CUBA LAKE
FISHERIES SURVEY
2011

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ABSTRACT

In June 2011, a fisheries survey was conducted in Cuba Lake to assess the status of the fish populations, with special emphasis on growth and abundance of walleye (*Sander vitreus*), smallmouth bass (*Micropterus dolomieui*), and yellow perch (*Perca flavescens*). Northern pike (*Esox lucius*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), pumpkinseed (*Lepomis gibbosus*), and rock bass (*Ambloplites rupestris*) populations were also evaluated and compared to the 2003 spring electrofishing survey (Evans 2004). Water quality parameters were measured and zooplankton samples were collected and analyzed.

There were 655 fish collected in 3 hours (180 minutes) of electrofishing effort. Walleye and smallmouth bass were the dominant predators and accounted for the majority of the gamefish in the lake. Walleye growth rates were as slow as they have been for the last 60 years, but despite the discontinuation of walleye stocking in 1999 the population density remained high as indicated by the catch rate of 43 walleye/hour. Smallmouth bass growth and catch rates (26/hr) were average for Cuba Lake in 2011 which is a decline from 2003 when both were high. Largemouth bass abundance has been consistently low since the 1990's. Northern pike, which were illegally introduced in the early 1990's were found in low numbers, however angler reports suggest that a relatively stable population does exist.

Cuba Lake exhibited a low predator to prey ratio in 2011. Yellow perch were the most abundant panfish in 2011 and displayed above average growth rates for New York State waters. In past studies, including the 2003 survey, rock bass have been one of the most abundant panfish. However, low catch rates for rock bass, bluegill, and pumpkinseed and large zooplankton size in 2011 indicate low overall panfish abundance.

Cuba Lake should be managed to provide a balanced fishery based on self-sustaining game and panfish populations. Smallmouth bass and walleye are the desired primary predators, with largemouth bass and northern pike comprising the remainder of the gamefish biomass. Yellow perch, rock bass, bluegill, and pumpkinseed should provide additional recreational angling opportunities throughout the summer and during the ice fishing season. Statewide angling regulations should continue and a future fisheries survey should be conducted in 5 years to continue evaluating game and panfish population status and trends.

Introduction

Cuba Lake (PA-53-54-11-P115) is a 445 acre (180 ha) eutrophic reservoir located in the west-central part of Allegany County (Figure 1), and is also a tributary of the Allegheny River watershed. Cuba Lake has a mean depth of 20 feet (6m) and a maximum depth of 46 feet (14m) for most of the year. However, every year during the late fall the lake is drawn down about 6-8 feet (2-3m) by means of the concrete spillway at the southern end of the lake. Cuba Lake has a watershed that spans approximately 15,360 acres (24 mi^2). The majority of the land use in the watershed is agricultural and about one third is forested.

Since construction in 1858, Cuba Lake has seen many changes in administration. From the 1890's until 1981 the lake was administered by the New York State Office of Parks, Recreation, and Historic Preservation (OPRHP) which included having a full time ranger working at the lake (Evans 2004). In 1981, the Cuba Lake District was created, and then in 1998 reached an agreement with the State to buy all state owned property surrounding the lake. The only area not included in the agreement was about 20 acres of land at the south end that is owned by the Seneca Nation of Indians. The agreement included a permanent easement to the New York State Department Of Environmental Conservation (DEC) of approximately 6 acres of land at the Rawson creek inlet on the Taylor farm property in order to maintain public access to the lake (Evans 2004). In the fall of 2011 the DEC began construction of a new access area with a concrete launch and parking for about 30 vehicle and trailers on this 6 acre piece.

Cuba Lake supports a variety of fish species and provides a sport fishery for smallmouth bass (*Micropterus dolomieui*), walleye (*Sander vitreus*), largemouth bass (*Micropterus salmoides*), and northern pike (*Esox lucius*). Northern pike were introduced in the early 1990's and have since established a self-sustaining population. The lake also contains other species commonly desired by anglers such as yellow perch (*Perca flavecens*), black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), pumpkinseed (*Lepomis gibbosus*), and rock bass (*Ambloplites rupestris*). Other common species include brown bullhead (*Ameiurus nebulosus*), common carp (*Cyprinus carpio*), white sucker (*Catostomus commersoni*), and golden shiner (*Notemigonus crysoleucas*).

Cuba Lake was historically stocked with walleye beginning in 1927 and this continued until 1998 when fisheries management halted stocking due to ample natural reproduction and slow growth rates (Evans 1999). The lake was also stocked with smallmouth bass, largemouth bass, yellow perch, black crappie, and brown bullhead between 1927 and 1963 (Pomeroy 1984). From 1972 to 1981, tiger muskellunge (*Esox lucius x Esox masquinongy*) were stocked in an attempt to provide a trophy fishery.

All fish species in Cuba Lake are currently supported by natural reproduction and managed through the use of statewide angling regulations. The objectives of the 2011 Cuba Lake fisheries survey were to monitor the current status of all gamefish and panfish species, compare them to past study results, and recommend future fisheries management strategies.

Methods

A late spring night electrofishing survey was conducted on June 8 and 9, 2011. All standard procedures and methodology of the New York State Centrarchid Sampling Manual (Green 1989) were followed for collecting, analyzing, and interpreting data. Sampling effort was divided into 8 separate electrofishing runs; four-fifteen minute runs in which all fish were collected, and four-thirty minute runs when only gamefish were collected. Virtually the entire shoreline was electrofished for a total of 3 hours effort. During sampling, fish collected were identified, measured to the nearest mm, and scale samples were taken to determine age.

Zooplankton samples were taken on June 8 and September 9, 2011 at the deepest point in the lake using a 0.5m diameter nylon net with 153 micron mesh following methodology by Mills and Schiavone (1982). Samples were preserved in alcohol for later analysis following methodology described by Mills et al. (1987). Water quality parameters (water temperature, dissolved oxygen, pH, and conductivity) were measured at the same site.

Length at age for walleye, smallmouth bass, and yellow perch was determined through scale aging, and relative weight (Wr) (Anderson 1980) estimates for smallmouth bass (200-300mm and 300-400mm) were computed utilizing the formula:

$$Wr=(W/Ws)x100$$

Where W=actual weight

Ws= standard weight

Smallmouth bass $Ws= 10^{((-5.329 + (3.200 \text{ x LogL}))}$ (Kolander and Willis 1991)

Where L = length of fish in mm

Size composition of walleye and smallmouth bass populations were analyzed using proportional stock densities (PSD) and relative stock densities (RSD) as described by Anderson and Gutreuter (1983).

	stock size (mm)	quality size (mm)	preferred size (mm)
walleye	250	380	510
smallmouth bass	180	200	350

Results and Discussion

Walleye

One hundred and thirty walleye were collected, resulting in a catch rate of 43 walleye/hour (Table 1), which indicates an abundant population (Forney et al. 1994). This catch rate was slightly higher than the electrofishing catch rate in the spring of 2003 which was 39 fish/hour, and very similar to the long term average catch rate of 45 walleye/hour.

According to Evans (2004), walleye recruitment in Cuba Lake was fairly stable as of 2003, represented by strong year class data from 1994, 1995, 1996, 1998, and 2001. Most of the walleye (about 75%) collected during the 2011 spring survey were classified as yearling fish from the 2010 year class. The majority of the remaining fish collected were from the 2009 year class, and only a handful of walleye older than 3+ years were collected. These data suggest that minimal recruitment has been taking place since the 2003 survey, but also confirms that there was successful natural reproduction in 2009 and 2010.

However, indications of low recruitment could be a result of adult fish from older year classes not being vulnerable to electrofishing gear at the time of sampling. Due to the warm water temperatures at the time of sampling, it is probable that adult walleye had migrated to deeper water in search of cooler temperatures. The high catch rate of smaller fish in 2011 would most likely indicate that there are decent numbers of adult fish to support successful reproduction, and in turn would imply that there is stable recruitment that is not detected through spring electrofishing. In the past, it was thought that over harvest of adult fish was a cause of low recruitment, but this idea is refuted by the fact that there are high numbers of yearling fish, which signifies that there are enough adult fish surviving to successfully spawn.

Walleye growth rates in Cuba Lake have historically been slow to moderate, and the results of the 2011 survey indicate a continuing trend (Table 2). In New York State, three year old walleye averaging 295mm in length are considered to have slow growth (Festa et al. 1987). Three year old walleye in Cuba Lake in 2011 averaged 301mm indicating slow growth rates that closely resemble the 2003 survey (Evans 2004). However, age 2 and age 5 walleye from 2011 seem to exhibit more moderate growth rates (Table 2).

Over the years there have been many ideas as to why the walleye in Cuba Lake exhibit slow growth rates. Early research suggested that poor deep water oxygen levels during the summer months forced walleye to crowd into shallow waters causing slow growth (Stone and Pasko 1946). This theory was questioned by Roeker (1953) because an adequate forage base existed in these shallow areas suggesting that growth rates should be faster. Pomeroy (1984) made the point that even though adequate forage does exist, the dense aquatic vegetation in these shallow areas limits the ability of walleye to feed during the summer months. Evans (2004) suggested that these ideas may be plausible, but if these are the only limiting factors to slow growth then smallmouth bass should exhibit the same symptoms of slow growth, but they have acceptable growth rates.

Evans (2004) presumed that slow growth in walleye is sometimes density dependent based on intraspecific competition, and noted that the forage base has not always been abundant.

It is possible that there is minimal interspecific competition between smallmouth bass and walleye which would explain why they do not exhibit slow growth rates at the same time (Evans 2004). Although the ideas of Evans (2004) are the most plausible, it is difficult to draw a conclusion with the limited amount of information on the adult walleye population. A future percid survey implementing trap or gill nets to target adult walleye would provide for better understanding.

Historically, Cuba Lake was managed with a reduced minimum size limit of 305 mm (12 in) in an effort to increase harvest and therefore increase growth rates. This is a recommendation under the New York Walleye Management Plan (Festa et al. 1987) for over abundant slow growing populations. This reduced size limit was discontinued in 1977 because no increase in walleye growth was observed most likely due to insufficient harvest or limited prey availability.

The proportional stock density (PSD) for walleye in 2011 was 11 (Table 3). This is very similar to the PSD of 9 in 2003 (Evans 2004), but much lower than the long term average PSD of 39 (Table 3). Slow growth rates certainly contribute to low PSD's, but the more probable reason is associated with the sampling gear used in the surveys. Trap nets and gill nets were more commonly used in earlier surveys which are usually biased towards catching larger fish and therefore resulting in a higher PSD. Primarily all surveys from the 1990's to 2011 implemented boat electrofishing which seems to target smaller walleye causing a misrepresentation of the actual size composition of the population.

Smallmouth Bass

Seventy seven smallmouth bass were collected resulting in a catch rate of 26 SMB/hour (Table 1), which was considerably lower than the 39 fish/hour in the 2003 survey (Evans 2004), but very similar to the long term average of 28 SMB/hour. However, the 2011 catch rate was double the average catch rate (13/hr) for smallmouth bass in New York State waters (Green et al 1986).

Smallmouth bass had a PSD of 90 and an RSD_{14} of 47 (Table 4). The 2011 value for PSD was the highest ever recorded for Cuba Lake, and the RSD_{14} value was slightly lower than the 2003 survey but still ranks high when compared to the long term average (Table 4). Smallmouth bass populations providing quality fishing were characterized by PSD's of 50 to 80 and RSD_{15}'s of 10 to 25 (Green et. al. 1986). The stock indices from the 2011 spring survey are well above the recommended desirable ranges for a well balanced population (Anderson 1980).

Relative weight estimates for smallmouth bass in 2011 were 88.1 for fish 200-300 mm in length, and 84.5 for fish 300-400 mm in length. These estimates are below the recommended values (95-105) for fish in good condition indicating that the bass population may be stressed. This below average condition could be a result of low prey abundance or over abundance of predators.

Earlier Cuba Lake surveys in 1986 (Mckeown 1988) and 1992 (Evans 1993a) have shown average growth rates for New York State waters, taking smallmouth bass five years to reach the legal size of 12 inches (305mm). Growth rates increased in a 1998 study, and again in 2003 when SMB were averaging 340mm by age four (Evans 2004). The growth rate has decreased in 2011 as age four SMB are only averaging 284mm, and then reaching legal size by age 5, and averaging 321mm (Table 5). The smallmouth bass growth rate in Cuba Lake is now considered to be average when compared to other New York State waters (Green et. al.1986). Declining growth rates and below average weight estimates for smallmouth bass could be an indication of an unbalanced fishery heavily weighted towards predators. The stock indices and catch rates have remained high, and although the growth rates have dropped since the last survey, angler reports indicate that the smallmouth bass fishery in Cuba Lake is still excellent.

Largemouth Bass

No largemouth bass were collected during the 2011 late spring night electrofishing survey. Largemouth bass abundance in Cuba Lake has been consistently low for the past 18 years (Table 1). In a 1982-1983 survey by Pomeroy (1984) and a 1985-1986 study by Mckeown (1988) the ratio of smallmouth bass to largemouth bass was about 2:1. This ratio had increased to about 3:1 in a 1991-1992 study (Evans 1993a), and then greatly increased to 15:1 by 1999. In a 2003 survey by Evans, only 1 largemouth bass was captured amongst 300 smallmouth bass. A similar ratio was portrayed in the 2011 spring electrofishing survey, when 77 smallmouth bass and no largemouth bass were collected.

Although no largemouth bass were collected during the 2011 survey, a population does exist in Cuba Lake. Each year, largemouth bass catches are observed in angler and tournament reports. It is likely that sampling for largemouth bass by electrofishing is inefficient due to the location of the fish during spring sampling. The winter drawdown of Cuba Lake kills all shallow vegetation beds where largemouth bass would normally reside. Since spring electrofishing takes place in 2 -5ft. of water along the shoreline, it can be assumed that largemouth bass are oriented to deeper water and any remaining vegetation, which would account for low sample numbers. However, since the sampling methodology has not changed from year to year, and the largemouth bass abundance is constantly decreasing, it is likely that other factors are having an effect on the population. One specific reason for the decline in largemouth bass could be competition with the northern pike population (Evans 2004).

Northern Pike

Only 3 northern pike, measuring 280mm (11 in.), 375mm (14.8 in.), and 661mm (26 in.) were collected during the 2011 late spring night electrofishing survey resulting in a catch rate of 1 fish/hour (Table 1). This number is very low when compared to 20 northern pike collected in the spring of 2003, and 17 collected in the fall of 2003. Recent survey results indicate that the northern pike population has stabilized or may even be decreasing. However, these survey results are most likely an inaccurate indication of the northern pike population in Cuba Lake. Northern pike were not specifically targeted either by the timing of the sampling or by the gear (electrofishing is rather ineffective for sampling northern pike), but were merely collected as an incidental catch.

In the early 1990's, northern pike were illegally introduced into Cuba Lake, and in 1996 were collected by electrofishing for the first time. Evans (2004) suggested that an increasing northern pike population would most likely have a negative effect on other predator species, especially largemouth bass because they both inhabit the same shallow, weedy areas and desire the same type of forage, but also on smallmouth bass and walleye. The largemouth bass population does appear to be diminishing, but smallmouth bass and walleye remain abundant and northern pike have not yet had a significant negative effect on the overall Cuba Lake fishery.

Panfish

Three hundred and fifty five yellow perch were collected resulting in a catch rate of 355 fish/hour (Table 6). Yellow perch are the most abundant panfish in Cuba Lake, followed by bluegill, pumpkinseed, and rock bass (Table 6). Only four rock bass were collected in 2011 resulting in a catch rate of 4 fish/hour. When compared to past surveys the rock bass population appears to be diminishing, but angler reports create the assumption that a stable population does exist. Few black crappie were collected during the 2011 survey, most likely due to the fact that most of the fish had migrated to deeper water and were no longer vulnerable to the electrofishing gear. However, evidence shown through ice fishing reports and early spring angling during the period when black crappie are spawning proves that a fishable population does exist.

The predator/prey ratio (based on electrofishing catch rates) from the 2011 spring electrofishing survey was 0.17 (Table 7). This number suggests that the overall predator biomass in Cuba Lake could possibly be decreasing and allowing for larger panfish populations. A balanced fishery may be indicted by a predator to prey ratio of $\geq$ 0.20 (Mills et. al. 1987). The ratio for Cuba Lake was slightly lower than this target, which could be a result of the large catch of young yellow perch, and not necessarily an indication of an unbalanced fishery.

Yellow perch PSD was 13, compared to a PSD of 18 in 2003 (Evans 2004). Evans suggested that the PSD should increase for several years as the large year class in 2001 aged; however, the large gap between survey years precluded documenting this. Low PSD's could also be the result of high predation or exploitation rates of larger sized fish. The majority of the yellow perch collected in 2011 were between 70 and 120 mm in length, indicating another large year class in 2010, and therefore negatively influencing the PSD.

Yellow perch growth rates for Cuba Lake are above the average for New York State waters (Table 8). Forney et al. (1994) indicated that age four yellow perch over 200 mm (8in.) are a sign of good growth and balance in a New York State fishery. The yellow perch collected in 2011 averaged almost 200 mm at age three, and five year old fish were already considerably larger than the 6 year old average for New York State waters (Table 8). No other panfish species were aged due to small sample sizes.

Zooplankton

In June of 2011, zooplankton length averaged 1.12 mm, which was much larger than in May of 2003 (0.60 mm), and is actually the largest average ever recorded for Cuba Lake (Table 7). The average size decreased to 0.64 mm in September which is slightly lower than the long term September average (Table 7). The percent of *Daphnia* was 64% in the June sample and 45% in the September sample. Zooplankton size represents a suitable index for predator/prey balance within a fishery (Mills et al. 1987). This can be recognized when comparing the large average zooplankton size and the low predator to prey ratio in 2011 to previous survey years (Table 7). A decrease in zooplankton size throughout the summer was likely a result of the large 2010 year class of yellow perch which prey on the zooplankton (Mills et al. 1987). If the zooplankton size were to increase from the spring sample to the late summer sample it would indicate that there was not a strong year class of panfish to feed on the zooplankton. Some years, as in 2003, the panfish in Cuba Lake are heavily harvested by anglers and preyed upon by piscivors, resulting in increasing zooplankton length over the summer months, and also good growth rates for panfish due to limited competition.

Water Quality

Due to equipment malfunction, no accurate readings for dissolved oxygen were taken in June of 2011 (Table 9). As indicated in past surveys, Cuba Lake always stratifies during the summer. The thermocline in the lake has been steadily rising over time; from 1937 to about 1990 the thermocline set at 20 feet, it set at 15 feet in the 1990's, and in 2003 dissolved oxygen levels were inadequate for fish below 10 feet in depth (Evans 2004). No water quality samples were taken in August of 2011 and therefore the exact thermocline could not be pin-pointed, but if this trend continued in 2011, the thermocline would have been located in the top third of the water column. Conductivity in 2011 was 102 μmho/cm and pH levels remained fairly constant throughout the water column only ranging from 7.4 to 7.9 (Table 9).

Management Goal

Manage Cuba Lake to produce and maintain a balanced fishery with walleye and smallmouth bass as the primary predators. Largemouth bass and northern pike will make up a smaller part of gamefish biomass. Panfish such as yellow perch, rock bass and bluegill will add to the recreational fishery (Evans 2004).

Management Objectives

1. Manage smallmouth bass to sustain a favorable population size structure (PSD >40, bass reaching legal size in their fifth growing season). Late spring night electrofishing catch rates for smallmouth bass of all sizes should meet or exceed 13 fish/hour (statewide average from Green et al. 1986).

2. Manage walleye to sustain a favorable population size structure with spring electrofishing catch rates between or exceeding 8 to 20 walleye/hour (statewide target from Festa et al. 1987). Festa et al. (1987) considered catch rates for New York State of < 8 walleye/hr to represent low abundance, and catch rates of > 20 walleye/hour to represent high abundance.

3. Maintain the abundance and diversity of predators (smallmouth bass, walleye, largemouth bass, and northern pike) at levels conducive to providing good population size structure and growth for panfish, particularly yellow perch, rock bass, and bluegill (Green 1989, Forney et al. 1994).

4. In the event that an angler survey is able to be conducted the following angler catch rate objectives will also apply:
- Manage walleye to sustain a favorable population size structure with angler catch rates of 0.10 to 0.25 walleye/hr. Festa et al. (1987) considered catch rates of 0.05 to 0.10 walleye/hr for New York State as fair walleye fishing, good to very good walleye fishing as 0.10 to 0.25 walleye/hr, and catch rates over 0.25 walleye/hr as excellent walleye fishing.
- Manage smallmouth bass to sustain a favorable population size structure with angler catch rates for bass >12 in meeting or exceeding 0.29 fish/hr (statewide angler catch rates for bass from Green et al. 1986).

Management Strategies and Actions

1. Manage all fish species utilizing statewide angling regulations.

2. Natural reproduction of walleye is adequate for sustaining an abundant population. There is no need to re-institute the walleye fry stocking program that was discontinued in 1999.

3. Repeat the fisheries survey in 2016 following methodology of the statewide Centrarchid and Percid Sampling Manuals (Green 1989, Forney et al. 1994). Surveys should include zooplankton and water quality assessment.

4 Angler use, catch, and harvest surveys should be used in conjunction with the fisheries survey in 2016.

Literature Cited

Anderson, R. O. 1980. Proportional stock density (PSD) and relative weight (Wr): interpretive indices for fish populations and communities. pp 27-35. In: S. Gloss and B. Shupp (eds.) Practical Fisheries Management: More with less in the 1980's. Proceedings 1st annual workshop of the New York Chapter of the American Fisheries Society.

Anderson, R. O. and S. J. Gutreuter. 1983. Length, weight and associated structural indices. pp 283-300 in L. A. Nielsen and D. L. Johnson (eds.) Fisheries Techniques. American Fisheries Society, Bethesda, MD.

Evans, J. T. 1993a. Cuba Lake Fisheries Survey 1991-1992. New York State Department of Environmental Conservation, Allegany, NY. 25 pp.

Evans, J. T. 1999. Cuba Lake Fisheries Survey 1998. New York State Department of Environmental Conservation, Allegany, NY. 19 pp.

Evans, J. T. 2002. Silver Lake Progress Report 2001. New York State Department of Environmental Conservation, Allegany, NY. 26 pp.

Evans, J.T. 2004. Cuba Lake Fisheries Survey 1999-2003. New York State Department of Environmental Conservation, Allegany, NY.

Festa, P. J., J. L. Forney, and R. T. Colesante. 1987. Walleye management plan in New York State, a plan for restoration and enhancement. Special Publication, New York State Department of Environmental Conservation, Albany, NY. 104 pp.

Forney, J. L., G. Rudstam, D. M. Green and D. L. Stang. 1994. Percid Sampling Manual. Chapter 3 in Fish Sampling Manual. New York State Department of Environmental Conservation, Albany, NY.

Green, D. M. 1989. Centrarchid Sampling Manual. Chapter 1 in Fish Sampling Manual. New York State Department of Environmental Conservation, Albany, NY.

Green, D. M., B. J. Schonhoff III, and W. D. Youngs. 1986. The New York State bass study, 1977-1980: Use of angler collected data to determine population dynamics. Special Publication, New York State Department of Environmental Conservation, Albany, NY. 142 pp.

Kolander, K.D. and D.W. Willis. 1991. A proposed revision in the standard weight equation for smallmouth bass. Federal Aid in Fish Restoration Project F-15-R-1530. South Dakota State University, Brookings.

McKeown, P. E. 1988. Status of Fish Stocks in Cuba Lake 1985-1987. New York State

Department of Environmental Conservation, Allegany, NY. 44 pp.

Mills, E. L., D. M. Green, and A. Schiavone. 1987. Use of Zooplankton size to assess the community structure of fish populations in freshwater lakes. North American Journal of Fisheries Management. 7:369-378.

Mills, E. L. and A. Schiavone. 1982. Evaluation of fish communities through assessment of zooplankton populations and measures of lake productivity. North American Journal of Fisheries Management. 2:14-27.

Pomeroy, J. K. 1984. Fisheries Survey of Cuba Lake 1982-1983. New York State Department of Environmental Conservation, Allegany, NY. 26 pp.

Roeker, R. M. 1953. Cuba Lake Investigation. New York State Department of Environmental Conservation, Allegany, NY. 9 pp.

Stone, U. B. and D. Pasko. 1946. Cuba Lake Investigation. New York State Department of Environmental Conservation, Allegany, NY. 16 pp.

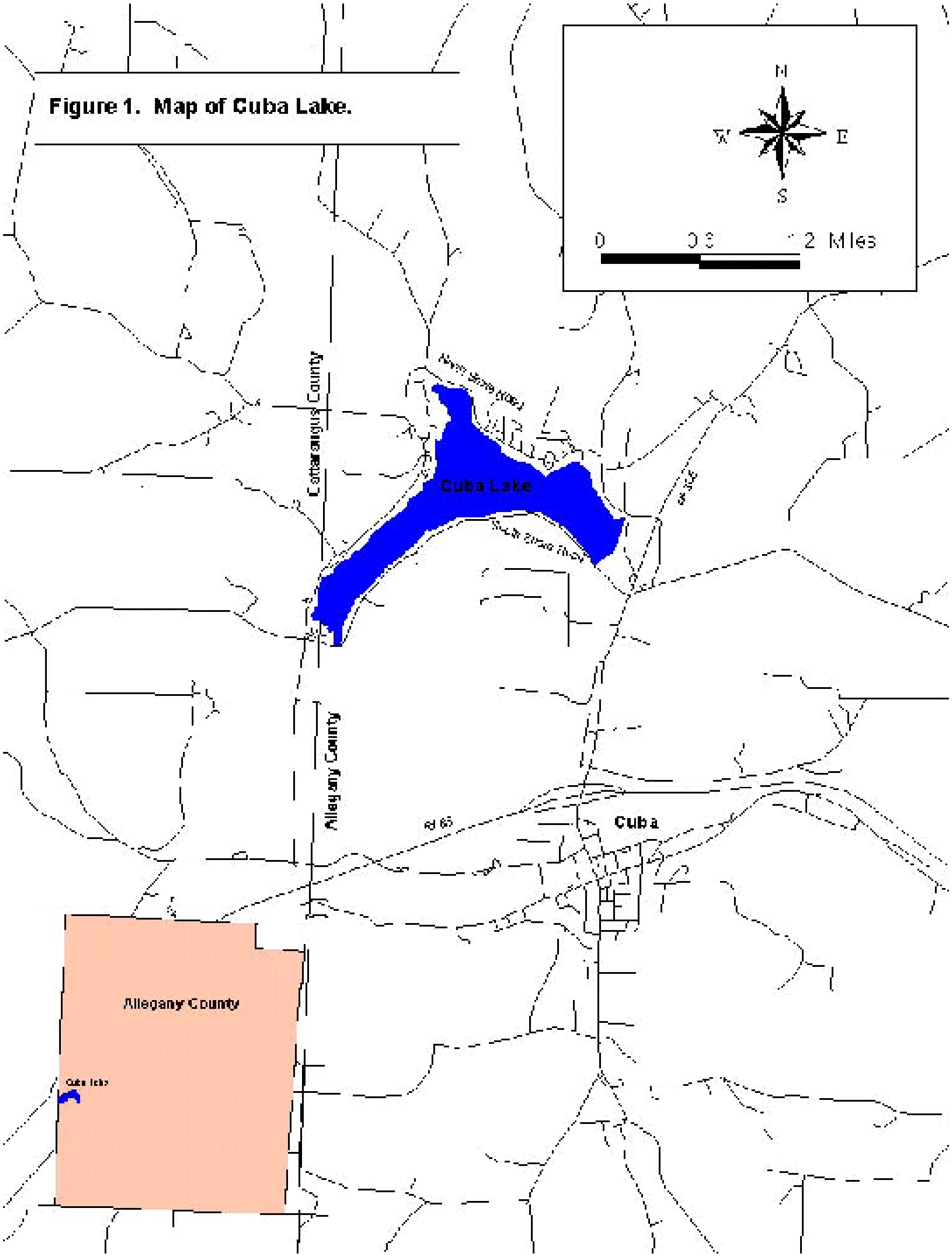

Figure 1. Map of Cuba Lake.

Table 1. Catch per hour (CPUE) for gamefish collected in the 2011 late spring night electrofishing survey in Cuba Lake, compared to values from 1993-2003.

Year	Walleye	Smallmouth Bass	Largemouth Bass	Northern Pike
1993-1998 avg.[1]	46	35	4	0
1999[2]	41	39	2	5
2000[2]	43	58	0	5
2001[2]	15	76	4	7
2002[2]	87	81	0	0
2003[2]	39	39	<1	1
2011	43	26	0	1

[1] Evans, J.T. 1999.
[2] Evans, J.T. 2003.

Table 2. Mean length (mm) at age for walleye collected in Cuba Lake, 1946-1998, 2003, and 2011, compared to average growth from the New York State Walleye Management Plan.

Year	**Age**									
	1	2	3	4	5	6	7	8	9	10
1946-1998 avg.[1]		265	321	364	399	422	444	460	542	549
2003[1]	206	296	321	376	378	398	420	513	495	
2011	198	296	301		424					520
Fast growth[2]		345	419	472	516	546				
Slow growth[2]		234	295	340	366	389				

[1] Evans, J.T. 2003.
[2] Festa, et. al. 1987. Growth averages from the New York State Walleye Management Plan.

Table 3. Catch per hour (CPUE), proportional stock density[1], and relative stock density for walleye collected by late spring night electrofishing in Cuba Lake, 1946-1998, 1999-2003, 2011.

Year	**CPUE**	**PSD**	**RSD_{20}**
1946-1998 avg.[2]		39	4
1999[3]	41	25	0
2000[3]	43	8	0
2001[3]	15	0	0
2002[3]	87	20	7
2003[3]	39	9	<1
2011	43	11	4

[1]walleye stock size 250 mm (10 in), quality size 380 mm (15 in), preferred size 510 mm (20 in)
[2]Evans, J.T. 1999.
[3]Evans, J.T. 2003.

Table 4. Catch per hour (CPUE), proportional stock density[1], and relative stock density for smallmouth bass collected by late spring night electrofishing on Cuba Lake, 1982-2011, compared to average values from the New York State Bass Study.

Year	CPUE	PSD	RSD_{14}
1982-2002 avg.[2]	28	51	23
2003[2]	39	80	55
2011	26	90	47
1986[3]	13	40-70	

[1] smallmouth bass stock size 180 mm (7 in), quality size 280 mm (11 in), preferred size 350 mm (14 in)
[2] Evans, J.T. 2003.
[3] Green et. al. 1986. Average values for waters in the New York State bass study, 1977-1980.

Table 5. Mean length (mm) at age for smallmouth bass collected in Cuba Lake in 2011 compared with values from Cuba Lake in 2003, and the New York State bass study (SBS).

	Cuba Lake	Cuba Lake[1]	SBS[2]
Age	2011	2003	1977-1980
1	157	98	
2	191	182	174
3	238	270	235
4	284	340	288
5	321	395	337
6	335	417	371
7	376	434	399
8	403	454	426
9	412	491	447

[1] Evans, J.T. 2003.
[2] Green et. al. 1986.

Table 6. Catch per hour (CPUE) for panfish collected by late spring night electrofishing in Cuba Lake in 2011, compared to values from 1993-2003.

Year	yellow perch	rock bass	bluegill	pumpkinseed
1993-1998 avg.[1]	63	62	8	7
1999[2]	115	111	3	0
2000[2]	70	78	0	7
2001[2]	200	201	5	3
2002[2]	38	205	0	2
2003[2]	88	142	11	4
2011	355	4	19	7

[1] Evans, J.T. 1999.
[2] Evans, J.T. 2003.

Table 7. Zooplankton summary and predator to prey ratios from 2011 late spring night electrofishing in Cuba Lake, compared to values from 1985-1998, and 2003.

Year	Month	Zooplankton mean size (mm)	Predator/prey ratio
1985-1998 avg.[1]	May	0.81	0.36
	June	0.95	
	July	0.99	
	August	0.93	
	September	0.81	
2003[2]	May	0.60	0.57
	August	0.93	
2011	June	1.12	0.17[3]
	September	0.64	

[1] Evans, J.T. 1999.
[2] Evans, J.T. 2003.
[3] Predator/prey value in 2011 was calculated using only all fish runs which is different methodology than what was used to calculate past values.

Table 8. Mean length (mm) at age for yellow perch collected by late spring electrofishing in Cuba Lake in 2011, compared to values from 2003 and the New York State average.

Age	2011 length (mm)	2003[1] length (mm)	NYS Average[2] length (mm)
1	113	86	80
2	145	146	127
3	194	172	167
4		213	195
5	267		218
6			233

[1] Evans, J.T. 2003.
[2] Green, D.M. 1989.

Table 9. Chemical and physical parameters for Cuba Lake in 2011.

6/8/2011

Depth (ft)	Water (°F)	Dissolved Oxygen (ppm)	pH	Conductivity (µmho/cm)
0	77.2	3.7*	7.7	102
5	75.0	3.8*	7.8	
10	73.6	3.7*	7.9	
15	63.2	3.9*	7.8	
20	53.9	3.7*	7.7	
25	51.9	3.0*	7.5	
30	50.9	2.8*	7.4	

* Due to equipment malfunction, dissolved oxygen readings are inaccurate.