HARRIS NUCLEAR PLANT
2006 ENVIRONMENTAL MONITORING REPORT

January 2008

Environmental, Health and Safety Services Section

PROGRESS ENERGY CAROLINAS, INC.
Raleigh, North Carolina

Preface

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Metric-English Conversion and Units of Measure

Length

1 micron (Φm) = 4.0 x 10^{-5} inch
1 millimeter (mm) = 1000 Φm = 0.04 inch
1 centimeter (cm) = 10 mm = 0.4 inch
1 meter (m) = 100 cm = 3.28 feet
1 kilometer (km) = 1000 m = 0.62 mile

Area

1 square meter (m^2) = 10.76 square feet
1 hectare (ha) = 10,000 m^2 = 2.47 acres

Volume

1 milliliter (ml) = 0.034 fluid ounce
1 liter = 1000 ml = 0.26 gallon
1 cubic meter = 35.3 cubic feet

Weight

1 microgram (Φg) = 10^{-3} mg or
10^{-6} g = 3.5 x 10^{-8} ounce
1 milligram (mg) = 3.5 x 10^{-5} ounce
1 gram (g) = 1000 mg = 0.035 ounce
1 kilogram (kg) = 1000 g = 2.2 pounds
1 metric ton = 1000 kg = 1.1 tons
1 kg/hectare = 0.89 pound/acre

Temperature

Degrees Celsius (EC) = 5/9 (EF-32)

Specific conductance

ΦS/cm = Microsiemens/centimeter

Turbidity

NTU = Nephelometric Turbidity Unit

Water Chemistry Abbreviations

Cl^-	Chloride	NH_3-N	Ammonia-nitrogen
SO_4^{2-}	Sulfate	$NO_3^- + NO_2^-$ - N	Nitrate + nitrite-nitrogen
Ca^{2+}	Total calcium	TP	Total phosphorus
Mg^{2+}	Total magnesium	TOC	Total organic carbon
Na^+	Total sodium	Cu	Total copper
TN	Total nitrogen	TDS	Total Dissolved Solids

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Reservoir Description

Harris Reservoir, located in Chatham and Wake Counties, North Carolina, was created by impounding Buckhorn Creek, a tributary of the Cape Fear River (Figure 1). The main body of Harris Reservoir has a surface area of 1,680 ha; the auxiliary reservoir has a surface area of 130 ha. The main reservoir has a maximum depth of 18 m, a mean depth of 5.3 m, a volume of 8.9×10^7 m^3, a full-pool elevation of 67.1 m NGVD, and an average residence time of 28 months. The reservoir began filling in December 1980 and reached full-pool elevation in February 1983. The 64.5-km shoreline is mostly wooded and the 183.9-km^2 drainage area is mostly rolling hills with land used primarily for forestry and agriculture. The conversion of areas from forestry or agricultural purposes to residential uses continues in many areas of the drainage.

Harris Reservoir was constructed to supply cooling tower makeup and auxiliary reservoir makeup water to the 900-MW Harris Nuclear Plant, which began commercial operation in May 1987. In 1986 the bottom waters of the reservoir near the main dam began receiving National Pollutant Discharge Elimination System (NPDES)-permitted wastewater discharges from the power plant cooling tower. Tributaries also receive NPDES-permitted discharges from the Harris Energy and Environmental Center and from wastewater treatment plants at Apex and Holly Springs. The reservoir is a source of drinking water for Progress Energy employees at the Harris Nuclear Plant and the Harris Energy and Environmental Center.

Objectives

The primary objectives of the 2006 Harris Nuclear Plant non-radiological environmental monitoring program were to: (1) assess the overall water quality of Harris Reservoir, (2) identify any natural or power plant-induced effects on reservoir water quality, (3) document the introduction and expansion of nonnative plant and animal populations in the reservoir, and (4) demonstrate the existence of a reasonable recreational fishery.

Methods

The Harris Nuclear Plant environmental program for 2006 included monitoring the reservoir's: (1) limnological characteristics (water quality, water chemistry, and phytoplankton), (2) fisheries community, (3) possible introductions of zebra and quagga mussels, and (4) distribution of aquatic vegetation. Sampling methods and statistical analyses for data collected during 2006 were similar to those used for data collected during 2004 (PEC 2005) (Tables 1 and 2). A list of common and scientific names of species mentioned in this report is provided (Table 3).

All analytical testing completed in support of the Harris Reservoir environmental program was performed by laboratories which were certified by the State of North Carolina to perform water and wastewater testing (except for the analysis of total phosphorus). Total phosphorus analysis was conducted by The University of Missouri—a vendor approved by Progress Energy Carolinas, Inc., for this testing. The accuracy and precision of laboratory analyses of water chemistry data were determined with analytical standards, spikes, and replicates. Quality assurance information including the accuracy and percent recovery of water chemistry standards are available upon request. In this report where concentrations were less than the laboratory-reporting limit, the concentrations were assumed to be at one-half the reporting limit for the calculation of the mean.

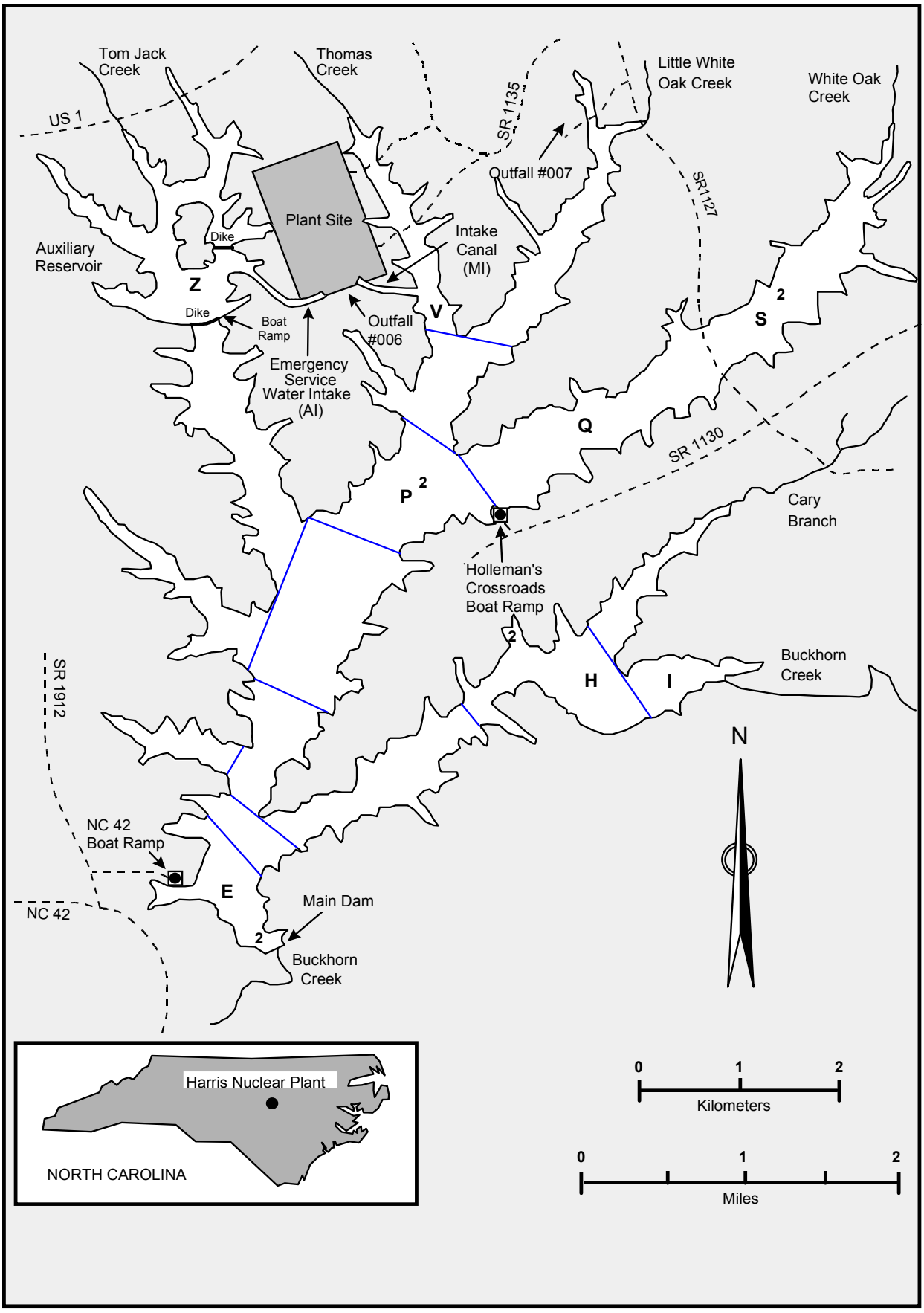


Figure 1. Sampling areas and stations at Harris Reservoir during 2006.

Table 1. Environmental monitoring program at Harris Reservoir for 2006.

Program	Frequency	Location
Water quality	January, May, July, November	Stations E2, H2, P2, and S2 (surface to bottom at 1-m intervals)
Water chemistry	January, May, July, November	Stations E2, H2, P2, and S2 (surface samples at all stations)
Plankton		
Chlorophyll *a*	January, May, July, November	Stations E2, H2, P2, and S2
Phytoplankton[+]	January, May, July, November	Stations E2, H2, P2, and S2
Biofouling monitoring		
Zebra mussel surveys	January, May, July, November	Areas E, P or Q, and V
Fisheries		
Electrofishing	February, May, August, November	Stations E1, E3, H1, H3, P1, P3, S1, S3, V1, and V3
Aquatic vegetation survey	November	Areas MI and Z

[+]Phytoplankton samples were collected and preserved but were not identified because all sampled chlorophyll *a* concentrations were < 40 Φg/L.

Table 2. Field sampling and laboratory methods followed in the 2006 environmental monitoring program at Harris Reservoir.

Program	Methods
Water quality	Temperature, dissolved oxygen, pH, turbidity, and specific conductance were measured with calibrated YSI® multi-parameter instruments and YSI® dissolved oxygen meters. Measurements were taken from surface to bottom at 1-m intervals. Water clarity was measured with a Secchi disk.
Water chemistry	Surface water samples were collected in appropriate containers, transported to the laboratory on ice, and analyzed according to accepted laboratory methods.
Phytoplankton	Equal amounts of water from the surface, the Secchi disk transparency depth, and twice the Secchi disk transparency depth were obtained with a Van Dorn sampler and mixed in a plastic container. A 250-ml sub sample was taken and preserved with 5 ml of "M3" fixative.
Chlorophyll *a*	Equal amounts of water from the surface, the Secchi disk transparency depth, and twice the Secchi disk transparency depth were obtained with a Van Dorn sampler and mixed in a plastic container. A 1000-ml sub sample was collected in a dark bottle, placed on ice, and returned to the laboratory. In the laboratory a 250-ml sub sample was analyzed according to Strickland and Parsons (1972) and APHA (1995).
Electrofishing	Fifteen-minute samples were collected at each station using a Smith-Root Type VI-A, 5.0 GPP, or 7.5 GPP equipped, Wisconsin-design electrofishing boat with pulsed DC current. Fish were identified to species, measured to the nearest mm, weighed to the nearest gram, examined for the presence of disease and deformities, and released.
Biofouling monitoring	The dock at the Holleman's boat ramp or water quality station marker buoys were visually inspected for mussels during routine water quality monitoring.
Aquatic vegetation survey	Portions of the shoreline and/or littoral zone of the Harris Plant main reservoir intake canal and auxiliary reservoir were systematically surveyed by boat to document the presence of aquatic vegetation, specifically hydrilla and water primrose.

Table 3. Common and scientific names of species mentioned in this report.

Common Name	Scientific Name
Fish	
Black crappie	*Pomoxis nigromaculatus*
Bluegill	*Lepomis macrochirus*
Bluespotted sunfish	*Enneacanthus gloriosus*
Bowfin	*Amia calva*
Brown bullhead	*Ameiurus nebulosus*
Chain pickerel	*Esox niger*
Channel catfish	*Ictalurus punctatus*
Coastal shiner	*Notropis petersoni*
Common carp	*Cyprinus carpio*
Flat bullhead	*Ameiurus platycephalus*
Gizzard shad	*Dorosoma cepedianum*
Golden shiner	*Notemigonus crysoleucas*
Grass carp	*Ctenopharyngodon idella*
Largemouth bass	*Micropterus salmoides*
Redear sunfish	*Lepomis microlophus*
Snail bullhead	*Ameiurus brunneus*
Threadfin shad	*Dorosoma petenense*
Unidentified killifish	*Fundulus* spp.
Warmouth	*Lepomis gulosus*
White catfish	*Ameiurus catus*
White perch	*Morone americana*
Mussels	
Quagga mussel	*Dreissena bugensis*
Zebra mussel	*Dreissena polymorpha*
Aquatic Vegetation	
Water primrose	*Ludwigia* spp.
Hydrilla	*Hydrilla verticillata*

Discussion

Harris Reservoir supplies makeup water to the closed-cycle cooling system for the Harris Nuclear Plant. The Harris Nuclear Plant discharges primarily cooling tower blowdown, along with low volume waste discharges, into the reservoir near the main dam.

Harris Reservoir continued to show qualities of a typical, biologically productive, southeastern reservoir in 2006. Reservoir waters were well-mixed during late autumn and winter months with similar temperature and dissolved oxygen levels throughout the water column. Dissolved oxygen levels declined near the bottom with stratification during late spring and summer. Nutrient concentrations remained somewhat similar to recent years and were in an expected range for a productive reservoir in this area of the Piedmont. Total nitrogen, nitrate + nitrite-N, and total phosphorus values have shown slightly increasing trends in recent years but are not considered biologically significant.

Largemouth bass, bluegill, and redear sunfish continued to dominate the fish community in Harris Reservoir during 2006. Annual catch rates for redear sunfish and largemouth bass were similar to catch rates in previous years while the annual catch rates for bluegill sunfish increased from recent years. Bluegill and largemouth bass were represented by multiple size groups and an abundance of small fish indicated good reproduction. Similar to previous years, young redear sunfish were less common in samples than young bluegill and largemouth bass. The largemouth bass population remained balanced with a high percentage of larger fish present in the population.

No exotic mussel species that could cause biofouling problems were found in Harris Reservoir or the auxiliary reservoir during 2006. During November of 2006 a visual aquatic vegetation survey of the shoreline was conducted in the Thomas Creek arm of the Harris Reservoir and in the HNP intake canal. Similar to previous years, the dominant aquatic vegetation was hydrilla and water primrose (*Ludwigia* spp.). The areal coverage of both aquatic weeds was similar to recent years and no fouling of the plant intake screens occurred. No stands of hydrilla were observed in the littoral zone of the auxiliary reservoir during 2006. The attempt to control hydrilla by releasing grass carp in the auxiliary cooling reservoir continues to be effective in preventing infestation and spread of hydrilla.

REFERENCES

APHA. 1995. Standard methods for the examination of water and wastewater. 19th ed. American Public Health Association, Washington, DC.

PEC. 2005. Harris Nuclear Power Plant 2004 environmental monitoring report. Progress Energy Carolinas, New Hill, NC.

Strickland, J. D. H., and T. R. Parsons. 1972. A practical handbook of seawater analysis. Bulletin No. 167 (2nd ed.). Fisheries Research Board of Canada.

Appendix 1. Water temperature, dissolved oxygen, conductivity, pH, and Secchi disk transparency data collected from Harris Reservoir during 2006.

January 24, 2006

Depth (m)	Temperature (°C)				Dissolved oxygen (mg/L)				Conductivity (µS/cm)				pH				Secchi disk depth (m)			
	E2	H2	P2	S2	E2	H2	P2	S2	E2	H2	P2	S2	E2	H2	P2	S2	E2	H2	P2	S2
0.2	10.3	9.8	9.8	9.3	11.9	10.8	11.5	8.9	133	119	129	156	7.7	7.9	8.3	8.3	1.2	1.2	1.2	0.9
1.0	9.8	9.8	9.6	9.2	12.1	10.8	12.4	8.4	133	119	129	155	7.7	7.9	8.0	8.3				
2.0	9.2	9.6	9.3	9.1	12.1	10.8	11.5	8.5	133	119	128	153	7.7	7.9	7.9	8.2				
3.0	9.1	9.6	9.2	9.1	11.7	10.9	11.3	8.2	133	119	128	156	7.7	7.8	7.9	8.2				
4.0	9.1	9.6	9.2	9.1	11.3	10.8	11.1	8.1	133	119	128	156	7.6	7.8	7.8	8.1				
5.0	9.1	9.5	9.2		11.1	10.8	11.0		133	119	129		7.6	7.8	7.8					
6.0	9.1	9.3	9.2		11.0	10.4	10.7		133	121	129		7.6	7.7	7.8					
7.0	9.1	9.2	9.2		10.8	10.0	10.7		133	123	129		7.6	7.7	7.8					
8.0	9.1	9.2	9.2		10.7	9.8	10.6		133	123	129		7.6	7.6	7.8					
9.0	9.0	9.2			10.6	9.7			134	123			7.6	7.6						
10.0	9.0				10.5				133				7.6							
11.0	9.0				10.5				133				7.5							
12.0	9.0				10.4				133				7.5							
13.0	9.0				10.4				133				7.5							
14.0	9.0				10.4				133				7.5							
15.0	9.0				10.4				134				7.5							
16.0	9.0				10.0				134				7.5							

May 10, 2006

Depth (m)	Temperature (°C)				Dissolved oxygen (mg/L)				Conductivity (µS/cm)				pH				Secchi disk depth (m)			
	E2	H2	P2	S2	E2	H2	P2	S2	E2	H2	P2	S2	E2	H2	P2	S2	E2	H2	P2	S2
0.2	21.1	20.3	20.1	20.0	9.2	9.2	9.3	7.3	160	158	161	149	7.9	7.7	7.7	6.9	2.2	1.5	1.8	1.0
1.0	21.1	20.2	20.1	19.2	9.1	9.2	9.3	6.8	160	158	161	148	7.9	7.7	7.7	6.8				
2.0	20.1	19.7	19.8	18.7	8.5	8.7	9.2	6.0	160	157	161	146	7.6	7.4	7.6	6.7				
3.0	19.7	19.6	19.5	16.2	5.8	8.4	8.8	2.3	161	157	161	123	6.9	7.3	7.5	6.1				
4.0	18.9	19.5	19.1	16.0	5.4	7.7	8.0	2.2	161	157	161	123	6.7	7.1	7.1	6.2				
5.0	18.3	19.4	18.9	16.0	3.3	7.1	7.2	2.2	161	157	161	124	6.5	7.0	7.0	6.7				
6.0	18.1	19.0	18.6		2.2	5.6	6.0		161	154	161		6.5	6.8	6.8					
7.0	17.5	17.8	18.0		1.9	2.2	4.0		167	144	164		6.4	6.5	6.6					
8.0	16.9	17.1	17.4		1.6	0.6	2.3		168	163	174		6.4	6.7	6.6					
9.0	16.4		17.3		1.5		1.5		171		185		6.4		6.7					
10.0	16.2				1.3				172				6.4							
11.0	15.8				1.1				174				6.4							
12.0	15.3				0.9				176				6.4							
13.0	14.5				0.5				182				6.5							
14.0	14.3				0.3				186				6.6							
15.0	13.9				0.3				191				6.7							
16.0	13.7				0.3				201				6.7							
17.0	13.7				0.3				203				6.8							

Appendix 1 (continued)

July 10, 2006

Depth (m)	Temperature (°C)				Dissolved oxygen (mg/L)				Conductivity (µS/cm)				pH				Secchi disk depth (m)			
	E2	H2	P2	S2	E2	H2	P2	S2	E2	H2	P2	S2	E2	H2	P2	S2	E2	H2	P2	S2
0.2	27.7	28.2	28.0	27.7	8.9	8.5	8.5	7.7	139	137	138	133	8.2	7.7	8.0	7.2	1.4	1.3	1.7	1.3
1.0	27.5	28.0	28.0	27.6	8.8	8.5	8.5	7.5	139	138	138	133	8.0	7.7	8.0	7.1				
2.0	27.1	27.5	28.0	27.4	8.3	7.7	8.3	7.1	139	138	138	134	7.8	7.3	7.7	7.0				
3.0	26.2	27.2	27.3	26.3	2.5	4.7	7.8	0.5	139	138	138	143	6.3	6.7	7.4	6.5				
4.0	25.3	24.8	27.0	23.9	0.5	0.5	6.0	0.3	144	145	138	156	6.2	6.4	6.7	6.5				
5.0	23.1	22.4	22.3	23.7	0.3	0.4	0.5	0.3	158	145	144	155	6.2	6.2	6.2	6.5				
6.0	21.9	21.0	21.2		0.3	0.3	0.3		162	143	139		6.2	6.1	6.1					
7.0	21.3	20.8	20.8		0.2	0.2	0.2		158	143	138		6.2	6.1	6.1					
8.0	20.7	20.6	20.4		0.2	0.2	0.2		153	146	140		6.2	6.1	6.2					
9.0	20.2				0.2				151				6.2							
10.0	19.7				0.2				161				6.2							
11.0	19.2				0.2				171				6.3							
12.0	17.8				0.2				192				6.4							
13.0	16.7				0.1				218				6.5							
14.0	16.2				0.1				226				6.6							
15.0	16.0				0.1				229				6.6							
16.0	15.9				0.1				233				6.7							
17.0	15.8				0.1				246				6.7							

November 30, 2006

Depth (m)	Temperature (°C)				Dissolved oxygen (mg/L)				Conductivity (µS/cm)				pH				Secchi disk depth (m)			
	E2	H2	P2	S2	E2	H2	P2	S2	E2	H2	P2	S2	E2	H2	P2	S2	E2	H2	P2	S2
0.2	12.6	15.0	14.4	15.4	8.3	11.3	11.3	12.2	123	123	124	113	7.3	7.5	7.6	7.4	1.0	1.5	1.2	0.9
1.0	12.5	14.7	14.4	15.1	8.2	11.2	11.3	11.3	122	123	124	113	7.2	7.5	7.6	7.2				
2.0	12.3	14.3	14.2	13.7	8.2	10.9	11.1	6.8	122	123	124	99	7.1	7.5	7.6	6.8				
3.0	11.8	12.6	12.3	10.0	8.1	9.8	9.9	5.0	120	122	124	62	7.1	7.4	7.5	6.9				
4.0	11.7	12.0	12.0	9.6	7.7	9.1	9.0	4.8	110	119	123	62	7.0	7.3	7.4	7.2				
5.0	11.6	11.5	11.9	9.5	7.1	8.9	9.0	3.4	106	112	120	65	7.0	7.2	7.3	7.2				
6.0	11.5	11.3	11.5	9.5	6.3	8.5	9.0	3.8	104	109	112	80	6.9	7.2	7.3	7.4				
7.0	11.4	11.2	11.3		6.1	6.4	8.6		107	101	103		6.8	7.0	7.2					
8.0	11.4	11.2	11.1		6.2	5.7	8.0		107	101	96		6.8	6.9	7.1					
9.0	11.4		11.0		6.1		7.4		108		95		6.8		7.1					
10.0	11.4				6.0				107				6.8							
11.0	11.4				6.2				108				6.7							
12.0	11.4				6.3				109				6.7							
13.0	11.4				6.3				109				6.7							
14.0	11.4				6.3				109				6.7							
15.0	11.4				6.2				114				6.7							

Appendix 2. Means, ranges, and spatial trends of selected limnological variables from the surface waters of Harris Reservoir during 2006.

Variable	Station				Reservoir Mean
	E2	H2	P2	S2	
Total dissolved solids (mg/L)	86 (76-98)	82 (73-92)	87 (72-103)	92 (79-110)	87 (72-110)
Turbidity (NTU)	3.3 (1.9-4.6)	3.5 (1.0-5.7)	2.9 (1.7-4.0)	8.0 (5.5-13)	4.4 (1.0-13)
Secchi disk transparency (m)	1.4 (1.0-2.2)	1.4 (1.2-1.5)	1.5 (1.2-1.8)	1.0 (0.9-1.3)	1.3 (0.9-2.2)
Chlorophyll *a* (µg/L)	16 (1.8-29.9)	16 (5.7-21.3)	12 (6.3-17.1)	9.5 (4.2-13.2)	13 (4.2-29.9)
Nutrients (mg/L)					
Ammonia-N	0.02 (< 0.02-0.02)	0.01 (< 0.02-0.02)	0.01 (< 0.02-0.02)	0.03 (< 0.02-0.08)	0.02 (< 0.02-0.08)
Nitrate + nitrite-N	0.14 (0.05-0.24)	0.14 (0.06-0.22)	0.14 (0.05-0.21)	0.08 (0.03-0.14)	0.12 (0.03-0.24)
Total nitrogen	0.96 (0.73-1.29)	0.98 (0.66-1.44)	0.87 (0.60-1.13)	0.89 (0.62-1.10)	0.92 (0.60-1.44)
Total phosphorus	0.048 (0.030-0.069)	0.031 (0.024-0.034)	0.036 (0.030-0.046)	0.035 (0.027-0.041)	0.037 (0.024-0.069)
Total organic carbon	7.3 (5.8-8.5)	7.7 (6.5-8.9)	7.9 (7.2-8.7)	8.7 (7.8-9.4)	7.9 (5.8-9.4)
Hardness[&]	19 (18-21)	19 (17-21)	19 (18-21)	22 (19-26)	20 (17-26)
Specific conductance (µS/cm)	139 (123-160)	134 (119-158)	138 (124-161)	138 (113-156)	137 (113-161)
Ions (mg/L)					
Calcium	4.3 (3.9-4.8)	4.3 (3.7-4.8)	4.2 (3.8-4.8)	5.3 (4.5-7.0)	4.5 (3.7-7.0)
Chloride	18 (17.4-19.6)	18 (16.7-18.4)	18 (17.6-19.2)	17 (15.1-20.4)	18 (15.1-20.4)
Magnesium	2.1 (2.0-2.1)	2.1 (1.9-2.2)	2.1 (1.9-2.2)	2.0 (1.9-2.1)	2.1 (1.9-2.2)
Manganese	102 (47.2-168.0)	61 (43.0-83.8)	66 (53.8-88.3)	135 (39.6-207.0)	91 (39.6-207.0)
Sodium	13.4 (12.8-14.1)	13.2 (11.8-14.4)	14.5 (12.6-14.4)	13.0 (12.0-13.8)	13.2 (11.8-14.4)
Sulfate	15 (13.4-17.5)	15 (12.2-16.5)	14 (11.7-17.2)	14 (9.5-20.6)	15 (9.5-20.6)
Total alkalinity[&]	17 (16-20)	16 (14-20)	16 (14-18)	19 (15-28)	17 (14-28)
Copper (µg/L)	1.8 (1.1-2.8)	1.5 (1.0-2.1)	5.6 (1.0-18.1)	1.7 (1.3-2.7)	2.7 (1.0-18.1)

[&]Total alkalinity units are in mg/L as $CaCO_3$ and hardness is calculated as mg equivalents $CaCO_3$/L.

Appendix 3. Mean number per hour for fish collected with electrofishing sampling by transect from Harris Reservoir during 2006.

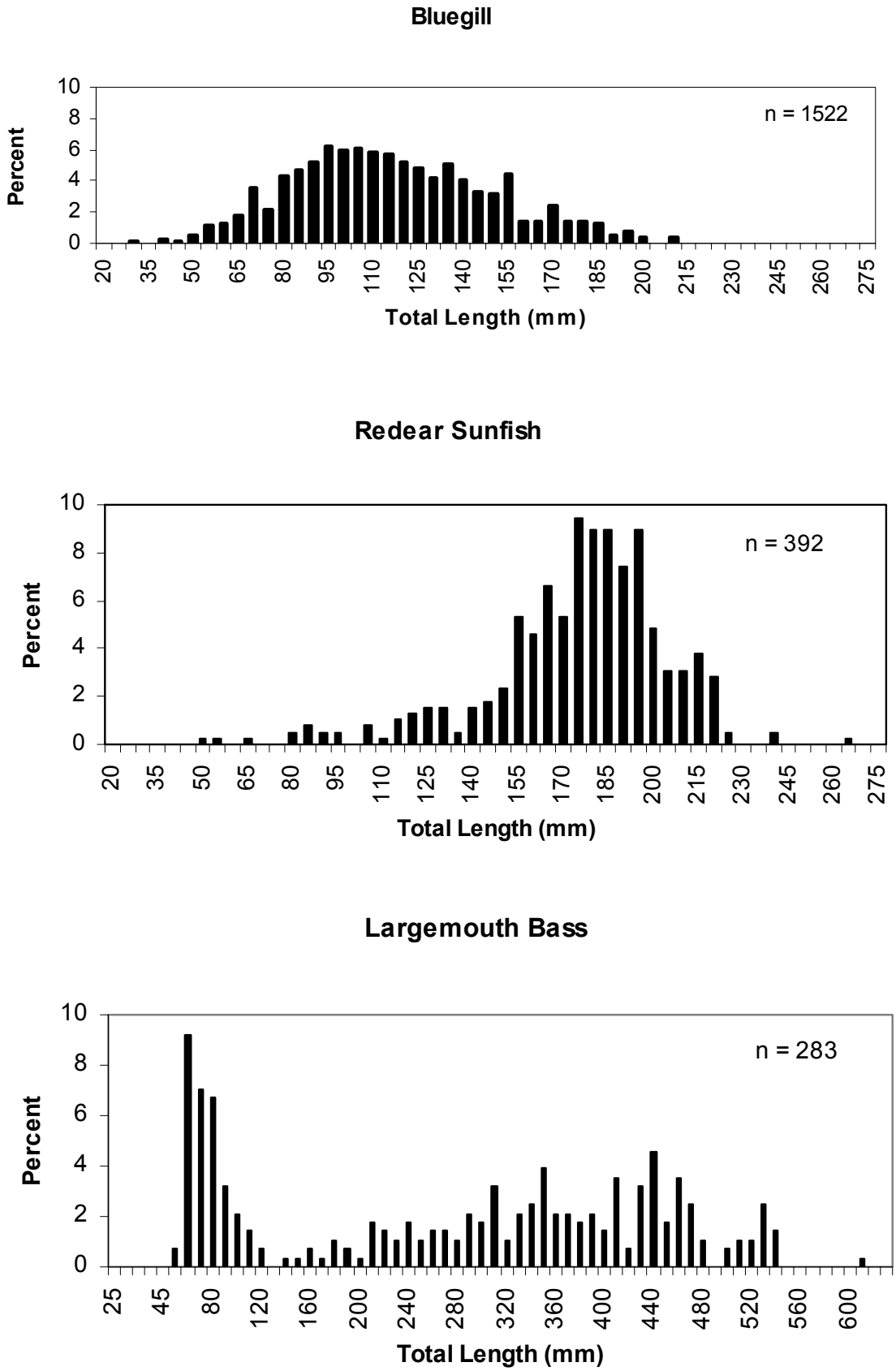
Species	Transect					Reservoir mean
	E	H	P	S	V	
Bowfin	0	< 1	1	2	2	1
Gizzard shad	12	16	3	38	13	16
Threadfin shad	28	36	192	202	< 1	92
Common carp	0	1	0	0	< 1	< 1
Golden shiner	2	2	3	4	4	3
Coastal shiner	0	2	1	< 1	0	1
Snail bullhead	1	0	0	0	0	< 1
White catfish	4	1	4	< 1	6	3
Brown bullhead	1	4	2	3	1	2
Flat bullhead	< 1	0	0	0	1	< 1
Channel catfish	0	0	0	0	< 1	< 1
Chain pickerel	0	0	0	4	4	2
Unidentified killifish	0	0	1	0	0	< 1
White perch	1	< 1	< 1	0	0	< 1
Bluespotted sunfish	0	0	0	2	< 1	1
Warmouth	2	3	< 1	14	4	5
Bluegill	130	184	118	174	154	152
Redear sunfish	60	76	22	32	5	39
Sunfish (hybrid)	0	0	0	< 1	0	< 1
Largemouth bass	26	23	29	28	36	28
Black crappie	16	72	12	6	5	22
Total[&]	**284**	**423**	**389**	**512**	**236**	369

[&]Summations may vary from column totals due to rounding.

Appendix 4. Mean weight (in kilograms) per hour for fish collected with electrofishing sampling by transect from Harris Reservoir during 2006.

Species	Transect					Reservoir mean
	E	H	P	S	V	
Bowfin	0	0.6	1.5	2.3	4.4	1.8
Gizzard shad	2.5	4.0	0.7	5.7	3.8	3.3
Threadfin shad	0.3	0.3	1.6	2.2	< 0.1	0.9
Common carp	0	4.7	0	0	2.2	1.4
Golden shiner	0.1	0.1	0.1	0.1	< 0.1	0.1
Coastal shiner	0	< 0.1	< 0.1	< 0.1	0	< 0.1
Snail bullhead	< 0.1	0	0	0	0	< 0.1
White catfish	2.1	0.6	2.4	0.2	3.3	1.7
Brown bullhead	0.2	1.6	0.8	1.2	0.2	0.8
Flat bullhead	< 0.1	0	0	0	0.2	< 0.1
Channel catfish	0	0	0	0	0.4	0.1
Chain pickerel	0	0	0	2.1	1.4	0.7
Unidentified killifish	0	0	< 0.1	0	0	< 0.1
White perch	0.1	0.1	< 0.1	0	0	< 0.1
Bluespotted sunfish	0	0	0	< 0.1	< 0.1	< 0.1
Warmouth	0.1	0.2	< 0.1	0.5	0.4	0.3
Bluegill	4.0	6.9	3.5	5.6	5.6	5.1
Redear sunfish	7.3	6.8	2.4	2.0	0.3	3.8
Sunfish (hybrid)	0	0	0	< 0.1	0	< 0.1
Largemouth bass	11.2	17.5	16.2	10.8	36.0	18.3
Black crappie	1.6	8.0	1.2	1.5	0.4	2.5
Total[&]	**29.7**	**51.4**	**30.5**	**34.2**	**58.7**	40.9

[&]Summations may vary from column totals due to rounding.



Appendix 5. Length-frequency distributions for bluegill, redear sunfish, and largemouth bass collected with electrofishing sampling from Harris Reservoir in 2006.