HONEOYE LAKE FISH STOCK ASSESSMENT, 1997-2000

FINAL REPORT

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Abstract: An evaluation of the Honeoye Lake fish community occurred from 1997 to 2000. The evaluation included modified Finger Lakes standard gang gill nets in fall 1997 and 1999, walleye *Sander vitreus vitreus* population density estimate using mark and recapture techniques in 1999 and 2000, and nighttime, shoreline electrofishing gear for both largemouth bass *Micropterus salmoides* and smallmouth *Micropterus dolomieui* bass during fall 1997 and spring and fall 1998. Additionally, an Angler Diary Program, ongoing since 1989, was utilized to provide data on angler success. Also, an attempt to evaluate the population characteristics of the Honeoye Inlet walleye spawning run was attempted Spring 2000.

A total of 1,009 (84.1 fish/net night) and 764 (63.7 fish/net night) fish were collected in gill nets in 1997 and 1999, respectively. In both years, walleye, bluegill *Lepomis macrochirus*, pumpkinseed *Lepomis gibbosus*, and yellow perch *Perca flavescens* were the dominant species collected. Walleye catch per unit effort (CPUE) was 25.0 and 12.2 fish/net night in 1997 and 1999, respectively. Average length at age 3+ was 413 mm, indicating moderate to slow growth. Condition of walleye was generally poor with relative weights for fish <457 mm near 85. In 2000, the walleye population was estimated at 33,592 adults, or 47 walleye/ha. Although walleye were collected in Honeoye Inlet, the small sample size limited evaluation of the spawning stock.

Yellow perch CPUE was 9.6 fish/net night in both 1997 and 1999 and may be indicative of low population density. Growth was moderate to fast with yellow perch averaging 215 mm at age 3+. Over 60 percent of bluegill and pumpkinseed collected were >200 mm and were in excellent condition, indicating a quality sunfish fishery in Honeoye Lake, however, sampling gear and deployment location was biased toward larger fish.

Largemouth bass accounted for >90% of bass collected during electrofishing sampling. Electrofishing CPUE was much higher than statewide averages ranging from 53 bass/h in Fall 1997 to 123 bass/h in Spring 1998. Size distribution, condition, and growth rate indices suggest an excellent bass fishery exists in Honeoye Lake.

The high density, relatively slow growth rate, and poor condition, suggests the walleye population is overcrowded. Also, yellow perch population characteristics suggest that they may have been impacted by abundant predator populations. Therefore it is recommended that the walleye size limit be decreased from 457 mm (18 in) to 381 mm (15 in) beginning October 2000. Anticipated results include increased angler harvest and growth of walleye, and recovery of the yellow perch population. Additionally, a more comprehensive evaluation of the black bass and sunfish populations should be conducted. This evaluation should be based on procedures in the New York State Centrarchid Sampling Manual.

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Introduction

Honeoye Lake provides excellent warmwater fishing opportunities within New York. During a 1976-77 angler survey, Honeoye Lake received more angling pressure on a per acre basis than any other Finger Lake (Chiotti 1980). A recent mail survey of licensed anglers estimated 11,930 anglers fished approximately 90,730 hours during 1996, ranking Honeoye Lake as the 28th most fished waterbody in New York (Connelly et al. 1997). Ice fishing is also an important component of the Honeoye Lake fishery. In 1988, anglers fished an estimated 40,800 hours through the ice (Abraham 1993).

Historically, walleye *Sander vitreus vitreus* and yellow perch *Perca flavescens* have been the preferred species by anglers fishing Honeoye Lake. Chiotti (1980) reported yellow perch and walleye ranked first and second in directed angling pressure in Honeoye Lake. DEC's management goal for Honeoye Lake has been to maintain a viable walleye/yellow perch fishery. Management of this fishery has involved the manipulation of the walleye population through fry stocking and angling regulations to maintain population levels sufficient to control yellow perch abundance, maintain adequate growth rates of walleye, and provide for a quality walleye fishery.

Stocking of walleye in Honeoye Lake has been quite variable (Table 1). Reports indicate that walleye stocking began as early as 1897 (Chiotti 1980). More regular stocking began in 1947 with 0.96 million to 4 million fry stocked annually through 1969. From 1969 through 1981 stocking occurred almost every other year, with numbers ranging from 2.7 to 4.4 million fry. Based on periodic trawl sampling, Forney (Cornell University, unpublished data) indicated that recruitment of wild and stocked walleye fry was low and recommended increasing the annual rate of stocked fry to 8.67 million (5000/ac) in the spring. Results show that this stocking rate contributed significantly to the walleye fishery and has remained in place since 1981.

Along with the variable stocking rates, minimum size regulations for walleye were changed several times to address various concerns. Prior to 1950, walleye were managed under statewide regulations of 305 mm (12 in) minimum size limit and 10/day creel. In 1950, the creel limit was reduced to 5/day. The 305 mm (12 in) minimum size limit was removed in 1961 and in 1970, the creel limit reverted back to 10/day. In 1977, a 457 mm (18-in) minimum size limit with 3 fish/day creel limit was implemented to increase walleye abundance, maintain an adequate spawning stock, and control yellow perch populations. However, in 1989, the size limit was reduced to 381 mm (15 in) because a high walleye population was beginning to reduce the number of yellow perch. In the late 1980's, alewives *Alosa psuedoharengus* were reported in the lake (William Abraham, DEC, personal communication). Because an expanding alewife population could negatively impact both walleye and yellow perch populations, the minimum size limit was returned to 457 mm (18 in) in 1993 to increase predation on alewives. Currently, the 457 mm (18 in), 3 fish/day regulations remains in effect.

Recent reports from anglers indicated they were catching numerous sub-legal walleye and very few legal walleye (i.e. 457 mm-18 in). The walleye population was last evaluated in 1993 and several changes in Honeoye Lake since may have negatively impacted the walleye fishery. Alewives appear to have been eliminated. During the winter of 1996, a rapid thermal change caused a massive alewive die-off (Dave Kosowski, DEC, personal communication). Since that time, there have been no reports of alewives from anglers or Finger Lakes Community College researchers who have annually conducted field sampling in Honeoye Lake as part of course exercise. The possible extirpation of alewives may be limiting the forage base for the abundant walleye population. Additionally, the introduction of zebra mussels *Dreissena polymorpha* in 1998 (Pearsall and Richardson 2001) may be causing a shift from desirable planktors toward less desirable or smaller species. Zebra mussels may also be reducing the density of plankton in the water column, which would increase water clarity. The clearer water may cause submerged aquatic vegetation growth, which is already problematic, to encroach on deeper waters. Increases in submerged aquatic vegetation may negatively impact walleye populations and favor littoral species such as largemouth bass *Micropterus salmoides* and sunfish *Lepomis spp*.

The walleye-yellow perch fishery remains the dominant fishery, but populations of largemouth and smallmouth bass *Micropterus dolomieui*, bluegill *Lepomis macrochirus*, pumpkinseed *Lepomis gibbosus*, and brown bullhead *Ameiurus nebulosus*, provide important angling opportunities. Data from angler diaries indicate that total catch of largemouth bass has increased dramatically since the diary program began in 1989-90 from 487 bass to 1,342 bass caught in 1996-97 (Kosowski 1997). This increase occurred even though the total number of angling trips and average hours per trip decreased from 705 trips and 4.4 hours/trip in 1989-90 to 662 trips and 3.2 hours/trip in 1996-97. Little biological information concerning species other than walleye and yellow perch exists for Honeoye Lake.

An evaluation of the Honeoye Lake fishery was conducted because of numerous concerns relating to poor fishing for walleye, non-native species introductions, and the relatively sparse information regarding the overall fish community. The objectives of the survey were to: 1) estimate population abundance and population characteristics (i.e. length, weight, and age indices) of walleye; 2) evaluate characteristics of the walleye spawning run in Honeoye Inlet; 3) evaluate the overall fish community structure; and 4) assess population characteristics of black bass**.**

Methods

Honeoye Lake is an approximately 717 ha (1,772 ac) lake located near the Town of Richmond in Ontario County. It is one of the smallest of the 11 Finger Lakes. With an average depth of 5 m (16 ft) and a maximum depth of 10 m (35 ft), it is also the shallowest of all Finger Lakes (Schaffner and Oglesby 1978). Over 80% of the lake is < 7.6 m (25 ft) deep. Honeoye Lake is eutrophic, with rooted aquatic vegetation very abundant to a depth of about 4.6 m (15 ft). Substrate is predominantly mud with scattered sand, gravel, and cobble areas intermixed.

Fish Community Assessment: 1997 and 1999

Modified NYSDEC Finger Lakes standard gang gill nets were used to assess the fish community of Honeoye Lake from 15-19 September 1997 and 12-15 September 1999. Nets were a slightly different configuration from those suggested in the Percid Sampling Plan (Forney et al. 1994) but identical to nets used in Conesus Lake. These gill nets consisted of 2.4 m (8 ft) deep, multifilament nylon net hung on polyfoam float and lead-core bottom lines. Six 15.2 m (50 ft) panels measuring 38, 51, 64, 76, 102, and 127 mm (1.5, 2.0, 2.5, 3.0, 4.0, and 5.0 in) stretch mesh were randomly connected for a total net length of 91.4 m (300 ft). The construction of these nets allows for sampling fish near the bottom of the water column.

Similar to other Finger Lakes studies, Honeoye Lake was arbitrarily delineated into 12 grids (Abraham 1983) (Figure 1). One net was set in each grid for one night. Three nets were set per night for a total of 12 net/nights and nets fished for approximately 20 hours. Because of the abundant vegetation, nets were set on the outside edge of the weed beds at depths ranging from 10 - 28 ft.

All fish collected from each net were separated by mesh size. Individual fish were identified to species and total length (mm) and weight (g) were recorded. Scales for age analysis were removed from all walleye collected and 10 scale samples per inch group were removed from yellow perch and sunfish species. Since fish were collected in September, near the end of the growing season, mean length at age 3+ was used to assess growth rates for both yellow perch and walleye. Sex and maturity were determined for all walleye collected by visually inspecting the reproductive organs. Stomach contents for all walleye collected were identified to species when possible, and enumerated. Walleye were also visually inspected for parasites or disease.

Population size structure for all species collected was evaluated using length-frequency distributions. Proportional stock density (PSD) and relative stock density (RSD) were estimated for walleye, yellow perch, bluegill, and pumpkinseed. Relative abundance was indexed using catch-per-unit-effort (CPUE) expressed as number of fish collected divided by total net nights (fish/net night). Mean relative weights (Wr), a measure of fish condition, were determined for walleye in 25 mm size groups, for bluegill, pumpkinseed, and yellow perch in 10 mm size groups, and for stock, quality, and preferred length groups for each species. Length range for length groups are species specific and follow recommendations proposed by Anderson (1980). Age structure and mean length were calculated for walleye, yellow perch, bluegill, and pumpkinseed sunfish. Fish age was determined by counting annuli on the scales at 33X using a microfiche reader and 15-25X using a dissecting microscope.

CPUE for all species with sufficient sample sizes were compared between 1997 and 1999 using a simple t-test. Differences were considered significant if P was < 0.05.

Walleye Population Abundance: 1999 and 2000

Sampling methods were consistent with techniques used to estimate walleye population abundance in 1993 (William Abraham, DEC, unpublished data). To obtain the initial sample of marked fish, one 1.8 m(6 ft) and one 1.5 m(5 ft) Oneida style trap net, with 22.9 m (75 ft) and 15.2 m (50 ft) leaders respectively, were set during peak walleye spawning near ice out on Honeoye Lake from 6-15 April 1999 and 14-31 March 2000. For a complete description of the Oneida Lake trap net see Forney et al. (1994). Nets were set off two points, one on the east (i.e. Log Cabin Point) and west (i.e. California Ranch Point) side of the lake (Figure 1). These sites were selected because high numbers of walleyes have been collected there during past surveys. Nets were set in the afternoon the first day of sampling and pulled the following morning. Nets were reset in the same location after all fish were removed from the trap. Nets were fished for a total of 9 and 10 days in the same location during 1999 and 2000, respectively. In 2000, water temperatures typically were in the upper 30's ^{o}F to lower 40's ^{o}F but ranged from 36 ^{o}F on 17 March to 51 ^{o}F on 24 March.

Sex and maturity were determined for all walleye collected. Total length (mm) was recorded for the majority of walleye collected in both 1999 and 2000. During 1999 all sexually mature walleye collected on the east side of the lake were marked with a metal jaw tag until all available tags were used. Jaw tags were engraved with a return address. Upon exhaustion of the jaw tags fish received right pectoral fin clips. All sexually mature walleye collected on the west side of the lake were marked with a right pectoral fin clip. In 2000, all mature walleye were marked with an upper caudal fin punch using a 5/16 in. circular punch.

With the assistance of Finger Lakes Community College (FLCC) personnel, an attempt was made to determine if there was a spawning run in Honeoye Inlet. Previously, the inlet was privately controlled and only anecdotal information existed concerning a walleye spawning run. In 2000, access was gained to this inlet through a cooperative effort with the landowner, Nature Conservancy, FLCC, and NYSDEC. FLCC personnel set a hoopnet in the inlet beginning 28 March and periodically fished the net until 10 April for a total of 5 days. Additionally, FLCC personnel collected walleye in the inlet on 15 and 23 March 2000 using a Smith Root 16 foot electrofishing boat. On 6 April, DEC personnel also electrofished the inlet using a boat mounted georator and wand to collect walleye. Total length (mm), sex, and maturity were determined for all walleye collected. To differentiate them from fish collected in the lake, walleye collected in the inlet were marked with a lower caudal fin punch.

In 1999, gill net sets used to assess fish community structure were also used to obtain the walleye recapture sample. For a description of gear, techniques, and data collection, see the Fish Community Assessment section. All walleye jaw tags and fin clips were recorded. In 2000, the walleye recapture sample was collected on 7 days from 2 May-2 June during both daytime and nighttime periods along shorelines using boat electrofishing gear. Fish collected were examined for an upper or lower caudal fin punch. Total length and weight were recorded from all walleye collected. All walleye collected during the recapture sample were given a dorsal fin punch. Population abundance was estimated using Chapman modification of the Peterson population equation without replacement of recaptures (Ricker 1975):

$$N = \frac{(M+1)(C+1)}{(R+1)}$$

where, N = population estimate
M = number marked
C = recapture sample
R = number of recaptures

A 95% confidence interval was estimated using poisson distribution based on the ratio of marked fish in the recapture sample (Ricker 1975).

During 2000, Schnabel Multiple Census was also used to estimate the walleye population abundance during the trapnetting to obtain an estimate prior to recapture effort (Ricker 1975).

$$N = \frac{\sum(C_t M_t)}{R}$$

where, C_t = total sample taken on day t
M_t = total number marked
R = total recaptures
N = population estimate

Black Bass Population Assessment: 1997-1998

Largemouth bass and smallmouth bass were collected in Honeoye Lake on 20 October 1997, and 3 June and 17 September 1998 during nighttime hours using boat electrofishing gear (Smith-Root 5.0 GPP). The electrofishing crew consisted of one boat operator and two scappers. Electrofishing outputs for 1997 were pulse DC, 60 pps, 530 V, and 7.0-7.5 A. Forty-five minute shocking periods were used to collect bass and walleye along four shoreline areas. Similar electrofishing outputs were employed in June and September 1998. However, in September, bass and walleye were collected along seven shoreline areas for 15 minute shocking periods and in June, one area was sampled for 1.33 hours. Bass were separated by species and total length (mm) in 1997 and 1998; weight (g) was recorded in 1998. Scales for subsequent age analysis were removed from 10 fish per 25 mm group.

For each sampling event, population size structure for largemouth and smallmouth bass was evaluated using length-frequencies (25 mm size groups), PSD and RSD (RSD_{38} for largemouth bass and RSD_{35} for smallmouth bass). Abundance was indexed using CPUE expressed as number of fish collected divided by total sampling time (fish/hour). In 1998, mean relative weights (Wr), were determined for largemouth bass in 25-mm size groups and for 3 size groups: stock (200-299 mm), quality (300-379 mm), and preferred (380-510 mm). Age structure was estimated for both largemouth and smallmouth bass. Age was determined by counting annuli on scales at 33X using a microfiche reader and 15-25X using a dissecting microscope. Mean length at time of capture was determined for each age group for both species.

Angler Diary Program

An Angler Diary Program on Honeoye Lake has been conducted annually since 1989. The Program consists of cooperating anglers recording fishing trip information in a DEC provided diary. Information recorded includes number of anglers, time started, time stopped, species targeted, length and weight for each species caught, and whether fish were harvested or released. Cooperators are reminded to log information each day even if no fish are caught. At the end of the fishing season, DEC mails a self addressed postage paid envelope to each cooperator requesting them to return their diary. One follow-up letter is mailed requesting unreturned diaries. Data were summarized by number of trips, average h/trip, targeted effort, catch rates (fish/h), number of gamefish harvested (by species) , harvest rate of gamefish (fish/h), and average length and weight of harvested fish. A brief summary sheet detailing diary results and related management efforts including the cooperators' diary are returned to the cooperator.

Results and Discussion

A total of 1,009 and 764 fish were collected in 1997 and 1999, respectively, using gill nets. In 1997, walleye, bluegill, pumpkinseed, and yellow perch, in decreasing order of abundance, were the dominant species collected (Figure 2). Collectively, these species accounted for 81% of all fish collected. Similar results were found in 1999, with bluegill being the dominant species, followed by walleye, yellow perch, and pumpkinseed; these species represented 83% of the total catch (Figure 2). Black bass are generally not susceptible to capture in gillnets, therefore their relative abundance should not be inferred from this catch. The overall CPUE (fish/net night) was significantly lower in 1999 (63.7) than it was in 1997 (84.1, P = 0.014, Table 2). This difference is primarily related to the >50% decrease in the cumulative catch of walleye, white suckers *Catostomus commersoni*, and brown bullheads from 1997 to 1999.

No alewives were collected during either year. Therefore, it appears that the winter-kill of 1996 (David Kosowski, DEC, personal communication) may have resulted in complete extirpation of alewives. Current regulations prohibit the use of alewives for bait on Honeoye Lake, however, these regulations were in effect when the species was originally introduced into the lake in the late 1980's. It is speculated that alewife were introduced by an angler. It is important to remind the angling public about the potential detriments to the fishery from this type of introduction.

Walleye: The number of walleye collected in 1999 (N=146) was significantly less than in 1997 (N=300, P = 0.001, Table 2). CPUE for 1997 and 1999 was 25.0 and 12.2 fish/ net night, respectively. Nets were fished during similar water conditions during the same time period each year. One slight difference between the two years was the depth of net sets to avoid submerged vegetation. In 1999, the average depth of net set was about 5 ft (1.5 m) deeper than in 1997. However, even with these deeper sets, several nets were still set in submerged vegetation. Therefore, CPUE in 1999 may be biased because of the reduced catchability of several gillnets.

Forney et al. (1994) suggested catch rates in standardized gillnets indicative of low and high abundance of walleye populations, but direct comparisons for this survey cannot be made because different net configurations were used in Honeoye Lake. A modified Finger Lakes gillnet consists of six 50 ft multifilament panels as compared to the gillnet cited by Forney et al. (1994), which is made up of six 25 ft monofilament panels. Additionally, Finger Lakes panels are eight ft deep whereas nets cited by Forney et al. (1994) were six ft deep and a 127 mm (5.0 in) panel is used in place of the 88.9 mm (3.5 in) mesh panel. However, taking these factors into account, a rough comparison to catch rates in standardized gillnets can be made by multiplying catch rates by 0.4 to account for the doubling of net length and additional 2 ft in depth. By doing this, the 1997 and 1999 catch rates are 10.0 and 4.9 walleye/net night, just at or higher than the 5 walleye/net night suggested by Forney et al. (1994) as indicating a population with high abundance.

In addition to high gillnet catch rates, other factors indicate that the walleye population may be abundant. Of walleye collected in 1997 and 1999, only 13% and 8%, respectively, were greater than the minimum size limit, indicating few fish were available for harvest (Figure 3). Anglers have indicated that although they can catch walleye, few are legal size. PSD of walleye was 64 and 36 in 1997 and 1999, respectively (Table 3).   The big difference between these PSD values was probably related to two large or dominant year classes. In 1997, catch of fish from the

1996 year class (age 1+) which on average were stock size fish (250-379 mm), and the 1994 year class (age 3+) which on average were quality size fish (380-509 mm), represented 35% and 25% of all year classes collected (Table 4). In 1999, the 1996 year class (age 3+) was still the dominant age group of fish (40%), however their average length was <380 mm and most were not quality sized fish. Since the 1994 year class numbers are lower, and the large 1996 year class is less than quality size fish, this would result in the lower PSD value in 1999.

Walleye reached mean lengths of 413 mm and 365 mm at age 3+ in 1997 and 1999, respectively (Table 4). Forney et al. (1994) suggested that for New York, walleye <380 mm in length at age 4 represents a slow growing population. Therefore, it appears that growth of walleye in Honeoye Lake is slow to moderate. In Canadarago Lake, walleye growth was slow when the population was abundant and fast when the population was small (Forney et al. 1994). Evans (1999) reported fast growth rates in an expanding walleye population after their introduction into Silver Lake, but as the population expanded, growth rapidly decreased. In 1997 and 1998 age 4 walleye averaged 363 mm and 326 mm, respectively and growth differences were attributed to a large year class. The relatively slow growth in Honeoye supports the theory that the population has become overcrowded relative to its forage supply.

Another indication that the walleye population may be overcrowded is poor relative condition. Mean relative weights (Wr) of most size groups of walleye collected in 1997 and 1999 were <100 (Figure 4). Mean Wr values of stock, quality, and preferred size groups of walleye were 87, 87, and 86 in 1997, and 91, 83, and 81 in 1999 (Table 3). Wr values of 100 represent average condition of walleye in New York and values <100 are indicative of “skinny” fish that may be overcrowded or lack adequate forage. However, Forney et al. (1994) warned that values of 100 may not be a desired management goal in New York and that other factors should be considered to determine if populations are out of balance.

Catch rate of walleyes from the Angler Diary Program during the 1998-99 fishing season was 0.36 fish/hour, the highest recorded value since the diary program began in 1989 (Pearsall 1999) (Figure 5). Festa et al. (1987) suggested New York waters with catch rates >0.25 fish/hour provided excellent walleye fishing. This high catch rate can probably be attributed to an abundant walleye population and also lack of forage (i.e. alewives and yellow perch) thereby increasing the likelihood that walleye will strike an anglers offering. However, although the catch rate is high, as stated earlier, most fish are not legal sized (457 mm;18 in minimum length).

During the 1998 ice fishing season, anglers voiced concerns about external growths on numerous walleyes. These growths were identified as dermal sarcoma, which is caused by a waterborne virus. This disease is prevalent during winter months and may be indicative of an abundant population. The walleye collected in the gill nets were relatively healthy with diseased fish accounting for <5% in 1999. Dermal sarcoma was not reported during the last population estimate in 1993, and may indicate that this is a relatively new infection of the walleye population in Honeoye Lake.

There is some concern that, under current minimum size limit restrictions, walleye may be impacting the forage base. The primary reason for the enactment of the 457 mm size limit in 1993 was a concern about the invasion of alewives and their potential impacts on walleye and yellow perch populations. Recent evidence indicates that alewives have been extirpated from Honeoye Lake by natural processes. Although catch rates of walleye in Honeoye Lake are excellent, they may be more indicative of a reduced forage base enabling them to be more susceptible to angling.

In 1999, 56% of all walleye stomachs examined were empty. Of those that had food items, the majority contained sunfish species (74%). Yellow perch occurred in only 9% of walleye stomachs that contained food. A cursory review of walleye stomach content data collected incidental to a recapture sample of walleyes in gill nets set in Spring 1993 indicated that yellow perch were the main forage for walleye, at least during the spring (William Abraham, DEC, unpublished data). Although this information is not quantitative in nature, it provides anecdotal evidence that since 1993 there may have been a shift in the diet of walleye which in turn is probably related to the decline in yellow perch abundance. However, potential seasonal shifts in diet may occur and comparison with spring stomach content samples would be needed to determine if there has been a shift in the diet of walleyes from yellow perch to sunfish.

Walleye Population Abundance

In 1999, a total of 1,058 walleye were collected and marked during Spring trapnetting. A total of 448 walleye were marked with metal jaw tags and the remaining 610 walleye received a right pectoral fin clip. Initial catch rates were 344 walleye/trapnet night and declined to 16 walleye/trapnet night the seventh day of sampling. Fall gill net collections yielded 146 walleye, 10 of which were marked from the spring sample. The population was estimated at 14,152 $\pm$ 7,309.

Abraham (DEC, unpublished data) estimated the walleye population in 1993 at 21,760 $\pm$ 10,637. In that study, recapture samples were collected with both standard gang gill nets and electrofishing gear in the latter part of April. In 1999, effort directed at recaptures included only standard gang gill nets fished in September which may decrease the confidence of the population estimate because of potential harvest of marked fish. Another potential concern about the current population estimate is that the peak spawning period may have been missed during the marking phase. Of fish collected during the marking sample, over 92% were male. In 1993, 66% of jaw tagged walleye were male, probably more indicative of the spawning population. This is more apparent when looking at sex composition of the modified Finger Lakes gill net catch. Males composed 65% and 54% of the walleye of known sex collected in 1997 and 1999 gill nets. Since it appears female walleye may be under represented in the marking sample, it is possible that the 1999 population estimate was biased. Therefore, in 2000, another attempt was made to estimate the size of the adult walleye population.

During 2000, ice out on Honeoye Lake occurred during the second week in March. This is the earliest the event has occurred in at least the past 30 years (William Abraham, DEC, personal communication) and unlike 1999, the lake was accessible immediately at ice out.

A total of 2,867 walleye were collected in the lake during the 2000 marking sample (Figure 6). An additional 82 walleye were collected in Honeoye Inlet. Catch rates ranged from 267 walleye/net night on 15 March to 23 walleye/net night on 31 March. Catch of walleye at Log Cabin was over twice that at California Ranch sampling location. Male walleye accounted for 87% of the lake catch and 88% of the inlet catch. Increased numbers of female walleye (i.e. representing >25% of catch) began showing up on 24 March and represented over 50% of walleye collected on 29 and 31 March. The overall large proportion of males was similar to 1999. The skewed sex distribution may be more of a result of spawning behavior and sampling design since male walleye tend to arrive at the spawning grounds earlier than females and stay until after the run has occurred, whereas females remain on the spawning grounds for a relatively short time (Smith 1985). Since nets were set immediately after ice out, females would then be less susceptible to capture and males would be disproportionally sampled at the beginning of the marking period. During the first week of sampling, 98% of 1,715 walleye collected were male. During the last week of sampling, males represented 56% of 537 walleye collected.

Average length of walleye collected in 2000 was 406 ± 45 mm and ranged from 265-706 mm (Figure 6). Only 2 walleye collected were immature and averaged 343 mm. All male walleye were ripe. Of the 366 female walleye collected, 59% were ripe. Only 5% were either partially spent or spent indicating that sampling occurred during the main spawning run. Ninety-percent of walleye collected were <457-mm (18 in) size limit, with 55% between 381-mm (15 in) and 457-mm (18 in) (Figure 6). Length frequency distribution of female walleye indicated that they were typically larger than male walleye.

A total of 230 walleye were aged. The spawning population consisted primarily of age 4 and 5 walleye accounting for nearly 80% of all walleye collected. The oldest fish aged were three age 12 females from the 1988 year class. Growth of walleye was slow to moderate with fish reaching 384 mm at age 4 (Table 5). These results are similar to growth rates of walleye collected by gill nets in the fall of 1997 and 1999 and are indicative of an overabundant population.

Throughout the trapnet sample, 159 walleye were recaptured. Using the Schnabel Multiple Census estimate (Ricker 1975), the adult walleye population was estimated at 24,154 fish. An upper and lower bound of 28,707 and 20,847 was estimated using poisson distribution

(Ricker 1975). Two main assumptions for using a multiple census technique include random sampling and random mixing of marked and unmarked individuals (Everhart and Young 1981). Because of our sampling design, it is unlikely that these two assumptions were met. Trapnets were placed in a fixed location and not randomly fished. Additionally, walleye were removed from the net, placed in a livewell, and then transported to the middle of the lake or out of the wind to collect the necessary data. No attempt was made to randomly distribute fish, or transport them a great distance from the trapnets. If marked fish were properly mixed throughout the lake, the likelihood that a marked fish would encounter the trapnet would be less than if the fished were released near the proximity of the nets, as was done in this case. This would reduce the number of recaptures and increase the population estimate. Therefore, it is likely that the population estimate obtained using this method is biased, and likely higher than estimated. However, the multiple census technique was only used to obtain a rough estimate of population size to help determine the desired recapture sample and the mark and recapture technique will likely provide a more precise estimate.

Based on a rough population estimate of 25,000-30,000 walleye and a marked sample of about 3,000 fish, it was determined that in order to reach a 50% level of precision at the 95% confidence level for the population estimate, approximately 300 walleye would need to be collected during the recapture sample (Everhart and Young 1981). To increase precision to 25%, approximately 500 walleye would need to be collected. We initially set a recapture goal of 500 walleye, but due to time constraints and the opening of the walleye fishing season, we stopped short of our goal.

We initially attempted to collect the recapture sample during daylight hours. This was moderately successful on the first day in which a total of 58 walleye were collected by two electrofishing crews. However the next day, which was bright and sunny, only one walleye was collected over 2 h of electrofishing. Night electrofishing was then employed for the remainder of the recapture sample. A total 352 walleye were collected during seven electrofishing trips. Of this sample, 28 and two fish were marked with an upper or lower caudal punch, respectively. This results in a population estimate of 33,592 with lower and upper limit of 23,775 and 49,120 adult walleye, or approximately 47 adult walleye/ha (19/ac). When excluding fish ≤ 356 mm (14 in), the population is estimated at 29,926 walleye with a lower and upper limit of 20,230 and 39,622 walleye ≥ 356 mm, or approximately 42 walleye ≥ 356 mm/ha (17/ac). In 1999, the estimated abundance of age 4 and older walleye in Oneida Lake, one of the premier walleye lakes in New York, was 216,000 walleye, or about 11 walleye/ha (Van DeValk et al. 2000). However, the walleye population in Oneida Lake has severely declined since the late 1980's. Current walleye densities in Honeoye Lake are similar to population densities that occurred in Oneida Lake in the late 1980's.

Only 82 walleye were marked by FLCC in Honeoye Inlet and only two of these marked walleye were collected during the recapture sample, therefore we were unable to estimate the inlet spawning run population with any reasonable confidence. Several factors may have led to the relatively low number of fish collected. The actual walleye run in Honeoye Inlet may be relatively small. The inlet is difficult to sample because of limited access for sampling gear. Also, sampling effort was limited and occurred sporadically throughout the spawning season. In addition, numerous beaver dams may have hindered the progress of walleye upstream.

Honeoye Inlet was significantly altered by a private individual in the early 1970's. As a result of this activity, the most downstream portion of main channel was bypassed, and the majority of the stream flows through an approximately three mile dug canal before it enters Honeoye Lake. Several pipe culverts traverse this canal. It is relatively wide and the bottom substrate consists of silt and muck, unsuitable walleye spawning habitat. However, about a mile upstream of the dug canal in the natural inlet channel, suitable spawning habitat consisting of gravel bars and runs exist. Anecdotal evidence suggests walleye were observed in these areas in the past, however no documented occurrence exists.

It is encouraging that walleye are utilizing the inlet. Of the 82 walleye collected, there was one walleye that was marked out in the lake in 2000 and five fish that were marked in the lake in 1999. In future years, it would be beneficial to concentrate more effort to estimate the magnitude and characteristics of the spawning run in the inlet. DEC is in the process of developing a cooperative relationship with FLCC, which recently acquired a field station adjacent to the inlet. Future collaborative efforts could include radiotelemetry to identify spawning areas in the inlet as well as in the lake, maintaining an open channel for walleye migration, walleye fry production in the inlet, and species composition and utilization of the canal during summer months.

An interesting observation during the mark and recapture study was the healing rate of the hole punches in the caudal fin. Although exact numbers were not recorded, it was noted that numerous marks had completely healed over from the marking in late March to the recapture throughout May. Although marks could still be distinguished by color variation, it is doubtful that these marks would be identifiable in the fall. Therefore, unless fish will be collected in a relatively short time after being marked, it is recommended that some other mark be used (i.e. jaw tag, fin clip) or that another fin or area of the fish be marked, such as the opercle flap.

Yellow Perch: A total of 115 yellow perch were collected in both 1997 and 1999, therefore relative abundance, as measured by CPUE remained constant at 9.6 fish/net night (Table 2). Forney et al. (1994) suggested CPUE between 5 and 25, using a standard monofilament net, was expected for New York waters. Similar to the adjustments in catch rates due to different net configurations for walleyes (see Walleye section), a rough comparison can be obtained by multiplying modified Finger Lakes gillnet catch rates by 0.4. By doing this, catch rates fall below 5 fish/net night and suggest a low abundance of yellow perch. In Conesus Lake using gillnets identical to those employed in Honeoye Lake, the estimated CPUE of yellow perch ranged from 45.4 in 1988 (Abraham 1993) to 0.6 in 1997 (Lane 1997). An abundant alewife population is suspected in the recent demise of the yellow perch population in Conesus Lake (Lane 1997). In Honeoye Lake, it is quite probable that the abundant walleye population is responsible for negatively impacting the yellow perch fishery. In an examination of 23 waters in New York, Rudstam et al. (1996) found that abundant walleye populations limit yellow perch recruitment. This appears to be the case in Honeoye Lake.

In 1997, almost 35% of yellow perch collected were >250 mm (Figure 7). In 1999, only 17% were >250 mm (Figure 7). PSD values reflect the differences between 1997 and 1999 with PSD 64 and 31 for 1997 and 1999, respectively (Table 6). RSD_{25} for 1997 and 1999 are 37 and 17, respectively and also reflect the differences between the two years. The main difference appears to be a strong year class in 1997, which represented 33% of yellow perch sampled in 1999.

Mean Wr of yellow perch was <95 for all size groups collected in 1997 and 1999 (Figure 8). Mean Wr's of stock (130-199-mm), quality (200-249-mm), and preferred (250-299-mm) size groups of yellow perch were 86, 89, and 92 for 1997, and 92, 92, and 89 for 1999 (Table 6). Wr values of 100 represent average condition of yellow perch in New York and values <100 are indicative of "skinny" fish that may be overcrowded or lack adequate forage. However, mean Wr's for all size groups are >85 and, although they indicate less than optimal condition, they may not be poor for Honeoye Lake yellow perch. Other indices, such as growth rate, should be examined to assist in the interpretation of these values.

In 1997, mean length at age 3+ (assumed age 4) was 205 mm (8 in, Table 7) and near the high end of moderate growth for New York as suggested by Forney et al. (1994). Growth rate of yellow perch in 1999 was more moderate, with yellow perch averaging 185 mm (7.3 in) at age 3+. Mean length at age 4 >215 mm (8.5 in) is considered fast growth and is indicative of low population abundance. Evans (1999) found in Silver Lake that yellow perch growth increased as the walleye population became more abundant and began to negatively impact yellow perch abundance.

Size indices, growth rate, and relative weight of yellow perch suggest that in Honeoye Lake, population densities are moderate and not low as suggested by catch rate information. Prior to the initiation of the survey in 1997, anglers indicated that catch rate of yellow perch was lower than in the past. Results from the 1997 survey tend to substantiate anglers concerns of a suppressed yellow perch population with faster growth rates, size distributions geared toward larger sized fish, and relatively low gillnet CPUE. More recently, anglers have indicated that, although catch rates are still low, they have been increasing. However, it is likely that these fluctuations in yellow perch population are naturally occurring. Forney et al. (1994) discussed potential reasons for recruitment fluctuation in yellow perch populations, however, most relate to predation by abundant predator populations. It is important to monitor the yellow perch population in response to the recent decrease in the walleye minimum size limit from 18 in to 15 in.

Bluegill and Pumpkinseed: Sunfish provide a very important fishery in Honeoye Lake. Abraham (1992) reported a combined sunfish harvest through the ice second only to yellow perch. A total of 213 and 258 bluegill and 187 and 114 pumpkinseeds were collected in 1997 and 1999, respectively. Length frequency distributions in 1997 and 1999 indicate that both bluegill and pumpkinseed size distributions are skewed toward larger fish (Figure 9). PSD and RSD_{20} estimates reflect these skewed distributions. PSD for bluegill were 84 and 86 for 1997 and 1999, respectively (Table 8). Similarly, PSD for pumpkinseed were 93 and 95 for 1997 and 1999, respectively. In 1997, RSD_{20} for bluegill and pumpkinseed were 31 and 78, respectively. Anderson (1980) suggested PSD for balanced sunfish populations of 20-60. Several factors may have resulted in the large PSD values including gear selectivity toward larger sunfish and net placements (i.e. outside weed edge) in areas where stock size sunfish (80-129-mm) do not inhabit.

Mean Wr of bluegill in 1997 was >80 and in 1999 was >100 (Figure 10). Mean Wr's of stock (80-149-mm), quality (150-199-mm), and preferred (200-249-mm) size groups of bluegill were 92, 93, and 99, for 1997 and 116, 117, and 118 for 1999 (Table 8). Wr's indicate that bluegill populations are in excellent condition. Similar results were found for pumpkinseeds with Wr >95 for all size groups considered (Table 8).

Growth of both bluegill and pumpkinseed during 1997 and 1999 appears to be above average. Bluegill were 163 and 157 mm at age 3+ while pumpkinseeds were 144 and 154 mm at age 3+ in 1997 and 1999 (Table 9). In New York waters, bluegill and pumpkinseeds averaged 138 and 129 mm at the end of four growing seasons (Green 1989).

Honeoye Lake appears to have a quality sunfish fishery. Anglers have indicated that sunfish that are caught are in excellent condition and can average over one pound. There is evidence that the quality sunfish fishery exists because of an abundant predator population. As mentioned earlier, walleye appear to have been shifting from yellow perch to sunfish for their diet. If walleye are abundant, increased foraging on these smaller sized sunfish may be reducing their numbers. Likewise, largemouth bass populations appear to be abundant. Therefore, it appears there may be two abundant predator populations that are impacting sunfish abundance. However, the sampling strategy precludes an in-depth analysis of the sunfish population. To better understand sunfish population characteristics, an alternative sampling gear should be utilized. Green (1989) suggested sunfish populations be assessed with electrofishing gear to determine their relative abundance as well as other population characteristics.

Black Bass Population Assessment

Almost all bass collected (90%) during electrofishing sampling were largemouth bass (Table 10). Although sampling effort for each collection during 1997 and 1998 varied, the number of fish collected in each sample was similar (Table 10). Therefore, CPUE (fish/h) for largemouth bass was variable and ranged from 53.3 in Fall 1997 to 123.3 in Spring 1998. Largemouth bass CPUE's are substantially greater than the statewide average of 29.5 for Fall and 15.8 for Spring sampling for other New York waters (Green et al. 1986). CPUE's in Honeoye Lake were greater than Chautaqua Lake, where CPUE of largemouth bass for Spring and Fall samples in 1996 and 1997 ranged from 11.2-19.9 (McKeown 1998). Largemouth bass CPUE's ranged from 8-58 fish/hour from 1988-1998 in Silver Lake (Evans 1999). Fish were collected using similar gear at night during late Spring. However, some caution should be exercised when making comparisons to Silver Lake largemouth bass populations. Bass were collected incidental to walleye sampling and habitats more conducive to largemouth bass may not have been sampled in relation to their abundance (Evans 1999).

Angler diary results tend to substantiate the high electrofishing catch rates experienced and indicate that the largemouth bass fishery is becoming very prominent. Catch rates of bass have been increasing since 1992-93 (Figure 11). Catch rate of largemouth bass >305 mm (12 in) was 0.36/h in 1998-99. Green et al. (1986) reported an average catch rate from 11 New York waters of 0.24 bass/h and a catch rate of legal fish (i.e. >305 mm) of 0.13 bass/h. Therefore, it appears that Honeoye Lake currently provides an excellent largemouth bass fishery. A fishing tournament held in September 1999 reported four bass over 7 lbs were weighed in, giving an indication of the quality of the bass fishery.

Length frequency distributions of largemouth bass were somewhat similar for all three samples (Figure 12). PSD's ranged from 65 to 77 while RSD_{38} ranged from 4 to 12 suggesting that bass populations provide a very good recreational fishing opportunity (Table 10). In both spring and fall 1998, Wr for stock (200-299 mm), quality (300-379 mm), and preferred (380-509 mm) size groups of largemouth bass were in the upper 90's to lower 100's indicating good condition. According to growth categories developed by Green (1989), largemouth bass growth is considered moderate with bass reaching 305 mm (12 in) during their fourth growing season (Table 11). Age 2+ fish from the 1996 year class were dominate in both the spring and fall 1998 samples. These fish are <300 mm minimum size limit and will reach harvestable size in about 2 years.

Because of the varying sampling schemes employed, it is difficult to determine if any changes may have occurred throughout the study. If a more standardized sampling design was developed, changes in population characteristics could be more adequately assessed. Because of the increasing popularity of this fishery, and the recently enacted catch and release early bass season, it is important to follow methodologies established in the New York State Centrarchid Sampling Manual (Green 1989) to assess bass population characteristics.

Northern Pike

Another important discovery during the collection of walleye during the marking sample in 2000 was the capture of three northern pike *Esox lucius.* DEC had received a couple of prior reports of northern pike being caught, but this was the first time they were documented. One of these fish was large (3.7 kg, (>10 lbs)), indicating it may have been in the lake for some time. It is unclear how they got into the lake, however it is speculated they were introduced by an angler. We do not have any indication of the population status in the lake. However, because of the current abundance of walleye and black bass, another voracious predator such as the northern pike could have negative impacts on the forage base. The potential expansion of this population should be closely monitored.

Summary

Modified Finger Lakes gillnets were used for the first time in Honeoye Lake in 1997 and again in 1999. Results from these assessments suggest that the walleye population is becoming overcrowded and yellow perch abundance is depressed. Alewife, the main reason the size limit for walleye was increased from 381 to 457 mm (15 to 18 in) in 1993, have been extirpated by natural causes in the mid 1990's. Based on angler reports and survey results, it appears that walleye may be beginning to stockpile under the current 457 mm (18 in) minimum size limit. It also appears that an abundant walleye population may have negatively impacted yellow perch recruitment, and as a result, have switched to sunfish for their main diet component. A population estimate of walleye conducted in 2000 indicates that about 47 adults/ha occur in Honeoye Lake, nearly four times greater than the current estimated density in Oneida Lake (VanDeValk et al. 2000), the premier walleye fishery in New York. Additionally, electrofishing samples and angler diary results indicate that bass populations are also at above average levels. Increased levels of predators in Honeoye Lake may have led to the high quality sunfish fishery that currently exists, with fish >1 lb not uncommon. However, the primary goal in Honeoye Lake is to maintain a viable walleye/yellow perch fishery, and based on negative reports by anglers concerning the status of these populations, attempts should be made to improve these fisheries.

Additionally, there are indications that walleye are utilizing Honeoye Inlet during the spawning season. Sporadic sampling verified the presence of adult walleye in spawning condition in the inlet, however because of sampling limitations and potential hindrances to a spawning run, a detailed assessment could not be conducted. It would be beneficial to take an in-depth look at the inlet spawning population and determine if spawning is successful and if it contributes to the lake population.

Recommendations

1. Reduce the minimum size limit of walleye from 457 to 381 mm (18 in to 15 in) to account for the elimination of alewives, the negative impacts on the yellow perch population, and alleviate overcrowded walleye population conditions. (Note: 15 in minimum size limit was enacted 1 October 2000)

2. Because of the proposed walleye regulation change and recent introduction of zebra mussels, continue monitoring the fish community using modifed Finger Lakes gill nets and electrofishing on a 3 year rotation, primarily for walleye/yellow perch and bass/sunfish interactions.

3. Utilize New York State Centrarchid Sampling Manual protocol for black bass and sunfish species for Honeoye Lake to more closely monitor these increasingly important species.

4. Further evaluate Honeoye Inlet walleye spawning run characteristics including abundance, spawning location, and fry production.

5. Continue to monitor northern pike expansion and potential impacts to fish community.

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Table 1. Walleye fry stocking history in Honeoye Lake, 1947-2000.

Year	Number (millions)	Year	Number (millions)
1947	2	1974	
1948	2	1975	
1949	4	1976	4
1950	4	1977	2.7
1951	2	1978	
1952	1	1979	4.4
1953	1.86	1980	
1954	1.2	1981	8.7
1955	2	1982	
1956	2.25	1983	8.7
1957	1.5	1984	8.7
1958	3	1985	8.7
1959	3	1986	8.67
1960	1	1987	
1961	3	1988	8.67
1962	2	1989	8.67
1963	2	1990	8.67
1964	1.6	1991	8.67
1965	1.6	1992	3.87
1966	1.4	1993	8.67
1967	0.96	1994	8.67
1968	1.4	1995	8.67
1969	3.2	1996	8.67
1970		1997	8.67
1971	4	1998	8.67
1972		1999	
1973	4	2000	8.67

Table 2. Catch-per-unit-effort (CPUE-fish/net night) in modified Finger Lakes standard gillnets[1] in Honeoye Lake, 1997 and 1999. Standard deviations are given in parenthesis. * indicates statistically significant difference (*P* < 0.05).

	1997		1999		
Species	CPUE	*N*	CPUE	*N*	*P*
Rainbow trout	0.2 (0.39)	2	0.0	0	0.166
Golden shiner	0.3 (0.87)	3	0.0	0	0.339
White Sucker	7.1 (5.30)	85	3.1 (2.75)	37	0.033*
Redhorse sucker sp.	0.1 (0.29)	1	0.0	0	0.339
Brown bullhead	4.8 (5.44)	58	1.1 (1.73)	13	0.040*
Rock bass	0.8 (0.87)	9	0.3 (0.62)	3	0.118
Pumpkinseed	15.6 (11.48)	187	9.5 (5.87)	114	0.121
Bluegill	17.8 (9.98)	213	21.5 (17.64)	258	0.518
Smallmouth bass	1.3 (1.66)	15	1.3 (1.82)	15	1.000
Largemouth bass	0.5 (0.67)	6	1.5 (1.24)	18	0.023*
Black crappie	1.3 (1.60)	15	3.8 (3.41)	45	0.036*
Yellow perch	9.6 (7.03)	115	9.6 (7.40)	115	1.000
Walleye	25.0 (8.99)	300	12.2 (7.06)	146	0.001*
Total	84.1 (16.18)	1009	63.7 (20.97)	764	0.014*

[1]Finger lakes standard gang gill net: 6 panels X 50' of 1.5", 2.0", 2.5", 3.0", 4.0", 5.0"

Table 3. Population characteristics of walleye collected in Honeoye Lake using modified Finger Lakes standard gang gillnets, Fall 1997 and 1999.

Characteristic	1997	1999
N	300	146
PSD	63.9	36.0
RSD_{51}	8.3	2.0
Mean length (mm)	378	371
Relative weight (Wr)		
Stock (250-379 mm)	87	91
Quality (380-509 mm)	87	83
Preferred (510-629 mm)	86	81
Memorable (630-759 mm)	65	-

Table 4. Mean length (mm) at age at time of capture by sex for walleye collected with modified Finger Lakes standard gang gillnets[1], September 1997 and 1999.

	1997-gill net			1999-gill net		
Age	N	Length	Range	N	Length	Range
			Male			
1+	17	292	255-320	1	281	-
2+	23	387	375-405	11	331	286-367
3+	50	406	370-505	22	361	327-409
4+	20	430	395-475	6	424	406-451
5+	16	438	385-465	5	448	433-461
6+	6	443	410-460	2	430	415-444
7+	2	420	410-430	7	451	435-476
8+	1	450	-	2	432	422-441
9+						
10+	1	635	-			
			Female			
1+	2	300	290-310	2	302	296-307
2+	11	404	295-445	13	357	331-378
3+	24	429	385-460	21	373	333-440
4+	6	439	400-465	3	433	423-451
5+	10	502	425-550	5	485	437-547
6+	6	522	470-585	3	492	460-542
7+	9	549	515-600	1	480	-
8+	3	563	540-575	1	562	-
9+						
10+						
11+	1	580	-			
			All			
1+	102	284	235-390	13	290	226-309
2+	36	389	284-445	38	336	286-378
3+	75	413	370-505	59	365	325-440
4+	26	432	395-475	10	428	406-451
5+	26	463	385-550	10	467	433-547
6+	13	487	410-585	5	467	415-542
7+	11	526	410-600	8	454	435-480
8+	4	535	450-575	3	475	422-562
9+						
10+	1	635	-			
11+	1	580	-			

Table 5. Mean length (mm) at age at time of capture by sex for walleye collected from Honeoye Lake with Oneida Style trapnets, April 1999 and March 2000.

	1999			2000		
Age	N	Length	Range	N	Length	Range
			Male			
2	1	270	-			
3	26	321	304-375	11	324	310-358
4	9	398	368-423	32	372	338-416
5	3	410	401-425	13	431	400-456
6	10	443	409-485	14	452	423-478
7	5	473	453-495	7	479	450-506
8	3	506	495-515	1	530	-
9						
10	1	505	-			
			Female			
3				1	375	-
4	2	441	415-467	39	394	340-451
5	2	466	458-474	46	433	385-492
6	3	511	504-525	25	473	425-546
7	4	538	503-570	7	519	478-565
8	3	528	490-584	10	546	516-577
9	3	568	515-625	15	564	530-609
10				5	616	605-632
11	2	638	612-663	1	630	-
12				3	654	614-706
			All			
2	1	270	-			
3	26	332	304-375	12	329	310-375
4	11	405	368-467	71	384	338-451
5	5	432	401-474	59	432	385-492
6	13	459	409-525	39	466	423-546
7	9	502	453-570	14	499	450-565
8	6	517	490-584	11	544	516-577
9	3	568	515-625	15	564	530-609
10	1	505	-	5	616	605-632
11	2	638		1	630	-
12				3	654	614-706

Table 6. Population characteristics of yellow perch collected in Honeoye Lake using modified Finger Lakes standard gang gillnets, Fall 1997 and 1999.

Characteristic	1997	1999
N	115	115
PSD	64.3	31.3
RSD_{25}	37.4	17.4
Mean length (mm)	222	202
Relative weight (Wr)		
Stock (130-199 mm)	81	92
Quality (200-249 mm)	86	94
Preferred (250-299 mm)	91	89

Table 7. Mean length (mm) at age at time of capture for yellow perch collected with Finger Lakes standard gang gillnets[1], September 1997 and 1999.

	1997-gillnet			1999-gillnet		
Age	N	Length	Range	N	Length	Range
1+	9	145	140-155	2	140	138-141
2+	4	169	165-175	18	155	140-190
3+	8	205	190-250	5	185	137-240
4+	8	237	195-280	10	231	187-282
5+	3	255	235-280	7	240	199-290
6+	7	286	265-310	4	287	265-326
7+	1	305	-	2	283	268-297
8+	1	310	-	5	292	253-316
9+	1	300	-	2	322	302-342

Table 8. Population characteristics of bluegill and pumpkinseed sunfish collected in Honeoye Lake using modified Finger Lake standard gang gillnets, fall 1997 and 1999.

Characteristic	1997	1999
Bluegill		
N	213	258
PSD	83.6	86.4
RSD_{20}	30.5	64.3
Mean length (mm)	179	199
Wr-Stock (80-149 mm)	92	116
Quality (150-199 mm)	93	117
Preferred (200-249 mm)	99	118
Memorable (250-299 mm)	96	99
Pumpkinseed		
N	187	114
PSD	93.0	95.0
RSD_{20}	77.5	65.8
Mean Length (mm)	200	202
Wr-Stock (80-149 mm)	94	97
Quality (150-199 mm)	100	117
Preferred (200-249 mm)	104	112
Memorable (250-299 mm)	104	

Table 9. Mean length (mm) at age at time of capture for bluegill and pumpkinseed collected with Finger Lakes standard gang gillnets[1], September 1997 and 1999.

	1997-gillnet			1999-gillnet		
Age	N	Length	Range	N	Length	Range
			Bluegill			
1+				2	100	97-102
2+	4	108	100-120	12	135	104-164
3+	18	163	125-210	16	157	118-195
4+	3	203	180-230	6	197	177-218
5+	5	230	220-240	8	221	144-298
6+	1	235	-	6	230	200-256
7+	2	250	250-250	3	225	
8+				2	245	
9+						
			Pumpkinseed			
1+						
2+	7	111	90-150	4	121	100-144
3+	8	144	120-190	2	154	153-155
4+	5	176	155-195			
5+	5	209	195-215	10	188	172-205
6+	3	223	215-230	4	216	176-239
7+	3	232	225-235	3	219	207-231
8+	1	250	-	4	224	213-244
9+						
10+				1	236	

Table 10. Population characteristics of largemouth bass and smallmouth bass collected in Honeoye Lake during nighttime using boat-mounted electrofishing gear, Fall 1997 and Spring and Fall 1998. 95% confidence intervals are given in parentheses.

Characteristic	Fall 1997	Spring 1998	Fall 1998
Effort (hours)	3.00	1.33	1.75
	Largemouth bass		
N	160	164	179
Population density (# /acre)[1]	12.2 (1.0)	21.5 (4.8)	16.8 (1.0)
CPUE (fish/hour)	53.3	123.3	102.3
CPUE $\geq$254 mm	40.3	93.2	56.0
CPUE <254 mm	13.0	30.1	46.3
PSD	65.1 (8.3)	70.4 (7.5)	76.6 (8.1)
RSD_{38}	12.4	7.7	4.7
Mean length (mm)	278	288	255
Wr-Stock (200-299mm)	-	102	101
Quality (300-379 mm)	-	95	98
Preferred (380-509 mm)	-	95	97
	Smallmouth bass		
N	16	0	7
CPUE (fish/hour)	5.3	-	4.0
CPUE $\geq$254 mm	2.3	-	1.7
CPUE <254 mm	3.0	-	2.3
PSD	54.5		
RSD_{35}	54.5		
Mean length (mm)	282		262

[1] N $\geq$ 254 mm; Green et al. (1986)

Table 11. Mean length (mm) at age at time of capture for largemouth and smallmouth bass collected by electrofishing from Honeoye Lake, 1997-1998.

	Fall 1997			Spring 1998			Fall 1998		
Age	N	Length	Range	N	Length	Range	N	Length	Range
				Largemouth bass					
0+	9	98	80-115	7	98	82-120	10	104	82-117
1+	4	168	100-199	9	125	103-197	14	179	115-203
2+	12	252	212-284	27	233	192-279	18	201	160-271
3+	4	282	259-300	15	293	233-331	13	292	246-310
4+	10	336	290-398	15	333	300-365	14	326	300-355
5+	7	362	322-395	10	359	327-405	10	360	327-400
6+	3	376	347-397	11	385	345-435	3	377	350-395
7+	4	426	380-450	1	411	-			
8+	3	436	420-453				1	411	-
				Smallmouth bass					
0+	1	100	-						
1+	5	176	166-200				2	190	185-195
2+	4	225	210-265				2	233	214-252
3+							2	344	342-345
4+									
5+	2	416	410-422						
6+	1	460	-						
7+	3	448	405-470						

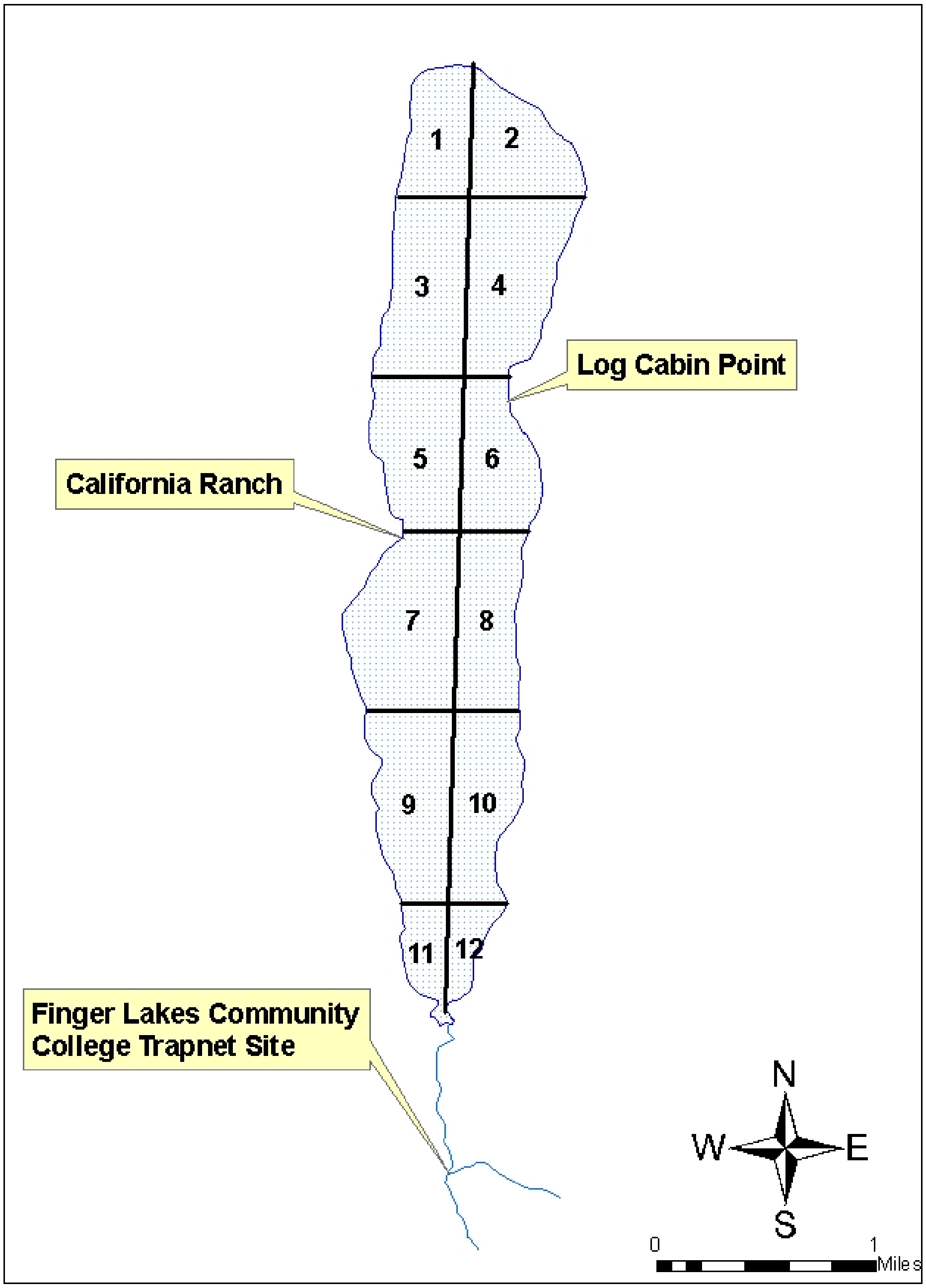

Figure 1. Honeoye Lake gillnet sampling grids 1997-1999 and trapnet locations 1999-2000.

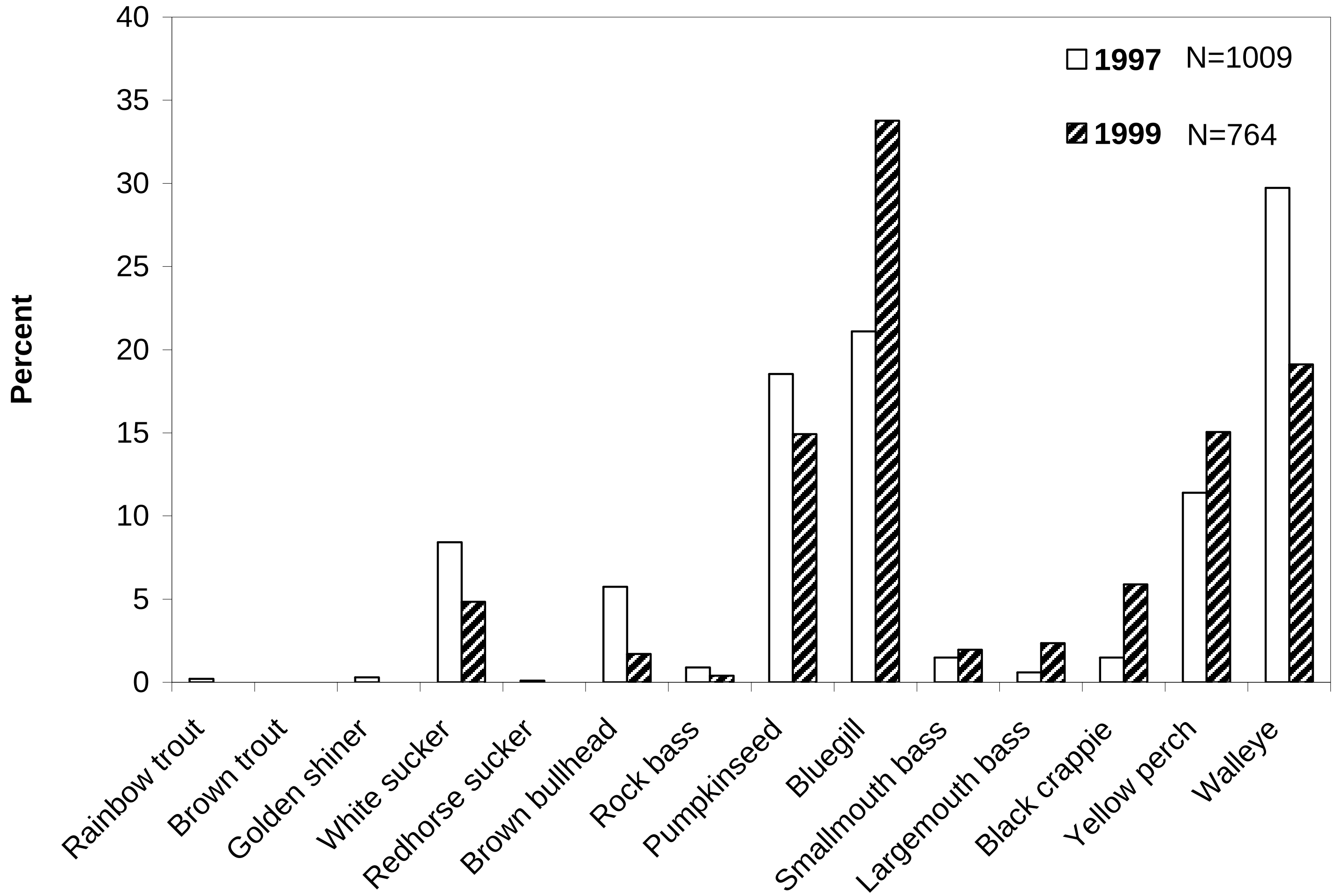

Figure 2. Species catch composition from Honeoye Lake modified Finger Lakes standard gang gillnets, 1997 and 1999.

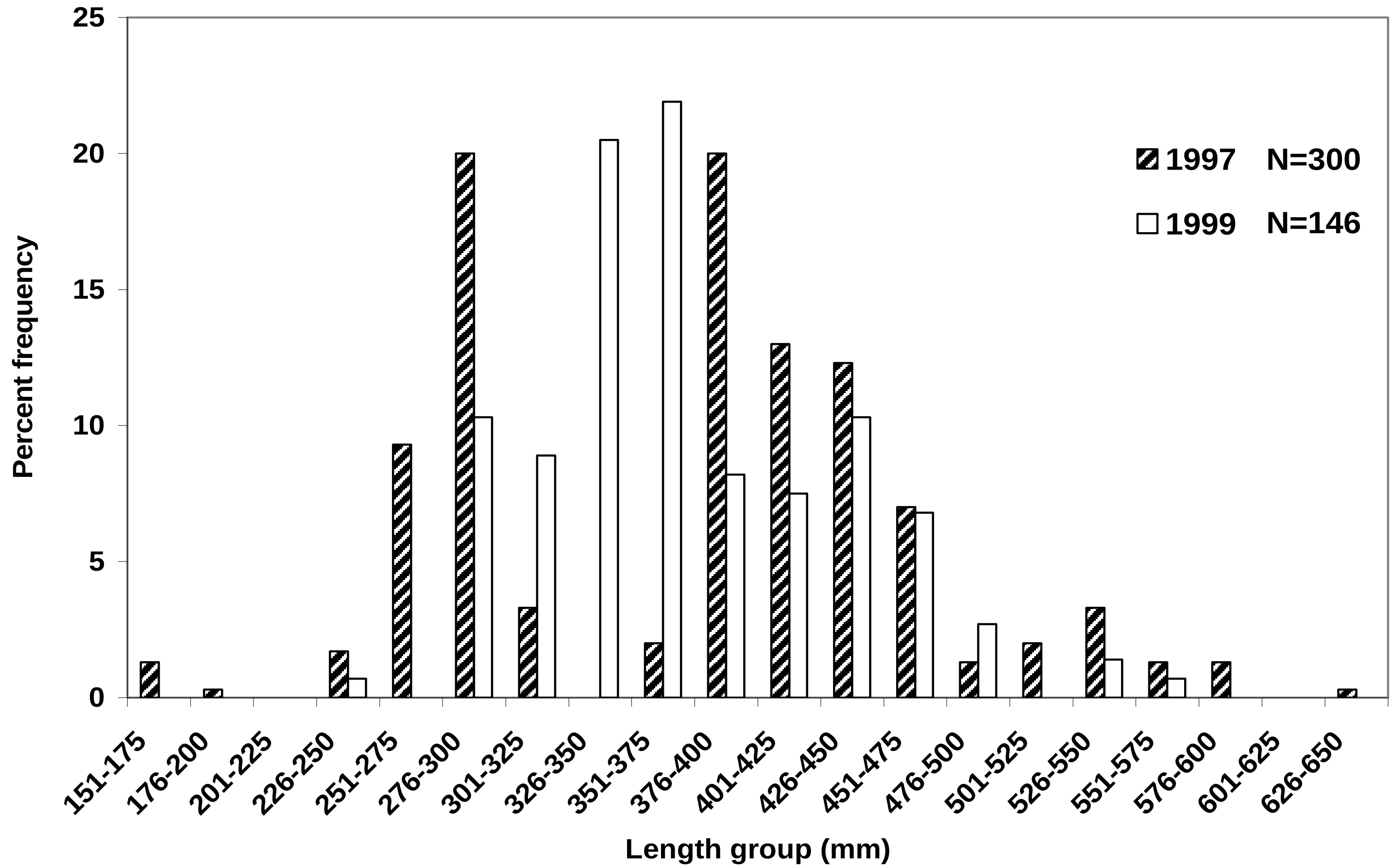

Figure 3. Length frequency distribution of walleye collected from Honeoye Lake using modified Finger Lakes standard gang gillnets, 1997 and 1999.

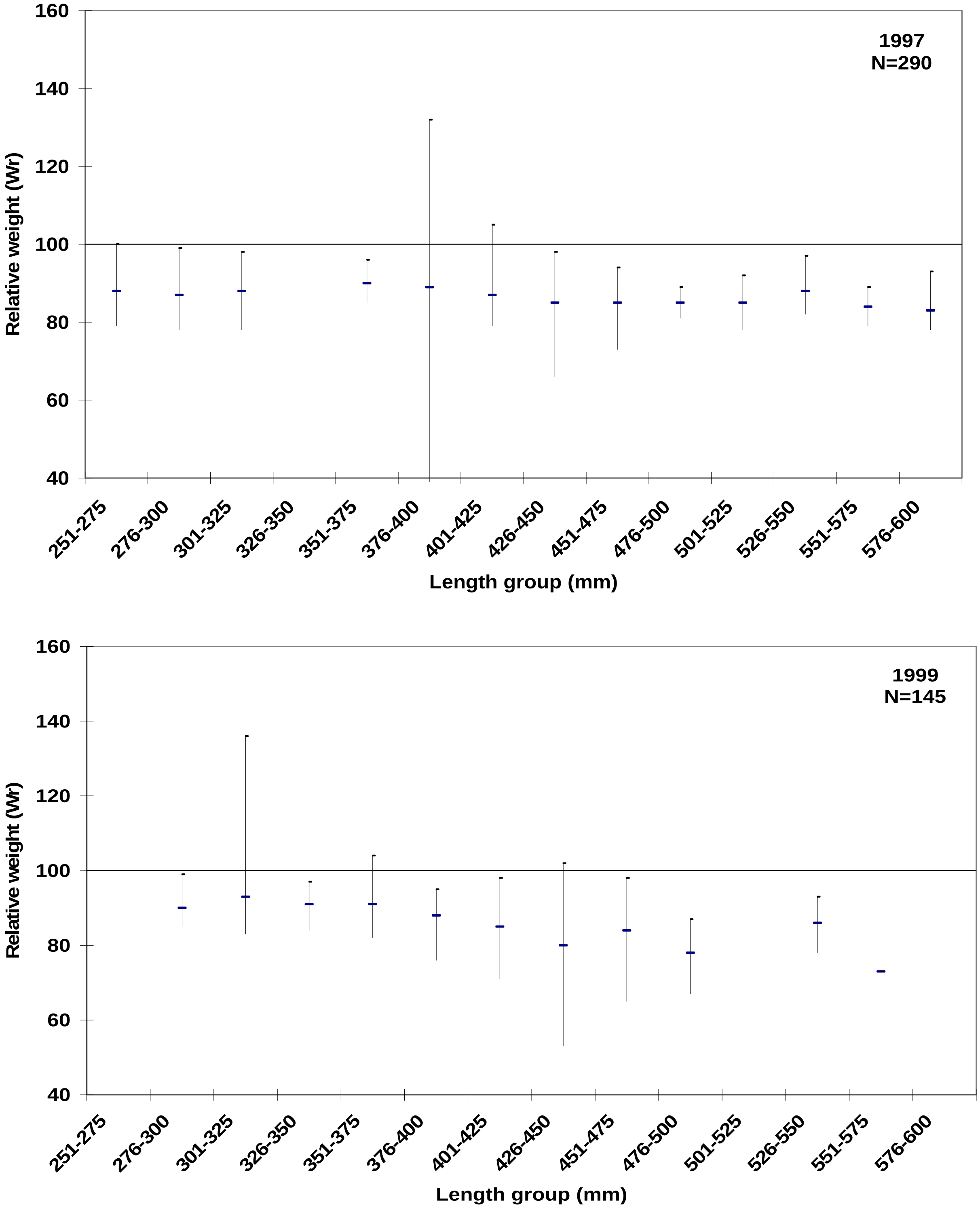

Figure 4. Relative weight (Wr) of walleye collected with modified Finger Lake standard gang gill nets from Honeoye Lake, 1997 and 1999.

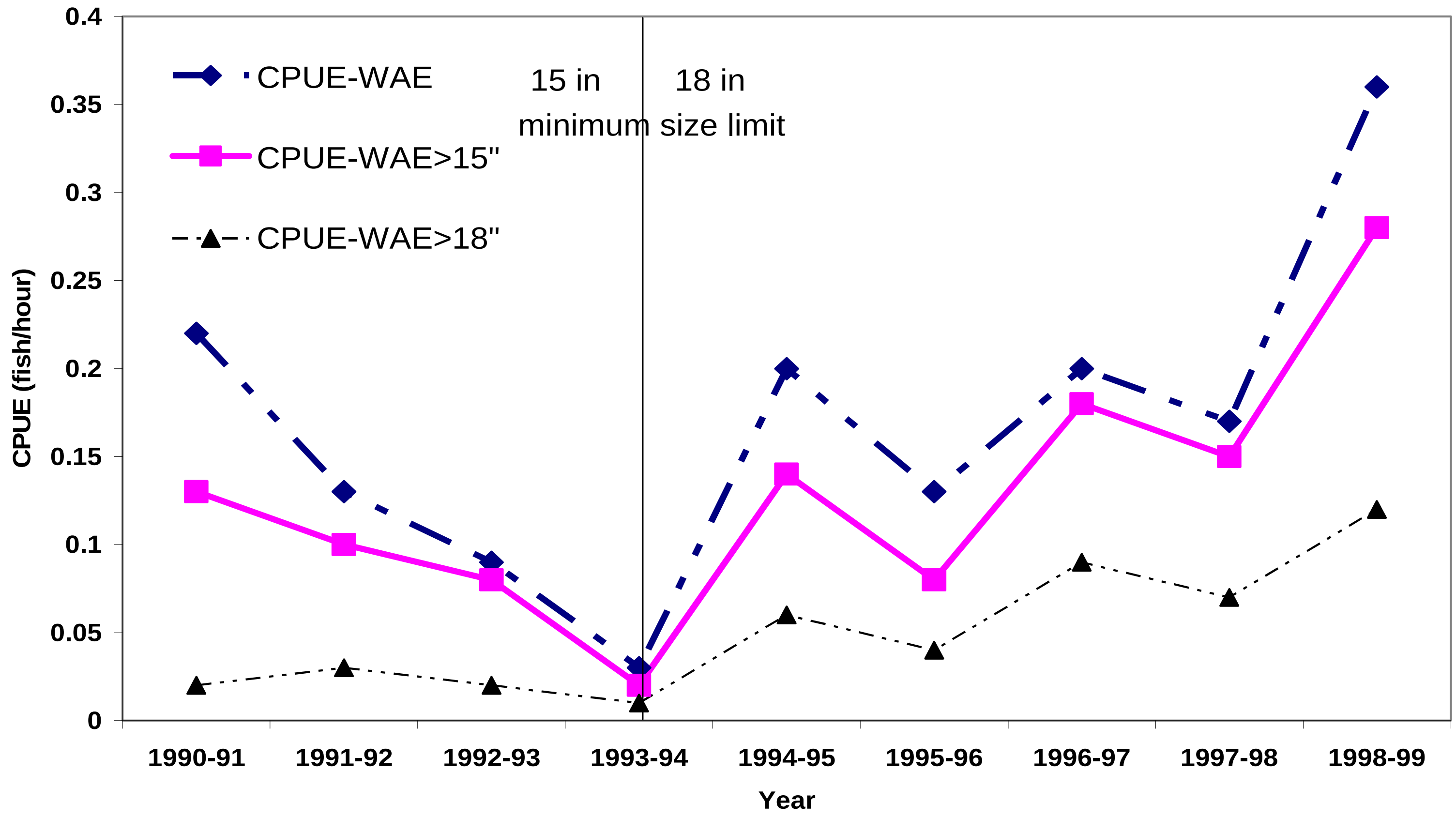

Figure 5. Catch-per-unit-effort (fish/angler h) for walleye from Angler Diary Cooperators on Honeoye Lake from 1990-1999. Minimum size limit for walleye was 15" from 1989-1992 and 18" from 1993-2000.

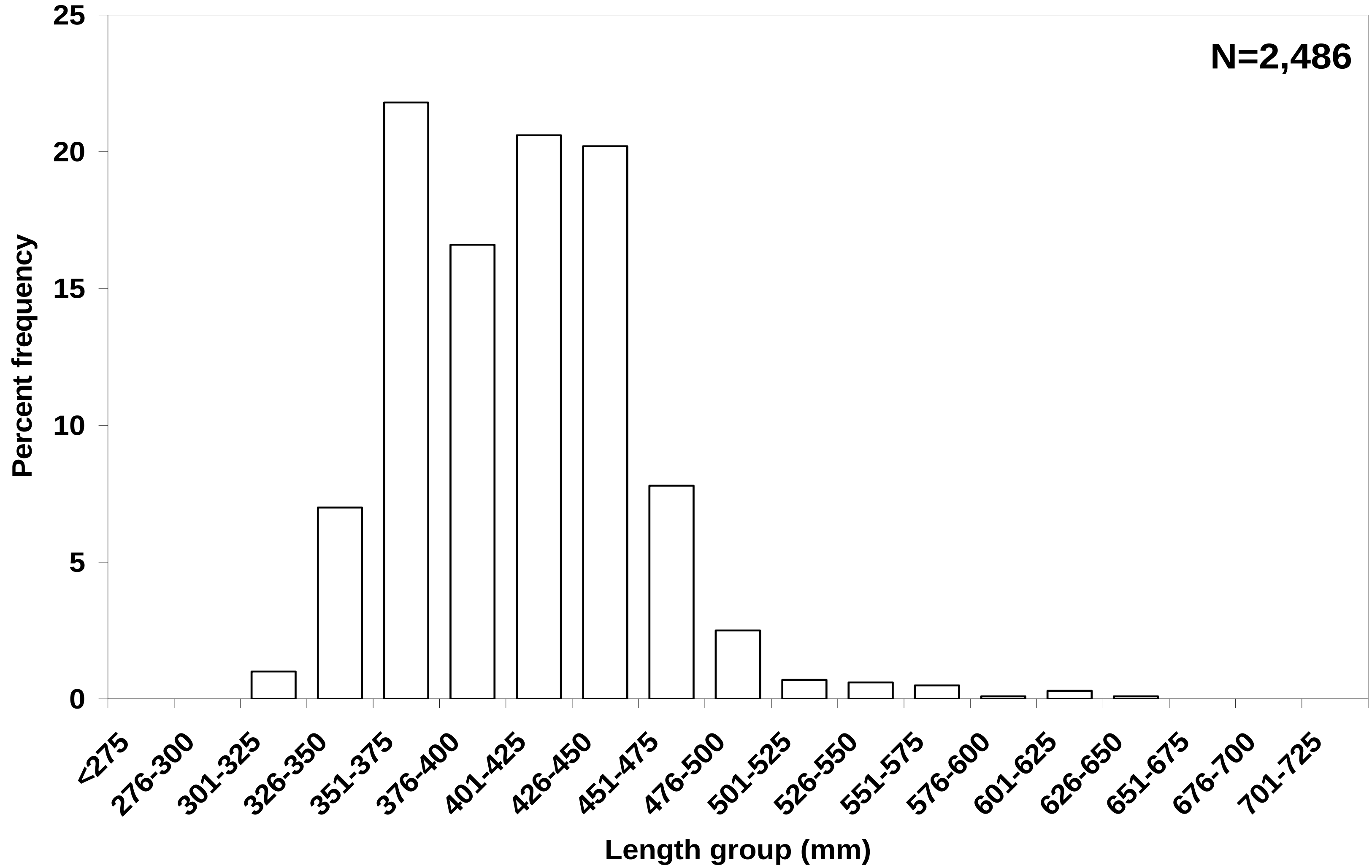

Figure 6. Length frequency distribution of walleye collected from Honeoye Lake using Oneida style trapnets in Spring 2000.

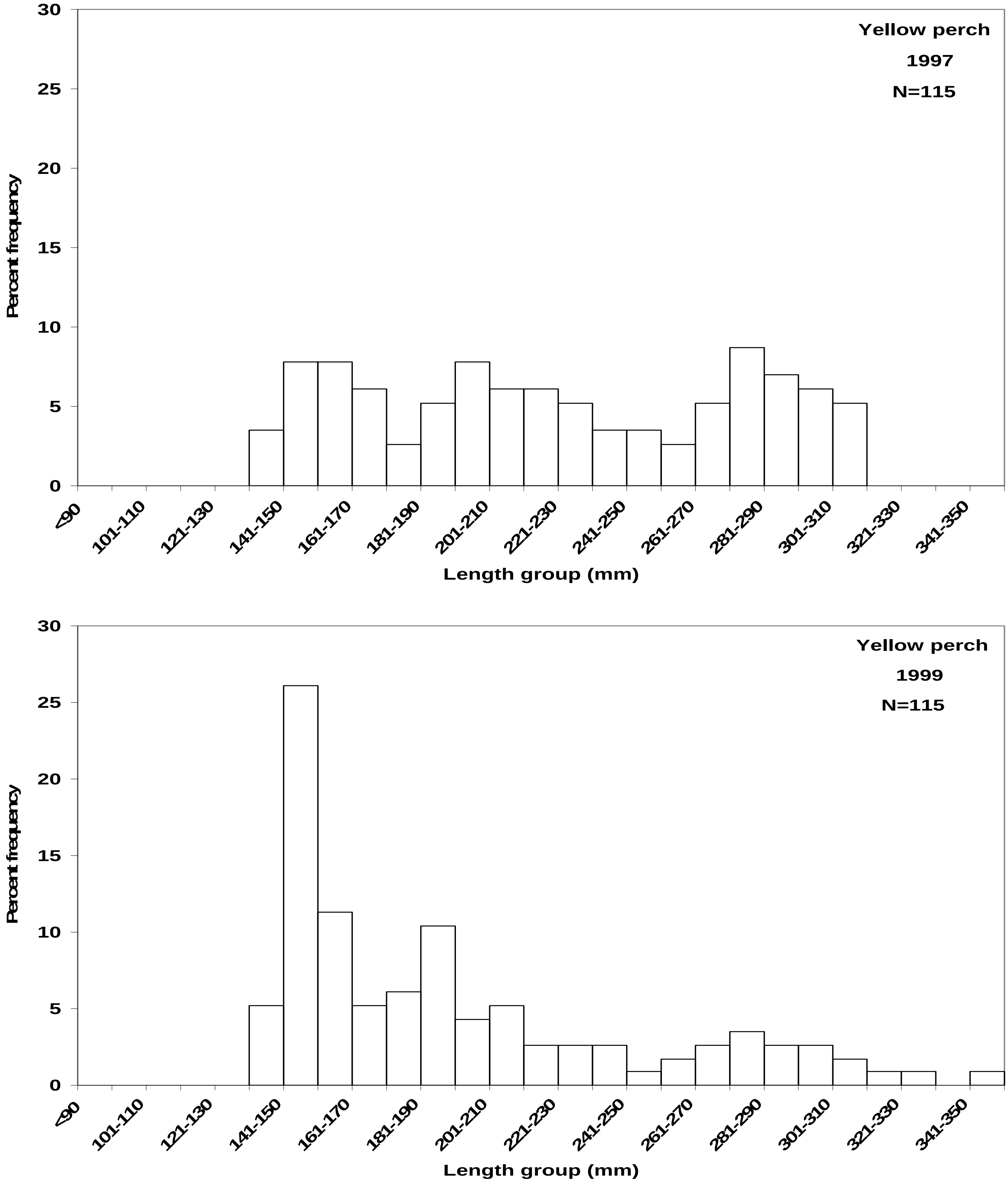

Figure 7. Size distribution of yellow perch collected with modified Finger Lakes standard gang gill nets from Honeoye Lake, August 1997 and 1999.

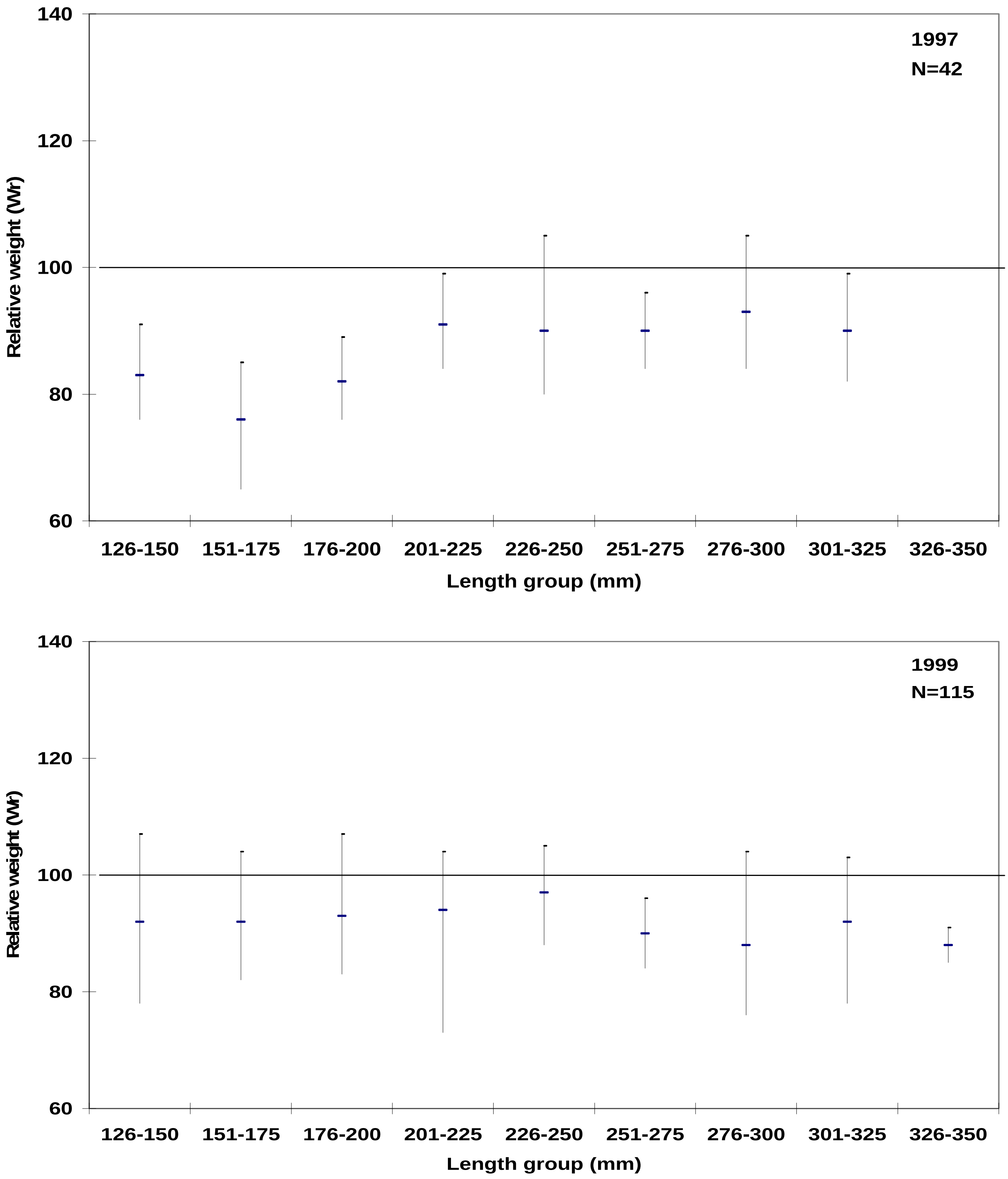

Figure 8. Relative weight (Wr) of yellow perch collected with modified Finger Lake standard gang gillnets from Honeoye Lake, 1997 and 1999.

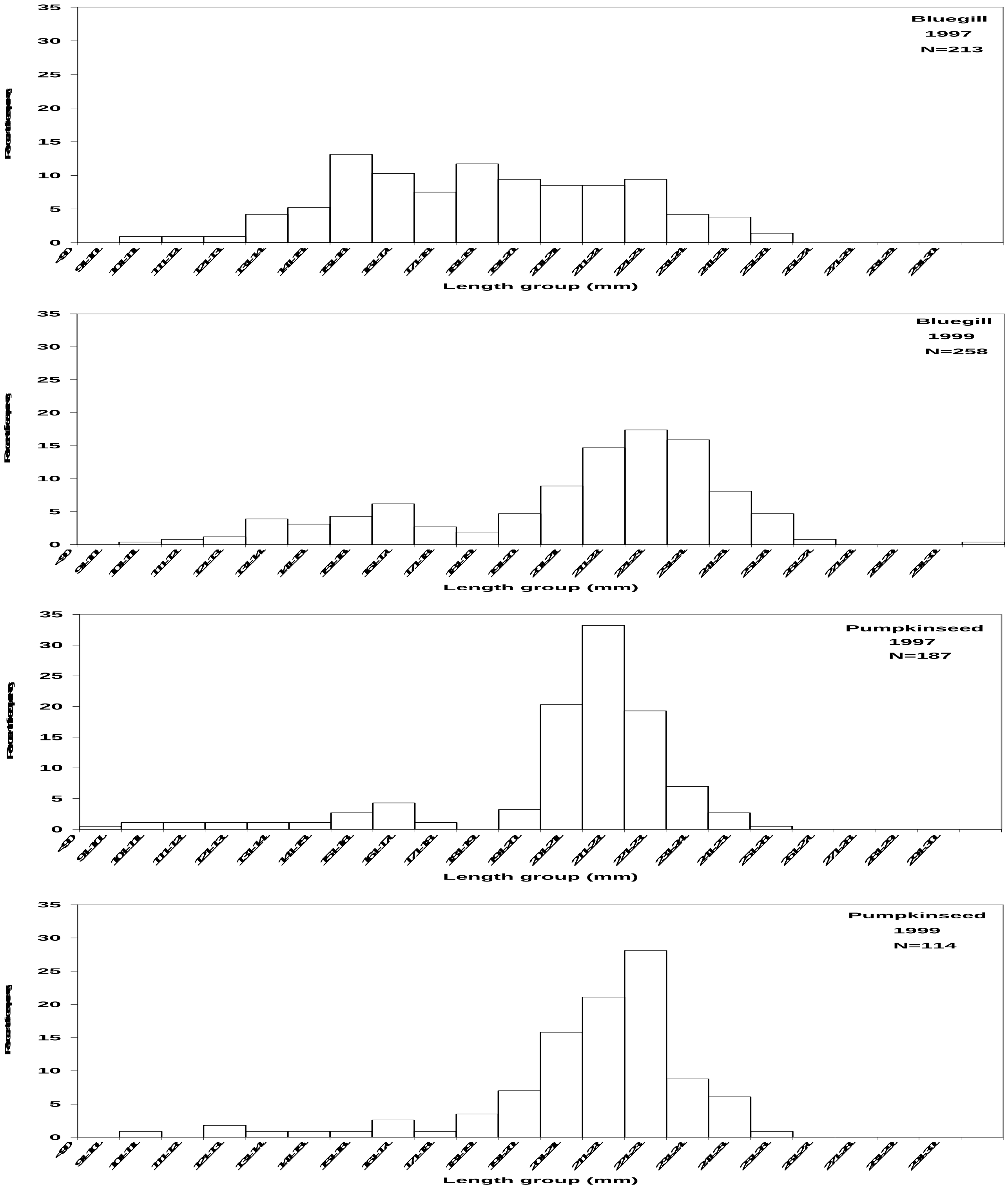

Figure 9. Size distribution of bluegills and pumpkinseeds collected with modified Finger Lakes standard gang gill nets in Honeoye Lake, August 1997 and 1999.

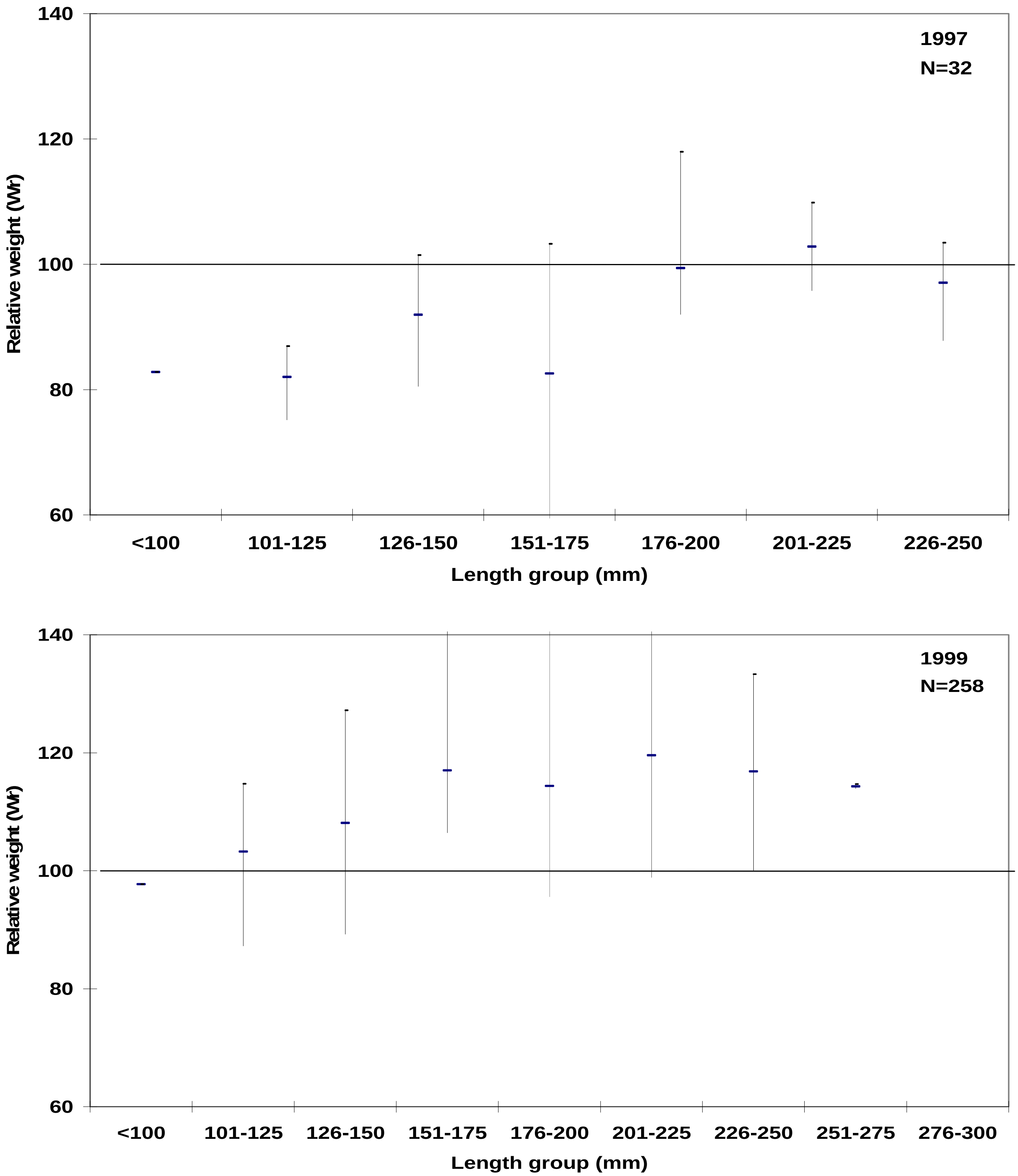

Figure 10. Relative weight (Wr) of bluegills collected with modified Finger Lake standard gang gill nets from Honeoye Lake, 1997 and 1999.

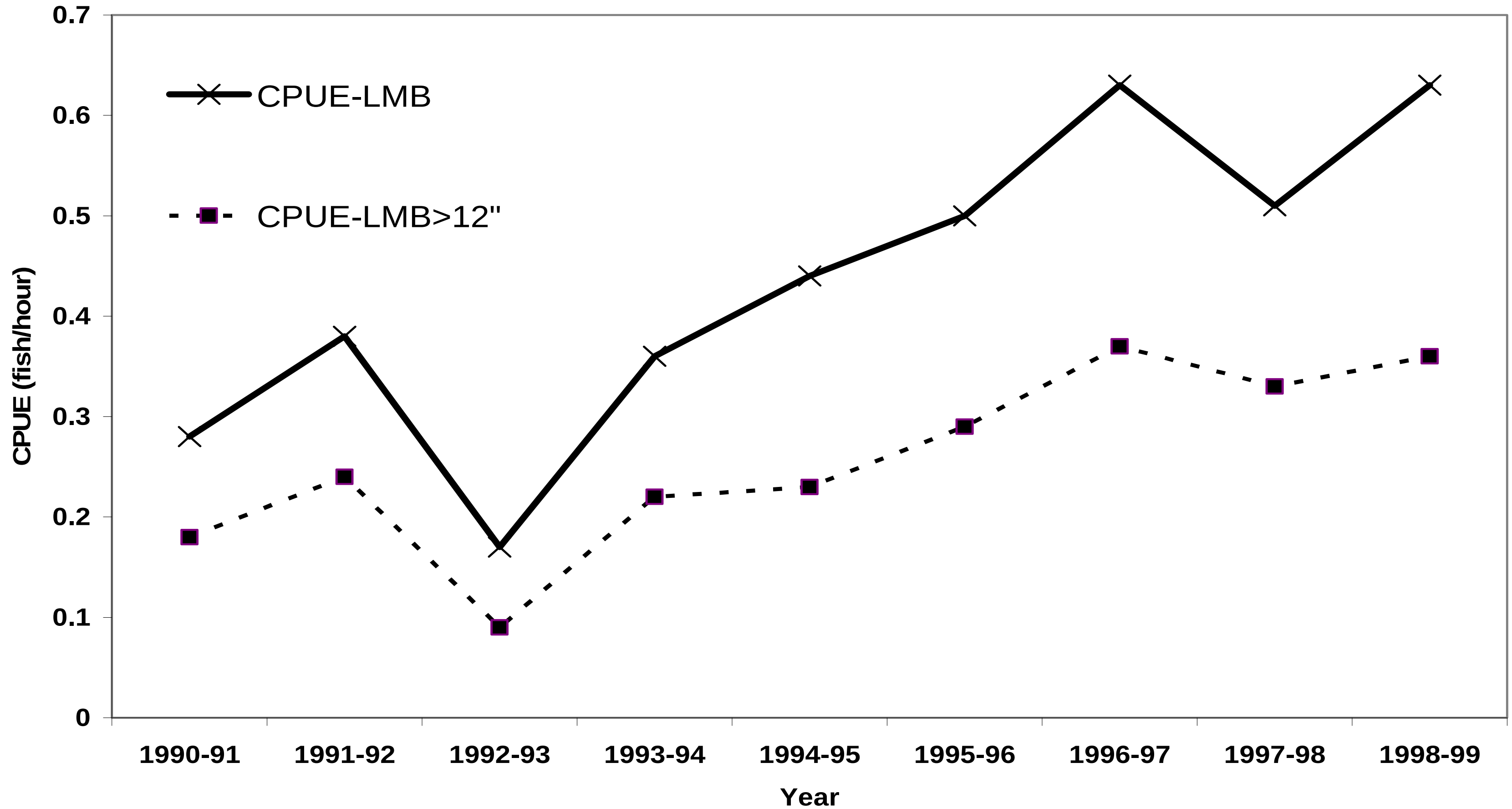

Figure 11. Catch-per-unit-effort (fish/angler h) for largemouth bass from Angler Diary Cooperators on Honeoye Lake from 1990-1999.

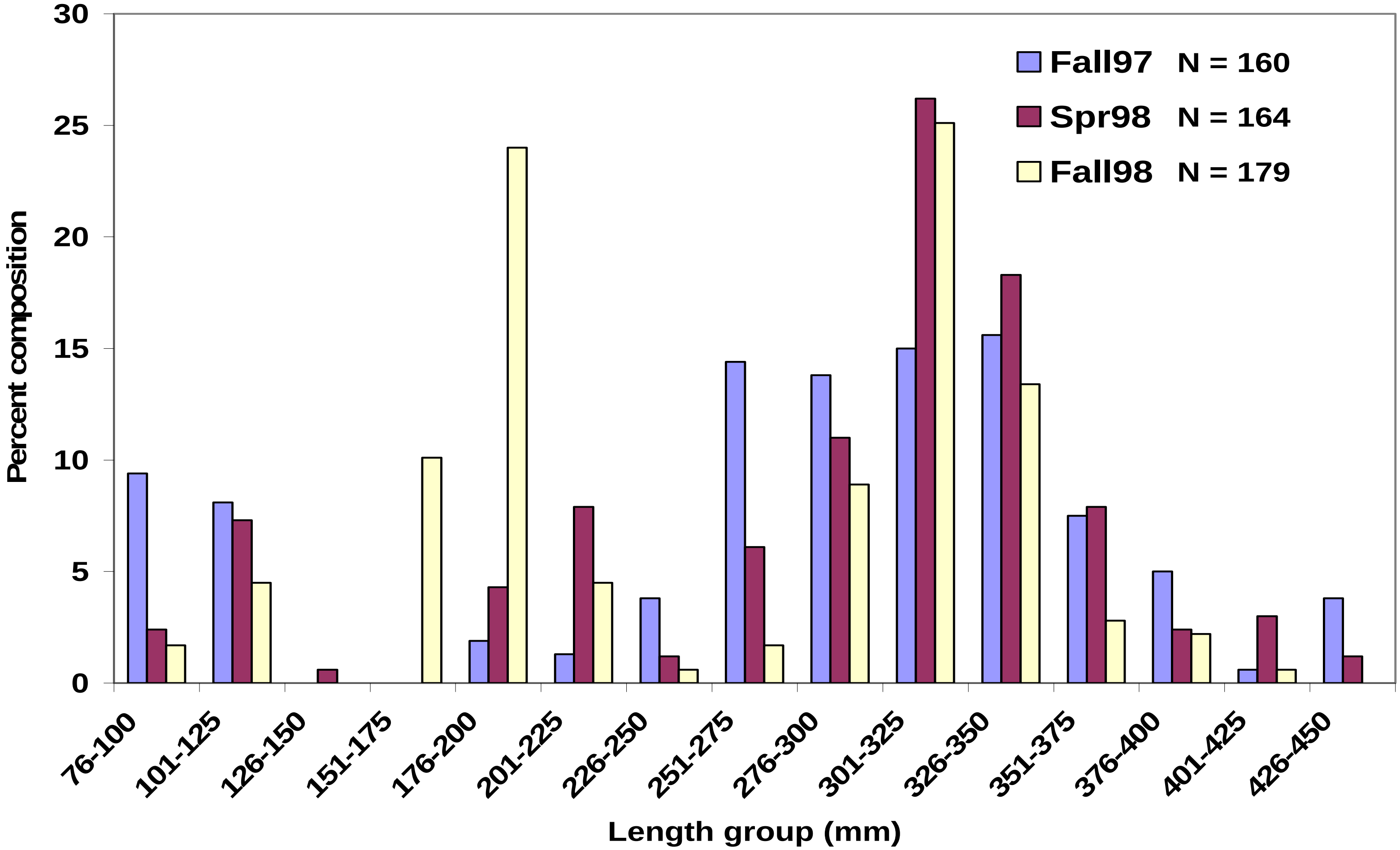

Figure 12. Length frequency distribution of largemouth bass collected from Honeoye Lake using shoreline electrofishing gear in Fall 1997 and Spring and Fall 1998.