LAKE MICHIGAN

2006 Creel Survey Report

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EXECUTIVE SUMMARY

- A nonuniform probability creel survey was conducted on Lake Michigan from April 1 to October 31, 2006 and three Lake Michigan tributaries from March 1 to March 31, 2006 and July 1 to December 31, 2006. The survey covered sport fishing by shore anglers and boat anglers (including chartered trips) from several Indiana ports (Washington Park and Trail Creek Marina, Michigan City; numerous private ramps and slips on Burns Waterway, Portage; Pastrick Marina, East Chicago; Whihala Beach County Park boat launch, Whiting, and Hammond Marina, Hammond) and stream anglers on three tributaries of Lake Michigan (Trail Creek, LaPorte County; East Branch of the Little Calumet River, Porter County, and Salt Creek, Porter County).

- Due to Indiana's close proximity to neighboring states' borders and the migratory nature of trout and salmon, many boat fishing trips were conducted in other states' waters. The estimates provided represent estimates of fish returned to Indiana ports. Because a subset of all fishing locations was surveyed, the creel survey cannot yield estimates of total harvest and effort for southern Lake Michigan. Rather, the creel data is used to monitor trends in the Lake Michigan fishery.

- During the survey period anglers fished an estimated 284,337 hours. Seventy-three percent of the fishing hours came from boat anglers.

- Estimated total catch from the combined fisheries was 346,995 fish representing twenty-seven fish species. Yellow perch dominated the catch, comprising 78% of the total. The boat fishery, including chartered trips, dominated the catch accounting for 311,704 fish or 90% of the total.

- Coho salmon, Chinook salmon, lake trout, and brown trout catch rates all fell compared to the prior fishing season; whereas steelhead catch rates remained comparable. The yellow perch catch rate was one of the highest recorded from 1994 to 2006. Comparing the 2006 catch rates with their long-term averages, Chinook salmon and yellow perch were above average; whereas brown trout, coho salmon, lake trout, and steelhead trout were below average.

- Bass anglers fished an estimated 12,522 angler-hours, catching 6,795 black bass, mainly smallmouth. The majority of fishing occurred from boats, accounting for 93% of the effort and 85% of the catch. Most bass caught were released; only 2% of the total catch was harvested.

- Overall, anglers felt it was very important to important to have trout and salmon and yellow perch in Lake Michigan. The majority of anglers felt very satisfied to somewhat satisfied with the salmonid fishery; however, 30% to 40% of brown trout and lake trout anglers rated their satisfaction as less satisfied to not satisfied with these two salmonid species. Only 8% of the yellow perch parties gave a less than satisfied rating with the perch fishery.

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INTRODUCTION

The recreational fisheries of Lake Michigan are economically, socially, and ecologically important. Successful management of these recreational fisheries relies upon data describing the fishery including, but not limited to, sport catch and effort. Sport fish harvest, catch per unit effort, biological data, and social data are widely used to make fishery management decisions, and to develop a better understanding of ecosystem and population dynamics (Bence et al. 1995).

In 1966, the Indiana Department of Natural Resources (IDNR) Division of Fish and Wildlife (DFW) began collecting sport harvest data on Indiana's portion of Lake Michigan (McReynolds 1966). The emphasis was on collecting both commercial and sport harvest data; however, since only three commercial anglers were actively or semi-actively engaged in the industry in 1966, the emphasis was shifted to obtaining information on the sport fishery. By 1968, the creel survey developed into an assessment of salmonid movements in southern Lake Michigan (Barry 1968). With coho salmon concentrating in the southern end of Lake Michigan during the winter of 1967 and the spring of 1968, biologists questioned whether this would become the annual migration pattern for salmon and other species of the salmonid family. Since the 60's, the creel program has expanded to assess angler effort, harvest, the quality and quantity of the fishery, and provide information to evaluate stocking and fishing regulations. In order to effectively incorporate creel data into management strategies, though, surveys must be of sound design.

Beginning in 1994, a review of the IDNR Lake Michigan creel survey revealed that the design varied, almost every season, since its 1966 inception (Bence et al. 1995). Yearly design modifications were common, particularly between 1968 and 1994. Modifications included the type of survey utilized (i.e. roving, roving-access, etc.), the sampling locations utilized, time frames utilized, and the data analysis and data reporting utilized. Consistency, with respect to the creel survey design, did not exist until after the 1994 creel season. Undoubtedly, the choice of survey design the biologist used was influenced by the survey objective and yearly funding availability.

In 2004, an extensive evaluation of the 1994 to 2003 Indiana Lake Michigan creel survey was initiated. The primary goal of the review was to (1) assess the current survey design (e.g. survey objectives, type of survey, time frames sampled, sample selection, data manipulation, etc.) and (2) make recommendations to improve the overall statistical design. Implementation of those recommendations began with the 2006 creel season. The modifications incorporated were based upon guidance from the Lake Michigan Creel Survey Working group of the Lake Michigan Technical Committee and literature reviews of angler survey methods (Pollock et al. 1994; Bence et al. 1995; Lockwood et al. 1999).

The objective of the angler creel survey was to evaluate sport fishing effort, fish catch by species, angler preferences and angler attitudes from southern Lake Michigan and tributaries as part of the DFW Work Plan 300FW1F10D39504. Due to limitations in site access (e.g. access restrictions to industrial areas based upon the National Threat Advisory level) and budgetary restrictions, however, the creel survey can only provide an index of fishing catch, harvest and effort along Lake Michigan and its tributaries. These data assist the DFW Lake Michigan fishery management efforts in providing valuable trend information concerning the status of sport fish in Lake Michigan and provides the sport community with catch and effort statistics.

STUDY SITE

Indiana's portion of Lake Michigan is the smallest of the four states bordering the Lake (approximately 1% of the Lake Michigan area), encompassing about 43 miles of shoreline (224 square miles). Most of the area is highly developed and heavily industrialized, with the exception of the Dunes National Lakeshore and the Indiana Dunes State Park (Figure 1).

Several lakefront marinas provide boat and shore access, including: Washington Park and Trail Creek Marina, Michigan City; one municipal ramp and several private ramps along Burns Waterway, Portage; Robert A. Pastrick Marina, East Chicago; Lake County Parks and Recreation Whihala Beach boat launch, Whiting and Hammond Marina, Hammond. Three coal-fired power plants are also located along the shoreline, including the Northern Indiana Public Service Company (NIPSCO) Michigan City Generating Station, Michigan City; NIPSCO Bailly Generating Station, Burns Harbor

and the Dominion State Line Power Plant, Hammond. The NIPSCO Michigan City station and State Line provide fishing opportunities for pedestrian (i.e. shore) anglers. No public entry is allowed at the NIPSCO Bailly Generating Station, although limited access exists just west of the station near Indiana Dunes National Lakeshore boat-in beach. Various industries and private clubs along the shoreline also provide limited access to pedestrian/shore and/or boat anglers [e.g. Mittal Steel (formerly Bethlehem Steel), Burns Harbor; Midwest Steel, Burns Harbor; Amoco Whiting Refinery, Whiting; etc.]. Access, however, is typically limited to employees or members of those businesses or clubs. Access or access restrictions at private industrial properties is directly influenced by the National Threat Advisory issued through the United States Department of Homeland Security. In the past, high national threat levels have resulted in closure to access.

Public access to the tributaries of Lake Michigan is limited to county parks, city parks and state access sites. Main tributaries of the Lake Michigan coastal area include: the Little Calumet River, Grand Calumet River, Turkey Creek, Deep River, Salt Creek, Coffee Creek, Dunes Creek, Trail Creek, Galena River, and several smaller tributaries and man-made ditches.

STOCKING

Salmon and trout continue to be an important component of the Lake Michigan fish community, with an annual average of 13.7 million fingerling trout and salmon stocked into Lake Michigan since 1994 (Table 1). From 1994 to 2006, the number of trout and salmon stocked in Indiana waters of Lake Michigan by DFW has averaged 1.2 million fish per year (Table 2, Figure 2). In 2006, however, reduced numbers of coho salmon, Chinook salmon, and steelhead trout were planted due to the rehabilitation of Indiana's main Lake Michigan salmonid production facility (Mixsawbah State Fish Hatchery). Hatchery rehabilitation was crucial in order to avoid the complete failure of this facility. In order to minimize the loss of fish production and lessen the impact to trout and salmon anglers, Bodine State Fish Hatchery (Indiana's other salmonid production facility) supplemented stocking by releasing more, younger steelhead. Additionally, fish trades with neighboring states were negotiated to help minimize production losses.

Lake Michigan anglers should not be impacted by the coho stocking adjustment until the spring of 2008. Any impact to the Lake Michigan stream Skamania fishery will occur during the third and fourth summer following the stocking of those smaller trout. Fortunately, the trout and salmon adult fish harvest is comprised of fish between 2 and 5 years of age, resulting in generational overlaps during spawning migrations.

METHODS

The Lake Michigan creel survey was divided into boat, shore, and stream components. Sport fishing from the boat and shore fisheries was monitored between April 1 and October 31, 2006 at four main ports; Washington Park and Trail Creek Marina in Michigan City; numerous private ramps and slips on Burns Waterway (Portage Marina, Doyne's Marina, Treasure-Chest Marina) in Portage; Pastrick Marina in East Chicago; the Lake County Parks and Recreation Whihala Beach boat launch in Whiting and Hammond Marina in Hammond (Figure 1). The shore fishery was also monitored at the Michigan City Washington park pier, Port of Indiana Public Access Site (Portage), East Chicago Pastrick Marina pier and the Hammond Marina pier. The lake survey was conducted using a non-uniform probability access design. Sampling probabilities, proportional to the amount of fishing expected, were assigned to each site (based upon prior angler survey effort data). The sum of the probabilities assigned to the sampling sites equaled one.

Stream sport fishing surveys were conducted at main public access sites (i.e. county parks, state access sites) and popular fishing areas on Trail Creek, the East Branch of the Little Calumet River and Salt Creek (Figure 1). Each stream was sampled separately, from March 1 through March 31 and from July 1 through December 31, 2006. Trail Creek was sampled from the Trail Creek basin upstream to Johnson Road (Appendix I); the East Branch of the Little Calumet River was sampled from the Ameriplex complex (S.R. 249) upstream to the Indiana National Lakeshore Heron Rookery located on 600 East (Appendix I), and Salt Creek was sampled from the Ameriplex complex upstream to U.S. 30 (Appendix I). The stream survey was conducted using a non-uniform probability roving-access design. Probabilities were assigned to

each tributary (based upon prior angler survey effort data) so that the total of the probabilities was equal to one.

Sample size determination followed the guidelines recommended by Shipman and Hudson (1980); survey time covered at least 25% of the available fishing hours. The fishing season was stratified by fishery type (lake or stream), site (port or tributary), survey period (i.e. months), and day type (i.e. weekday, weekend). A two-stage sampling design (see Pollock et al. 1994) was used to assign days (primary sampling unit, PSU) and the site/shift combination (secondary sampling unit, SSU). The creel survey was conducted on most weekend days and on two to three randomly chosen days during the week. Weekends were sampled more heavily due to heavier fishing effort compared to weekday effort. Holidays were classified as weekend days; however, no holidays were sampled due to administrative restrictions.

Fishing day lengths were standardized for the entire creel season to represent daylight hours (sunrise to sunset). The fishing day was described as 14-hours in length (0600 hours to 2000 hours) from April through September, 12-hours in length (0600 hours to 1800 hours) in March and October, and 9-hours in length (0700 hours to 1600 hours) in November and December. The fishing day was divided into two periods, or shifts: AM and PM. Shifts were equal in duration, did not overlap, and were sampled with equal probability. One or two shifts were worked per workday. Although a seasonal night fishery on Lake Michigan and tributaries exists, personnel safety precluded the justification of including an additional shift in the Lake Michigan creel design.

Two intermittent employees (i.e. clerks) performed the lake survey from April through October; one intermittent employee performed the stream survey in March, and July through December. The shift included time for travel to the site, and scheduling of two non-overlapping periods ranging from 7-hours April through September (0600 to 1300 hours and 1300 to 2000 hours), 6-hours March and October (0600 to 1200 hours and 1200 to 1800 hours) and 4.5-hours November and December (0700 to 1130 hours and 1130 to 1600 hours). All times were adjusted by 1 hour (moved ahead or back) during daylight saving time. Dates and SSU's were selected via random selection with

replacement. Minor adjustments were made to the schedule in order to comply with the maximum 75-hour bi-weekly state personnel requirements.

Three types of data were collected for each lake site or tributary sampled: angler and/or vehicle counts for effort, angler interviews for harvest rates and total catch, and biological information on harvested fish.

Two types of multiple counts were utilized for the lake creel survey: interval and instantaneous. For the interval count, fishing boats were counted for a twenty-minute period as they returned to the port being surveyed. Three counts were made each day at the selected port. The count times for the early or late shift were selected at random, without replacement, to insure that counts were made at various hours throughout the day during any given month. Interval boat counts occurred at sample areas where all boats returned to the port through a defined channel. Shore anglers were counted using instantaneous counts, performed immediately following the interval boat counts. Stream effort was measured by utilizing progressive counts. The clerk drove the entire stream section, stopping at predetermined sites to count either angler vehicles or anglers (anglers counted only at the DNR Public Fishing area located in the Trail Creek basin). Two progressive counts were performed per shift. Count times were selected using systematic random sampling as outlined in Pollock et al. (1994).

After the counts were completed, the clerk (s) interviewed anglers to obtain catch and fishing times. Boat angler parties were interviewed at the completion of their fishing trip while shore and stream angler parties were interviewed while they were actively fishing. Both incomplete and completed fishing interviews were obtained from shore and stream anglers. If applicable, incomplete shore and stream fishing trips were updated throughout the shift. Anglers or angler parties were asked what time they started their fishing trip, if they came by car and parked at the vehicle count site (stream anglers only), what they fished for, and the number/type of fish harvested and released. Additional information about angler county-of-residence, species preference, and angler satisfaction was also collected. If a large number of boat, shore or stream anglers were encountered, the clerk (s) sub-sampled anglers for interviewing. Biological information was taken on harvested fish, including species, total length (mm), weight (kg), fin clip, and tag numbers.

Effort and catch calculations followed Lockwood et al. (1999) and Pollock et al. (1994). Catch (fish harvested and released) and effort estimates were generated for each combination of site (lake port or tributary), day type, fishing mode, month and target species (information on target species obtained from the interviews when anglers were asked what species they were fishing for). From the sample of counts and interviews, catch rate (R) and angling effort (E) were calculated; catch (C) was estimated as their product. All calculations were based upon multiple-day estimates. Multiple-day estimates treat all interviews within a longer period (i.e. month) as though they were random samples from that longer time period. A single catch-rate was calculated for the month, and then multiplied by effort for that month to produce estimates of catch. Multiple-day estimates were summed over the creel survey time period and angling mode to provide a total estimate of angling effort (angler-hours) and catch. Although the multiple-day estimate ignores day-to-day differences in catch rates, inadequate sample sizes precluded the use of daily estimates (Lockwood et al. 1999).

Boat effort

Estimated number of boats for period p from interval count j on day d:

$$(1)\quad B_{pdj} = F_d\,[(\,b_{dj} \;/\; L_{dj})]$$

where,

F_d = F_p * D (number of fishable hours on day d, defined as 7-hours in April through September and 6-hours in October * total days in sample period),

b_{dj} = boats or other units counted on day d during interval j,

L_{dj} = duration (hours) of interval count j on day d.

When $n_d > 1$, estimated mean number of boats for period p based on day d:

$$(2^*)\quad \bar{B}_{pd} = \frac{\sum_{j=1}^{n_d} B_{pdj}}{n_d}$$

where,

n_d = number of counts on day d.

* Shift and site probabilities incorporated after equation 2 by dividing the average boat count by total probability [$B_{pdI\Pi} = B_{pd} / \Pi_{pm}$]. Π_{pm} was the total probability that fishing period p was included in the sample. This probability included the probabilities of choosing time of day (shift) and area (site). Total probability was obtained by multiplying the individual probabilities.

Estimated mean number of boats for period p calculated as:

$$(3)\quad \bar{B}_p = \frac{\sum_{d=1}^{m_p} \bar{B}_{pdI\Pi}}{m_p}$$

where,

m_p = number of sampled days in which counts were made.

From the interviews (completed trip), mean total angler-hours per boat trip during period p calculated as:

$$(4)\quad \bar{e}_p = \frac{\sum_{i=1}^{k_p} h_{pi}}{k_p}$$

where,

h_{pi} = total angler hours fished by angler (or angler party) i,

k_p = number of angler parties interviewed.

Estimated boat angler-hours were a product of estimated number of boats and mean total angler-hours per boat trip during period p:

$$(5)\quad E_p = \bar{B}_p * \bar{e}_p$$

Boat catch

Estimated catch per angler-hour from completed trip interviews for period *p* calculated as:

$$(6)\quad \hat{R}_p = \frac{\sum_{i=1}^{k_p} c_{pi}}{\sum_{i=1}^{k_p} h_{pi}}$$

where,

c_{pi} = total catch of a particular species by angler (or angler party) *i*,

h_{pi} = total angler hours fished by angler (or angler party) *i*,

k_p = total number of anglers (or angler parties) interviewed.

Estimated catch calculated as:

$$(7)\quad \hat{C}_p = \hat{E}_p * R_p$$

where,

R_p = catch rate.

Shore effort

Effort was estimated as the product of the average number of anglers (instantaneous counts), length of fishing day and the number of days in the stratum.

Estimated angler-hours for period *p* from count *j* on day *d*:

$$(8)\quad \hat{E}_{pdj} = F_p * A_{dj}$$

where,

F_p = fishable hours in stratum,

A_{dj} = anglers counted on count j within day d.

When $n_d > 1$, estimated mean angler-hours for day d:

$$(9^*)\quad \bar{E}_{pd} = \frac{\sum_{j=1}^{n_d} \hat{E}_{pdj}}{n_d}$$

where,

n_d = number of counts made on day d.

* Shift and site probabilities were incorporated after equation 9 by dividing the average shore angler-hours by total probability [$E_{pdI\!I} = E_{pd} / I\!I_p$]. $I\!I_p$ was the total probability that fishing period p was included in the sample. This probability included the probabilities of choosing time of day (shift) and area (site). Total probability was obtained by multiplying the individual probabilities.

Estimated mean angler-hours for period p:

$$(10)\quad \hat{E}_p = \frac{\sum_{d=1}^{m_p} \bar{E}_{pdI\!I}}{m_p}$$

where,

m_p = number of sampled days in which counts were made.

Total angler-hours for day d:

$$(11)\quad \hat{E}_I = \hat{E}_p * D$$

where,

D = total days in stratum (sample period).

Shore catch

Catch rates were calculated using the ratio-of-means estimator for both completed and incomplete trip interviews. Although Lockwood et al. (1999) recommend the use of the mean-of-ratios estimator for incomplete trip interviews, there is no strong consensus on the correct procedure for calculating mean catch rate from incomplete trips (Pollock et al. 1994). Thus, prior to calculation of total catch, t-tests were performed to see if catch rates were significantly different between completed and incomplete shore trip interviews. Results indicated that the median of the variable catch rate was not statistically different [P-value > 0.05]; therefore, estimated catch per angler-hour from shore interviews for period p was calculated using equation (6) and equation (7).

Estimated catch calculated as:

$$(12)\quad \hat{C}_p = \hat{E}_p * R_p$$

where,

$R_p =$ catch rate.

Stream effort

Effort data were collected in the form of progressive counts of vehicles and anglers (only at the DNR public access site). Additionally, walk-in anglers were interviewed (i.e. those anglers that did not drive a vehicle to the fishing site). Walk-in angler effort was calculated directly from the completed trip interviews. Total angler-hours equaled the sum of angler-hours from the vehicle counts, angler counts and walk-in effort.

Since anglers and vehicles were counted individually, estimated angler-hours for period p from count j on day d followed equations (8) through (11). Anglers at the DNR public access site were calculated separately from the vehicle counts. Walk-in angler effort was calculated directly from the angler interview data. Successive adjustments of the total of trip durations (reported by walk-in anglers, utilizing only completed fishing

trips) yielded estimates of daily fishing effort for the days sampled. These data were then used to obtain total effort for each stratum and then overall effort for the month.

Estimated mean angler-hours for period p:

$$(13)\quad \hat{E}_{\mathrm{p}} = \frac{\sum_{d=1}^{m_p} \mathrm{h}_{pd} / \Pi}{m_p}$$

Total angler-hours for day *d*:

$$(14)\quad \hat{E}_I = \hat{E}_p * D$$

Stream catch

Catch rates were calculated using the ratio-of-means estimator for both completed and incomplete trip interviews. Although Lockwood et al. (1999) recommend the use of the mean-of-ratios estimator for incomplete trip interviews, there is no strong consensus on the correct procedure for calculating mean catch rate from incomplete trips (Pollock et al. 1994). Thus, prior to calculation of total catch, t-tests were performed to see if catch rates were significantly different between completed and incomplete stream trip interviews. Results indicated that the median of the variable catch rate was not statistically different [P-value > 0.05]; therefore, estimated catch per angler-hour from stream interviews for period *p* was calculated using equations (6) and (7).

Targeted effort, catch

Targeted effort and targeted catch were calculated similar to estimated effort and catch. Targeted effort comes directly from angler interviews where they were asked what target they were fishing for. Targeted effort rates were calculated using the effort equations and substituting targeted effort for total effort. For example, the targeted effort rate was estimated by dividing total targeted effort by total effort. For the stratum,

targeted effort rate was multiplied by total estimated effort (from the counts) to obtain a targeted effort estimate for that stratum. Likewise, targeted catch rates were calculated by substituting targeted catch for total catch. From the interviews, targeted catch rates were estimated by dividing total targeted catch for the stratum by total effort for that stratum. Targeted catch rate was multiplied by total estimated effort (from the counts) to obtain a targeted catch estimate for the stratum.

With Indiana's close proximity to neighboring states' borders and the migratory nature of fish, many boat trips were actually conducted in other states' waters. The estimates provided in this report represent estimates of fish returned to Indiana ports. Comparisons with previous creel seasons estimates were restricted to catch-per-unit-of-effort (CPUE) because of the creel survey design change implemented in 2006. CPUE is provided as a measure of fishing quality or fishing success for important Lake Michigan sport fish species. Catch, or the total number of fish caught (whether kept or released), provides a more detailed recreational description and was utilized to standardize each fishing season. Estimates of catch and effort are presented without confidence intervals.

RESULTS

During the 2006 Lake Michigan creel survey, 2,766 angler interviews (representing 5,606 anglers) were collected from pedestrian (shore and stream) and boat anglers. They fished an estimated 284,337 hours (Table 3). Seventy-three percent of the fishing hours came from boat anglers.

Highest boat fishing effort occurred in August (54,753 hours), followed by June (35,451 hours) and July (33,276 hours). Greatest shore fishing effort occurred in June (7,507 hours), followed by August (6,186 hours) and July (4,285 hours). October (14,811 hours) and September (11,895 hours) were the months when stream anglers primarily fished (Table 6).

Total catch from the combined fisheries was 346,995 fish representing twenty-seven fish species (Tables 4-6, Appendix II). Yellow perch dominated the 2006 catch, comprising 78% of the total (Tables 4-6). For trout and salmon species, total catch was dominated by coho salmon, comprising 45% of the salmonid total. Chinook salmon catch was second to coho salmon, with 25% of the total; steelhead trout (13%), juvenile

salmonids (12%), lake trout (3%) and brown trout (2%) followed (Table 7). The majority of the catch came from the boat fishery, which accounted for 311,704 fish or 90% of the total (Table 3). Juvenile salmonids were mainly caught from the stream fishery (Table 6). These sub-legal catches occurred mostly during March, and October through December, which directly corresponds to state fish hatchery plantings (Table 6).

Trout and salmon (directed effort)

Anglers spent an estimated 168,650 hours pursuing trout and salmon. A total of 47,870 salmonids was caught during the survey, with 37,726 of those fish harvested (Tables 8-9). Of the fish caught, 87%, or 41,572, were equal or greater than the minimum size limit of 14 inches. Catch was greatest during the months of April through June for the boat and shore fisheries; March, and September through November for the stream fishery.

The combined salmonid CPUE was 25.0 fish/100 angler-hours.[1] This was slightly lower than what was observed in 2005, and also less than the ten-year average of 30.3 (Figure 3). The shore CPUE, which fell approximately 30% between 2005 and 2006, directly influenced the overall salmonid CPUE decline (Figure 4). However, CPUE for boat anglers also remained below the ten-year average for a fourth consecutive year.

The combined CPUE for coho salmon, Chinook salmon, lake trout and brown trout all fell when compared to the prior fishing season; whereas steelhead CPUE remained steady (Figure 5, Figure 7, Figure 9, Figure 11, Figure 13). Comparisons of CPUE, by fishery, show these declines were mainly influenced by changes observed from the shore and/or boat fisheries (Figure 6, Figure 8, Figure 10, Figure 12, Figure 13). With the exception of Chinook salmon, CPUE for all trout and salmon species remains below their ten-year averages.

Biological data collected from coho salmon, Chinook salmon, steelhead trout and brown trout showed a slight rise in mean size compared to 2005 (Appendix IV). Harvested coho salmon had an average length of 20.7 (± 2.1) in and 3.1 (± 1.3) lbs,

[1] The CPUE excludes juvenile salmonids. Juvenile salmonid catch data estimates are unavailable for 1997-2005.

comparable to the ten-year average (Appendix III, Appendix IV). Steelhead trout were also similar in size to their ten-year average, at 27.6 (± 3.4) in and 7.6 (± 2.7) lbs (Appendix III, Appendix IV). Brown trout average length and weight increased, 11% and 20% above their ten-year averages, respectively. Chinook salmon mean size, however, continues to remain below its long-term average. Harvested Chinook salmon had an average length of 27.8 (± 4.2) in and 8.4 (± 3.8) lbs; length 3% below the ten-year average, weight 19% below the ten-year average. Lake trout mean length and weight also remain lower than their ten-year average, 25.6 (± 2.4) in and 6.5 (± 2.3) lbs.

Yellow perch (directed effort)

Perch anglers fished 99,691 angler-hours, catching 267,907 perch. A total of 152,202 were harvested (Table 10). Boat anglers accounted for the majority of the yellow perch catch, 257,263 fish or 96% of the total. The majority of yellow perch were caught in June, July and August.

Yellow perch ranked first in angler catch, with an overall CPUE of 2.7 fish per angler-hour (Table 10, Figure 14). This CPUE was one of the highest recorded from 1994 to 2006 and nearly double the total number of perch harvested/hour (i.e. harvest rate) of 1.5. The boat fishery, accounting for the majority of the harvest (and catch), drove the overall success of the yellow perch fishing season (Figure 15).

Harvested yellow perch ranged from 6.1 to 14.3 in. Mean total length, 9.5 (± 1.4) in, and mean weight, 0.4 (± 0.2) lbs, were both lower than what was observed in 2005 and the long-term mean (Appendix III, Appendix IV).

Black bass species

Bass anglers fished 12,522 angler-hours, catching 6,795 black bass, mainly smallmouth (Tables 4-6). The majority of fishing occurred from boats, accounting for 93% of the effort and 85% of the catch (Table 11). Most bass caught are released, only 2% of the total catch being harvested (Table 11). In the boat fishery, the number of legal-sized bass released outnumbered the sub-legal releases (bass less than 14.0 in). In the shore fishery, the number of sub-legal sized bass released outnumbered legal releases.

Species preference

All anglers were asked which species of fish they preferred to catch from Lake Michigan and its tributaries. A total of 2,740 responses were recorded from boat, shore, and stream anglers.

Forty-six percent of boat anglers included at least one salmonid species in their response. On a species by species basis, boat anglers ranked yellow perch as their most preferred fish (47%), followed by Chinook salmon (15%), steelhead trout (15%), coho salmon (9%), and bass (9%).

Forty-six percent of shore anglers also included at least one salmonid species in their response. By species, 44% of shore anglers ranked yellow perch as their most preferred fish. Steelhead trout (28%), Chinook salmon (8%), bass (5%), coho salmon (4%), no preference (4%), and any trout or salmon (3%) were also among the top preferred species.

Steelhead trout were ranked as the most preferred stream species, accounting for 72% of the responses. Chinook salmon (8%), coho salmon (6%), any trout or salmon (6%), brown trout (3%), and no preference (2%) followed.

Angler residency

Anglers from 63 Indiana counties were represented during the survey (Appendix V). The majority of anglers interviewed were from Lake County, accounting for 27% of all anglers. LaPorte County, Porter County, and out-of-state residents followed, with 20%, 19%, and 17% of the anglers, respectively. Other counties with frequent use included St. Joseph County, Elkhart County and Marion County.

Anglers from 15 different states were represented in the survey, with the majority of these anglers from Illinois (89%); primarily Cook and Will Counties.

Importance and satisfaction ratings

During the interview process, fishing parties were asked to rate the importance they placed on having the species they were targeting in Lake Michigan (or tributary) and to rate their overall satisfaction with the quality of that specific fishery within the past 2-year period. If the fishing party was targeting any trout or salmon, all five trout and

salmon species were asked to be rated.[2] Parties were instructed to rate the questions on a scale of 1 to 5, with 1 being the lowest (poor) and 5 being the highest (excellent). If the party was unable to rate these questions because of lack of fishing experience, the rating was recorded as a 6 (don't know).

Overall, anglers felt it was very important to important to have their targeted species in Lake Michigan and its tributaries (Appendix VI). Less than 1% of anglers responded with a rating of 1 or 2.

The majority of anglers felt very satisfied to somewhat satisfied with the salmonid fishery. However, between 30% and 40% of brown trout and lake trout anglers rated their satisfaction as less satisfied to not satisfied. Boat, shore, and stream anglers were all less satisfied with the quality of these two species compared to other salmonid species. Only 8% of the yellow perch parties gave a low satisfaction rating.

DISCUSSION

The best fishing in 2006 was for yellow perch and Chinook salmon for boat anglers, yellow perch and steelhead trout for shore anglers, and Chinook salmon and steelhead for stream anglers. Comparing the 2006 CPUE with their long-term averages, Chinook salmon and yellow perch were above average; whereas brown trout, coho salmon, lake trout and steelhead trout were below average.

The above average CPUE for Chinook salmon and yellow perch were unsurprising, as excellent fishing for both species has been common (Palla 2006). Lakewide, the Chinook salmon harvest during 2006 reached 9.0 million lbs, which is an increase of 600,000 lbs over the 2005 harvest level and the second highest biomass harvested since 1986 (Breidert et al. 2007). Exceptional Chinook salmon fishing is a combination of increased numbers of Chinook salmon from natural reproduction and a declining trend in the forage base (Salmonid Working Group 2005). The great perch fishing is the direct result of several year classes contributing to the perch fishery. The perch stock continues to rebuild, with the sport fishery mainly supported by the 1998 and

[2] Stream anglers were not asked to rate lake trout since lake trout are confined mainly to Lake Michigan proper.

2002 year-classes. Recruitment from the 2003, 2004 and 2005 year-classes may add to the harvest in the upcoming years (YPTG, personal communication).

The below average CPUE observed for brown trout, coho salmon, lake trout and steelhead were comparable to the DFW 2005 survey data and to what was observed throughout Lake Michigan during 2006 (Palla 2006). Lakewide, the harvest levels of coho salmon increased over 2005, but remained below the long-term average (Breidert et al. 2007). The lake trout harvest also decreased; only comprising 3.9% of the total lakewide salmonid harvest. For the fourth consecutive year, the steelhead trout harvest remained below average for the time series and the brown trout harvest was the lowest recorded for the 22-year time series.

Many factors influence the overall success of a fishing season in southern Lake Michigan. These include, but are not limited to, weather patterns, water temperatures, water levels, stocking levels, forage levels and fish movement. Since lake wide and Indiana salmonid stocking levels have remained relatively stable between 2001 and 2005, water conditions and weather are likely shaping the seasonal distribution of fish species and overall angling success.

The southern end of Lake Michigan is unique, with its shallow basin and presence of coldwater fish species (i.e. trout and salmon), coolwater fish species (i.e. yellow perch), and warmwater fish species (i.e. smallmouth bass). As expected, each of these fish species has a preferred thermal regime or thermal guild. Given the importance of water temperature, fish will directly respond to variations in climate that involve changes in water volume, water flow, and water temperatures; changing living areas based on suitable water temperatures, prey availability, and oxygen concentrations (Kling et al. 2003). With Great Lakes' water levels near historic lows and annual average water temperatures on the rise, fish species distribution in southern Lake Michigan has likely been affected.

In 2006, water levels on all the Great Lakes were below average, and lower than the previous year (U.S. Department of the Army, Detroit District Corps of Engineers 2007). Lakes Michigan-Huron began the year at 577.0 ft, about 1.5 ft below the January long term average (LTA). The peak level, 577.9 ft in June and July, was also 1.5 ft below the peak LTA. For reference, this level is only 1.8 ft above the lowest recorded

monthly average lake level on Lakes Michigan-Huron, which occurred in March 1964 (U.S. Department of the Army, Detroit District Corps of Engineers 2007). Additionally, evidence of climatic change in the Great Lakes region has been noted with warmer temperatures, shorter winter periods and a longer ice-free season (Kling et al. 2003). Within Lake Michigan, regression results on the annual mean water temperatures recorded at St. Joseph MI between 1960 and 1992 suggest the presence of a long-term warming trend (McCormick and Fahnenstiel 1999). Lower water levels, coupled with warmer water temperatures, have influenced fish species distribution in southern Lake Michigan. Coldwater fish species, such as trout and salmon, will avoid temperatures that exceed their preferred temperatures if given the choice (Magnuson et al. 1979). If conditions persist long enough (i.e. increased water temperatures, decreased water levels), new environments within nearshore regions could become formed, resulting in significant changes to the biotic community (McCormick and Fahnenstiel 1999).

Quick warming in southern Lake Michigan benefits anglers in the early spring months, but can quickly impact fishing success as salmonids disperse to find cooler temperatures within the deeper northern and offshore areas. The 2006 spring season was similar to 2005, in that fish moved offshore into Illinois and Michigan waters by mid-April (Palla 2007). Fishing depths were greater than 130 feet of water, which entailed traveling a distance greater than 16 miles offshore. Targeting these fishing depths not only requires specialized equipment, but also increases expenses as anglers travel further offshore to locate fish concentrations. We cannot assess whether economics negatively impacted the number of anglers using the resource during the spring, but the average retail gasoline price increase from $2.27 per gallon in 2005 to $2.58 per gallon in 2006 likely limited the number of salmonid fishing trips (U.S. Department of Energy, Energy Information Administration 2007).

We can, however, use the 2006 charter data to examine the fishing season within our waters. Through a mandatory catch reporting system, charter boat operators submit catch and effort information on trips (i.e. paid trips) conducted exclusively within Indiana waters of Lake Michigan. In 2006, the total number of trout and salmon trips declined by 42%, from 703 excursions in 2005 to 407 excursions in 2006 (Palla 2007). In April alone, the number of trips conducted fell by 23% between 2005 and 2006. Many charter

operators moved offshore by April when salmonid aggregations could not be located within Indiana waters. Comments recorded on the charter boat operator report form during the month of April confirm that operators were less than satisfied with the 2006 spring season; ranging from "worse spring fishing season ever" to "moved offshore to find fish". One operator even commented, "Fishing was even worse than in 2005; with $3.50 gas prices and very few fish in Indiana - I can't continue to charter".

Water temperatures and water levels can negatively impact fishing; however, benefits from warming temperatures, shorter winter periods and longer ice-free seasons do exist. In particular, the increased opportunities or extension of the fishing season for anglers in the early winter and late fall periods. Boat and shore anglers both experience good catches of brown trout, coho salmon, lake trout and steelhead trout in February, March, and November (Brian Breidert, personal communication). These months, however, are currently not sampled in the lake portion of the DFW Lake Michigan creel survey.

In Lake Michigan, tremendous changes have occurred to the fish community with the introduction of Pacific salmon. While the future angling success within Indiana's waters of Lake Michigan may be difficult to predict, one thing is certain, anglers are provided with unique and diverse fishing opportunities. The variety of quality game fish alone, make Indiana waters of Lake Michigan a world class fishery.

RECOMMENDATIONS

- The Lake Michigan Fisheries Research Office should continue to assess sport fish harvest, fishing pressure and angler opinions through the Lake Michigan creel survey. Information on sport fishery harvest and catch per unit effort is essential to make management decisions and develop a better understanding of population dynamics.

- The Lake Michigan Fisheries Research Office should incorporate November into the creel survey schedule to assess the fall lake trout fishery. This sampling would provide information on overall catch and harvest, and provide data to guide fishery management efforts for the rehabilitation of lake trout in Lake Michigan.

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Table 1. Number of trout and salmon stocked in Lake Michigan each year, 1994 to 2006. All values are rounded to thousands.

	Atlantic Salmon	Brook Trout	Brown Trout	Chinook Salmon	Coho Salmon	Lake Trout	Rainbow Trout	Splake	TOTAL
1994	0.000	0.269	2.172	5.837	1.497	3.854	2.220	0.166	16.015
1995	0.000	0.328	1.876	6.549	2.401	2.265	1.878	0.151	15.448
1996	0.000	0.180	1.787	6.193	3.112	2.141	1.849	0.201	15.463
1997	0.000	0.115	1.804	5.745	2.620	2.235	1.864	0.155	14.538
1998	0.000	0.408	1.742	5.721	2.059	2.302	1.618	0.097	13.948
1999	0.000	0.191	1.649	4.324	2.765	2.348	1.680	0.077	13.034
2000	0.000	0.045	1.666	4.049	2.499	2.260	1.244	0.079	11.842
2001	0.000	0.102	1.749	4.518	2.765	2.382	1.849	0.131	13.495
2002	0.000	0.050	1.754	4.015	2.690	2.224	1.861	0.126	12.720
2003	0.000	0.024	1.649	4.422	3.124	2.609	2.078	0.104	14.010
2004	0.000	0.001	1.601	4.303	1.687	2.354	1.583	0.122	11.651
2005	0.000	0.000	1.523	4.306	2.561	2.887	2.170	0.099	13.546
2006	0.000	0.001	1.611	3.253	2.430	2.770	1.788	0.166	12.019
Avg.	0.000	0.132	1.737	4.864	2.478	2.510	1.822	0.129	13.671

Table 2. Number of trout and salmon stocked in Lake Michigan by Indiana Department of Natural Resources, 1994 through 2006.

	LAKE MICHIGAN				ST. JOSEPH RIVER			
	Brown Trout	Chinook Salmon	Coho Salmon	Steelhead	Chinook Salmon	Coho Salmon	Steelhead	Total
1994	0	368,026	84,397	378,522	168,938	0	172,975	1,172,858
1995	0	364,182	165,809	301,052	190,819	0	188,842	1,210,704
1996	0	362,162	266,549	312,776	209,407	75,980	254,135	1,481,009
1997	0	279,297	80,817	340,010	143,262	0	287,174	1,130,560
1998	0	386,525	148,320	183,715	206,987	0	299,869	1,225,416
1999	0	264,608	146,882	319,082	150,811	0	252,491	1,133,874
2000	0	267,865	157,208	174,136	149,911	0	220,439	969,559
2001	0	297,195	157,048	297,971	153,520	0	293,475	1,199,209
2002	35,000	253,000	224,797	298,884	0	0	306,297	1,117,978
2003	40,400	232,395	233,248	309,134	0	0	282,857	1,098,034
2004	46,238	237,052	236,026	334,968	0	0	278,109	1,132,393
2005	36,371	251,281	237,009	645,576	0	0	287,471	1,457,708
2006[1]	42,900	225,000	79,018	257,206	0	0	234,211	838,335

[1]Due to the shut-down and rehabilitation of Mixsawbah State Fish Hatchery in 2006, the coho salmon plantings were reduced by 60%; the spring release skamania steelhead were stocked in the fall of 2005 as fingerlings, Michigan steelhead (winter-run) will be stocked in 2007 as yearlings instead of December 2006 as fingerlings, and the St. Joseph River fall steelhead plantings were reduced by approximately 40,000 fish to offset changes to the Trail Creek and Little Calumet River steelhead stockings.

Table 3. Estimated angler hours and catch from the Indiana Department of Natural Resources Lake Michigan creel survey during 2006, based on total effort.

Fishery	Total Effort	%	Catch	%
Boat	208,219	(73%)	311,704	(90%)
Shore	27,772	(10%)	22,336	(6%)
Stream	48,346	(17%)	12,955	(4%)
TOTAL	284,337	(100%)	346,995	(100%)

Table 4. Boat fishery monthly estimated catch and effort from the Indiana Department of Natural Resources Lake Michigan creel survey during 2006, based on total effort.

Species	April	May	June	July	Aug.	Sept.	Oct.	Total
Steelhead	233	957	789	463	204	89	8	2,743
Coho	9,900	5,014	3,144	1,718	333	43	17	20,169
Chinook	541	1,305	969	1,025	4,903	1,265	77	10,085
Lake trout	146	432	319	68	190	77	281	1,513
Brown trout	403	34	32	10	26	8	89	602
TOTAL	11,223	7,742	5,253	3,284	5,656	1,482	472	35,112
Yellow perch	1,301	3,081	32,070	85,670	131,416	283	3,442	257,263
Black Bass sp.	720	1,304	1,434	988	488	313	557	5,804
Other	1,623	2,429	4,091	3,190	2,166	26	0	13,525
Angler hours	29,747	28,518	35,451	33,276	54,753	13,506	12,968	208,219

Table 5. Shore fishery monthly estimated catch and effort from the Indiana Department of Natural Resources Lake Michigan creel survey during 2006, based on total effort.

Species	April	May	June	July	Aug.	Sept.	Oct.	Total
Steelhead	20	62	520	13	55	0	0	670
Coho	39	0	0	0	0	20	0	59
Chinook	0	0	0	0	0	59	16	75
Lake trout	0	0	0	0	0	0	0	0
Brown trout	45	11	0	0	0	11	0	67
smolts*	0	8	0	0	0	0	0	8
TOTAL	104	81	520	13	55	90	16	879
Yellow perch	0	205	738	4,639	6,147	17	19	11,765
Black Bass sp.	256	45	229	89	254	105	7	985
Other	438	1,318	3,233	966	1,869	697	186	8,707
Angler hours	2,438	2,641	7,507	4,285	6,186	3,706	1,009	27,772

* juvenile salmonids.

Table 6. Stream fishery monthly estimated catch and effort from the Indiana Department of Natural Resources Lake Michigan creel survey during 2006, based on total effort.

Species	March	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Steelhead	491	602	152	403	360	313	321	2,642
Coho	353	0	0	680	488	23	0	1,544
Chinook	0	0	0	560	1,337	61	5	1,963
Brown trout	58	6	0	15	43	31	0	153
smolts*	2,020	44	9	309	1,157	1,071	1,048	5,658
TOTAL	2,922	652	161	1,967	3,385	1,499	1,374	11,960
Yellow perch	0	0	90	52	36	0	0	178
Black Bass spp.	0	6	0	0	0	0	0	6
Other	14	58	281	237	214	7	0	811
Angler hours	5,913	5,886	1,944	11,895	14,811	4,381	3,516	48,346

*juvenile salmonids.

Table 7. Estimated salmonid and yellow perch catch from the Indiana Department of Natural Resources Lake Michigan creel survey during 2006, based on total effort.

Yellow perch	269,206	
Salmonids	47,951	
Coho:	21,772	(45%)
Chinook:	12,123	(25%)
Steelhead:	6,055	(13%)
Smolts[1]:	5,666	(12%)
Lake Trout:	1,513	(3%)
Brown Trout:	822	(2%)

[1]juvenile salmonids

Table 8. Estimated trout and salmon catch and effort from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006, based on directed effort.

Year	Chinook Salmon	Coho Salmon	Steelhead Trout	Lake Trout	Brown Trout	Smolts[1]	Total	Directed Effort (hrs.)
1997	8,233	92,283	15,552	11,427	3,727	---	131,222	355,289
1998	5,810	78,690	25,158	23,340	1,240	---	134,238	379,743
1999	13,938	48,740	21,760	3,036	1,049	---	88,523	354,481
2000	14,092	83,505	18,604	4,272	3,319	---	123,792	353,750
2001	9,644	75,207	11,857	4,708	2,602	---	104,018	334,359
2002	17,309	107,432	15,299	1,709	2,654	---	144,403	362,228
2003	8,396	56,144	11,133	624	1,122	---	77,419	290,486
2004	11,407	23,668	5,566	308	1,191	---	42,140	197,291
2005	19,937	37,222	9,748	3,441	1,914	---	72,262	274,161
2006[2]	12,092	21,768	6,044	1,513	787	5,666	47,870	168,650

[1] Smolt (juvenile salmonid) catch data estimates unavailable for 1997-2005.

[2] Indiana Lake Michigan creel survey re-designed; modifications implemented in 2006.

Table 9. Estimated trout and salmon harvest and effort from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006, based on directed effort.

Year	Chinook	Coho	Steelhead	Lake Trout	Brown Trout	Total	Directed Effort (hrs.)
1997	5,976	76,470	11,946	11,123	3,340	108,855	355,289
1998	4,952	69,258	22,290	22,795	963	120,258	379,743
1999	8,691	45,465	16,496	2,888	754	74,294	354,481
2000	11,006	76,227	14,968	3,230	2,787	108,218	353,750
2001	7,864	72,171	9,605	3,910	2,244	95,794	334,359
2002	14,483	100,351	13,178	1,221	2,378	131,611	362,228
2003	7,092	53,935	9,223	374	942	71,566	290,486
2004	10,966	23,079	4,199	281	974	39,499	197,291
2005	19,098	35,858	8,421	3,208	1,649	68,234	274,161
2006[1]	10,923	19,663	5,057	1,429	654	37,726	168,650

[1] Indiana Lake Michigan creel survey re-designed; modifications implemented in 2006.

Table 10. Estimated yellow perch harvest, catch, and effort from the Indiana Department of Natural Resources Lake Michigan creel survey, 1987 though 2006, based on directed effort.

Year	Effort (hrs.)	Harvest	Total harvest/hr.	Catch[1]	Total Catch/hr.
1987	---	192,365	---	---	---
1988	75,030	240,251	3.20	---	---
1989	65,610	158,931	2.42	---	---
1990	74,492	132,249	1.78	---	---
1991	133,912	273,888	2.05	---	---
1992	102,600	171,561	1.67	---	---
1993	88,674	146,560	1.65	---	---
1994	44,124	66,785	1.51	71,920	1.63
1995	55,900	69,770	1.25	80,312	1.44
1996	76,360	137,791	1.80	159,168	2.08
1997	33,938	32,390	0.95	34,532	1.02
1998	40,125	37,532	0.94	50,494	1.26
1999	90,622	132,217	1.46	227,304	2.51
2000	96,537	129,988	1.35	215,382	2.23
2001	122,770	140,089	1.14	216,341	1.76
2002	97,161	124,656	1.28	198,275	2.04
2003	119,200	207,401	1.74	309,561	2.60
2004	97,971	144,442	1.47	201,906	2.06
2005	129,630	178,945	1.38	332,320	2.56
2006[2]	99,691	152,202	1.53	267,907	2.69

[1]Catch data estimates unavailable for 1987-1993.
[2] Indiana Lake Michigan creel survey re-designed; modifications implemented in 2006.

Table 11. Estimated number of black bass harvested and released by boat and shore anglers from the Indiana Department of Natural Resources Lake Michigan creel survey, 2001 through 2006.

		Number Harvested	Number Released	Directed Effort (hrs.)
2001	Boat	322	sub-legal = 1,988	
			legal = 4,447	10,475
	Pier	70	sub-legal = 862	
			legal = 275	2,208
	Total	392	7,572	12,683
2002	Boat	111	sub-legal = 9,022	
			legal = 7,606	18,257
	Pier	132	sub-legal = 438	
			legal = 207	2,101
	Total	243	17,273	20,358
2003	Boat	367	sub-legal = 1,253	
			legal = 4,220	13,794
	Pier	78	sub-legal = 902	
			legal = 135	1,850
	Total	445	6,510	15,644
2004	Boat	194	sub-legal = 1,789	
			legal = 2,081	6,020
	Pier	89	sub-legal = 901	
			legal = 151	1,247
	Total	283	4,922	7,267
2005	Boat	106	sub-legal = 3,410	
			legal = 4,288	8,470
	Pier	108	sub-legal = 1,033	
			legal = 254	2,134
	Total	214	8,985	10,604
2006[1]	Boat	94	sub-legal = 1,532	
			legal = 4,179	11,605
	Pier	80	sub-legal = 527	
			legal = 377	917
	Total	174	6,615	12,522

[1] Indiana Lake Michigan creel survey re-designed; modifications implemented in 2006.

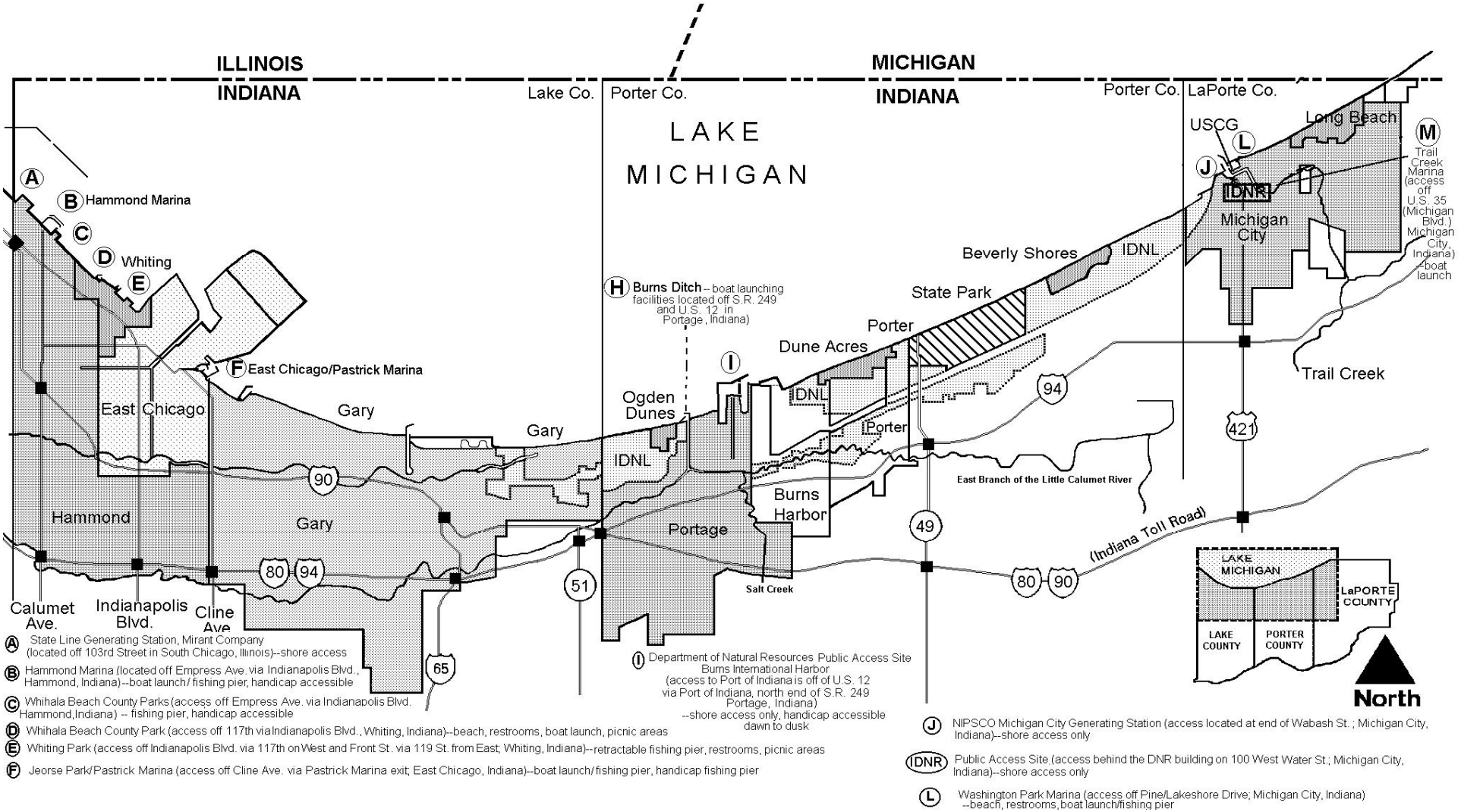


Figure 1. Indiana shoreline of Lake Michigan.

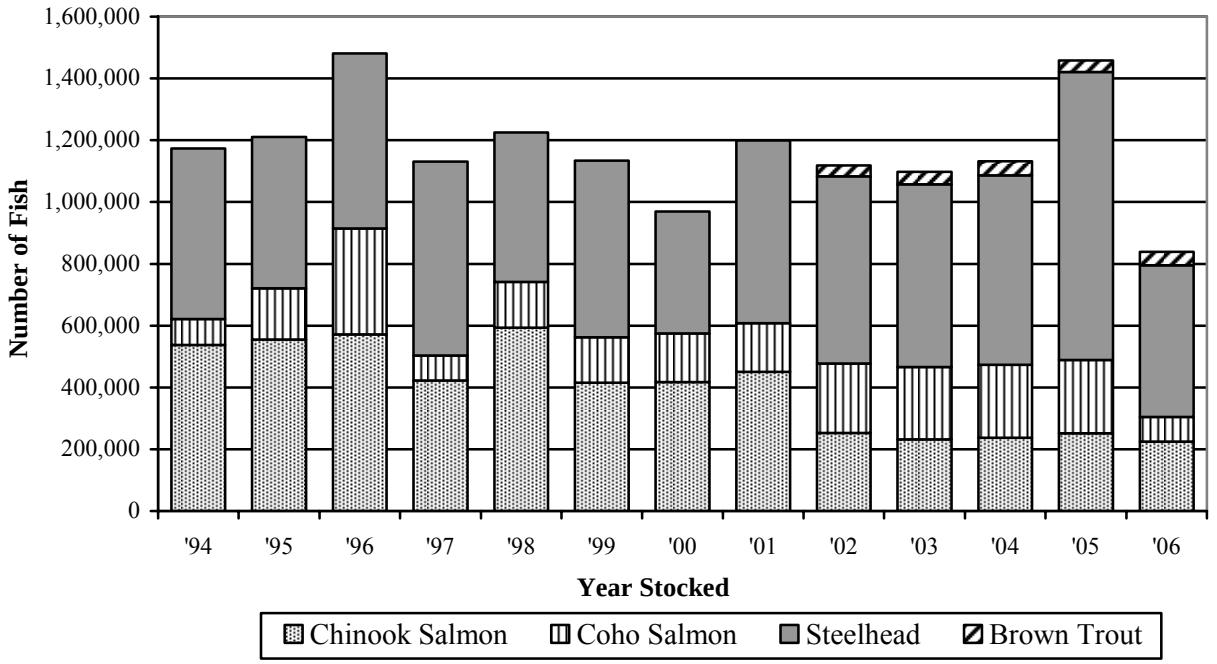


Figure 2. Number of trout and salmon stocked in Lake Michigan by the Indiana Department of Natural Resources, 1994 through 2006.

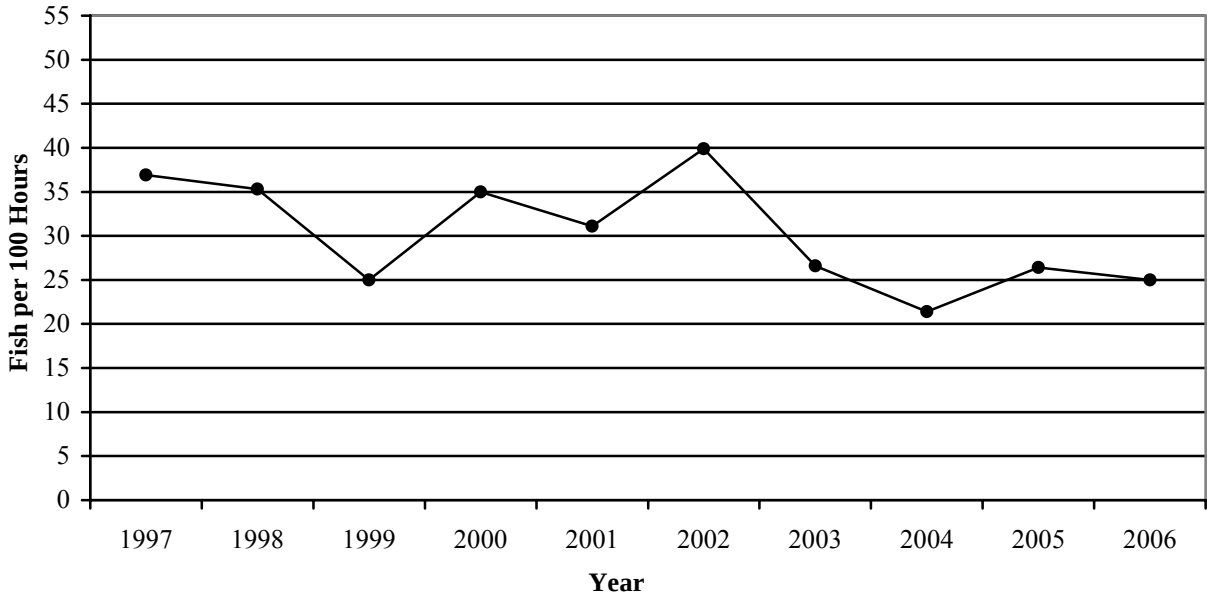


Figure 3. Trout and salmon CPUE from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006, based on directed effort.

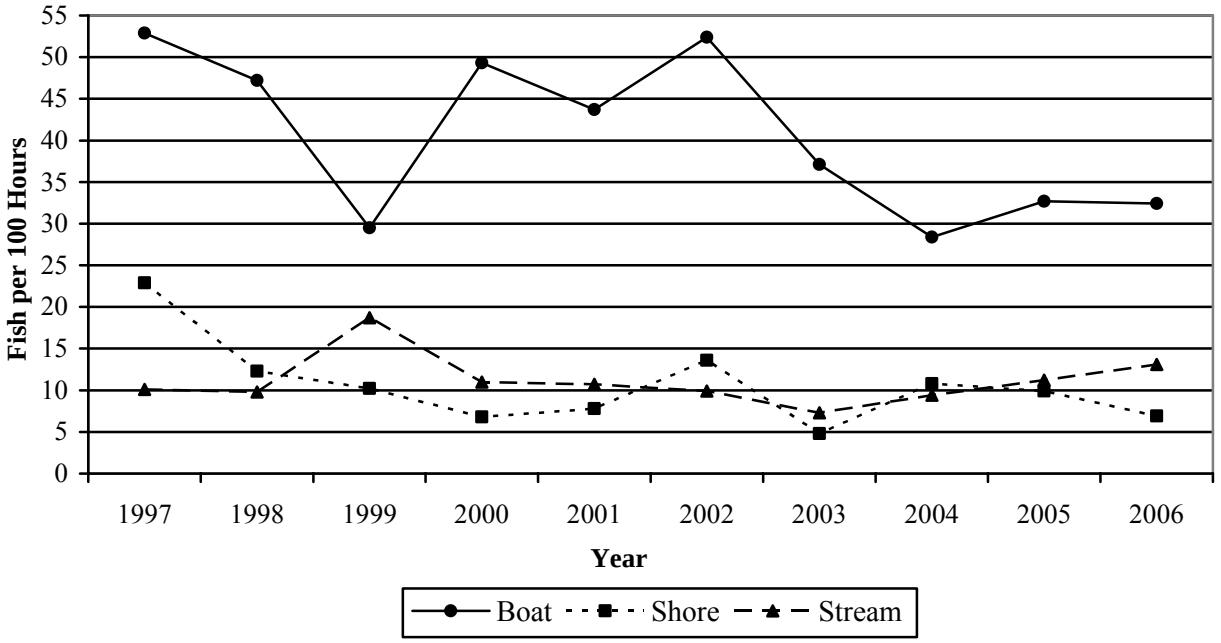


Figure 4. Trout and salmon CPUE from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006, by angler type (directed effort).

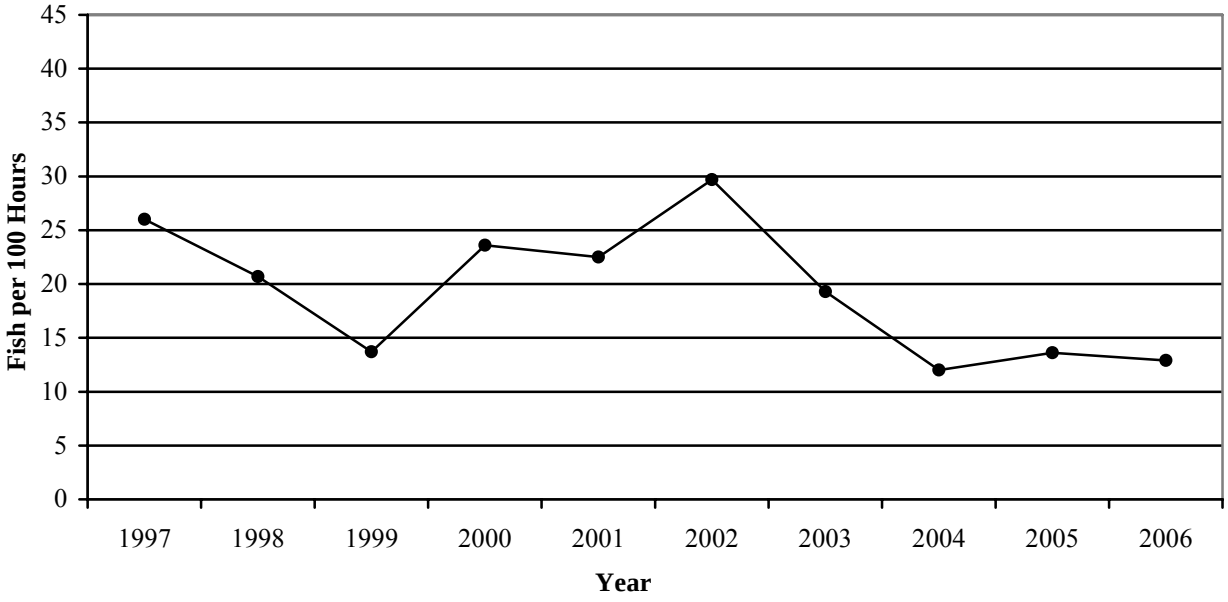


Figure 5. Coho salmon CPUE from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006, based on directed effort.

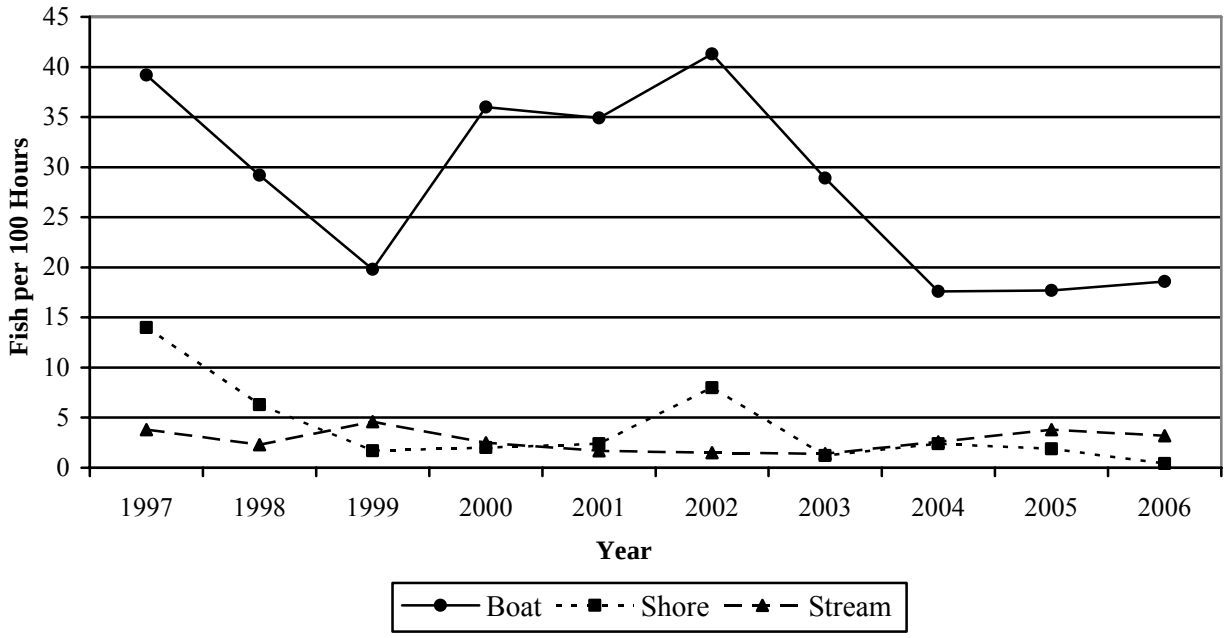


Figure 6. Coho salmon CPUE from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006, by angler type (directed effort).

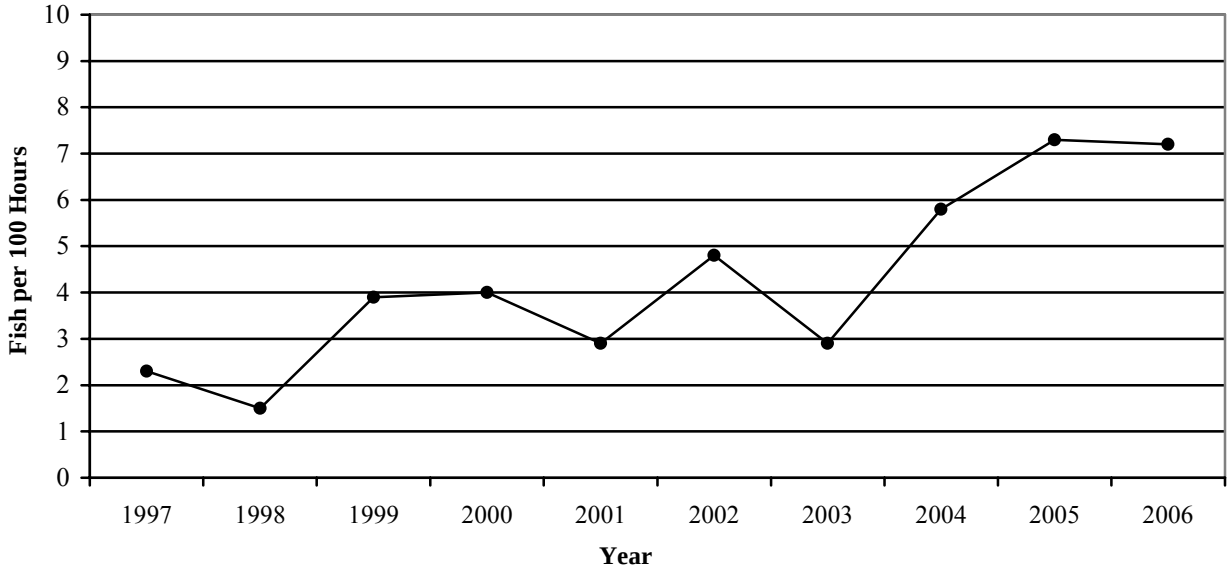


Figure 7. Chinook salmon CPUE from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006, based on directed effort.

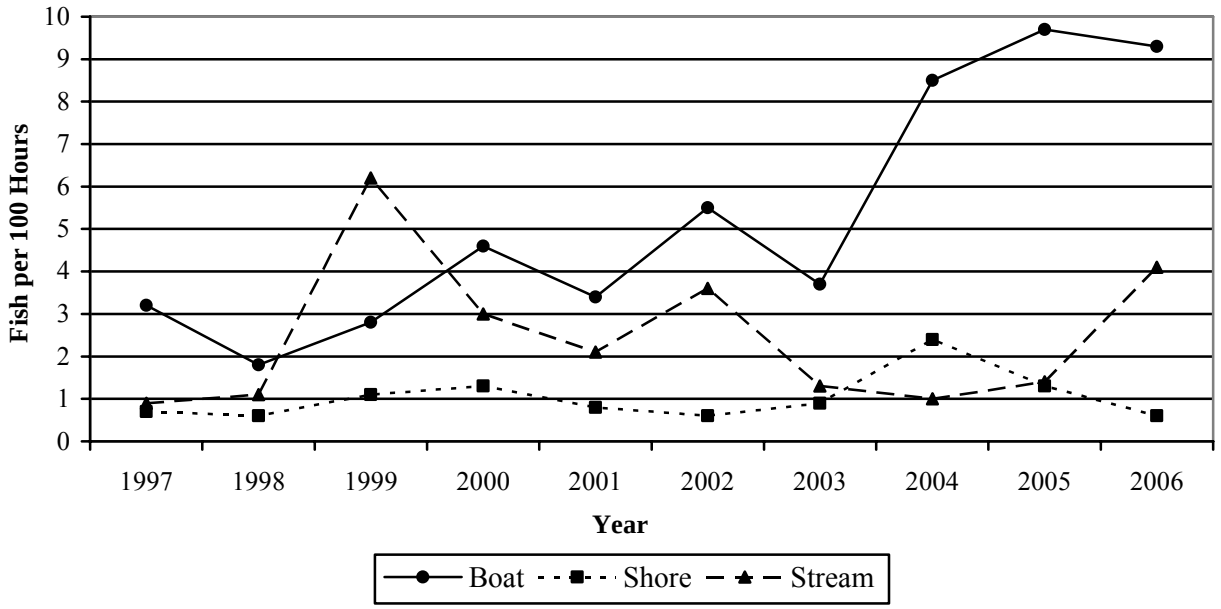


Figure 8. Chinook salmon CPUE from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006, by angler type (directed effort).

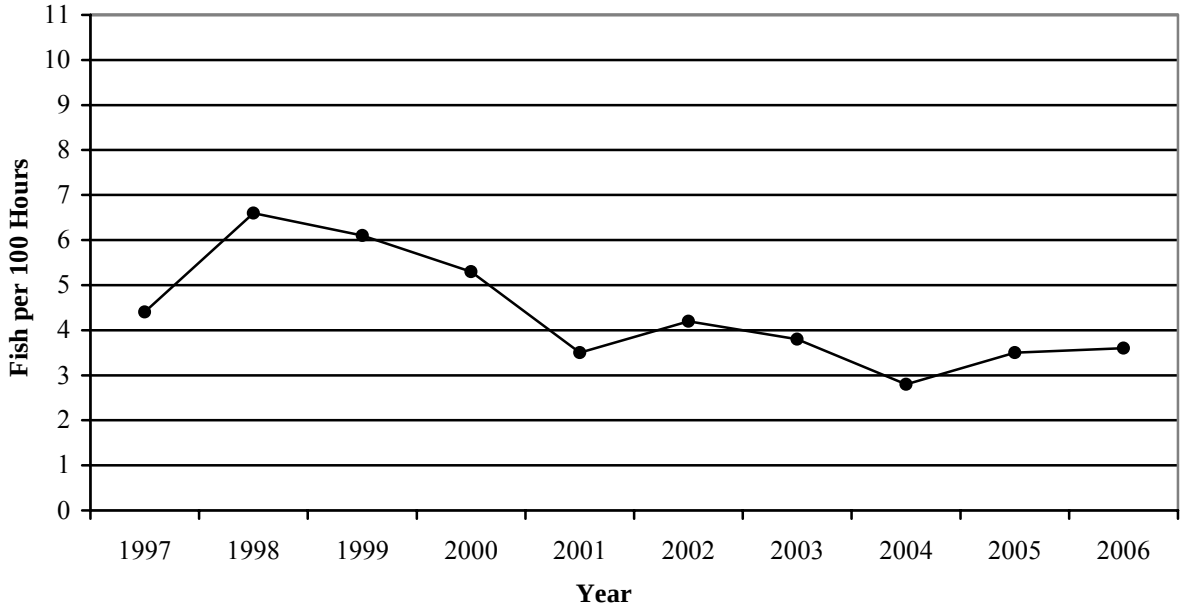


Figure 9. Steelhead trout CPUE from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006, based on directed effort.

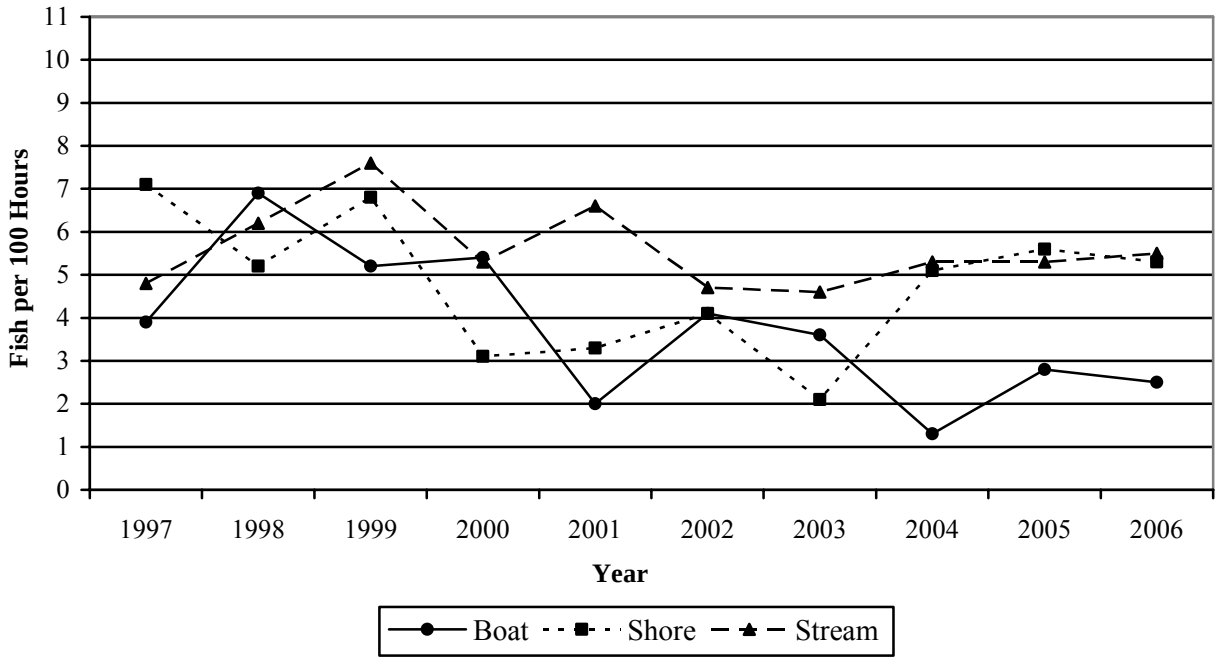


Figure 10. Steelhead trout CPUE from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006, by angler type (directed effort).

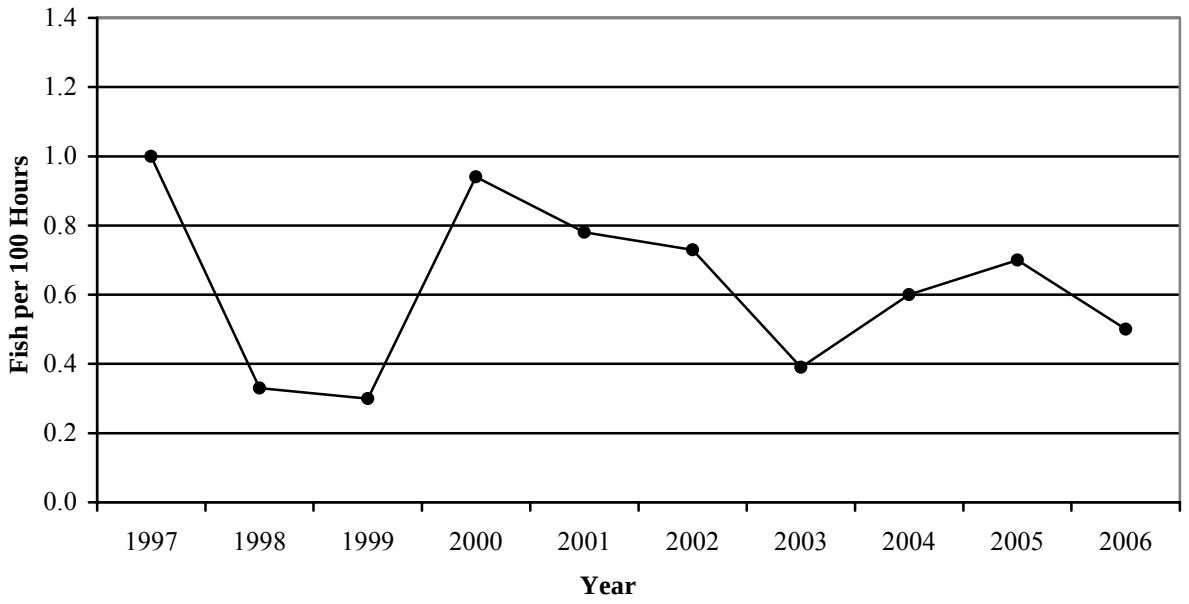


Figure 11. Brown trout CPUE from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006, based on directed effort.

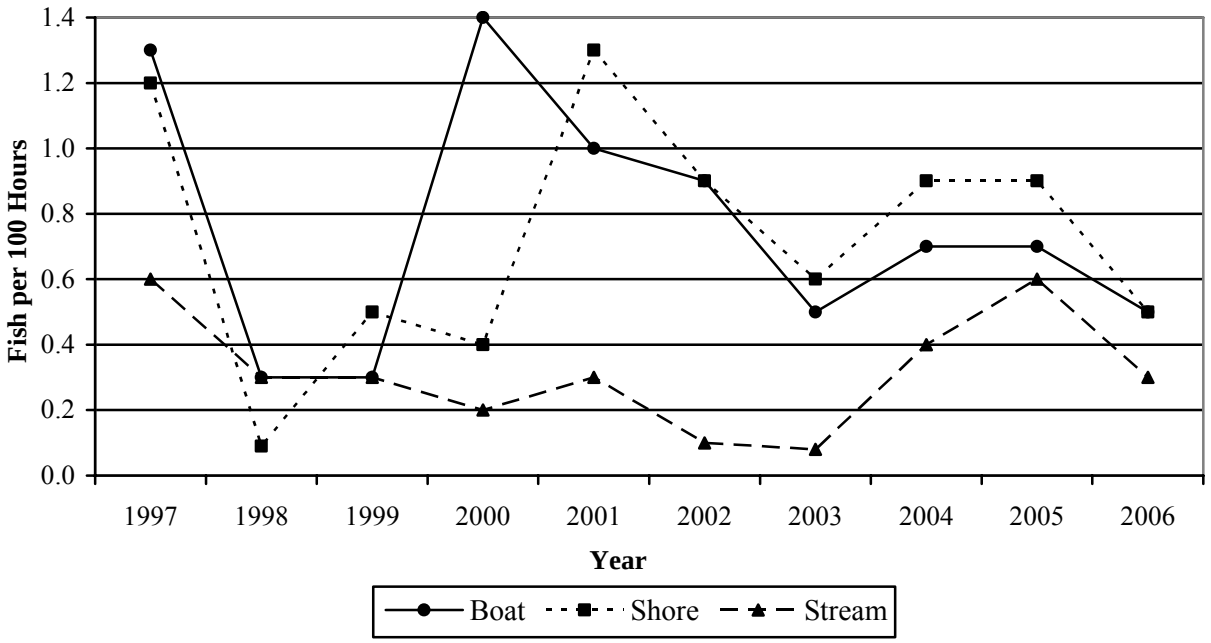


Figure 12. Brown trout CPUE from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006, by angler type (directed effort).

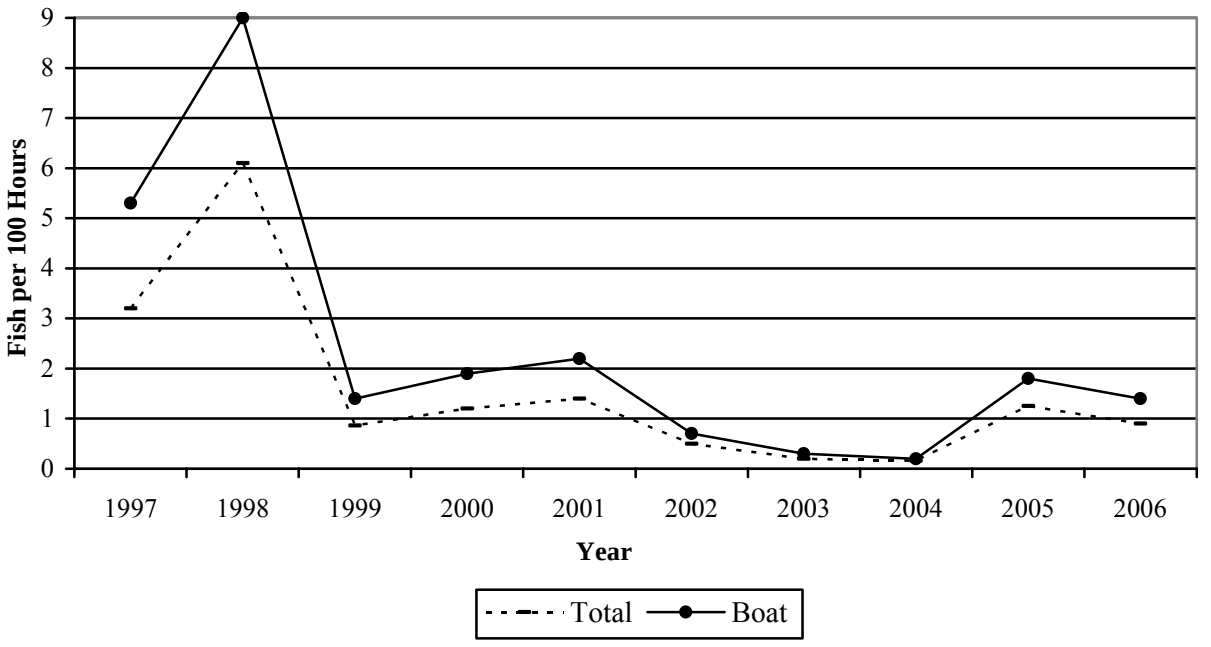


Figure 13. Lake trout CPUE from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006, based on directed effort.

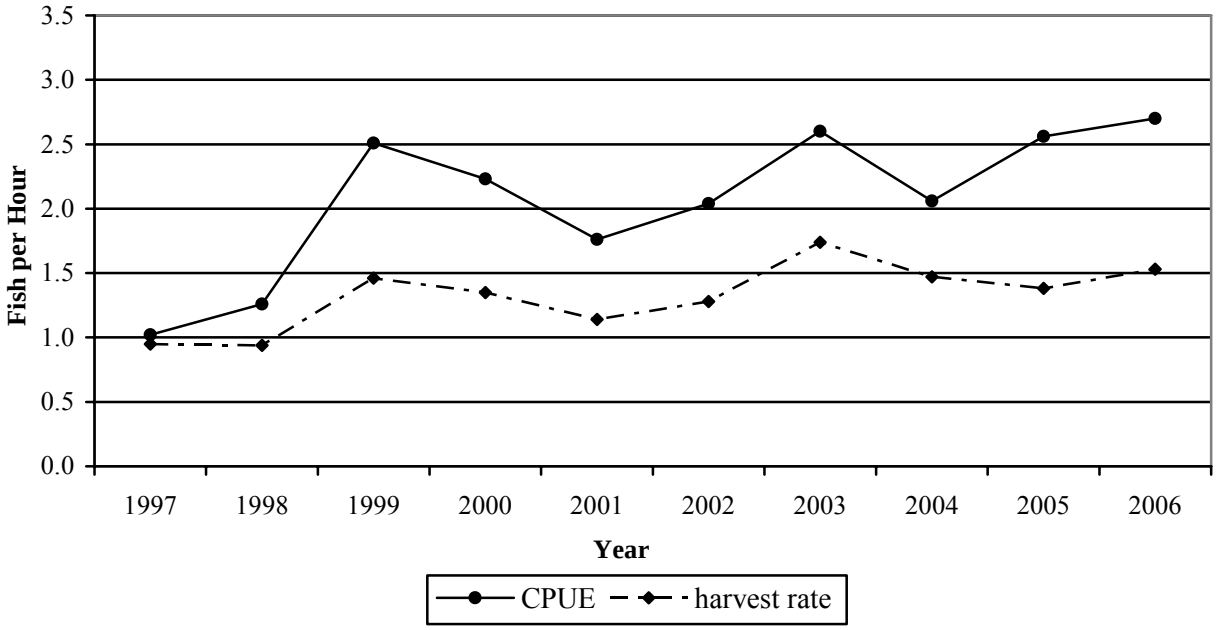


Figure 14. Yellow perch CPUE and harvest-per-unit-effort (harvest rate) from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006, based on directed effort.

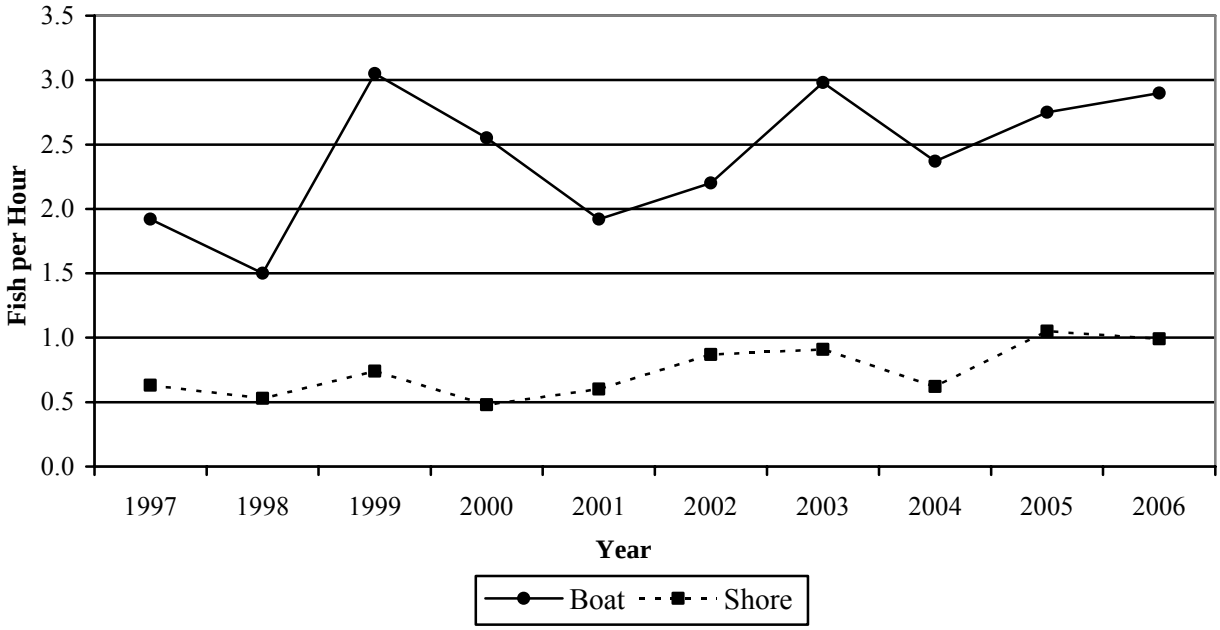
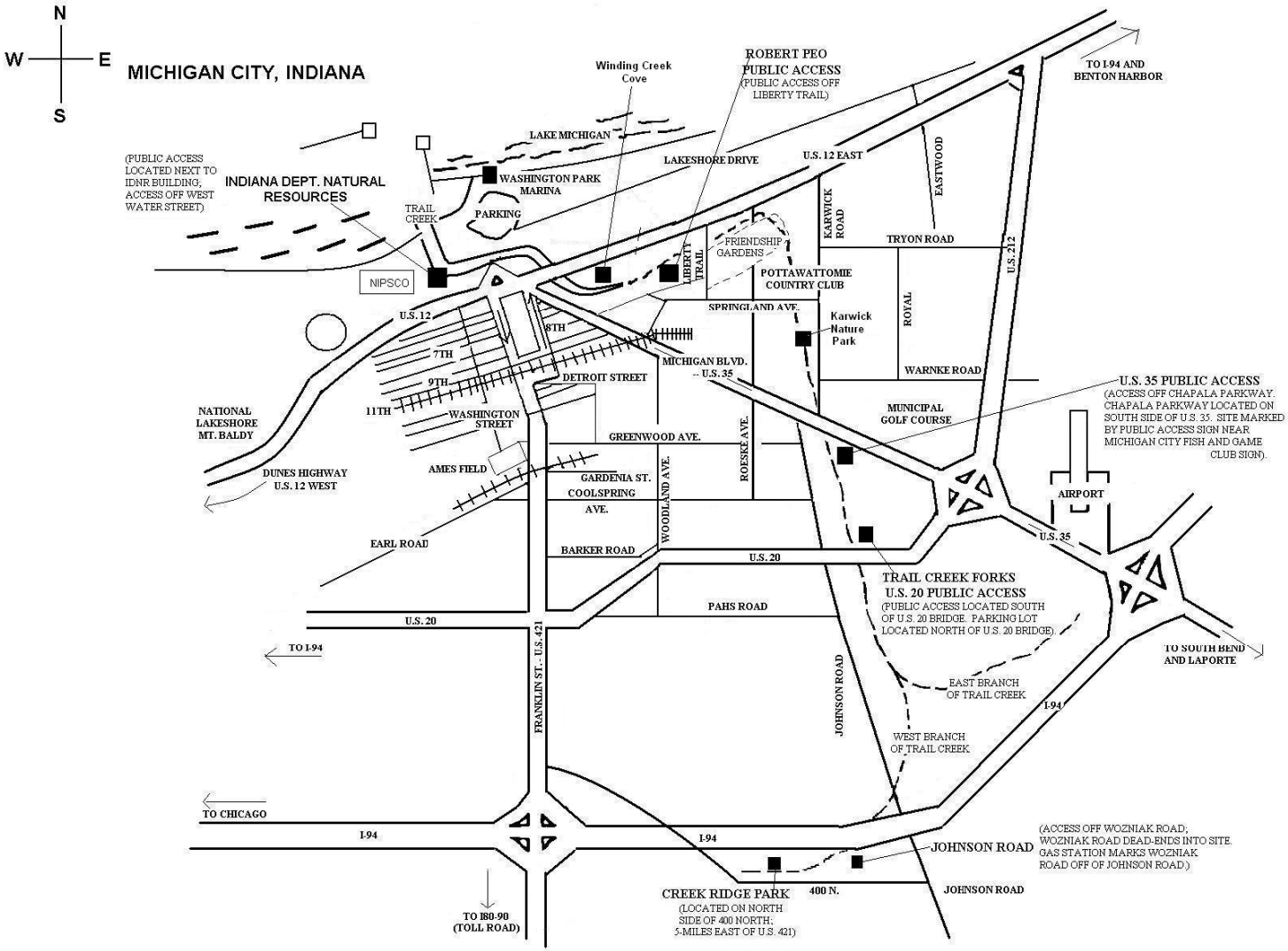
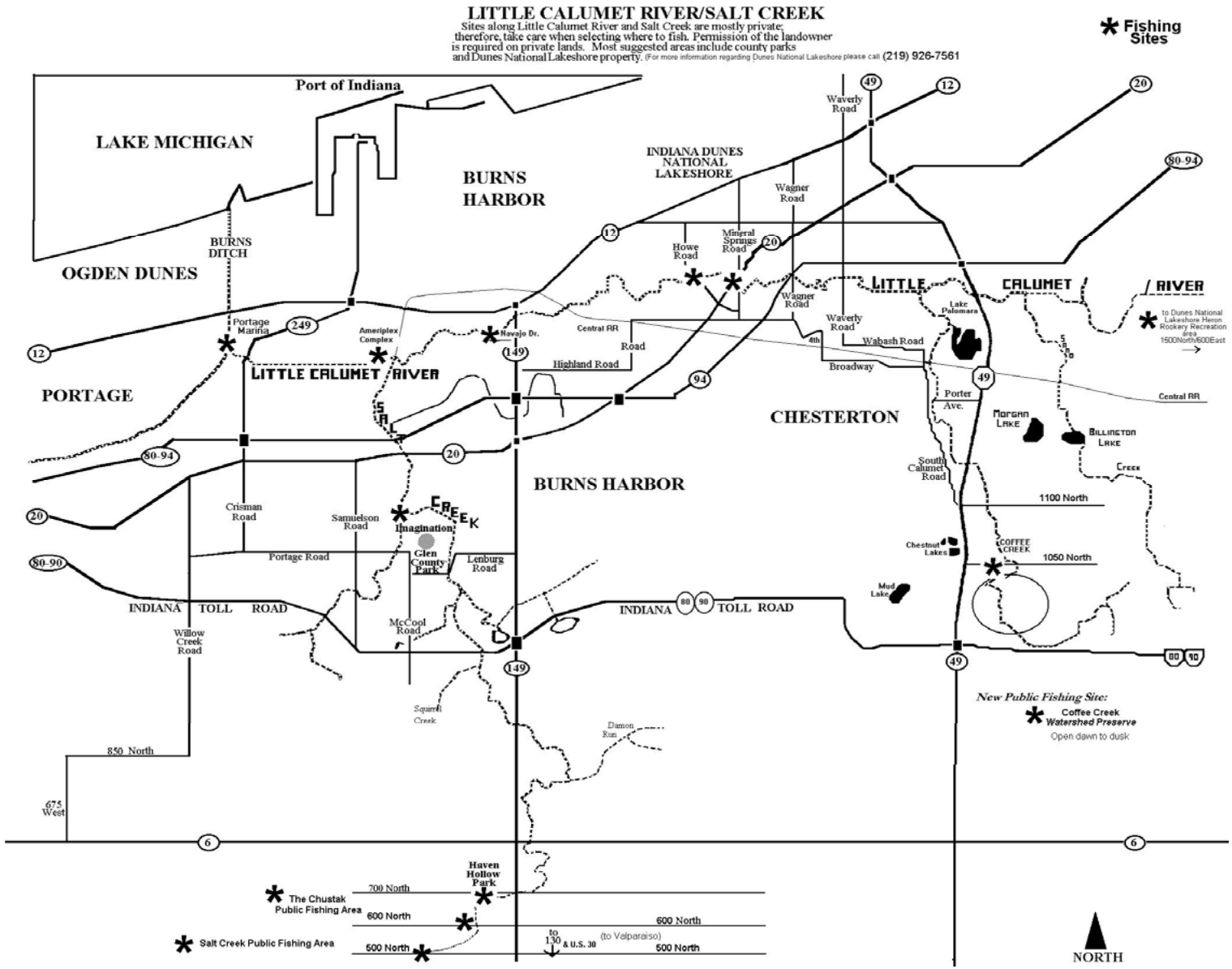


Figure 15. Yellow perch CPUE from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006, by angler type (directed effort).



Appendix I (a). Trail Creek public access map.



Appendix I (b). East Branch of the Little Calumet/Salt Creek public access map.

APPENDIX II

Appendix II (a). Estimated total catch for species other than salmonids, yellow perch, or black bass species from the Indiana Department of Natural Resources Lake Michigan creel survey during 2006.

	Catch					
	Boat Fishery		Shore Fishery		Stream Fishery	
	Number Harvested	Total Catch	Number Harvested	Total Catch	Number Harvested	Total Catch
Bullhead	---	---	0	15	---	---
Catfish	20	74	129	399	59	77
Carp	37	125	27	71	17	31
Chubs	---	---	---	---	213	220
Crappie	---	---	0	20	7	7
Freshwater Drum	7	112	39	144	66	66
Herring Family (Alewife/Gizzard Shad)	0	10	3	7	---	---
Northern Pike	8	8	---	---	---	---
Rock Bass	154	1,461	251	1,275	16	16
Round Goby	11,204	11,609	5,586	5,712	264	264
Suckers	---	---	0	2	0	24
Sunfish (Bluegill/Green Sunfish/Redear/Pumpkinseed)	---	---	462	1,058	59	96
Whitefish	7	7	4	4	---	---
Temperate Bass (White perch/bass)	0	119	---	---	10	10
TOTAL	11,437	13,525	6,501	8,707	711	811

APPENDIX III

Appendix III (a). Average length and weight of salmonid species and yellow perch (by month), observed from the Indiana Department of Natural Resources Lake Michigan creel survey during 2006. Data from boat, shore, and stream fisheries combined. std. = standard deviation.

	LENGTH (in.)				*WEIGHT (lbs.)*		
BROWN TROUT	Average	Range	std.		Average	Range	std.
March (n=3)	24.6	18.1 – 28.3	5.68	March (n=3)	7.1	2.1 – 11.2	4.62
April (n=15)	22.9	17.0 – 30.5	4.50	April (n=15)	6.1	2.0 – 14.4	4.25
May (n=2)	27.7	23.8 – 31.6	5.53	May (n=2)	10.8	5.6 – 16.0	7.30
June (n=0)	---	---	---	June (n=0)	---	---	---
July (n=1)	28.1	28.1	---	July (n=1)	9.6	9.6	---
August (n=0)	---	---	---	August (n=0)	---	---	---
September (n=2)	25.2	22.7 – 27.7	3.50	September (n=2)	7.7	5.8 – 9.6	2.71
October (n=2)	17.9	17.3 – 18.5	0.83	October (n=2)	3.9	2.6 – 5.1	1.75
November (n=1)	27.1	27.1	---	November (n=1)	7.3	7.3	---
December (n=0)	---	---	---	December (n=0)	---	---	---
n = 26	23.6	17.0 – 31.6	4.65	n = 26	6.7	2.0 – 16.0	4.13
COHO SALMON							
March (n=17)	18.6	16.1 – 25.2	1.91	March (n=17)	2.0	1.2 – 4.1	0.63
April (n=138)	19.9	13.2 – 26.3	1.53	April (n=138)	2.5	1.0 – 9.7	0.87
May (n=133)	20.0	15.4 – 23.3	1.29	May (n=133)	2.6	1.0 – 9.4	0.86
June (n=62)	21.6	17.7 – 25.4	1.46	June (n=62)	3.6	1.7 – 5.8	0.91
July (n=42)	22.9	18.3 – 25.8	1.73	July (n=42)	4.8	2.3 – 7.5	1.22
August (n=3)	24.0	21.4 – 25.5	2.25	August (n=3)	4.8	4.6 – 5.1	0.27
September (n=30)	22.7	15.3 – 28.8	3.16	September (n=30)	4.4	1.4 – 7.9	1.78
October (n=10)	24.4	20.8 – 29.5	3.03	October (n=10)	4.9	2.4 – 10.0	2.29
November (n=1)	23.8	23.8	---	November (n=1)	3.5	3.5	---
December (n=0)	---	---	---	December (n=0)	---	---	---
n = 436	20.7	13.2 – 29.5	2.15	n = 436	3.1	1.0 – 10.0	1.34

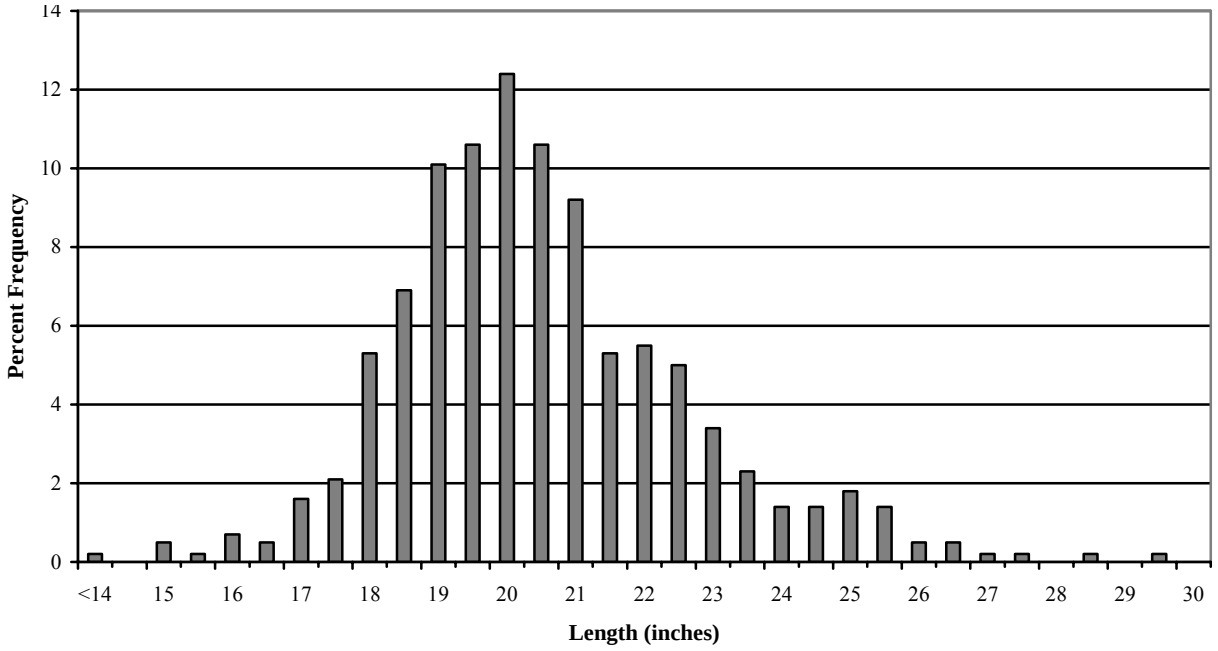
Appendix III (a) *continued*. Average length and weight of salmonid species and yellow perch (by month), observed from the Indiana Department of Natural Resources Lake Michigan creel survey during 2006. Data from boat, shore, and stream fisheries combined. std. = standard deviation.

	LENGTH (in.)				*WEIGHT (lbs.)*		
CHINOOK SALMON	Average	Range	std.		Average	Range	std.
March (n=0)	---	---	---	March (n=0)	---	---	---
April (n=69)	25.7	19.1 – 35.4	4.02	April (n=69)	6.5	1.0 – 16.2	3.71
May (n=61)	26.5	18.5 – 34.0	3.49	May (n=61)	7.0	2.1 – 15.1	2.80
June (n=19)	28.1	24.4 – 35.0	2.95	June (n=19)	8.2	5.3 – 15.1	2.91
July (n=30)	28.0	21.2 – 35.4	3.38	July (n=30)	8.7	3.1 – 18.0	3.48
August (n=25)	27.4	14.9 – 35.4	5.06	August (n=25)	8.6	1.2 – 17.2	4.27
September (n=64)	30.2	18.7 – 37.0	3.84	September (n=64)	10.7	2.6 – 20.8	3.55
October (n=17)	32.4	28.0 – 38.7	2.70	October (n=17)	11.4	6.8 – 19.7	3.27
November (n=0)	---	---	---	November (n=0)	---	---	---
December (n=0)	---	---	---	December (n=0)	---	---	---
n = 285	27.8	14.9 – 38.7	4.24	n = 285	8.4	1.0 – 20.8	3.83
LAKE TROUT							
March (n=0)	---	---	---	March (n=0)	---	---	---
April (n=3)	28.1	25.6 – 30.6	2.51	April (n=3)	8.3	5.7 – 10.4	2.42
May (n=38)	25.8	21.5 – 30.6	2.10	May (n=38)	6.4	3.5 – 10.2	1.76
June (n=12)	24.4	20.9 – 29.9	2.72	June (n=12)	5.8	2.6 – 12.1	2.59
July (n=3)	23.9	22.0 – 25.9	1.99	July (n=3)	7.8	4.3 – 13.6	5.00
August (n=1)	28.9	28.9	---	August (n=1)	9.4	9.4	---
September (n=2)	29.0	26.5 – 31.4	3.47	September (n=2)	9.7	7.3 – 12.2	3.46
October (n=3)	24.7	23.6 – 25.5	1.01	October (n=3)	5.5	5.1 – 5.8	0.36
November (n=0)	---	---	---	November (n=0)	---	---	---
December (n=0)	---	---	---	December (n=0)	---	---	---
n = 62	25.6	20.9 – 31.4	2.43	n = 62	6.5	2.6 – 13.6	2.28

Appendix III (a) *continued*. Average length and weight of salmonid species and yellow perch (by month), observed from the Indiana Department of Natural Resources Lake Michigan creel survey during 2006. Data from boat, shore, and stream fisheries combined. std. = standard deviation.

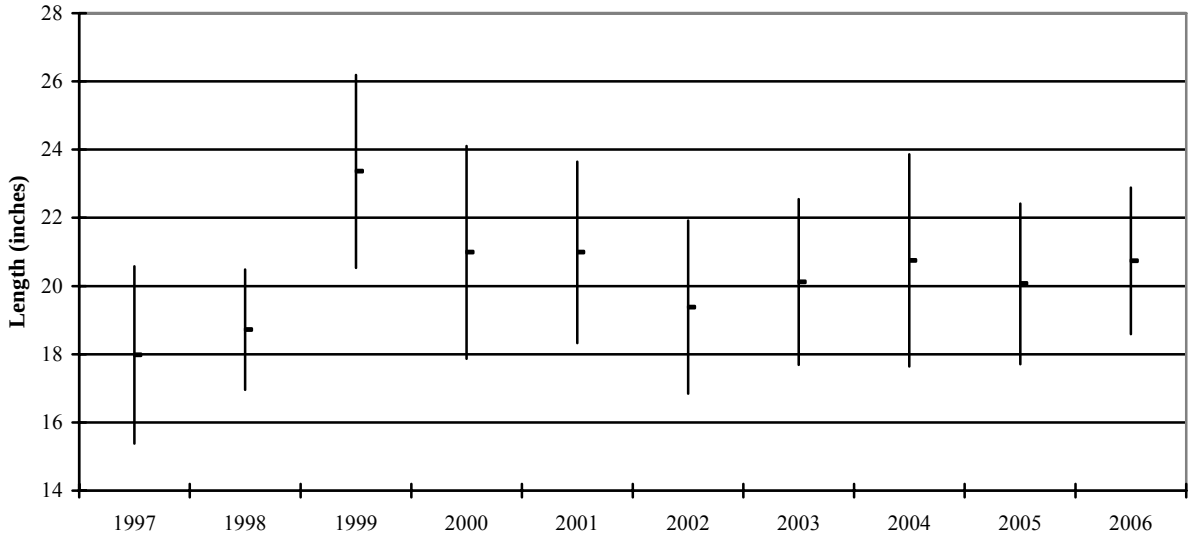
	LENGTH (in.)				*WEIGHT (lbs.)*		
STEELHEAD	Average	Range	std.		Average	Range	std.
March (n=11)	28.0	17.0 – 33.9	4.74	March (n=11)	7.5	1.6 – 11.7	3.11
April (n=34)	23.9	18.5 – 32.6	3.33	April (n=34)	5.0	2.3 – 14.2	2.57
May (n=46)	24.7	18.2 – 32.8	3.66	May (n=46)	5.7	2.0 – 12.4	2.60
June (n=60)	28.3	22.0 – 33.8	2.22	June (n=60)	8.2	3.5 – 14.3	2.19
July (n=94)	28.9	23.6 – 34.2	2.50	July (n=94)	8.7	4.4 – 15.7	2.37
August (n=25)	29.0	14.9 – 32.9	3.45	August (n=25)	8.9	5.8 – 13.3	2.07
September (n=17)	28.9	25.6 – 33.2	2.15	September (n=17)	8.3	5.3 – 11.3	2.02
October (n=11)	28.8	26.3 – 34.3	2.17	October (n=11)	8.0	5.9 – 12.4	1.73
November (n=8)	28.9	26.6 – 31.5	1.54	November (n=8)	7.5	6.3 – 8.8	0.90
December (n=15)	28.1	22.0 – 34.1	2.82	December (n=15)	7.5	4.4 – 11.6	1.91
n = 321	27.6	14.9 – 34.3	3.43	n = 321	7.6	1.6 – 15.7	2.66
YELLOW PERCH							
March (n=0)	---	---	---	March (n=0)	---	---	---
April (n=0)	---	---	---	April (n=0)	---	---	---
May (n=16)	7.9	6.1 – 12.0	1.71	May (n=16)	0.2	0.04 – 0.7	0.21
June (n=131)	10.0	6.9 – 14.3	1.78	June (n=131)	0.5	0.09 – 1.5	0.30
July (n=448)	9.3	6.9 – 14.2	1.39	July (n=448)	0.4	0.07 – 1.1	0.19
August (n=231)	9.7	6.8 – 14.0	1.19	August (n=231)	0.4	0.1 – 1.2	0.19
September (n=6)	9.2	7.5 – 11.3	1.32	September (n=6)	0.3	0.2 – 0.6	0.14
October (n=46)	10.3	8.0 – 13.0	1.08	October (n=46)	0.5	0.2 – 1.0	0.18
November (n=0)	---	---	---	November (n=0)	---	---	---
December (n=0)	---	---	---	December (n=0)	---	---	---
n = 878	9.5	6.1 – 14.3	1.45	n = 878	0.4	0.04 – 1.5	0.22

N = 436
Average length 20.7 in.
std. 2.15
Range 13.2 – 29.5

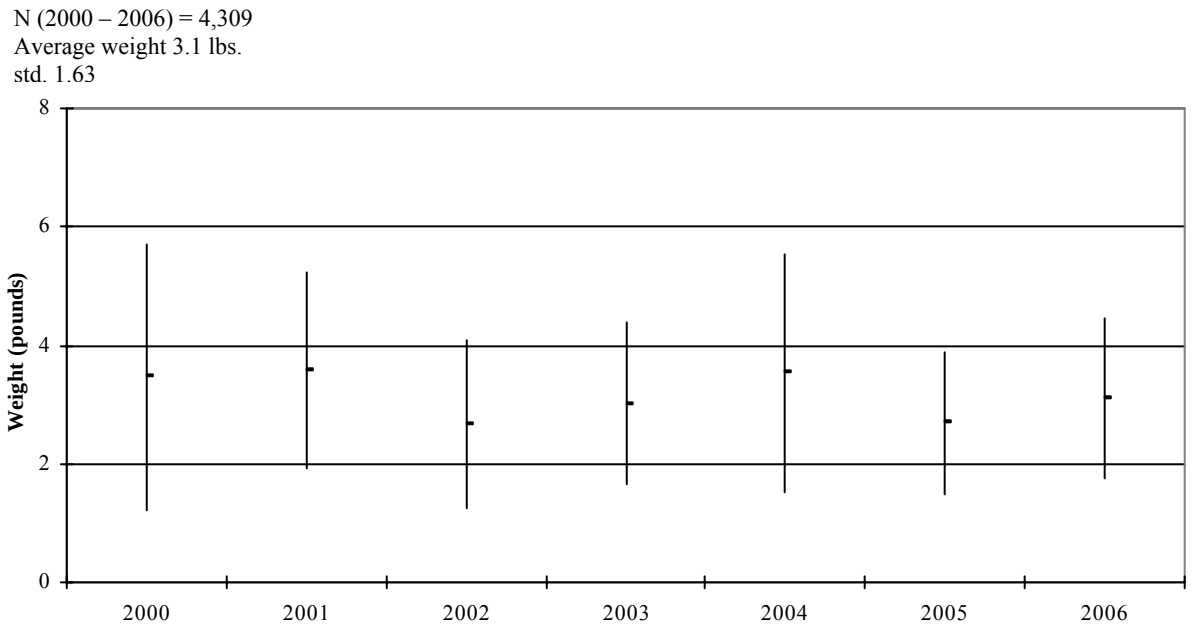


Appendix IV (a). Length frequency of coho salmon observed in the Indiana Department of Natural Resources Lake Michigan creel survey during 2006.

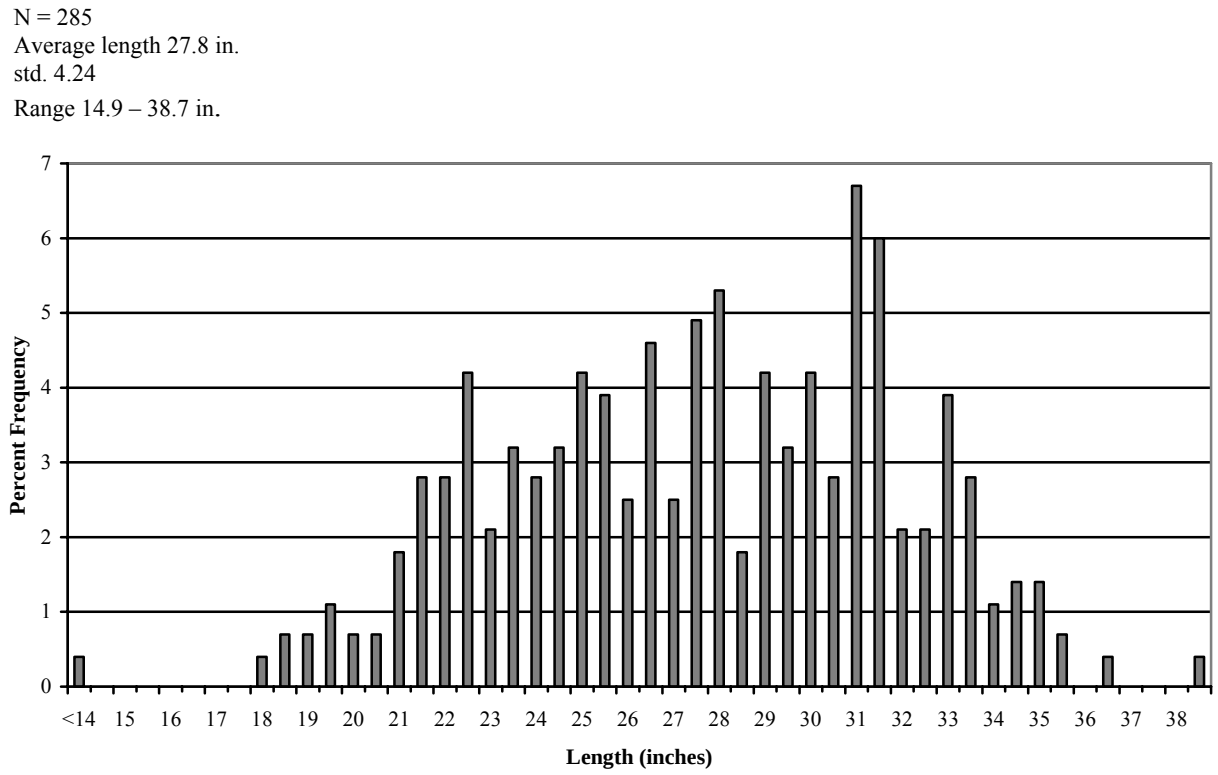
N (1997 – 2006) = 8,615
Average length 20.2 in.
std. = 3.06



Appendix IV (b). Average total length of creeled coho salmon from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006.

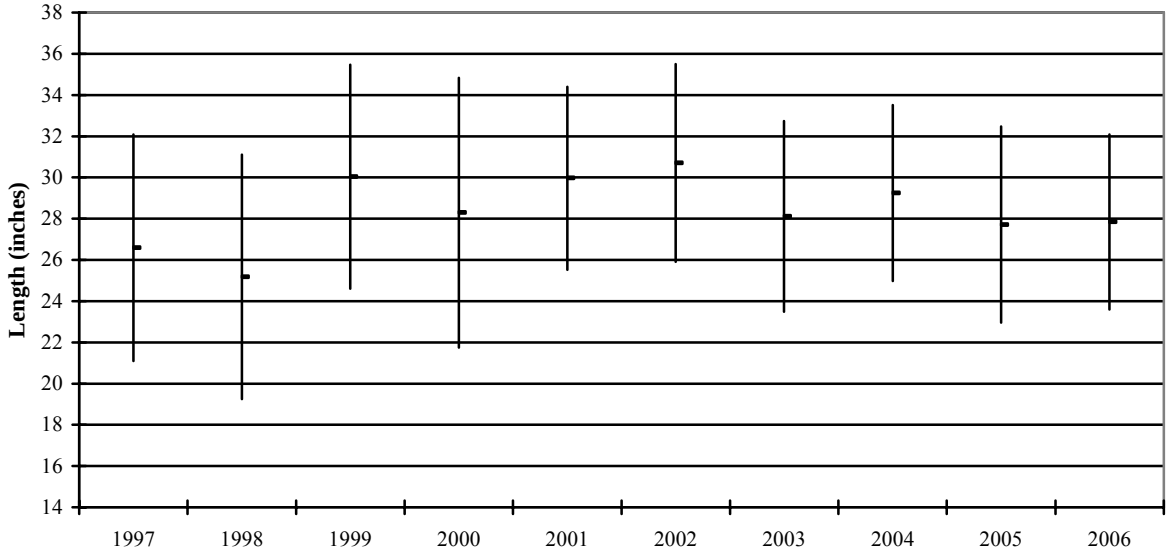


Appendix IV (c). Average weight of creeled coho salmon from the Indiana Department of Natural Resources Lake Michigan creel survey, 2000 through 2006.



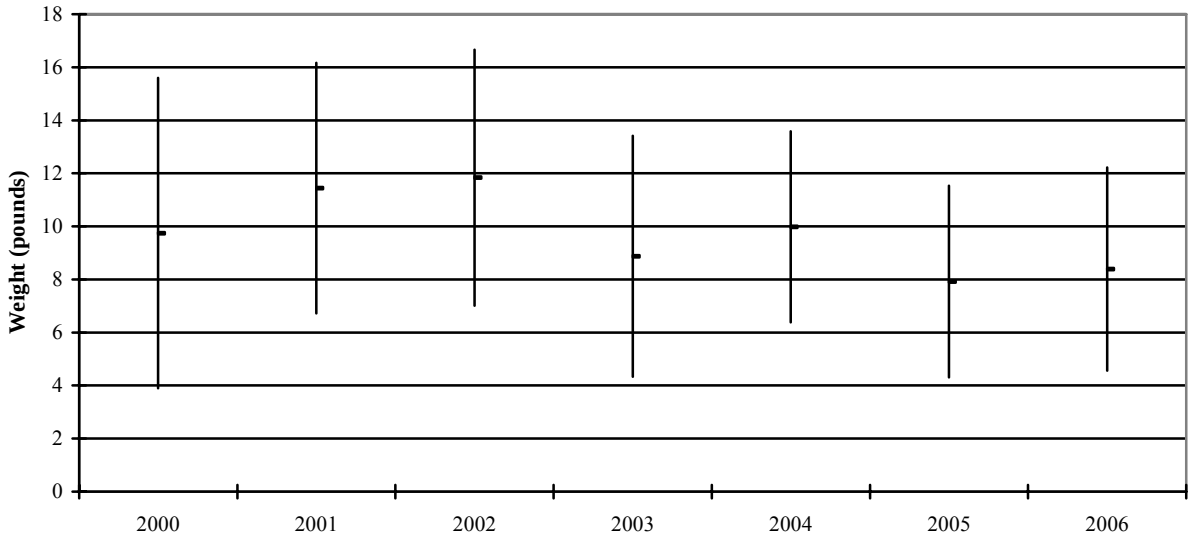
Appendix IV (d). Length frequency of Chinook salmon observed in the Indiana Department of Natural Resources Lake Michigan creel survey during 2006.

N (1997 – 2006) = 3,231
Average length 28.8 in.
std. = 5.24

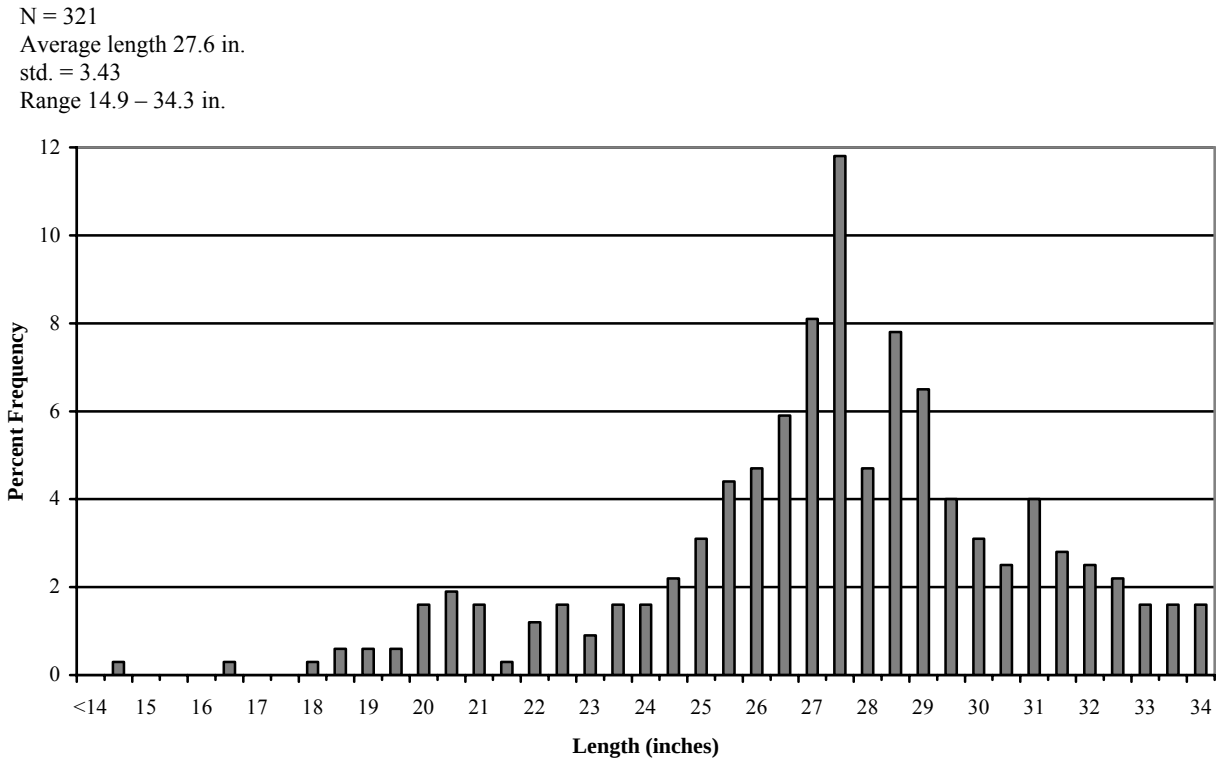


Appendix IV (e). Average total length of creeled Chinook salmon from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006.

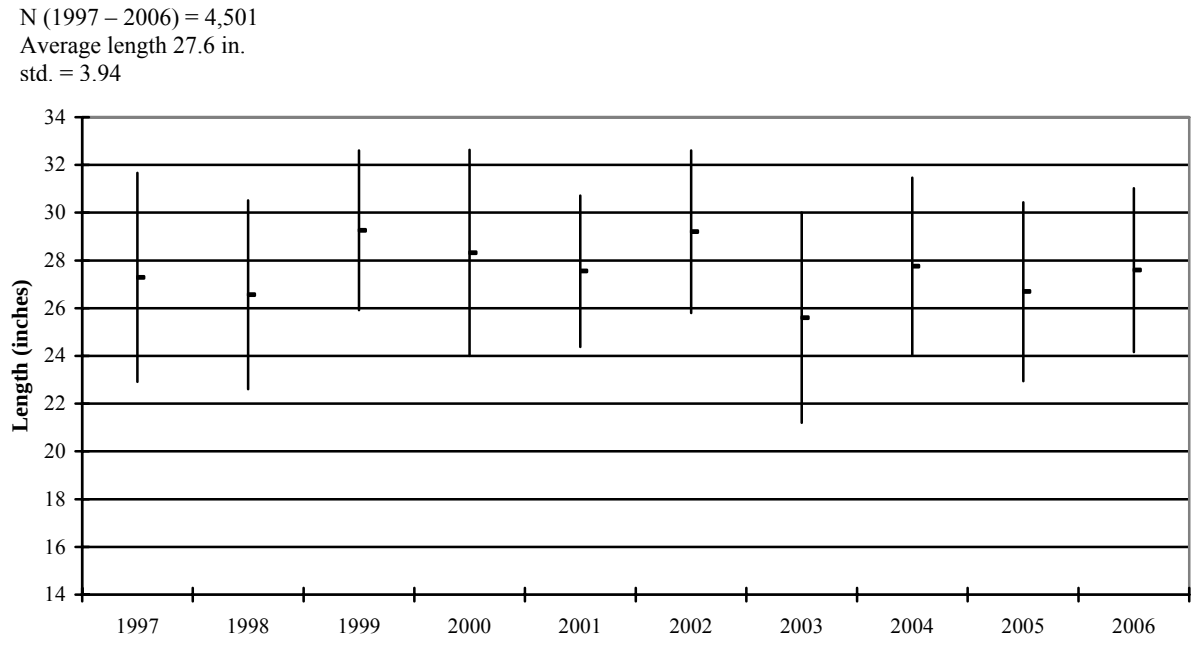
N (2000 – 2006) = 2,522
Average weight 10.0 lbs.
std. = 4.70



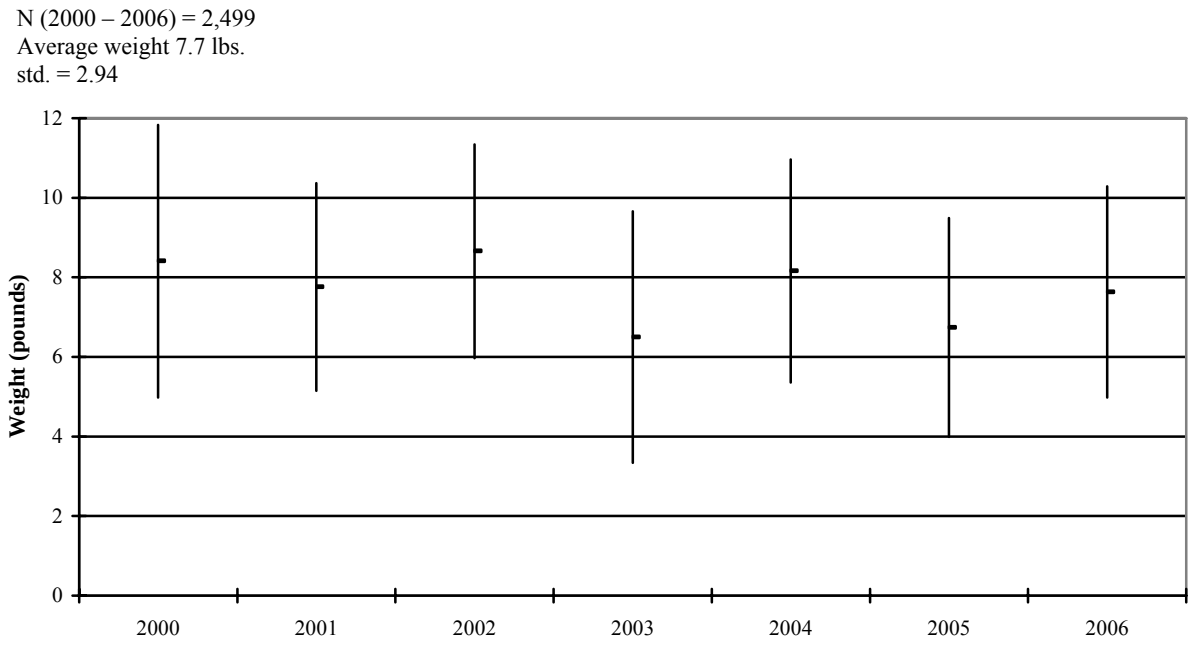
Appendix IV (f). Average weight of creeled Chinook salmon from the Indiana Department of Natural Resources Lake Michigan creel survey, 2000 through 2006.



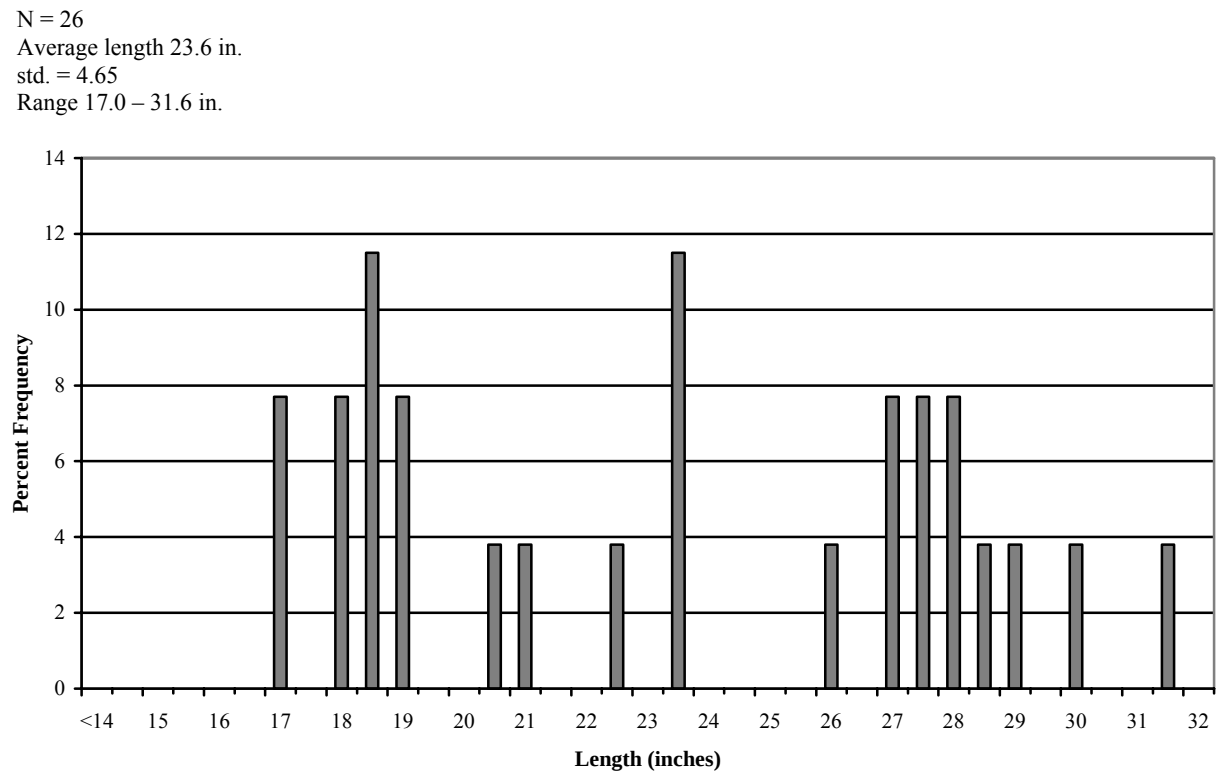
Appendix IV (g). Length frequency of steelhead observed in the Indiana Department of Natural Resources Lake Michigan creel survey during 2006.



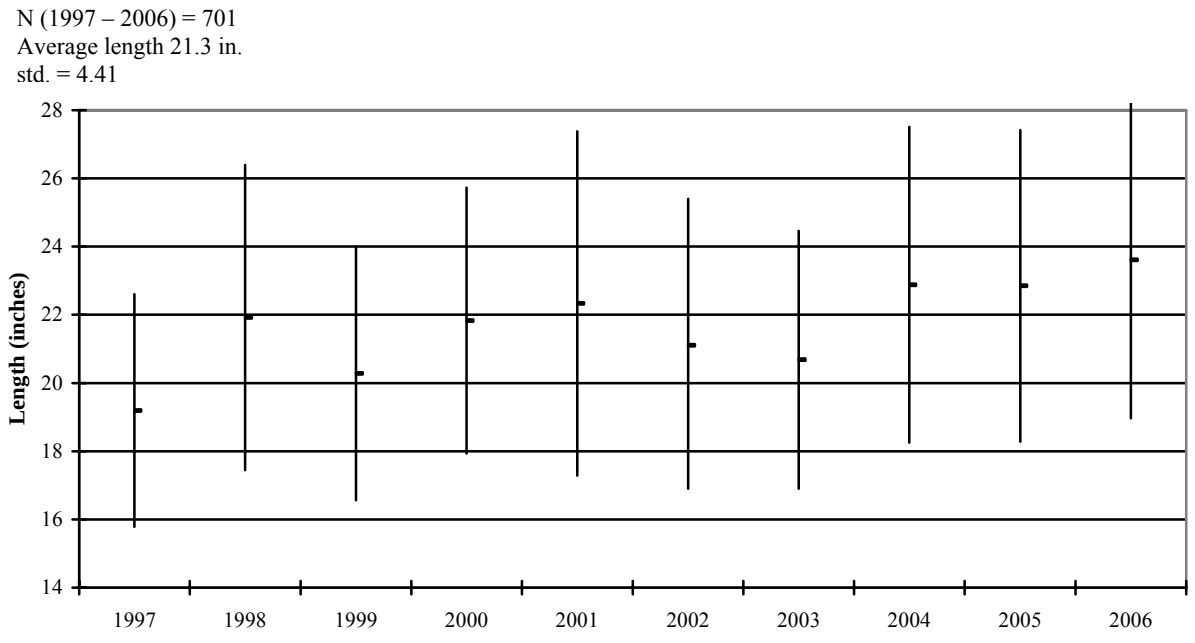
Appendix IV (h). Average total length of creeled steelhead from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006.



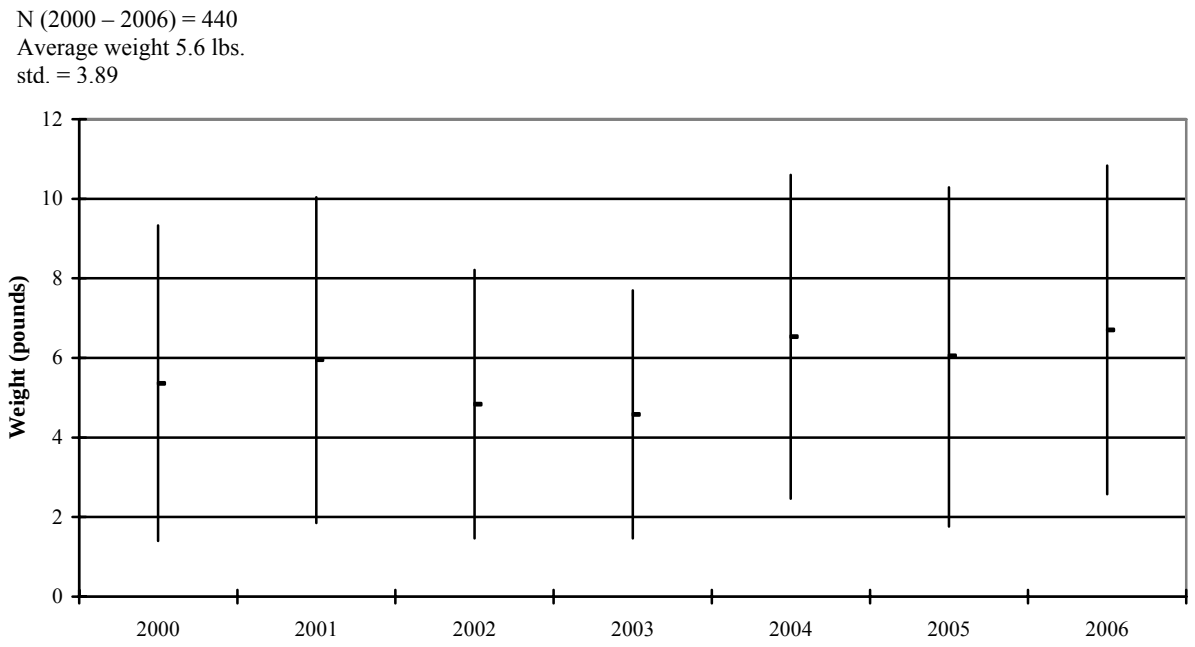
Appendix IV (i). Average weight of creeled steelhead from the Indiana Department of Natural Resources Lake Michigan creel survey, 2000 through 2006.



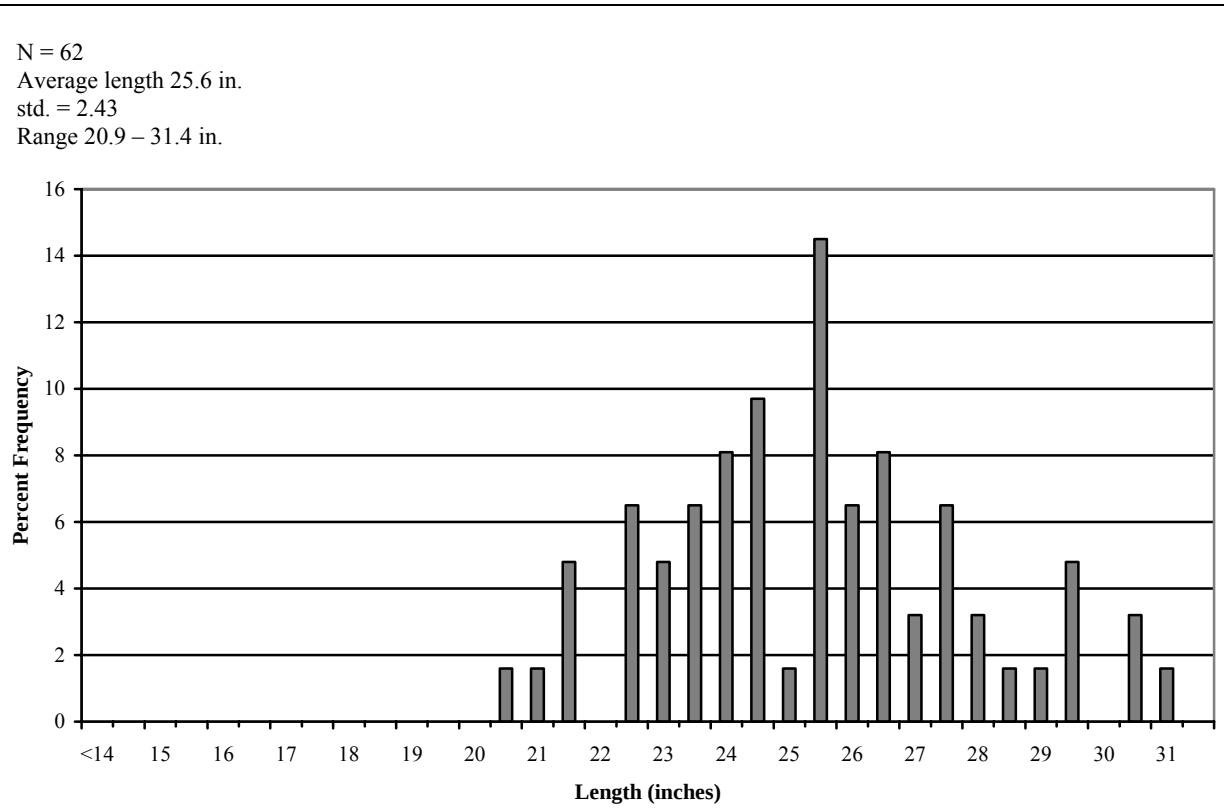
Appendix IV (j). Length frequency of brown trout observed in the Indiana Department of Natural Resources Lake Michigan creel survey during 2006.



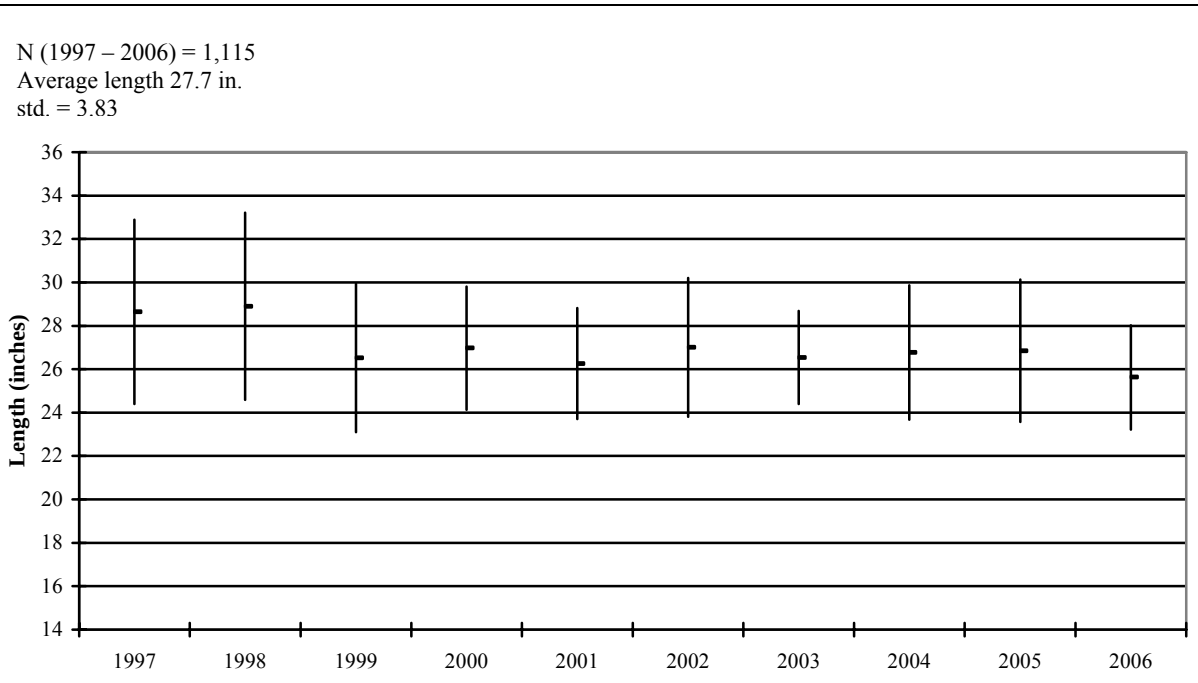
Appendix IV (k). Average total length of creeled brown trout from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006.



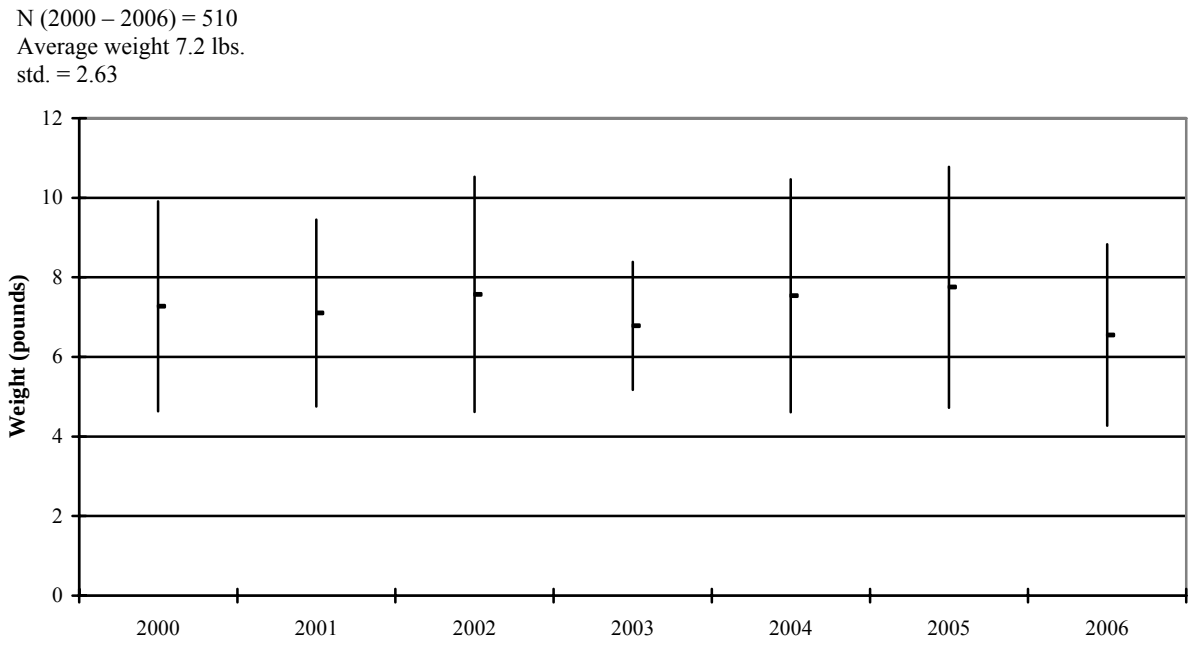
Appendix IV (l). Average weight of creeled brown trout from the Indiana Department of Natural Resources Lake Michigan creel survey, 2000 through 2006.



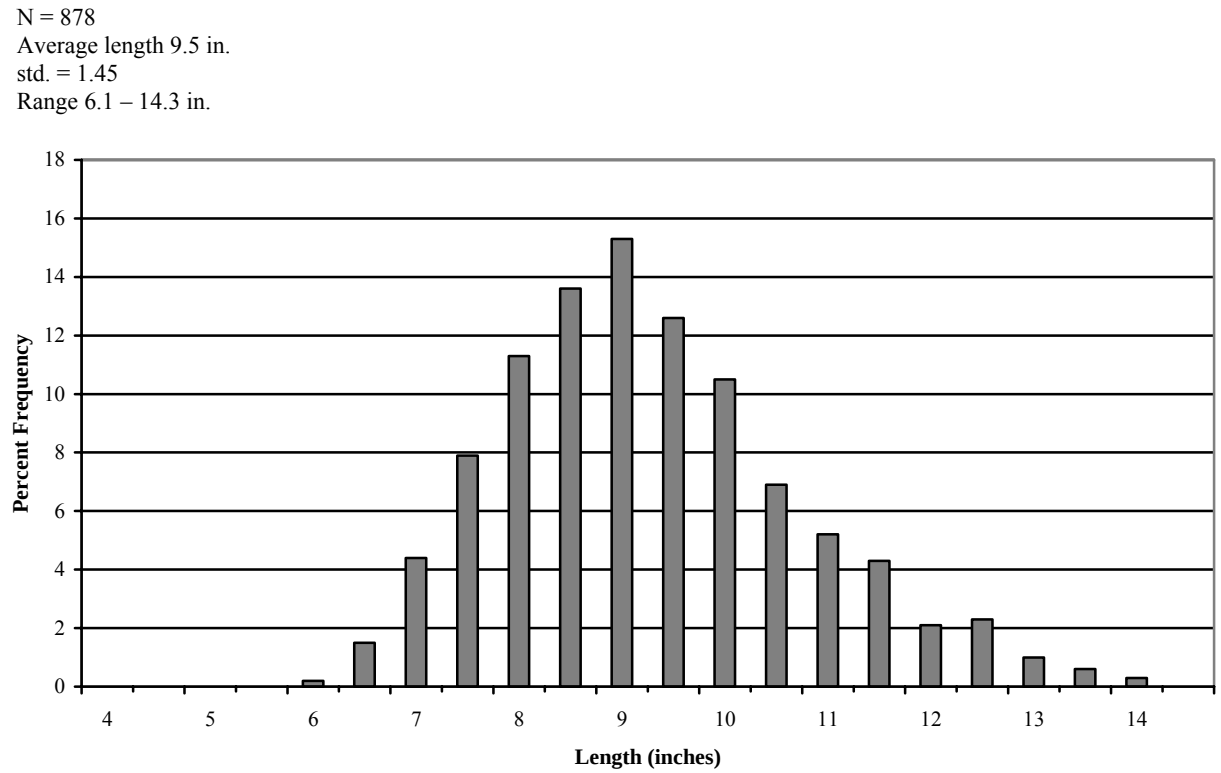
Appendix IV (m). Length frequency of lake trout observed in the Indiana Department of Natural Resources Lake Michigan creel survey during 2006.



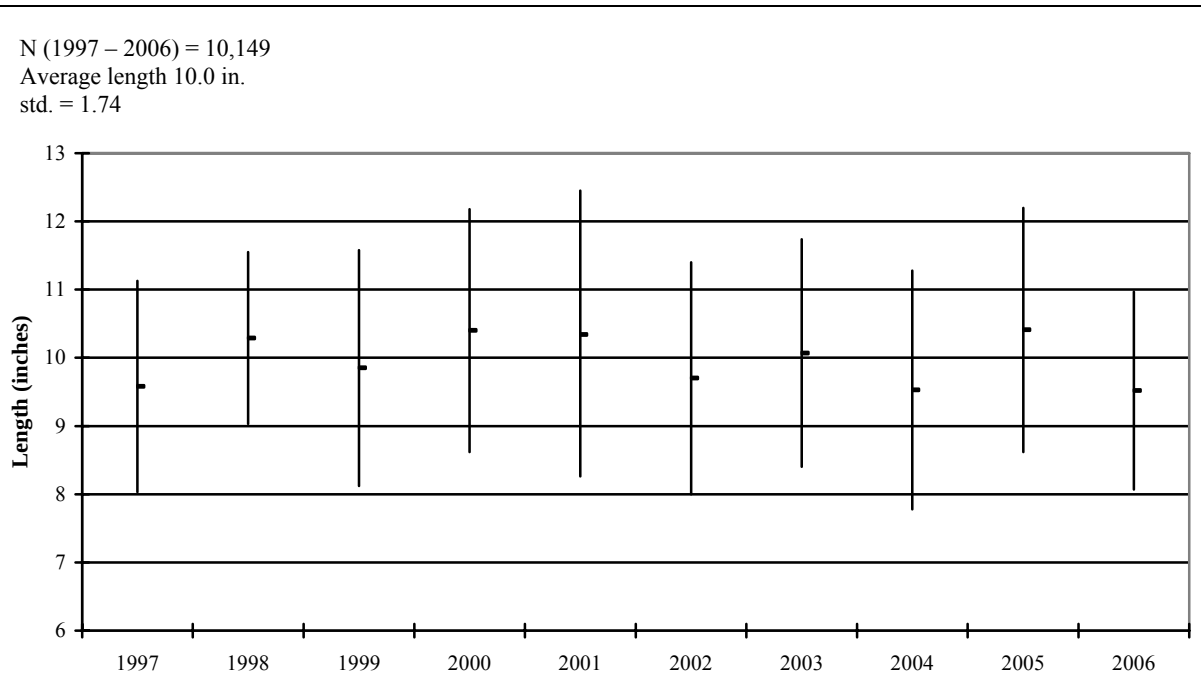
Appendix IV (n). Average total length of creeled lake trout from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006.



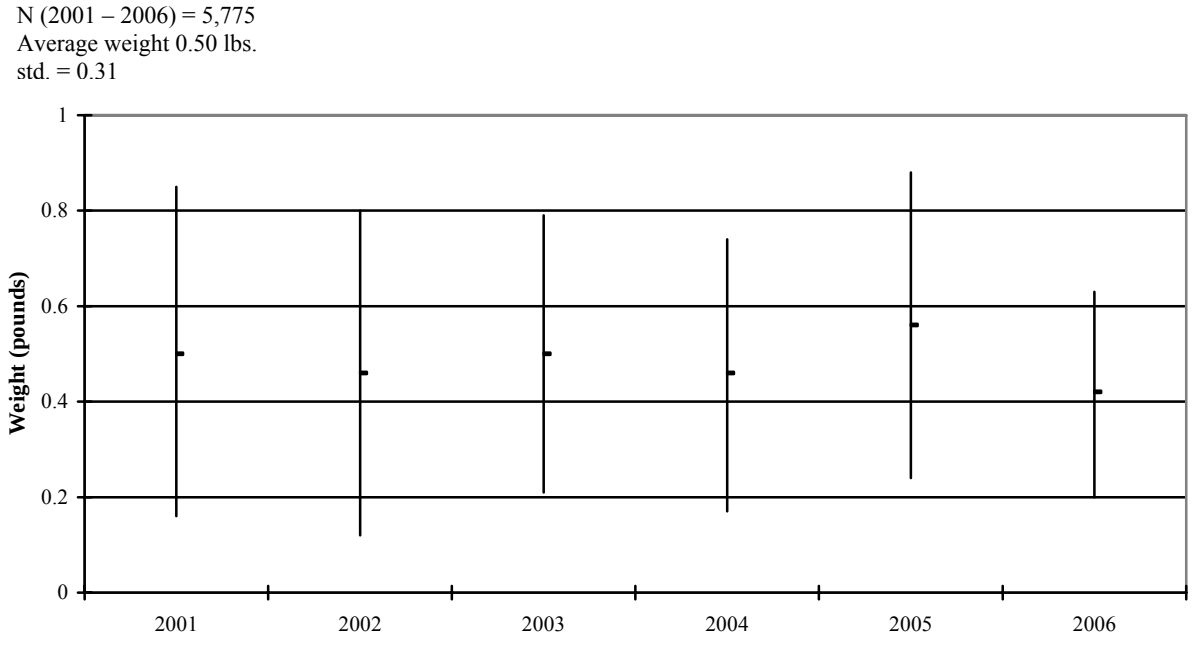
Appendix IV (o). Average weight of creeled lake trout from the Indiana Department of Natural Resources Lake Michigan creel survey, 2000 through 2006.



Appendix IV (p). Length frequency of yellow perch observed in the Indiana Department of Natural Resources Lake Michigan creel survey during 2006.



Appendix IV (q). Average total length of creeled yellow perch from the Indiana Department of Natural Resources Lake Michigan creel survey, 1997 through 2006.



Appendix IV (r). Average weight of creeled yellow perch from the Indiana Department of Natural Resources Lake Michigan creel survey, 2001 through 2006.

APPENDIX V

Appendix V (a). County of residence of anglers that were surveyed in the Indiana Department of Natural Resources Lake Michigan creel survey fishing from boat during 2006 (n=918).

County	No. Parties	%	County	No. Parties	%
Lake	377	(41.1)	Howard	1	(0.1)
Out-of-State	187	(20.4)	Lawrence	1	(0.1)
Porter	159	(17.3)	Madison	1	(0.1)
LaPorte	81	(8.8)	Miami	1	(0.1)
Elkhart	16	(1.7)	Noble	1	(0.1)
Marion	15	(1.6)	Parke	1	(0.1)
St. Joseph	10	(1.1)	Putnam	1	(0.1)
Allen	9	(1.0)	Tipton	1	(0.1)
Jasper	7	(0.8)			
Hendricks	6	(0.6)			
Tippecanoe	6	(0.6)			
Marshall	4	(0.4)			
Benton	3	(0.3)			
Grant	3	(0.3)			
Johnson	3	(0.3)			
Kosciusko	3	(0.3)			
Newton	3	(0.3)			
Starke	3	(0.3)			
Wabash	3	(0.3)			
Carroll	2	(0.2)			
Hamilton	2	(0.2)			
Monroe	2	(0.2)			
Pulaski	2	(0.2)			
Boone	1	(0.1)			
Cass	1	(0.1)			
Clinton	1	(0.1)			
Daviess	1	(0.1)			

Appendix V (b). County of residence of anglers that were surveyed in the Indiana Department of Natural Resources Lake Michigan creel survey fishing from shore during 2006 (n=978).

County	No. Parties	%	County	No. Parties	%
Lake	288	(29.4)	Fulton	1	(0.1)
LaPorte	286	(29.2)	Montgomery	1	(0.1)
Porter	207	(21.2)	Vigo	1	(0.1)
Out-of-State	82	(8.4)			
Elkhart	22	(2.2)			
St. Joseph	19	(1.9)			
Marion	13	(1.3)			
Starke	8	(0.8)			
Allen	7	(0.7)			
Kosciusko	5	(0.5)			
Wabash	5	(0.5)			
Delaware	3	(0.3)			
Grant	3	(0.3)			
Jasper	3	(0.3)			
Madison	3	(0.3)			
Marshall	3	(0.3)			
Warrick	3	(0.3)			
Wells	3	(0.3)			
Cass	2	(0.3)			
Hendricks	2	(0.2)			
Johnson	2	(0.2)			
Miami	2	(0.2)			
Pulaski	2	(0.2)			
Brown	1	(0.1)			
Carroll	1	(0.1)			

Appendix V (c). County of residence of anglers that were surveyed in the Indiana Department of Natural Resources Lake Michigan creel survey fishing from stream during 2006 (n=837).

County	No. Parties	%	County	No. Parties	%
Out-of-State	195	(23.3)	LaGrange	2	(0.2)
LaPorte	171	(20.4)	Madison	2	(0.2)
Porter	151	(18.0)	Montgomery	2	(0.2)
Lake	65	(7.8)	Morgan	2	(0.2)
St. Joseph	53	(6.3)	Perry	2	(0.2)
Elkhart	26	(3.1)	Vanderburgh	2	(0.2)
Allen	24	(2.9)	Whitley	2	(0.2)
Marion	22	(2.6)	Adams	1	(0.1)
Marshall	13	(1.5)	Bartholomew	1	(0.1)
Kosciusko	11	(1.3)	Boone	1	(0.1)
Tippecanoe	8	(0.9)	Carroll	1	(0.1)
Delaware	6	(0.7)	Clark	1	(0.1)
Grant	6	(0.7)	Clinton	1	(0.1)
White	6	(0.7)	Fayette	1	(0.1)
Cass	4	(0.5)	Fountain	1	(0.1)
Hendricks	4	(0.5)	Fulton	1	(0.1)
Putnam	4	(0.5)	Jay	1	(0.1)
Hamilton	3	(0.3)	Miami	1	(0.1)
Hancock	3	(0.3)	Monroe	1	(0.1)
Johnson	3	(0.3)	Newton	1	(0.1)
Lawrence	3	(0.3)	Owen	1	(0.1)
Noble	3	(0.3)	Shelby	1	(0.1)
Starke	3	(0.3)	Sullivan	1	(0.1)
Tipton	3	(0.3)	Wabash	1	(0.1)
Wells	3	(0.3)	Warren	1	(0.1)
DeKalb	2	(0.2)	Washington	1	(0.1)
Howard	2	(0.2)	Wayne	1	(0.1)
Huntington	2	(0.2)			
Jackson	2	(0.2)			
Jasper	2	(0.2)			

APPENDIX VI

Appendix VI (a). Boat, shore, and stream angler response to the species importance and species satisfaction questions from the Indiana Department of Natural Resources Lake Michigan creel survey, 2006.

Importance	Coho Salmon	%	Chinook Salmon	%	Steel-head	%	Brown Trout	%	Lake Trout	%	Yellow Perch	%
Very Important	524	87.0	525	91.8	984	93.3	248	89.0	46	78.0	785	94.9
Important	53	8.8	30	5.2	46	4.4	14	5.0	2	3.4	32	3.9
Somewhat Important	19	3.1	12	2.1	19	1.8	11	3.9	4	6.8	10	1.2
Of Little Importance	4	0.7	1	0.2	2	0.2	2	0.7	1	1.7	0	0
Not Important	1	0.2	3	0.5	1	0.1	3	1.1	5	8.5	0	0
Don't Know	1	0.2	1	0.2	2	0.2	1	0.3	1	1.7	0	0
TOTAL	602		572		1,054		279		59		829	

Satisfaction	Coho Salmon	%	Chinook Salmon	%	Steel-head	%	Brown Trout	%	Lake Trout	%	Yellow Perch	%
Extremely Satisfied	182	30.3	177	31.3	417	39.7	48	17.3	11	18.6	241	29.2
Very Satisfied	157	26.1	135	23.8	228	21.7	33	11.9	11	18.6	267	32.4
Somewhat Satisfied	144	24.0	150	26.5	246	23.4	56	20.2	10	16.9	244	29.6
Less Satisfied	47	7.8	40	7.1	60	5.7	41	14.8	8	13.6	53	6.4
Not Satisfied	16	2.7	18	3.2	16	1.5	60	21.7	18	30.5	13	1.6
Don't Know	55	9.1	46	8.1	84	8.0	39	14.1	1	1.7	7	0.8
TOTAL	601		566		1,051		277		59		825	

Appendix VI (b). Boat angler response to the species importance and species satisfaction questions from the Indiana Department of Natural Resources Lake Michigan creel survey, 2006.

BOAT ANGLERS

Importance	Coho Salmon	%	Chinook Salmon	%	Steel-head	%	Brown Trout	%	Lake Trout	%	Yellow Perch	%
Very Important	172	91.5	177	94.7	86	89.5	32	88.9	39	76.5	425	96.8
Important	12	6.4	7	3.7	8	8.4	1	2.8	2	3.9	12	2.7
Somewhat Important	3	1.6	2	1.1	1	1.1	1	2.8	4	7.8	2	0.5
Of Little Importance	1	0.5	0	0	1	1.1	0	0	1	2.0	0	0
Not Important	0	0	1	0.5	0	0	2	5.6	5	9.8	0	0
Don't Know	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	188		187		96		36		51		439	

Satisfaction	Coho Salmon	%	Chinook Salmon	%	Steel-head	%	Brown Trout	%	Lake Trout	%	Yellow Perch	%
Extremely Satisfied	54	28.7	57	31.1	24	25.3	6	16.7	11	21.6	134	30.5
Very Satisfied	52	27.7	51	27.9	26	27.4	8	22.2	10	19.6	156	35.5
Somewhat Satisfied	50	26.6	53	29.0	25	26.3	9	25.0	8	15.7	115	26.2
Less Satisfied	20	10.6	16	8.7	18	18.9	8	22.2	7	13.7	25	5.7
Not Satisfied	6	3.2	5	2.7	2	2.1	5	13.9	15	29.4	7	1.6
Don't Know	6	3.2	1	0.5	0	0	0	0	0	0	2	0.5
TOTAL	188		183		95		36		51		439	

Appendix VI (c). Shore angler response to the species importance and species satisfaction questions from the Indiana Department of Natural Resources Lake Michigan creel survey, 2006.

SHORE ANGLERS

Importance	Coho Salmon	%	Chinook Salmon	%	Steel-head	%	Brown Trout	%	Lake Trout	%	Yellow Perch	%
Very Important	73	70.9	103	92.0	223	91.0	13	59.1	7	87.5	353	92.7
Important	21	20.4	5	4.5	15	6.1	4	18.2	0	0	20	5.2
Somewhat Important	6	5.8	3	2.7	5	2.0	3	13.6	0	0	8	2.1
Of Little Importance	2	1.9	0	0	1	0.4	1	4.5	0	0	0	0
Not Important	0	0	0	0	0	0	0	0	0	0	0	0
Don't Know	1	1.0	1	0.8	1	0.4	1	4.5	1	12.5	0	0
TOTAL	103		112		245		22		8		381	

Satisfaction	Coho Salmon	%	Chinook Salmon	%	Steel-head	%	Brown Trout	%	Lake Trout	%	Yellow Perch	%
Extremely Satisfied	24	23.5	35	31.5	84	34.4	4	18.2	0	0	107	28.2
Very Satisfied	37	36.3	37	33.3	56	23.0	3	13.6	1	12.5	110	29.0
Somewhat Satisfied	25	24.5	30	27.0	76	31.1	7	31.8	2	25.0	124	32.7
Less Satisfied	7	6.9	5	4.5	17	7.0	4	18.2	1	12.5	27	7.1
Not Satisfied	3	2.9	3	2.7	4	1.6	2	9.1	3	37.5	6	1.6
Don't Know	6	5.9	1	0.9	7	2.9	2	9.1	1	12.5	5	1.3
TOTAL	102		111		244		22		8		379	

Appendix VI (d). Stream angler response to the species importance and species satisfaction questions from the Indiana Department of Natural Resources Lake Michigan creel survey, 2006.

STREAM ANGLERS

Importance	Coho Salmon	%	Chinook Salmon	%	Steel-head	%	Brown Trout	%	Lake Trout	%	Yellow Perch	%
Very Important	279	89.7	245	89.7	675	94.7	203	91.9	0	0	7	100
Important	20	6.4	18	6.6	23	3.2	9	4.1	0	0	0	0
Somewhat Important	10	3.2	7	2.6	13	1.8	7	3.2	0	0	0	0
Of Little Importance	1	0.3	1	0.4	0	0	1	0.5	0	0	0	0
Not Important	1	0.3	2	0.7	1	0.1	1	0.5	0	0	0	0
Don't Know	0	0	0	0	1	0.1	0	0	0	0	0	0
TOTAL	311		273		713		221		0		7	

Satisfaction	Coho Salmon	%	Chinook Salmon	%	Steel-head	%	Brown Trout	%	Lake Trout	%	Yellow Perch	%
Extremely Satisfied	104	33.4	85	31.3	309	43.4	38	17.4	0	0	0	0
Very Satisfied	68	21.9	47	17.3	146	20.5	22	10.0	0	0	1	14.3
Somewhat Satisfied	69	22.2	67	24.6	145	20.4	40	18.3	0	0	5	71.4
Less Satisfied	20	6.4	19	7.0	25	3.5	29	13.2	0	0	1	14.3
Not Satisfied	7	2.3	10	3.7	10	1.4	53	24.2	0	0	0	0
Don't Know	43	13.8	44	16.2	77	10.8	37	16.9	0	0	0	0
TOTAL	311		272		712		219		0		7	