STANDARD ERRORS) BY SEASON FOR LEWISTON RESERVOIR IN 2002

	Yellow perch				Smallmouth bass				Northern pike				Largemouth bass				Channel catfish			
Season	Mean Hrs.*	SE	Total Hrs.	SE	Mean Hrs.	SE	Total Hrs.	SE	Mean Hrs.	SE	Total Hrs.	SE	Mean Hrs.	SE	Total Hrs.	SE	Mean Hrs.	SE	Total Hrs.	SE
Spring	58	14	4,253	1,118	2	1	123	46	0.5	0.5	26	26	0.4	0.3	27	19	0	0	0	0
Summer	1	0.5	86	34	7	2	486	114	1	0.3	33	16	1	0.3	45	25	0.3	0.2	18	13
Fall	3	1	181	59	5	2	306	123	1	0.4	30	19	0	0	0	0	0	0	0	0
Winter	1	1	22	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Whole year	19	5	4,542	1,120	4	1	915	174	0.5	0.2	88	36	0.3	0.1	71	31	0.1	0.1	18	13

	Freshwater drum				Rock bass				White bass				Any-species			
Season	Mean Hrs.	SE	Total Hrs.	SE	Mean Hrs.	SE	Total Hrs.	SE	Mean Hrs.	SE	Total Hrs.	SE	Mean Hrs.	SE	Total Hrs.	SE
Spring	0.5	0.3	35	27	0	0	0	0	0	0	0	0	8	3	510	170
Summer	0.2	0.2	10	10	0.3	0.2	17	13	0.3	0.2	23	18	7	2	468	135
Fall	0	0	0	0	0	0	0	0	0.04	0.04	3	3	9	3	470	101
Winter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Whole year	0.2	0.1	45	28	0.1	0.1	17	13	0.1	0.1	25	19	7	1	1,447	257

See sample calculations in Appendix B. Mean hrs. = mean daily angler hours.
*Total effort can also be calculated using Equation 15.5 in Pollock et al. 1994.

Copyright © 2005 New York Power Authority

TABLE 3.3-1

MEAN DAILY CPUE, CATCH, AND HARVEST WITH ESTIMATED TOTAL CATCH AND HARVEST (WITH STANDARD ERRORS) FOR THE ENTIRE SURVEY FOR LEWISTON RESERVOIR IN 2002

	Raw catch total*	Mean Daily CPUE	Mean Daily CPUE SE	Mean Daily Catch	Mean Daily Catch SE	Mean Daily Harvest	Mean Daily Harvest SE	Estimated Totals				
								Total Catch	Catch SE	Total Harvest	Harvest SE	Total Released
Yellow perch	1,067	0.99	0.23	68	19	56	17	15,330	4,408	12,783	3,814	2,547
Smallmouth bass	165	0.34	0.05	12	3	3	1	2,652	759	586	259	2,066
Northern pike	25	0.11	0.03	5	3	0.02	0.02	1,127	556	6	6	1,120
White bass	31	0.13	0.06	7	6	7	6	1,367	1,103	1,245	1,098	122
Rock bass	59	0.17	0.04	5	2	0.05	0.03	920	290	11	8	909
White sucker	3	0.02	0.01	2	1	0	0	490	317	0	0	490
Freshwater drum	21	0.08	0.03	2	1	0	0	501	198	0	0	501
Round goby	16	0.05	0.02	1	0.3	0	0	179	88	0	0	179
Channel catfish	6	0.02	0.01	0.4	0.2	0.3	0.2	68	36	59	35	9
Brown bullhead	2	0.01	0.01	0.3	0.3	0	0	53	53	0	0	53
Largemouth bass	1	<0.01	0.00	0.1	0.1	0	0	11	11	0	0	11
Bluegill	1	<0.01	0.00	0.1	0.1	0.1	0.1	9	9	9	9	0
Totals	1,397							22,707		14,699		8,007

* Raw catch total is the sum of each species that anglers indicated during the interview they had caught on the day of the interview.

Copyright © 2005 New York Power Authority

TABLE 3.3-2

MEAN DAILY CPUE, CATCH, AND HARVEST WITH ESTIMATED TOTAL CATCH AND HARVEST (WITH STANDARD ERRORS) BY MONTH FOR LEWISTON RESERVOIR IN 2002

	Mean Daily CPUE	Mean Daily CPUE SE	Mean Daily Catch	Mean Daily Catch SE	Mean Daily Harvest	Mean Daily Harvest SE	Estimated Totals				
							Catch	Catch SE	Harvest	Harvest SE	Released
April											
Yellow perch	1.87	0.48	457	109	417	104	13,069	2,972	11,717	2,777	1,353
White bass	0.22	0.22	55	55	50	50	1,040	1,040	832	930	208
Smallmouth bass	0.15	0.07	46	22	11	11	1,487	759	208	208	1,279
Northern pike	0.05	0.04	15	11	0	0	485	422	0	0	485
Rock bass	0.04	0.04	11	11	0	0	208	208	0	0	208
White sucker	0.02	0.02	8	8	0	0	299	299	0	0	299
Freshwater drum	0.02	0.01	4	4	0	0	97	74	0	0	97
Total							16,685		12,757		3,929

Copyright © 2005 New York Power Authority

TABLE 3.3-2 (CONT.)

MEAN DAILY CPUE, CATCH, AND HARVEST WITH ESTIMATED TOTAL CATCH AND HARVEST (WITH STANDARD ERRORS) BY MONTH FOR LEWISTON RESERVOIR IN 2002

	Mean Daily CPUE	Mean Daily CPUE SE	Mean Daily Catch	Mean Daily Catch SE	Mean Daily Harvest	Mean Daily Harvest SE	Estimated Totals				
							Catch	Catch SE	Harvest	Harvest SE	Released
May											
Yellow perch	0.44	0.20	56	41	44	31	1,305	902	1,020	671	285
Northern pike	0.08	0.06	18	18	0	0	392	392	0	0	392
White sucker	0.04	0.04	8	8	0	0	168	168	0	0	168
Rock bass	0.07	0.07	2	2	0	0	49	49	0	0	49
Freshwater drum	0.05	0.05	1	1	0	0	33	33	0	0	33
Smallmouth bass	0.00	0.00	0	0	0	0	0	0	0	0	0
Largemouth bass	0.00	0.00	0	0	0	0	0	0	0	0	0
Total							1,947		1,020		927

Copyright © 2005 New York Power Authority

TABLE 3.3-2 (CONT.)

MEAN DAILY CPUE, CATCH, AND HARVEST WITH ESTIMATED TOTAL CATCH AND HARVEST (WITH STANDARD ERRORS) BY MONTH FOR LEWISTON RESERVOIR IN 2002

	Mean Daily CPUE	Mean Daily CPUE SE	Mean Daily Catch	Mean Daily Catch SE	Mean Daily Harvest	Mean Daily Harvest SE	Estimated Totals				
							Catch	Catch SE	Harvest	Harvest SE	Released
June											
Yellow perch	1.51	1.24	42	39	13	13	954	862	280	280	674
Rock bass	0.51	0.15	11	6	0.2	0.2	281	135	6	6	275
Smallmouth bass	0.41	0.15	9	4	0	0	265	128	0	0	265
Freshwater drum	0.10	0.06	3	2	0	0	99	63	0	0	99
White sucker	0.08	0.08	2	2	0	0	53	53	0	0	53
Northern pike	0.07	0.04	2	1	0	0	51	28	0	0	51
Round goby	0.07	0.06	1	0.4	0	0	14	10	0	0	14
Largemouth bass	<0.01	0.00	0	0	0	0	0	0	0	0	0
Total							1,717		286		1,431

Copyright © 2005 New York Power Authority

TABLE 3.3-2 (CONT.)

MEAN DAILY CPUE, CATCH, AND HARVEST WITH ESTIMATED TOTAL CATCH AND HARVEST (WITH STANDARD ERRORS) BY MONTH FOR LEWISTON RESERVOIR IN 2002

	Mean Daily CPUE	Mean Daily CPUE SE	Mean Daily Catch	Mean Daily Catch SE	Mean Daily Harvest	Mean Daily Harvest SE	Estimated Totals				
							Catch	Catch SE	Harvest	Harvest SE	Released
July											
Smallmouth bass	0.58	0.19	11	5	7	5	276	125	172	113	104
Rock bass	0.39	0.20	8	4	0.2	0.2	203	97	5	5	199
Yellow perch	0.40	0.27	5.2	3.6	1.4	1.0	152	108	45	36	107
White bass	0.17	0.17	2	2	0	0	68	68	0	0	68
Channel catfish	0.13	0.09	1	1	1	1	30	22	30	22	0
Bluegill	0.01	0.01	0.4	0.4	0.4	0.4	9	9	9	9	0
Freshwater drum	0.02	0.02	0.3	0.3	0	0	8	8	0	0	8
Northern pike	0.04	0.04	0.2	0.2	0.2	0.2	6	6	6	6	0
Largemouth bass	<0.01	0.00	0	0	0	0	0	0	0	0	0
Total							752		267		486

Copyright © 2005 New York Power Authority

TABLE 3.3-2 (CONT.)

MEAN DAILY CPUE, CATCH, AND HARVEST WITH ESTIMATED TOTAL CATCH AND HARVEST (WITH STANDARD ERRORS) BY MONTH FOR LEWISTON RESERVOIR IN 2002

	Mean Daily CPUE	Mean Daily CPUE SE	Mean Daily Catch	Mean Daily Catch SE	Mean Daily Harvest	Mean Daily Harvest SE	Estimated Totals				
							Catch	Catch SE	Harvest	Harvest SE	Released
August											
Smallmouth bass	0.51	0.15	18	6	3	2	386	94	60	57	326
Yellow perch	0.30	0.19	6	3	3	3	163	109	99	99	64
Rock bass	0.33	0.15	8	4	0	0	195	99	0	0	195
Round goby	0.24	0.19	4	3	0	0	125	103	0	0	125
Freshwater drum	0.27	0.18	3	2	0	0	66	47	0	0	66
Channel catfish	0.02	0.02	1	1	0	0	13	13	0	0	13
Total							948		159		789

Copyright © 2005 New York Power Authority

TABLE 3.3-2 (CONT.)

MEAN DAILY CPUE, CATCH, AND HARVEST WITH ESTIMATED TOTAL CATCH AND HARVEST (WITH STANDARD ERRORS) BY MONTH FOR LEWISTON RESERVOIR IN 2002

	Mean Daily CPUE	Mean Daily CPUE SE	Mean Daily Catch	Mean Daily Catch SE	Mean Daily Harvest	Mean Daily Harvest SE	Estimated Totals				
							Catch	Catch SE	Harvest	Harvest SE	Released
September											
Smallmouth bass	0.66	0.18	13	5	5	3	341	118	120	60	220
Yellow perch	0.32	0.15	10	7	6	4	231	145	134	92	97
White bass	0.37	0.23	8	5	6	3	183	107	146	76	38
Northern pike	0.19	0.10	6	3	0	0	136	70	0	0	136
Freshwater drum	0.10	0.07	3	2	0	0	74	54	0	0	74
Brown bullhead	0.05	0.05	2	2	0	0	50	50	0	0	50
Round goby	0.05	0.04	1	1	0	0	38	32	0	0	38
Channel catfish	0.02	0.02	1	1	1	1	25	25	25	25	0
Total							1,078		425		653

Copyright © 2005 New York Power Authority

TABLE 3.3-2 (CONT.)

MEAN DAILY CPUE, CATCH, AND HARVEST WITH ESTIMATED TOTAL CATCH AND HARVEST (WITH STANDARD ERRORS) BY MONTH FOR LEWISTON RESERVOIR IN 2002

	Mean Daily CPUE	Mean Daily CPUE SE	Mean Daily Catch	Mean Daily Catch SE	Mean Daily Harvest	Mean Daily Harvest SE	Estimated Totals				
							Catch	Catch SE	Harvest	Harvest SE	Released
October											
Yellow perch	1.56	1.01	9	6	6	5	286	196	213	189	73
Northern pike	0.43	0.23	2	1	0	0	71	41	0	0	71
Smallmouth bass	0.27	0.15	4	3	0.4	0.3	97	70	10	6	87
Round goby	0.11	0.08	1	1	0	0	30	21	0	0	30
Freshwater drum	0.03	0.03	1	1	0	0	16	16	0	0	16
Largemouth bass	0.03	0.03	0.5	0.5	0	0	12	12	0	0	12
White bass	0.04	0.04	0.2	0.2	0	0	5	5	0	0	5
Total							517		223		294

Copyright © 2005 New York Power Authority

TABLE 3.3-2 (CONT.)

MEAN DAILY CPUE, CATCH, AND HARVEST WITH ESTIMATED TOTAL CATCH AND HARVEST (WITH STANDARD ERRORS) BY MONTH FOR LEWISTON RESERVOIR IN 2002

	Mean Daily CPUE	Mean Daily CPUE SE	Mean Daily Catch	Mean Daily Catch SE	Mean Daily Harvest	Mean Daily Harvest SE	Estimated Totals				
							Catch	Catch SE	Harvest	Harvest SE	Released
November											
Northern pike	0.50	NA	0.4	0.4	0	0	11	11	0	0	11
Yellow perch	0	NA	0	0	0	0	0	0	0	0	0
Total							11		0		11

Copyright © 2005 New York Power Authority

TABLE 3.3-3

MEAN DAILY CPUE, CATCH, AND HARVEST WITH ESTIMATED TOTAL CATCH AND HARVEST (WITH STANDARD ERRORS) BY SEASON FOR LEWISTON RESERVOIR IN 2002

	Mean Daily CPUE	Mean Daily CPUE SE	Mean Daily Catch	Mean Daily Catch SE	Mean Daily Harvest	Mean Daily Harvest SE	Estimated Totals				
							Catch	Catch SE	Harvest	Harvest SE	Released
Spring											
Yellow perch	1.26	0.31	191	58	179	55	13,548	4,289	12,720	4,120	828
Smallmouth bass	0.08	0.04	17	9	4	4	1,350	725	208	208	1,142
White bass	0.13	0.13	20	20	20	20	1,040	1,040	1,040	1,040	0
Northern pike	0.06	0.03	13	7	0	0	854	466	0	0	854
White sucker	0.03	0.02	6	4	0	0	437	317	0	0	437
Rock bass	0.08	0.04	6	4	0	0	328	214	0	0	328
Freshwater drum	0.04	0.02	4	2	0	0	296	188	0	0	296
Largemouth bass	0.00	0.00	0	0	0	0	0	0	0	0	0
Total							17,853		13,968		3,885

Copyright © 2005 New York Power Authority

TABLE 3.3-3 (CONT.)

MEAN DAILY CPUE, CATCH, AND HARVEST WITH ESTIMATED TOTAL CATCH AND HARVEST (WITH STANDARD ERRORS) BY SEASON FOR LEWISTON RESERVOIR IN 2002

	Mean Daily CPUE	Mean Daily CPUE SE	Mean Daily Catch	Mean Daily Catch SE	Mean Daily Harvest	Mean Daily Harvest SE	Estimated Totals				
							Catch	Catch SE	Harvest	Harvest SE	Released
Summer											
Yellow perch	0.80	0.46	21	16	7	5	1,383	979	448	328	935
Smallmouth bass	0.59	0.11	15	4	4	2	970	244	248	136	721
Rock bass	0.40	0.10	9	3	0.2	0.1	608	203	12	8	596
Freshwater drum	0.13	0.07	2	1	0	0	123	58	0	0	123
Round goby	0.11	0.07	1	1	0	0	118	83	0	0	118
White bass	0.06	0.06	1	1	0	0	80	80	0	0	80
White sucker	0.03	0.03	1	1	0	0	59	59	0	0	59
Channel catfish	0.05	0.03	1	0	0.5	0.4	44	27	34	25	10
Northern pike	0.03	0.02	1	0	0.1	0.1	43	27	7	7	36
Bluegill	0.00	0.00	0.2	0.2	0.2	0.2	10	10	10	10	0
Largemouth bass	0.00	0.00	0	0	0	0	0	0	0	0	0
Total							3,438		759		2,678

Copyright © 2005 New York Power Authority

TABLE 3.3-3 (CONT.)

MEAN DAILY CPUE, CATCH, AND HARVEST WITH ESTIMATED TOTAL CATCH AND HARVEST (WITH STANDARD ERRORS) BY SEASON FOR LEWISTON RESERVOIR IN 2002

	Mean Daily CPUE	Mean Daily CPUE SE	Mean Daily Catch	Mean Daily Catch SE	Mean Daily Harvest	Mean Daily Harvest SE	Estimated Totals				
							Catch	Catch SE	Harvest	Harvest SE	Released
Fall											
Yellow perch	0.88	0.46	10	5	6	4	517	249	358	222	159
Smallmouth bass	0.43	0.11	8	3	3	1	388	129	127	61	261
Northern pike	0.31	0.12	4	2	0	0	203	77	0	0	203
White bass	0.24	0.14	4	3	3	2	184	107	142	75	42
Freshwater drum	0.08	0.05	2	1	0	0	86	54	0	0	86
Round goby	0.08	0.04	1	1	0	0	64	34	0	0	64
Brown bullhead	0.03	0.03	1	1	0	0	50	50	0	0	50
Channel catfish	0.01	0.01	1	1	1	1	25	25	25	25	0
Largemouth bass	0.01	0.01	0.3	0.3	0	0	11	11	0	0	11
Total							1,528		652		876

Copyright © 2005 New York Power Authority

TABLE 3.3-3 (CONT.)

MEAN DAILY CPUE, CATCH, AND HARVEST WITH ESTIMATED TOTAL CATCH AND HARVEST (WITH STANDARD ERRORS) BY SEASON FOR LEWISTON RESERVOIR IN 2002

	Mean Daily CPUE	Mean Daily CPUE SE	Mean Daily Catch	Mean Daily Catch SE	Mean Daily Harvest	Mean Daily Harvest SE	Estimated Totals				
							Catch	Catch SE	Harvest	Harvest SE	Released
Winter											
Northern pike	0.50	NA	0.4	0.4	0	0	11	11	0	0	11
Yellow perch	0	NA	0	0	0	0	0	0	0	0	0
Total							11		0		11

"SE" = standard error, and an "NA" (non-applicable) signifies an SE could not be calculated since only one data point (N=1) was available.

Copyright © 2005 New York Power Authority

TABLE 3.3-4

ESTIMATED TARGETED CPUE (WITH STANDARD ERRORS) FOR YELLOW PERCH BY MONTH AND SEASON FOR LEWISTON RESERVOIR IN 2002

Month or Season	Mean Daily CPUE	SE
April	1.75	0.44
May	0.49	0.20
June	3.63	2.86
July	0.95	0.58
August	1.33	0.67
September	0.56	0.23
October	1.93	1.25
November	0	0
Spring	1.24	0.29
Summer	2.33	1.30
Fall	1.25	0.64
Winter	0	0

Copyright © 2005 New York Power Authority

TABLE 3.3-5

ESTIMATED TARGETED CPUE (WITH STANDARD ERRORS) FOR SMALLMOUTH BASS BY MONTH AND SEASON FOR LEWISTON RESERVOIR IN 2002

Month or Season	Mean Daily CPUE	SE
April	0.75	0.75
May	0.00	0.00
June	1.95	1.46
July	0.62	0.19
August	0.94	0.33
September	0.79	0.23
October	0.27	0.12
November*	-	-
Spring	0.19	0.19
Summer	1.16	0.43
Fall	0.52	0.15
Winter*	-	-

* No anglers targeted smallmouth bass in November/Winter.

Copyright © 2005 New York Power Authority

TABLE 3.4-1

NUMBER OF FISH IN A LENGTH-FREQUENCY RANGE BY SPECIES AND MONTH FOR MEASURED FISH (TOTAL LENGTH IN MM) IN LEWISTON RESERVOIR IN 2002

White bass		Yellow perch								Channel catfish	
Range (mm)	Sept.	Range (mm)	April	May	July	Aug	Sept.	Oct.	Total	Range (mm)	July
200-210	5	180-200	13	0	0	0	4	0	17	400-410	1
211-220	1	201-220	100	14	0	1	0	0	115	411-420	1
221-230	2	221-240	115	36	3	0	1	0	155	421-430	0
231-240	0	241-260	82	5	1	1	0	3	92	431-440	1
241-250	0	261-280	36	0	1	0	4	0	41	441-450	0
251-260	0	281-300	17	1	1	0	0	1	20	451-460	1
261-270	1	301-320	5	0	0	0	0	1	6	461-470	0
271-280	0	321-340	3	0	0	0	0	0	3	471-480	0
281-290	0	341-360	2	0	0	0	0	0	2		
291-300	2										
Total	11	**Total**	373	56	6	2	9	5	451	**Total**	4

Northern pike						Smallmouth bass						
Range (mm)	April	May	July	Sept.	Total	Range (mm)	April	July	August	Sept.	Oct.	Total
460-480	0	0	0	0	0	80-100	0	1	0	0	0	1
481-500	0	0	1	0	1	101-120	0	1	0	0	0	1
501-520	1	0	0	0	1	121-140	0	1	1	0	0	2
521-540	0	0	0	0	0	141-160	0	0	0	0	0	0
541-560	0	0	0	0	0	161-180	0	0	0	0	0	0
561-580	0	0	0	0	0	181-200	0	0	2	0	0	2
581-600	0	0	0	0	0	201-220	0	0	0	0	0	0
601-620	0	0	0	2	2	221-240	0	0	0	0	0	0
621-640	0	0	0	0	0	241-260	0	0	0	0	0	0
641-660	0	1	0	0	1	261-280	0	0	0	0	0	0
661-680	1	0	0	0	1	281-300	0	0	0	0	0	0
681-700	0	0	0	0	0	301-320	0	3	1	1	0	5
701-720	0	0	0	0	0	321-340	1	2	2	3	1	9
721-740	0	0	0	0	0	341-360	0	2	0	2	0	4
741-760	0	0	0	0	0	361-380	1	2	5	1	0	9
761-780	0	0	0	0	0	381-400	0	0	1	2	0	3
781-800	0	0	0	0	0	401-420	0	0	2	0	0	2
801-820	0	1	0	0	1	421-440	0	0	0	0	0	0
						441-460	0	0	0	0	0	0
						461-480	1	0	0	1	0	2
						481-500	1	0	0	0	0	1
Total	2	2	1	2	7	**Total**	4	12	14	10	1	41

Copyright © 2005 New York Power Authority

TABLE 3.4-2

NUMBER OF FISH IN A LENGTH-FREQUENCY RANGE BY SPECIES AND SEASON FOR MEASURED FISH (TOTAL LENGTH IN MM) IN LEWISTON RESERVOIR IN 2002

White bass		Yellow perch					Channel catfish	
Range (mm)	Fall	Range (mm)	Spring	Summer	Fall	Total	Range (mm)	Summer
200-210	5	180-200	13	0	4	17	400-410	1
211-220	1	201-220	114	1	0	115	411-420	1
221-230	2	221-240	151	3	1	155	421-430	0
231-240	0	241-260	87	2	3	92	431-440	1
241-250	0	261-280	36	1	4	41	441-450	0
251-260	0	281-300	18	1	1	20	451-460	1
261-270	1	301-320	5	0	1	6	461-470	0
271-280	0	321-340	3	0	0	3	471-480	0
281-290	0	341-360	2	0	0	2		
291-300	2							
Total	11	**Total**	429	8	14	451	**Total**	4

Northern pike					Smallmouth bass				
Range (mm)	Spring	Summer	Fall	Total	Range (mm)	Spring	Summer	Fall	Total
460-480	0	0	0	0	80-100	0	1	0	1
481-500	0	1	0	1	101-120	0	1	0	1
501-520	1	0	0	1	121-140	0	2	0	2
521-540	0	0	0	0	141-160	0	0	0	0
541-560	0	0	0	0	161-180	0	0	0	0
561-580	0	0	0	0	181-200	0	2	0	2
581-600	0	0	0	0	201-220	0	0	0	0
601-620	0	0	2	2	221-240	0	0	0	0
621-640	0	0	0	0	241-260	0	0	0	0
641-660	1	0	0	1	261-280	0	0	0	0
661-680	1	0	0	1	281-300	0	0	0	0
681-700	0	0	0	0	301-320	0	4	1	5
701-720	0	0	0	0	321-340	1	4	4	9
721-740	0	0	0	0	341-360	0	2	2	4
741-760	0	0	0	0	361-380	1	7	1	9
761-780	0	0	0	0	381-400	0	1	2	3
781-800	0	0	0	0	401-420	0	2	0	2
801-820	1	0	0	1	421-440	0	0	0	0
					441-460	0	0	0	0
					461-480	1	0	1	2
					481-500	1	0	0	1
Total	4	1	2	7	**Total**	4	26	11	41

Copyright © 2005 New York Power Authority

TABLE 3.5-1

ANGLER RESIDENCE BY SEASON, STATE, AND COUNTY (NEW YORK ONLY) FOR THE 2002 LEWISTON RESERVOIR ANGLER SURVEY STUDY

Season	State	New York County	Number of Anglers	% of Total
Spring				
	New York	Steuben	1	0.3
	New York	Erie	51	17.2
	New York	Niagara	244	82.4
Total/Season			296	100.0
Summer				
	Alabama		1	0.7
	Georgia		1	0.7
	Michigan		1	0.7
	New York	Erie	58	39.5
	New York	Monroe	1	0.7
	New York	Niagara	83	56.5
	New York	N/A	1	0.7
	Virginia		1	0.7
Total/Season			147	100.0
Fall				
	New York	Erie	28	35.4
	New York	Niagara	50	63.3
	New York	N/A	1	1.3
Total/Season			79	100.0
Winter				
	New York	Niagara	2	100
Total/Season			2	
Seasons Combined				
	Alabama		1	0.2
	Georgia		1	0.2
	Michigan		1	0.2
	New York	Erie	137	26.1
	New York	Monroe	1	0.2
	New York	Niagara	379	72.3
	New York	Steuben	1	0.2
	New York	N/A	2	0.4
	Virginia		1	0.2
Total			524	100.0

Copyright © 2005 New York Power Authority

4.0 DISCUSSION

Anglers targeted eight species at the Reservoir in 2002. However, 12 species were caught and seven were harvested. It is apparent that the yellow perch remains the most important sport fish to the Reservoir fishery. Yellow perch was the most targeted species at the Reservoir (approximately 43% of interviewed anglers), and provided the greatest estimated catch and harvest. In an opportunistic angler survey conducted during a 1983 fisheries study of the Reservoir (Ecological Analysts 1984), anglers indicated yellow perch and smallmouth bass were their targets. In the 1999 upper Niagara River angler survey of shore/pier anglers, yellow perch was targeted by only 12% of the anglers (NYSDEC 2002) and was ranked third as a target in that survey. However, the survey did not begin until late July, and most of the effort applied to yellow perch in the 2002 Reservoir survey was in April and May. The second most targeted category of fish in the 2002 Reservoir survey was a general category termed, by anglers, as the "anything" category (i.e., any fishes they could catch). In this report, it is referred to as the any-species category, which accounted for about 29% of all the interviewed anglers in 2002. The proportion of anglers targeting any-species in the summer and fall was greater than in the spring. The any-species category was targeted by the majority (61%) of the shore/pier anglers in the 1999 upper River angler survey (NYSDEC 2002). This suggests that anglers on the Reservoir might have been more focused on a particular species (yellow perch) than shore anglers on the upper Niagara River. However, it is not known if the any-species category would have been so prominent in 1999 had interview data been collected in April through late July. The estimated total yellow perch catch in 2002 was 15,330 fish (based on data aggregated over the entire survey, Table 3.3-1), highest of all species caught, and the yellow perch accounted for ~68% of the total overall estimated catch (22,707 fish) (Table 3.3-1). Aggregating the harvest data over the entire study period (Table 3.3-1) also demonstrates that yellow perch was the most harvested species (12,783 fish) and accounted for ~87% of the total harvest (14,669 fish). A relatively large catch of yellow perch by anglers could have been predicted, based on catches in previous fisheries studies on the Reservoir (e.g., netting and electro-fishing surveys), where the yellow perch was generally found to be one of the most, if not the most abundant sport-fish, especially in the spring (NYPA 1984, and Environnement Illimité 2001).

The mean daily CPUE (as calculated using data from all anglers) was 1 fish/hr or less for all fish species over the entire survey (Table 3.3-1), but was as high as 1.87 fish/hr for yellow perch in April.

Copyright © 2005 New York Power Authority

Yellow perch was the only species that had a CPUE >1.0 fish/hr. There was little consistency relative to the species with the highest CPUE among months. In an angler survey conducted on the upper Niagara River in 1984, the yearly catch rate for yellow perch was determined to be 0.76 fish/hr (NYSDEC 1984a, NYSDEC 1984b) (based on a total of 56 parties surveyed, no standard error provided), which is lower than the mean CPUE for April through November 2002. In a limited 1999 NYSDEC upper River angler survey (conducted from mid-July to late November), the mean monthly CPUE for yellow perch ranged from 1.22 fish/hour (September) to 6.41 fish/hour (November). The targeted yellow perch CPUE (Table 3.3-4) ranged from 0.49 – 3.63 fish/hour (excluding November 2002), which is similar to that of the NYSDEC 1999 survey; however, October 1999 and November 1999 CPUE estimates ranged from 5.8 – 6.41 fish/hour for upper river shore anglers (NYSDEC 2002). Generally, the CPUE for the species in the 1999 survey was considerably greater than that in the 2002 Reservoir or the 1984 upper Niagara River surveys. Additionally, no yellow perch were caught in the Reservoir in November (although only two anglers were interviewed), while the CPUE on the upper Niagara River in November was higher than any CPUE observed during the entire Reservoir survey.

The smallmouth bass was also a popular fish at the Reservoir, targeted in all months but November, and second only to the yellow perch in terms of effort applied to it. It was also second to yellow perch in the raw numbers caught. However, even though anglers favored the fish, the estimated total catch of smallmouth bass was only 2,652 fish, about 17% of the estimated total yellow perch catch and about 12% of the estimated total catch for all species.

Smallmouth bass were caught in all months except May and November. In all other months, the mean CPUE (calculated using data from all anglers) for the smallmouth bass ranged from 0.15 to 0.66 fish/hr. The overall CPUE (calculated using data from all anglers) for smallmouth bass was 0.34 fish/hr. In an angler survey conducted on the upper Niagara River in 1984, the yearly catch rate for smallmouth bass was determined to be 0.36 fish/hr, n=54), and is similar to entire survey mean CPUE (calculated using data from all anglers) for 2002, though a standard error was not provided for the 1984 data (NYSDEC 1984a). The targeted smallmouth bass CPUE in 2002 ranged from 0 – 1.95 fish/hour, which is nearly identical to the targeted smallmouth bass CPUE in 1999 (NYSDEC 2002). Shore anglers were not interviewed in April, May and June in the 1999 survey of the upper river. The targeted CPUE was 0.75 fish/hour in April, 0 fish/hour in May, and 1.95 fish/hour in June in the 2002 Reservoir survey.

Copyright © 2005 New York Power Authority

REFERENCES

Connelly, N.A., T.L. Brown, and B.A. Knuth. 1998a. New York State Angler Survey 1996 Report 2: Angler Preferences, Satisfaction, and Opinion on Management Issues. New York State Department of Environmental Conservation, Bureau of Fisheries. Albany, NY. 99 pp.

Connelly, N.A., T.L. Brown, and B.A. Knuth. 1998b. New York State Angler Survey 1996 Report 4: Estimated Angler Effort and Expenditures. New York State Department of Environmental Conservation, Bureau of Fisheries. Albany, NY. 62 pp.

Ecological Analysts, Inc. 1984. Lewiston Reservoir Aquatic Ecology and Water Quality Studies, November 1982 to August 1983, prep. for American Bechtel.

Environnement Illimité, Inc. 2001. The Lewiston Reservoir Fish Survey Report for the Year 2000, prep. for the New York Power Authority.

Ichthyological Associates, Inc. 1975. A Fisheries Investigation of the Lewiston Pumped Storage Reservoir, Lewiston, New York.

New York State Department of Environmental Conservation, Bureau of Fisheries. 1984a. 1984 New York State Great Lakes Angler Survey, Volume I. New York State Department of Environmental Conservation, Bureau of Fisheries. Albany, NY. 41 pp.

New York State Department of Environmental Conservation, Bureau of Fisheries. 1984b. 1984 New York State Great Lakes Angler Survey, Volume II Appendices. New York State Department of Environmental Conservation, Bureau of Fisheries. Albany, NY. 104 pp.

New York State Department of Environmental Conservation, Bureau of Fisheries. 2002. 1999 Angler Survey of the Upper Niagara River.

Copyright © 2005 New York Power Authority

NYPA. 1984. Application for Amendment of License, FERC Project No. 2216. vol. II, Exhibit E..

Pollock, K.H, C.M. Jones, and T.L Brown. 1994. Angler Survey Methods and their Application to Fisheries Management. American Fisheries Society Special Publication 25. American Fisheries Society. Bethesda, MD.

Copyright © 2005 New York Power Authority

APPENDICES

New York Power Authority
NIAGARA POWER PROJECT
Copyright © 2005 New York Power Authority

APPENDIX A

NYSDEC Fish Species Codes

Common Name	Scientific Name		
(by family)	Genus	Species	NYS Species Code
Petromyzontidae			
Ohio Lamprey	*Ichthyomyzon*	*bdellium*	201
Chestnut Lamprey	*Ichthyomyzon*	*castaneus*	202
Northern Brook Lamprey	*Ichthyomyzon*	*fossor*	203
Mountain Brook Lamprey	*Ichthyomyzon*	*greeleyi*	204
Silver Lamprey	*Ichthyomyzon*	*unicuspis*	205
American Brook Lamprey	*Lampetra*	*appendix*	206
Sea Lamprey	*Petromyzon*	*marinus*	207
Acipenseridae			
Shortnose Sturgeon	*Acipenser*	*brevirostrum*	260
Lake Sturgeon	*Acipenser*	*fulvescens*	261
Atlantic Sturgeon	*Acipenser*	*oxyrhynchus*	262
Pallid Sturgeon	*Scaphirhynchus*	*albus*	263
Shovelnose Sturgeon	*Scaphirhynchus*	*platorynchus*	264
Polyodontidae			
Paddlefish	*Polyodon*	*spathula*	266
Lepisosteidae			
Spotted Gar	*Lepisosteus*	*oculatus*	267
Longnose Gar	*Lepisosteus*	*osseus*	268
Shortnose Gar	*Lepisosteus*	*platostomus*	269
Alligator Gar	*Lepisosteus*	*spatula*	270
Amiidae			
Bowfin	*Amia*	*calva*	271
Anguillidae			
American Eel	*Anguilla*	*rostrata*	276
Clupeidae			
Blueback Herring	*Alosa*	*aestivalis*	285
Alabama Shad	*Alosa*	*alabamae*	286
Skipjack Herring	*Alosa*	*chrysochloris*	287
Hickory Shad	*Alosa*	*mediocris*	288
Alewife	*Alosa*	*pseudoharengus*	289
American Shad	*Alosa*	*sapidissima*	290
Gizzard Shad	*Dorosoma*	*cepedianum*	294

Copyright © 2005 New York Power Authority

Common Name	Scientific Name		
(by family)	Genus	Species	NYS Species Code
Engraulidae			
Bay Anchovy	*Anchoa*	*mitchilli*	301
Hiodontidae			
Goldeye	*Hiodon*	*alosoides*	305
Mooneye	*Hiodon*	*tergisus*	306
Salmonidae			
Longjaw Cisco	*Coregonus*	*alpenae*	310
Cisco or Lake Herring	*Coregonus*	*artedii*	311
Lake Whitefish	*Coregonus*	*clupeaformis*	312
Bloater	*Coregonus*	*hoyi*	313
Kiyi	*Coregonus*	*kiyi*	315
Shortnose Cisco	*Coregonus*	*reighardi*	317
Shortnose Cisco	*Coregonus*	*reighardi*	318
Splake	*Hybrid*	*J15 & J16*	332
Pink Salmon	*Oncorhynchus*	*gorbuscha*	319
Coho Salmon	*Oncorhynchus*	*kisutch*	320
Rainbow Trout	*Oncorhynchus*	*mykiss*	326
Sockeye Salmon/Kokanee	*Oncorhynchus*	*nerka*	321
Chinook Salmon	*Oncorhynchus*	*tshawytscha*	322
Round Whitefish	*Prosopium*	*cylindraceum*	324
Atlantic Salmon	*Salmo*	*salar*	327
Brown Trout	*Salmo*	*trutta*	328
Brook Trout	*Salvelinus*	*fontinalis*	329
Lake Trout	*Salvelinus*	*namaycush*	330
Esocidae			
Redfin Pickerel	*Esox*	*americanus americanus*	345
Grass Pickerel	*Esox*	*americanus vermiculatus*	346
Northern Pike	*Esox*	*lucius*	347
Muskellunge	*Esox*	*masquinongy*	348
Chain Pickerel	*Esox*	*niger*	349
Tiger Musky	*Hybrid*	*K04 & K06*	350

Copyright © 2005 New York Power Authority

Common Name	Scientific Name		
(by family)	Genus	Species	NYS Species Code
Cyprinidae			
Central Stoneroller	*Campostoma*	*anomalum*	360
Goldfish	*Carassius*	*auratus*	361
Redside Dace	*Clinostomus*	*elongatus*	362
Lake Chub	*Couesius*	*plumbeus*	363
Grass Carp	*Ctenopharyngodon*	*idella*	364
Spotfin Shiner	*Cyprinella*	*spiloptera*	394
Common Carp	*Cyprinus*	*carpio*	365
Streamline Chub	*Erimystax*	*dissimilus*	371
Cutlips Minnow	*Exoglassum*	*maxillingua*	367
Tonguetied Minnow	*Exoglassum*	*laurae*	366
Brassy Minnow	*Hybognathus*	*hankinsoni*	368
Mississippi Silvery Minnow	*Hybognathus*	*nuchalis*	369
Gravel Chub	*Hybopsis*	*x-punctata*	374
Striped Shiner	*Luxilus*	*chrysocephalus*	384
Common Shiner	*Luxilus*	*cornutus*	385
Redfin Shiner	*Lythrurus*	*umbratilis*	396
Silver Chub	*Macrohybopsis*	*storeriana*	373
Hornyhead Chub	*Nocomis*	*biguttatus*	375
River Chub	*Nocomis*	*micropogon*	376
Golden Shiner	*Notemigonus*	*crysoleucas*	377
Bigeye Chub	*Notropis*	*amblops*	370
Comely Shiner	*Notropis*	*amoenus*	378
Satinfin Shiner	*Notropis*	*analostanus*	379
Pugnose Shiner	*Notropis*	*anogenus*	380
Emerald Shiner	*Notropis*	*atherinoides*	381
Bridle Shiner	*Notropis*	*bifrenatus*	382
Silverjaw minnow	*Notropis*	*buccatus*	409
Ironcolor Shiner	*Notropis*	*chalybaeus*	383
Bigmouth Shiner	*Notropis*	*dorsalis*	386
Blackchin Shiner	*Notropis*	*heterodon*	388
Blacknose Shiner	*Notropis*	*heterolepis*	389
Spottail Shiner	*Notropis*	*hudsonius*	390

Copyright © 2005 New York Power Authority

Common Name	Scientific Name		
(by family)	Genus	Species	NYS Species Code
Silver Shiner	*Notropis*	*photogenis*	391
Swallowtail Shiner	*Notropis*	*procne*	392
Rosyface Shiner	*Notropis*	*rubellus*	393
Sand Shiner	*Notropis*	*stramineus*	395
Mimic Shiner	*Notropis*	*volucellus*	397
Northern Redbelly Dace	*Phoxinus*	*eos*	398
Finescale Dace	*Phoxinus*	*neogaeus*	399
Bluntnose Minnow	*Pimephales*	*notatus*	400
Fathead Minnow	*Pimephales*	*promelas*	401
Western Blacknose Dace	*Rhinichthys*	*atratulus meleagris*	402
Longnose Dace	*Rhinichthys*	*cataractae*	403
Bitterling	*Rhodeus*	*sericeus*	404
Rudd	*Scardinius*	*erythrophthalmus*	405
Creek Chub	*Semotilus*	*atromaculatus*	406
Fallfish	*Semotilus*	*corporalis*	407
Pearl Dace	*Semotilus*	*margarita margarita*	408
Catostomidae			
River Carpsucker	*Carpiodes*	*carpio*	415
Quillback	*Carpiodes*	*cyprinus*	416
Highfin Carpsucker	*Carpiodes*	*velifer*	417
Longnose Sucker	*Catostomus*	*catostomus*	418
White Sucker	*Catostomus*	*commersoni*	419
Blue Sucker	*Cycleptus*	*elongatus*	420
Creek Chubsucker	*Erimyzon*	*oblongus*	421
Lake Chubsucker	*Erimyzon*	*sucetta*	422
Northern Hog Sucker	*Hypentelium*	*nigricans*	423
Smallmouth Buffalo	*Ictiobus*	*bubalus*	424
Bigmouth Buffalo	*Ictiobus*	*cyprinella*	425
Black Buffalo	*Ictiobus*	*niger*	426
Spotted Sucker	*Minytrema*	*melanops*	427
Silver Redhorse	*Moxostoma*	*anisurum*	428
River Redhorse	*Moxostoma*	*carinatum*	429
Black Redhorse	*Moxostoma*	*duquesnei*	430
Golden Redhorse	*Moxostoma*	*erythrurum*	431

Copyright © 2005 New York Power Authority

Common Name	Scientific Name		
(by family)	Genus	Species	NYS Species Code
Shorthead Redhorse	*Moxostoma*	*macrolepidotum*	432
Greater Redhorse	*Moxostoma*	*valenciennesi*	433
Ictaluridae			
Black Bullhead	*Ameiurus*	*melas*	442
Yellow Bullhead	*Ameiurus*	*natalis*	443
Brown Bullhead	*Ameiurus*	*nebulosus*	444
White Catfish	*Ictalurus*	*catus*	440
Blue Catfish	*Ictalurus*	*furcatus*	441
Channel Catfish	*Ictalurus*	*punctatus*	445
Stonecat	*Noturus*	*flavus*	446
Tadpole Madtom	*Noturus*	*gyrinus*	447
Margined Madtom	*Noturus*	*insignis*	448
Brindled Madtom	*Noturus*	*miurus*	449
Flathead Catfish	*Pylodictis*	*olivaris*	450
Aphredoderidae			
Pirate Perch	*Aphredoderus*	*sayanus*	460
Belonidae			
Atlantic Needlefish	*Strongylura*	*marina*	521
Cyprinodontidae			
Sheepshead Minnow	*Cyprinodon*	*variegatus*	530
Banded Killifish	*Fundulus*	*diaphanus*	531
Mummichog	*Fundulus*	*heteroclitus*	532
Rainwater Killifish	*Lucania*	*parva*	535
Poeciliidae			
Western Mosquitofish	*Gambusia*	*affinis*	540
Antherinidae			
Brook Silverside	*Labidesthes*	*sicculus*	545
Inland Silverside	*Menidia*	*beryllina*	547
Moronidae			
White Bass	*Morone*	*chrysops*	576
Striped Bass	*Morone*	*saxatilis*	577
White Perch	*Morone*	*americana*	575
Centrarchidae			
Mud Sunfish	*Acantharchus*	*promotis*	590
Rock Bass	*Ambloplites*	*rupestris*	591

Copyright © 2005 New York Power Authority

Common Name	Scientific Name		
(by family)	Genus	Species	NYS Species Code
Bluespotted Sunfish	*Enneacanthus*	*gloriosus*	592
Banded Sunfish	*Enneacanthus*	*obesus*	593
Redbreast Sunfish	*Lepomis*	*auritus*	594
Green Sunfish	*Lepomis*	*cyanellus*	595
Pumpkinseed	*Lepomis*	*gibbosus*	596
Warmouth	*Lepomis*	*gulosus*	597
Bluegill	*Lepomis*	*macrochirus*	598
Longear Sunfish	*Lepomis*	*megalotis*	599
Smallmouth Bass	*Micropterus*	*dolomieu*	600
Largemouth Bass	*Micropterus*	*salmoides*	601
White Crappie	*Pomoxis*	*annularis*	602
Black Crappie	*Pomoxis*	*nigromaculatus*	603
Percidae			
Eastern Sand Darter	*Ammocrypta*	*pellucida*	605
Greenside Darter	*Etheostoma*	*blennioides*	606
Rainbow Darter	*Etheostoma*	*caeruleum*	607
Bluebreast Darter	*Etheostoma*	*camurum*	628
Iowa Darter	*Etheostoma*	*exile*	608
Fantail Darter	*Etheostoma*	*flabellare*	609
Swamp Darter	*Etheostoma*	*fusiforme*	610
Spotted Darter	*Etheostoma*	*maculatum*	611
Johnny Darter	*Etheostoma*	*nigrum*	613
Tesselated Darter	*Etheostoma*	*olmstedi*	614
Variegate Darter	*Etheostoma*	*variatum*	615
Banded Darter	*Etheostoma*	*zonale*	616
Yellow Perch	*Perca*	*flavescens*	617
Logperch	*Percina*	*caprodes*	618
Channel Darter	*Percina*	*copelandi*	619
Gilt Darter	*Percina*	*evides*	620
Longhead Darter	*Percina*	*macrocephala*	621
Blackside Darter	*Percina*	*maculata*	622
Shield Darter	*Percina*	*peltata*	623
River Darter	*Percina*	*shumardi*	624
Sauger	*Stizostedion*	*canadense*	625
Walleye	*Stizostedion*	*vitreum*	626

Copyright © 2005 New York Power Authority

Common Name	Scientific Name		
(by family)	Genus	Species	NYS Species Code
Sciaenidae			
Freshwater Drum	*Aplodinotus*	*grunniens*	700
Silver Perch	*Bairdiella*	*chrysura*	701
Mugilidae			
Striped Mullet	*Mugil*	*cephalus*	735
Cottidae			
Mottled Sculpin	*Cottus*	*bairdi*	865
Slimy Sculpin	*Cottus*	*cognatus*	866
Spoonhead Sculpin	*Cottus*	*ricei*	867
Osmeridae			
Rainbow Smelt	*Osmerus*	*mordax*	335
Umbridae			
Central Mudminnow	*Umbra*	*limi*	340
Eastern Mudminnow	*Umbra*	*pygmaea*	341
Percopsidae			
Trout-perch	*Percopsis*	*omiscomaycus*	461
Gadidae			
Atlantic Cod	*Gadus*	*morhua*	492
Burbot	*Lota*	*lota*	493
Atlantic Tomcod	*Microgadus*	*tomcod*	496
Gasterosteidae			
Fourspine Stickleback	*Apeltes*	*quadracus*	560
Brook Stickleback	*Culaea*	*inconstans*	561
Threespine Stickleback	*Gasterosteus*	*aculeatus*	562
Blackspotted Stickleback	*Gasterosteus*	*wheatlandi*	563
Ninespine Stickleback	*Pungitius*	*pungitius*	564
Congridae			
Conger Eel	*Conger*	*oceanicus*	280
Soleidae			
Hogchoker	*Trinectes*	*maculatus*	910
Round Goby	*Neogobius*	*melanostomus*	999

Copyright © 2005 New York Power Authority

APPENDIX B

Example Calculations

Example calculation of the mean angler counts used in the angler effort estimates

Date	Time start	Time end	Total number of anglers arriving	Total or mean count (I_i)
5/1/02	14:40	20:30	7	7
5/2/02	8:00	14:50	0	0
5/4/02	8:00	15:50	24	24
5/5/02	14:30	20:45	11	11
5/7/02	7:30	8:30	0	0.5
5/7/02	13:00	14:00	1	
5/10/02	14:00	15:00	0	0
5/10/02	19:14	20:14	0	
5/11/02	9:25	10:25	4	3
5/11/02	12:45	13:45	2	
5/12/02	9:30	10:30	0	1
5/12/02	12:40	13:40	2	
5/13/02	7:20	8:20	0	0
5/13/02	10:35	11:35	0	
5/14/02	9:30	10:30	0	0
5/14/02	12:40	13:40	0	
5/15/02	9:25	10:25	1	1
5/15/02	12:40	13:40	1	
5/18/02	7:20	8:20	0	0
5/18/02	12:40	13:40	0	
5/19/02	7:20	8:20	0	0.5
5/19/02	11:35	12:35	1	
5/20/02	9:25	10:25	0	0
5/20/02	12:40	13:40	0	
5/21/02	15:30	16:30	0	0
5/21/02	18:40	19:40	0	
5/24/02	14:30	15:30	0	0
5/24/02	17:40	18:40	0	
5/25/02	9:30	10:30	0	1.5
5/25/02	12:40	13:40	3	
5/26/02	14:20	15:20	1	0.5
5/26/02	18:35	19:35	0	
5/27/02	14:45	15:45	7	3.5
5/27/02	20:50	21:25	0	
5/28/02	14:20	15:20	1	2
5/28/02	17:35	18:35	3	
5/29/02	8:25	9:25	0	0
5/29/02	12:40	13:40	0	
5/31/02	14:15	15:15	0	1
5/31/02	18:30	19:30	2	

Copyright © 2005 New York Power Authority

Daily total and daily species-specific effort calculations for May 2002 - similar to Table 15.23 in Pollock et al. 1994

Variable	I_i	T	$P\hat{e}_i = I_i * T$	π_i *	$\hat{e}_i = \sum(P\hat{e}_i) / \pi_i$	π_x	$\hat{e}_x = \hat{e}_i * \pi_x$
Date	**Total or mean count**	**# sample hours**	**Period effort**	**Proportion of hours sampled each day**	**Daily effort (angler hours)**	**Proportion of anglers seeking yellow perch**	**Daily effort for yellow perch in hour**
5/1/02	7	7	49	0.50	98	0.71	70
5/2/02	0	7	0	0.50	0	0	0
5/4/02	24	7	168	0.50	336	0.85	286
5/5/02	11	6.5	72	0.46	154	0.17	26
5/7/02	1	2	1	0.14	7	0	0
5/10/02	0	2	0	0.14	0	0	0
5/11/02	3	2	6	0.14	42	0.2	8
5/12/02	1	2	2	0.14	14	0	0
5/13/02	0	2	0	0.14	0	0	0
5/14/02	0	2	0	0.14	0	0	0
5/15/02	1	2	2	0.14	14	1	14
5/18/02	0	2	0	0.14	0	0	0
5/19/02	1	2	1	0.14	7	1	7
5/20/02	0	2	0	0.14	0	0	0
5/21/02	0	2	0	0.14	0	0	0
5/24/02	0	2	0	0.14	0	0	0
5/25/02	2	2	3	0.14	21	0.5	11
5/26/02	1	2	1	0.14	7	1	7
5/27/02	4	2	7	0.14	49	0.83	41
5/28/02	2	2	4	0.14	28	0.27	8
5/29/02	0	2	0	0.14	0	0	0
5/31/02	1	2	2	0.14	14	0.5	7
				Mean weekday ($\hat{e}_{wd}$)	**12**		**8**
				Mean weekend ($\hat{e}_{we}$)	**70**		**43**
				May mean daily angler effort	**36**		**22**
				May mean daily effort SE	**16**		**13**

SE = standard error

πi = probability of the sample hours being sampled based on the number of daylight fishable hours (14 hours in May).

Copyright © 2005 New York Power Authority

Daily total and daily species-specific effort calculations for May 2002 (cont.)

Total number of angler hours = $(E_{wd} * N_{wd}) + (E_{we} * N_{ew})$

May total effort =	902	
May total effort SE=	370	= square root $((\text{variance}_{wd} / n_{wd}) * N_{wd}\text{^}2)+((\text{variance}_{we} / n_{ew}) * N_{ew}\text{^}2))$ *** From Table 15.21 in Pollock et al. 1994
May total yellow perch effort =	551	
May yellow perch total effort SE=	300	n_{wd} = 13 (weekday sample days), N_{wd} = 22 (weekday total days), n_{ew} = 9 (weekend sample days), N_{ew} = 9 (weekend total days)

**** Total effort can also be calculated using Equation 15.5 from Pollock et al. 1994**

Copyright © 2005 New York Power Authority

Example calculations of the adjustment factor for estimating species specific angler effort

Date	Number fishing (t)	Species Code (u)	Adjustment factor e_x =sum of number seeking	Species
5/1/2002	2	1	0.14	Any
5/1/2002	1	617		
5/1/2002	2	617		
5/1/2002	2	617	0.71	Yellow perch
5/4/2002	3	617	0.85	Yellow perch
5/4/2002	4	617		
5/4/2002	2	347	0.08	Northern pike
5/4/2002	3	617		
5/4/2002	4	617		
5/4/2002	2	617		
5/4/2002	2	617		
5/4/2002	1	600	0.04	Smallmouth bass
5/4/2002	1	601	0.04	Largemouth bass
5/4/2002	1	617		
5/4/2002	1	617		
5/4/2002	1	617		
5/4/2002	1	617		
5/5/2002	1	1		
5/5/2002	2	1		
5/5/2002	2	1	0.83	Any
5/5/2002	1	617	0.17	Yellow perch

Copyright © 2005 New York Power Authority

APPENDIX C

Instantaneous Angler Counts on Lewiston Reservoir in 2002.

Date	Time start	Time end	Total number of anglers arriving	Total/avg. counts
4/5/02	15:00	15:02	0	0
4/6/02	7:30	13:17	10	10
4/7/02	9:40		16	16
4/8/02	7:40		9	9
4/11/02	16:00	16:02	4	4
4/12/02	7:40	15:00	27	27
4/13/02	14:45	20:15	0	0
4/14/02	16:15	20:15	10	10
4/15/02	14:40	20:45	26	26
4/17/02	14:35	20:35	20	20
4/18/02	14:35	20:35	22	22
4/20/02	14:30	20:45	16	16
4/21/02	7:45	14:30	23	23
4/22/02	14:30	20:05	0	0
4/24/02	14:45	20:45	10	10
4/25/02	7:40	14:40	0	0
4/27/02	14:40	20:15	9	9
4/28/02	7:30	14:30	3	3
4/29/02	14:30	20:30	0	0
5/1/02	14:40	20:30	7	7
5/2/02	8:00	14:50	0	0
5/4/02	8:00	15:50	24	24
5/5/02	14:30	20:45	11	11
5/7/02	7:30	8:30	0	0.5
5/7/02	13:00	14:00	1	
5/10/02	14:00	15:00	0	0
5/10/02	19:14	20:14	0	
5/11/02	9:25	10:25	4	3
5/11/02	12:45	13:45	2	
5/12/02	9:30	10:30	0	1
5/12/02	12:40	13:40	2	
5/13/02	7:20	8:20	0	0
5/13/02	10:35	11:35	0	
5/14/02	9:30	10:30	0	0
5/14/02	12:40	13:40	0	
5/15/02	9:25	10:25	1	1
5/15/02	12:40	13:40	1	

Copyright © 2005 New York Power Authority

Date	Time start	Time end	Total number of anglers arriving	Total/avg. counts
5/18/02	7:20	8:20	0	0
5/18/02	12:40	13:40	0	
5/19/02	7:20	8:20	0	0.5
5/19/02	11:35	12:35	1	
5/20/02	9:25	10:25	0	0
5/20/02	12:40	13:40	0	
5/21/02	15:30	16:30	0	0
5/21/02	18:40	19:40	0	
5/24/02	14:30	15:30	0	0
5/24/02	17:40	18:40	0	
5/25/02	9:30	10:30	0	1.5
5/25/02	12:40	13:40	3	
5/26/02	14:20	15:20	1	0.5
5/26/02	18:35	19:35	0	
5/27/02	14:45	15:45	7	3.5
5/27/02	20:50	21:25	0	
5/28/02	14:20	15:20	1	2
5/28/02	17:35	18:35	3	
5/29/02	8:25	9:25	0	0
5/29/02	12:40	13:40	0	
5/31/02	14:15	15:15	0	1
5/31/02	18:30	19:30	2	
6/1/02	17:55	18:55	0	0.5
6/1/02	20:03	21:03	1	
6/2/02	14:30	15:30	3	2
6/2/02	18:00	19:00	1	
6/3/02	17:35	18:35	0	0
6/3/02	19:45	20:45	0	
6/5/02	8:25	9:25	0	0
6/5/02	10:35	11:35	0	
6/6/02	16:30	17:30	0	1.5
6/6/02	19:40	20:40	3	
6/8/02	8:25	9:25	1	0.5
6/8/02	11:35	12:35	0	
6/9/02	7:20	8:20	0	3.5
6/9/02	10:30	11:30	7	
6/10/02	8:25	9:25	0	0
6/10/02	12:40	13:40	0	
6/13/02	16:25	17:25	0	0
6/13/02	19:35	20:35	0	
6/14/02	12:40	13:40	0	0

Copyright © 2005 New York Power Authority

Date	Time start	Time end	Total number of anglers arriving	Total/avg. counts
6/14/02	17:20	18:20	0	
6/15/02	14:20	15:20	4	6
6/15/02	17:30	18:30	8	
6/16/02	15:15	16:15	0	0
6/16/02	19:52	20:52	0	
6/18/02	16:50	17:50	1	2.5
6/18/02	20:10	21:10	4	
6/19/02	16:40	17:40	0	0
6/19/02	19:50	20:50	0	
6/20/02	9:40	10:40	0	0
6/20/02	13:00	14:00	0	
6/22/02	9:40	10:40	0	0.5
6/22/02	12:50	13:50	1	
6/23/02	17:45	18:45	6	3.5
6/23/02	20:01	21:01	1	
6/25/02	14:30	15:30	1	0.5
6/25/02	19:53	20:53	0	
6/26/02	10:40	11:40	4	3
6/26/02	12:57	13:57	2	
6/27/02	17:38	18:38	0	0
6/27/02	19:54	20:54	0	
6/29/02	7:30	8:30	0	3.5
6/29/02	12:52	13:52	7	
6/30/02	7:30	8:30	2	1
6/30/02	12:54	13:54	0	
7/1/02	16:39	17:39	0	0
7/1/02	19:50	20:50	0	
7/2/02	7:30	8:30	0	0
7/2/02	12:53	13:53	0	
7/3/02	17:40	18:40	0	0
7/3/02	19:59	20:59	0	
7/4/02	16:35	17:35	0	0
7/4/02	19:52	20:52	0	
7/5/02	16:45	17:45	4	3
7/5/02	20:03	21:03	2	
7/6/02	7:30	8:30	0	2
7/6/02	12:56	13:56	4	
7/7/02	9:45	10:45	3	4
7/7/02	13:02	14:02	5	
7/10/02	9:40	10:40	0	0
7/10/02	13:00	14:00	0	

Copyright © 2005 New York Power Authority

Date	Time start	Time end	Total number of anglers arriving	Total/avg. counts
7/11/02	15:15	16:15	0	0
7/11/02	20:59	21:25	0	
7/12/02	10:45	11:45	0	1
7/12/02	13:02	14:02	2	
7/13/02	7:30	8:30	2	2
7/13/02	13:10	14:10	2	
7/14/02	17:46	18:46	2	2
7/14/02	20:03	21:03	2	
7/15/02	17:45	18:45	0	3
7/15/02	20:03	21:03	6	
7/18/02	7:30	8:30	0	0
7/18/02	12:55	13:55	0	
7/19/02	9:40	10:40	0	0
7/19/02	12:50	13:50	0	
7/20/02	7:30	8:30	0	2.5
7/20/02	13:40	14:40	5	
7/21/02	7:30	8:30	2	3.5
7/21/02	12:55	13:55	5	
7/22/02	7:30	8:30	0	1
7/22/02	12:55	13:55	2	
7/23/02	9:38	10:38	2	1
7/23/02	13:01	14:01	0	
7/24/02	16:37	17:37	0	0.5
7/24/02	19:54	20:54	1	
7/27/02	7:30	8:30	1	2
7/27/02	12:56	13:56	3	
7/28/02	16:43	17:43	4	4.5
7/28/02	19:56	20:56	5	
7/29/02	9:35	10:35	1	1.5
7/29/02	12:55	13:55	2	
7/30/02	16:36	17:36	0	0.5
7/30/02	19:54	20:54	1	
8/2/02	9:38	10:38	0	0
8/2/02	12:49	13:49	0	
8/3/02	9:35	10:35	3	3
8/3/02	12:54	13:54	3	
8/12/02	16:50	17:50	0	1.5
8/12/02	20:05	21:05	3	
8/14/02	7:30	8:30	0	0
8/14/02	12:57	13:57	0	
8/15/02	9:35	10:35	0	0

Copyright © 2005 New York Power Authority

Date	Time start	Time end	Total number of anglers arriving	Total/avg. counts
8/15/02	12:54	13:54	0	
8/17/02	15:05	16:05	0	2
8/17/02	18:15	19:15	4	
8/18/02	9:55	10:55	4	5
8/18/02	13:39	14:39	6	
8/20/02	9:45	10:45	0	1.5
8/20/02	13:15	14:15	3	
8/21/02	11:45	12:45	2	3
8/21/02	14:59	15:59	4	
8/23/02	7:20	8:20	0	1
8/23/02	11:35	12:35	2	
8/24/02	8:25	9:25	6	3.5
8/24/02	11:35	12:35	2	
8/24/02	14:50	15:50	6	
8/24/02	20:15	20:45	0	
8/25/02	9:20	10:20	9	6
8/25/02	12:36	13:36	3	
8/26/02	7:20	8:20	0	1
8/26/02	11:35	12:35	2	
8/28/02	9:30	10:30	0	0.5
8/28/02	12:40	13:40	1	
8/30/02	15:20	16:20	0	0
8/30/02	18:30	19:30	0	
8/31/02	8:25	9:25	2	2
8/31/02	11:35	12:35	2	
9/1/02	9:20	10:20	0	1
9/1/02	11:30	12:30	2	
9/2/02	7:15	8:15	0	0
9/2/02	11:30	12:30	0	
9/4/02	7:20	8:20	0	0
9/4/02	12:40	13:40	0	
9/5/02	9:25	10:25	1	0.5
9/5/02	12:35	1:35	0	
9/6/02	15:25	16:25	0	0
9/6/02	17:35	18:35	0	
9/7/02	7:20	8:20	2	1
9/7/02	12:40	13:40	0	
9/8/02	15:25	16:25	2	4.5
9/8/02	17:35	18:35	7	
9/10/02	7:20	8:20	0	0
9/10/02	12:40	13:40	0	

Copyright © 2005 New York Power Authority

Date	Time start	Time end	Total number of anglers arriving	Total/avg. counts
9/12/02	9:30	10:30	0	0
9/12/02	12:40	13:40	0	
9/13/02	9:30	10:30	0	0
9/13/02	12:40	13:40	0	
9/14/02	7:20	8:20	5	4.5
9/14/02	11:35	12:35	4	
9/15/02	8:20	9:20	0	1
9/15/02	11:30	12:30	2	
9/16/02	15:35	16:35	4	5
9/16/02	18:45	19:45	6	
9/19/02	15:20	16:20	1	1.5
9/19/02	18:30	19:30	2	
9/20/02	14:15	15:15	2	5
9/20/02	17:25	18:25	8	
9/21/02	9:25	10:25	4	4
9/21/02	12:35	13:35	4	
9/22/02	9:46	10:46	3	4.5
9/22/02	12:56	13:56	6	
9/24/02	9:30	10:30	2	2.5
9/24/02	12:40	13:40	3	
9/25/02	15:20	16:20	1	2
9/25/02	18:30	19:30	3	
9/27/02	18:46	19:46	0	0
9/28/02	9:40	10:40	5	6
9/28/02	12:54	13:54	7	
9/29/02	15:34	16:34	0	0
9/29/02	17:45	18:35	0	
10/1/02	15:20	16:20	0	0.5
10/1/02	17:30	18:30	1	
10/3/02	9:25	10:25	0	0
10/3/02	12:35	13:35	0	
10/4/02	14:15	15:15	0	0
10/4/02	17:30	18:30	0	
10/5/02	15:20	16:20	7	3.5
10/5/02	17:30	18:30	0	
10/6/02	9:44	10:44	1	1
10/6/02	12:54	13:54	1	
10/7/02	16:25	17:25	0	0
10/8/02	9:20	10:20	0	0
10/8/02	12:35	13:35	0	
10/9/02	7:15	8:15	0	0

Copyright © 2005 New York Power Authority

Date	Time start	Time end	Total number of anglers arriving	Total/avg. counts
10/9/02	10:30	11:30	0	
10/12/02	9:44	10:44	3	3.5
10/12/02	12:53	13:53	4	
10/13/02	15:15	16:15	2	2
10/13/02	17:25	18:25	2	
10/14/02	9:25	10:25	0	0
10/14/02	12:35	13:35	0	
10/14/02	16:20	17:20	0	
10/16/02	9:20	10:20	0	0
10/16/02	12:35	13:35	0	
10/17/02	14:10	15:10	0	1
10/17/02	17:20	18:20	2	
10/18/02	16:40	17:40	0	0
10/20/02	9:38	10:38	1	0.5
10/20/02	12:50	13:50	0	
10/21/02	9:25	10:25	1	0.5
10/21/02	12:35	13:35	0	
10/23/02	14:15	15:15	0	0
10/25/02	9:25	10:25	0	0
10/25/02	12:35	13:35	0	
10/26/02	9:37	10:37	0	0
10/26/02	12:55	13:55	0	
10/27/02	15:10	16:10	0	0
10/28/02	9:25	10:25	2	1
10/28/02	12:35	13:35	0	
10/30/02	7:15	8:15	0	0
10/30/02	12:35	13:35	0	
11/1/02	12:45	13:45	0	0
11/1/02	16:00	17:00	0	
11/3/02	14:50	15:50	0	0
11/5/02	9:20	10:20	0	0
11/5/02	12:35	13:35	0	
11/6/02	7:15	8:15	0	0
11/6/02	12:35	13:35	0	
11/8/02	9:20	10:20	0	0
11/8/02	12:35	13:35	0	
11/9/02	9:35	10:35	2	2
11/10/02	15:08	16:08	0	0
11/11/02	7:15	8:15	0	0
11/11/02	12:35	13:35	0	
11/12/02	17:00	17:30	0	0

Copyright © 2005 New York Power Authority

Date	Time start	Time end	Total number of anglers arriving	Total/avg. counts
11/14/02	9:20	10:20	0	0
11/14/02	12:35	13:35	0	
11/15/02	8:15	9:15	0	0
11/15/02	11:25	12:25	0	
11/16/02	11:50	12:50	0	0
11/17/02	9:20	10:20	0	0
11/17/02	12:35	13:35	0	
11/18/02	11:50	12:50	0	0
11/20/02	9:15	10:15	0	0
11/20/02	12:30	13:30	0	
11/22/02	9:20	10:20	0	0
11/22/02	12:35	13:35	0	
11/23/02	7:00	8:00	0	0
11/23/02	12:20	13:20	0	
11/24/02	9:35	10:35	0	0
11/25/02	14:55	15:55	0	0
11/26/02	7:30	8:30	0	0
11/28/02	10:41	11:41	0	0
11/29/02	9:15	10:15	0	0
11/30/02	11:50	12:50	0	0

Copyright © 2005 New York Power Authority