Surveillance and Status of Fish Stocks in Western Lake Erie, 2006*

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Abstract

Each summer and autumn since 1961, the Lake Erie Biological Station has conducted assessments of fish populations in western Lake Erie near East Harbor State Park, Ohio, and more recently has included assessments of fish diets, zooplankton, and benthic macroinvertebrates. The catches of nearly all major age-0 forage fishes in autumn 2006 were considerably less than their 15-year (1992-2006) means. Rainbow smelt (*Osmerus mordax*), was an exception, as catches were higher than the 15-year mean by nearly 50%. Catches of all age-0 spiny-rayed fishes caught in 2006 were less than 25% of their 15-year means. In particular, no age-0 walleye (*Sander vitreus*) were captured 2006. Catches of round goby (*Neogobius melanostomus*) (all ages combined) were similar to the previous three years and substantially below the species' 11-year (1996-2006) mean. For most species examined, mean total lengths for age-0 individuals in 2006 were similar to their respective 15-year means. Yellow perch (*Perca flavescens*) and white perch (*Morone americana*) adults (age-2 and older) consumed predominately zooplankton and benthic macroinvertebrates in summer. The proportions of zooplankton in the diet of yellow perch and of benthic macroinvertebrates in the diet of white perch have increased since 2004. Although the autumn diet of white perch was dominated by benthic macroinvertebrates, fish composed a relatively large proportion (25.3% by wet weight). *Dreissena* spp. dominated the benthic macroinvertebrates collected in 2006, followed by Chironomidae. Chironomid density was the highest recorded on this survey since the first benthic samples were collected in 1997. Cyclopoid copepods were the most abundant zooplankton taxon detected during summer sampling, and Bosminidae was the most abundant zooplankton taxon detected in the autumn.

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Introduction

Since 1961, the U.S. Geological Survey, Lake Erie Biological Station (LEBS) has conducted annual bottom trawl surveys during summer and autumn near East Harbor State Park, Ohio. The objectives for this survey are to determine 1) relative abundance and growth of key young-of-year (age-0) fish species, 2) diets of adult (age-2 and older) yellow perch (*Perca flavescens*) and white perch (*Morone americana*), and 3) composition of benthic invertebrates and zooplankton in the study area. Relative abundance indices and growth data from these surveys provide information on potential recruitment of these important species. Abundances and composition of benthic invertebrates and changes in diet provide critical information on carrying capacity, expected growth, and condition of commercially important species.

This report includes results from the 2006 LEBS trawl surveys, diet analyses from adult yellow perch and white perch collected in the surveys, and assessments of benthic and zooplankton communities. For selected fish species, recruitment was evaluated by comparing the 2006 autumn abundance values of age-0 individuals with long-term (15-year) LEBS average catches. We compare relative abundances and growth of age-0 fish species, composition of benthic invertebrates and zooplankton, and diets of yellow perch and white perch with results from previous years.

Methods

Collection of fish - Trawl surveys were conducted during the summer (31 July – 2 August 2006) and autumn (16-18 October 2006) in western Lake Erie near East Harbor State Park, Ohio (Figure 1). On consecutive days (weather permitting) duplicate trawls were conducted at the 3, 4.5, and 6-m depth contours during the morning, afternoon, and night with a 7.9-m (headrope) bottom trawl. The trawl was towed for 10 minutes on-bottom at an average speed of 3.7 km/h (range 3.5-4.1 km/h). Area swept (in hectares) was calculated as width of the trawl opening (3.9 m, measured using SCANMAR acoustic net mensuration gear) multiplied by the distance towed. The distance towed was measured as the difference in starting and ending latitudes and longitudes determined using differential Global Positioning System (GPS). Total sampling effort was 6 h (36 tows) in each season.

Fish caught in the trawls were identified to species. Forage species (*e.g.*, alewife [*Alosa pseudoharengus*], gizzard shad [*Dorosoma cepedianum*], emerald shiner [*Notropis atherinoides*], spottail shiner [*N. hudsonius*], trout-perch [*Percopsis omiscomaycus*], and rainbow smelt [*Osmerus mordax*]) were categorized as either age-0 (hereafter: YOY) or yearling-and-older (hereafter: YAO). Spiny-rayed fish (*e.g.*, yellow perch [*Perca flavescens*], white perch [*Morone americana*], white bass [*Morone chrysops*], walleye [*Sander vitreus*], and freshwater drum [*Aplodinotus grunniens*]) were categorized as YOY, yearling, or age-2 and older. All ages were combined for round goby (*Neogobius melanostomus*).

Young-of-year abundance and growth - For each species, we calculated an index of abundance for 2006 based on catches of YOY fish caught in the trawls during autumn. This index was calculated as the mean number of YOY fish caught per hectare swept by the bottom trawl. Percent relative standard error (RSE) of the index was calculated by dividing the standard error by the mean number caught per hectare and then multiplying this ratio by 100. For each species, potential recruitment was then evaluated by comparing the YOY abundance index for autumn 2006 with its respective long-term (11 years for round goby and 15 years for the remaining species) autumn mean. We used the 11-year mean for round goby because the species was first captured in this survey in 1996. Similarly, changes in growth rate were evaluated for each species by comparing mean total lengths of YOY individuals captured in autumn 2006 with its respective long-term (11 years for round goby and 20 years for the remaining species) autumn mean.

Yellow perch and white perch diets in 2006 - In both seasons, we removed stomachs and otoliths from a maximum of five yellow perch and five white perch, all age-2-and-older, at each of the three depths and for each of the three time periods. The specimens were selected randomly from the trawl catches. Stomachs were frozen in the field and transported to the laboratory. Ages of specimens were estimated by examining whole otoliths under a dissecting microscope in the laboratory. Prey items in stomachs were identified to the lowest possible taxonomic level, enumerated, and then measured (total length). Wet weights were calculated for individual invertebrates by use of appropriate length-weight regression equations (Dumont et al. 1975; Culver et al. 1985; G. Mittlebach, The Ohio State University, unpublished data). Whole fish were measured to the

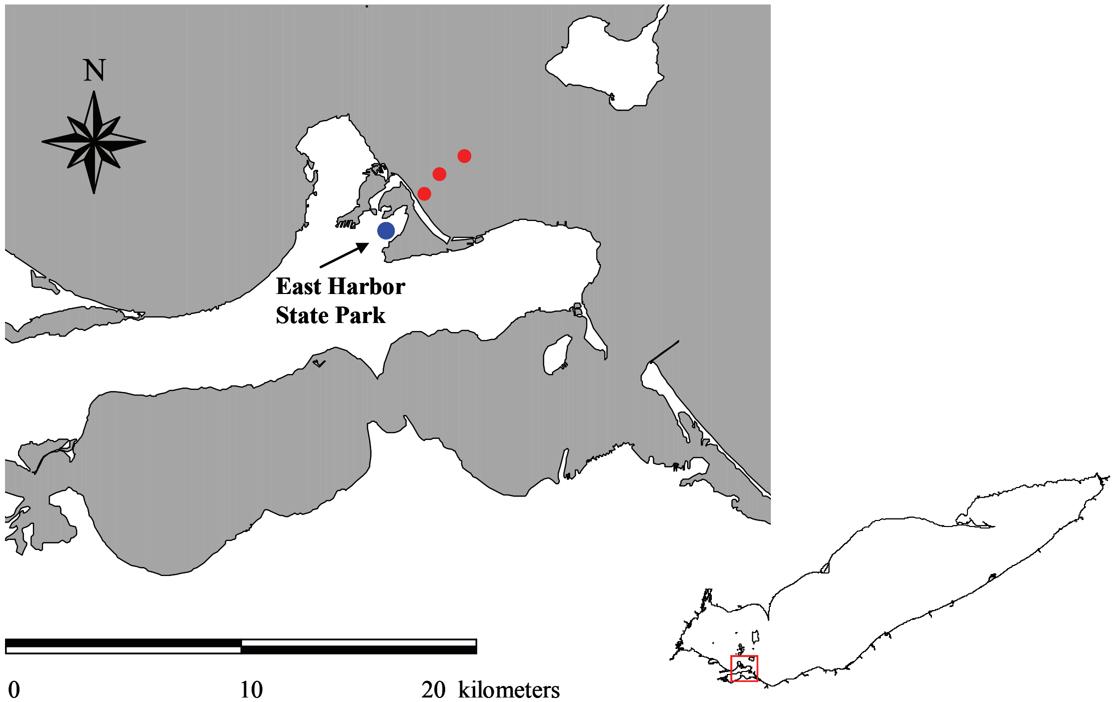

Figure 1. Location of sites sampled by the USGS Lake Erie Biological Station (red dots) offshore of East Harbor State Park (blue dot) in the western basin of Lake Erie.

nearest millimeter and weighed. When possible, standard and backbone lengths were measured from partially digested fish. Equations from Knight et al. (1984) and Knight and Kayle (Ohio Department of Natural Resources, Division of Wildlife [ODNR], unpublished data) were used to convert standard and backbone lengths of partially digested fish to total lengths. For partially digested fish, we estimated wet weight at the time of ingestion using total length-wet weight regressions (Hartman 1989 and ODNR, unpublished data). Results were reported as frequency of occurrence and mean percent weight (Wallace 1981) by taxon and by season. Only stomachs that contained food items were included in the analysis. When possible, we reported mean percent weight of zooplankton, benthic invertebrates, and fish in summer and autumn diets of yellow perch and white perch collected on this survey during 2002-2006 (Bur et al. 2005, 2006).

Benthic macroinvertebrates - Samples of benthic macroinvertebrates were collected in both seasons during daylight (morning or afternoon) trawling sessions, using a standard Ponar dredge. Three replicate samples were taken from the 6-meter station twice during each season (N = 12). Sediment and fine organic matter were removed and the remaining sample was preserved in 95% ethanol and Phloxin-B. Invertebrates collected were later sorted, identified to lowest possible taxonomic level, and enumerated in the laboratory. All twelve samples were combined to estimate relative density (mean number/m^2) and percent composition of benthic taxa.

Zooplankton - Zooplankton samples were collected by vertically towing a 0.5-m (153-µm mesh), conical plankton net from near bottom to the surface at the 6-m station in both seasons. Volume sampled (units: m^3) was estimated by multiplying distance traveled (measured by a flow meter attached to the opening of the net) by the area of the net opening. Three replicate samples were collected during morning, afternoon, and night trawling sessions. The three replicate samples from each time period were pooled into a single jar while on station and a 10% Lugol's preservative was added. This procedure yielded six composite summer samples and six composite autumn samples. Zooplankton taxa were then identified to lowest possible taxonomic level and enumerated in the laboratory to estimate relative density (mean number/m^3) and percent composition in each season.

Results and Discussion

Young-of-year abundance and growth - Autumn 2006 abundances for nearly all YOY target species were considerably lower than their respective 15-year averages (Table 1). Abundances of alewife and gizzard shad in 2006 were below their respective 15-year averages, a result that has occurred for alewife in five of the past six years, and since 1999 for gizzard shad (Figure 2). Prior to 2000, catches of both species were quite variable. In contrast, rainbow smelt abundance was 50% higher than the 15-year average (Table 1) and was the second highest recorded on this survey since 1992 (Figure 3).

Abundance of emerald shiner has remained lower than the 15-year average for the past five years, whereas abundance of trout-perch was lower than average for the past three years and that of spottail shiner was lower than average for four of the past five years (Table 1 and Figure 4). Relatively low RSEs for emerald shiner, spottail shiner, and trout-perch from 2004 through 2006 suggested that their respective spatial and temporal distributions in those years were more homogeneous than the previous couple of years (Figure 4).

Autumn abundances for YOY spiny-rayed species in 2006 were much lower than their respective 15-year averages (Table 1), also indicating low recruitment. For freshwater drum, the mean catch/ha in 2006 was one of the lowest recorded since data collection began in 1961 and was less than 3% of the long-term mean (Table 1 and Figure 5). Although abundance of white bass was higher in 2006 than in 2004 and 2005, it was 40% lower than the 15-year mean. The RSEs of the abundance indices for freshwater drum and

Table 1. Autumn catch rates of age-0 fish from bottom trawling an area near East Harbor State Park, Ohio in western Lake Erie for 2006 and the mean autumn catch rates for 1992-2006 (15-year mean). Catch rates are expressed as the mean number per hectare swept by the trawl. Relative standard error (expressed as a percent) is calculated as standard error of the mean number per hectare for a species divided by mean number per hectare and multiplied by 100.

	Number/hectare		Relative standard error (%)	
Species	**2006**	**15-year mean**	**2006**	**15-year mean**
alewife *Alosa pseudoharengus*	1	66	63	46
gizzard shad *Dorosoma cepedianum*	25	148	21	31
rainbow smelt *Osmerus mordax*	15	10	36	49
emerald shiner *Notropis atherinoides*	172	1025	44	39
spottail shiner *N. hudsonius*	5	59	34	39
trout-perch *Percopsis omiscomaycus*	7	72	39	30
yellow perch *Perca flavescens*	1	106	37	27
walleye *Sander vitreus*	0	12	-	35
white bass *Morone chrysops*	1	5	28	48
white perch *M. Americana*	209	818	28	22
freshwater drum *Aplodinotus grunniens*	1	39	37	46

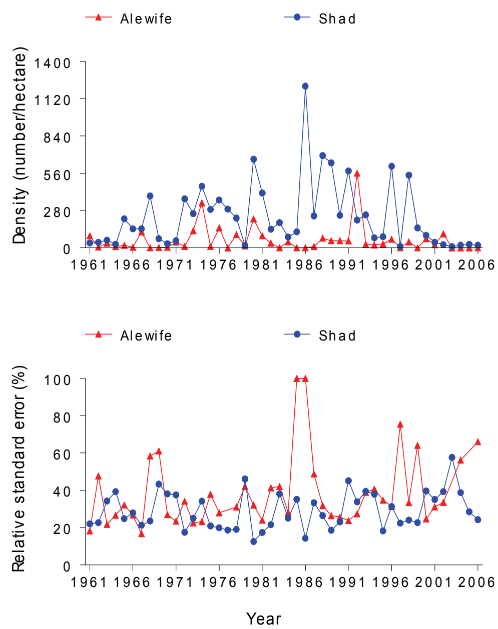

Figure 2. Density (top) and relative standard error (bottom) for age-0 alewife and gizzard shad as number of individuals per hectare in western Lake Erie near East Harbor State Park, Ohio, during autumn 1961-2006.

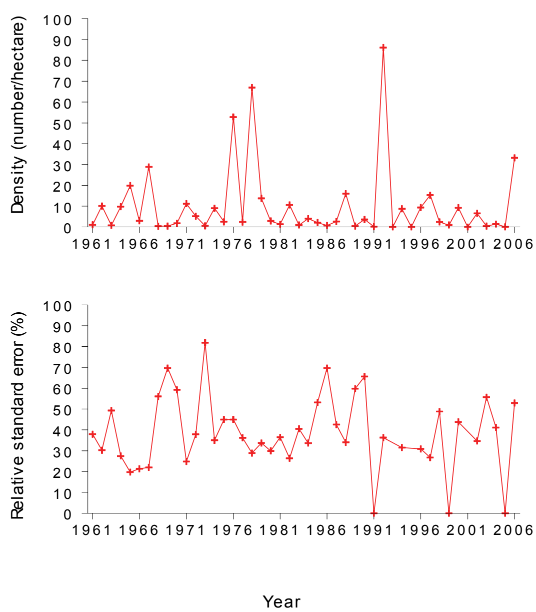

Figure 3. Density (top) and relative standard error (bottom) for age-0 rainbow smelt as number of individuals per hectare in western Lake Erie near East Harbor State Park, Ohio, during autumn 1961-2006.

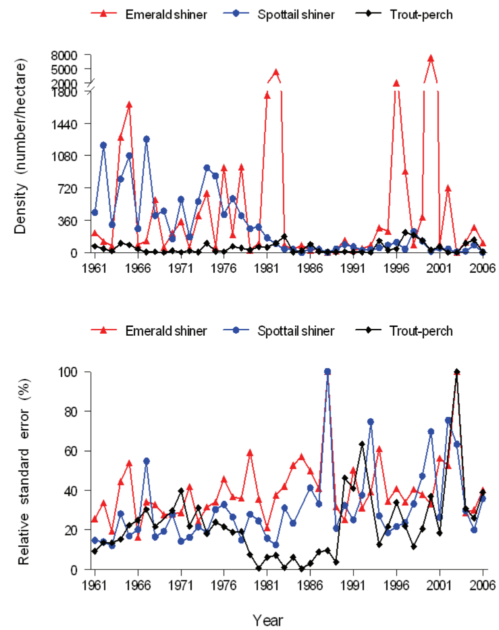

Figure 4. Density (top) and relative standard error (bottom) for age-0 emerald shiner, spottail shiner, and trout-perch as number of individuals per hectare in western Lake Erie near East Harbor State Park, Ohio, during autumn 1961-2006.

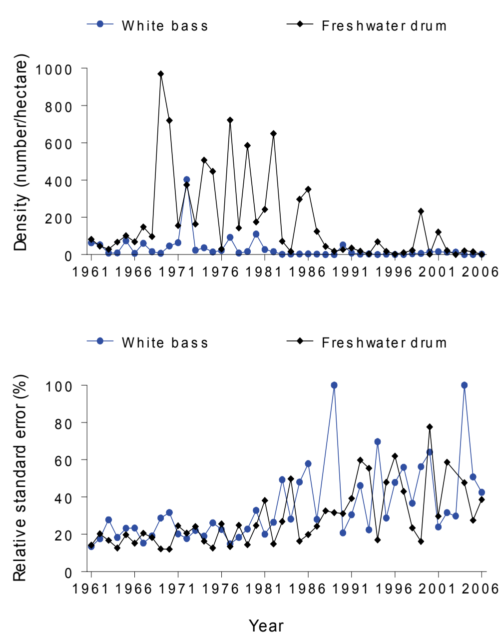

Figure 5. Density (top) and relative standard error (bottom) for age-0 white bass and freshwater drum as number of individuals per hectare in western Lake Erie near East Harbor State Park, Ohio, during autumn 1961-2006.

white bass were relatively high in recent years (Figure 5). In 2006, the abundance of white perch was only 25% of the long-term average. Mean catch/ha of white perch was less than the long-term average (818/ha) for three of the last four years (Figure 6). The abundance of YOY yellow perch was the lowest in the last 15 years and was only 1% of the long-term average (Figure 7). Walleye YOY were not caught in the autumn trawl catches, continuing a trend of low recruitment since 2004.

Freshwater drum was one of the species affected by viral hemorrhagic septicemia (VHS), which contributed to mass mortality of adult drum in spring 2006. It is possible that the spring mortalities affected recruitment of freshwater drum and may have affected recruitment of other species as well. Yellow perch suffered mass mortalities, although the mortalities were not as severe as those of freshwater drum.

In 2006, mean abundance for round goby (3/ha for all ages combined) was slightly higher than for the previous two years, but much lower than the 11-year mean (35/ha) (Figure 8). Until recently, round goby had been the most abundant species in trawl samples, but catches have been steadily declining since 2000.

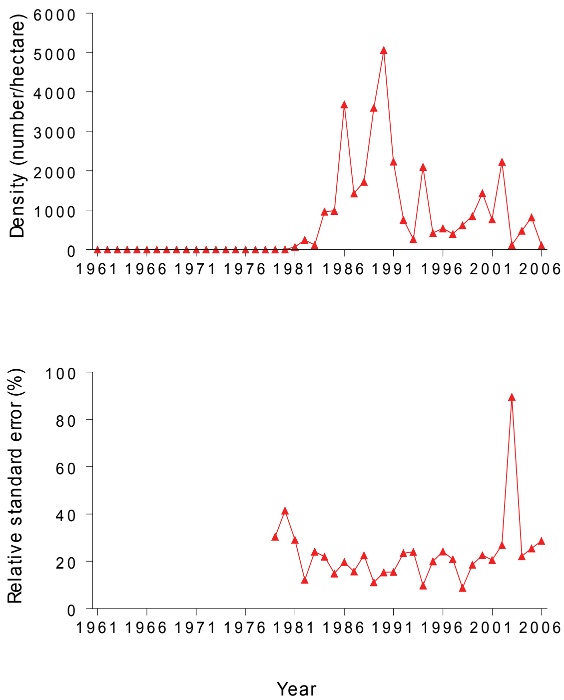

Figure 6. Density (top) and relative standard error (bottom) for age-0 white perch as number of individuals per hectare in western Lake Erie near East Harbor State Park, Ohio, during autumn 1961-2006.

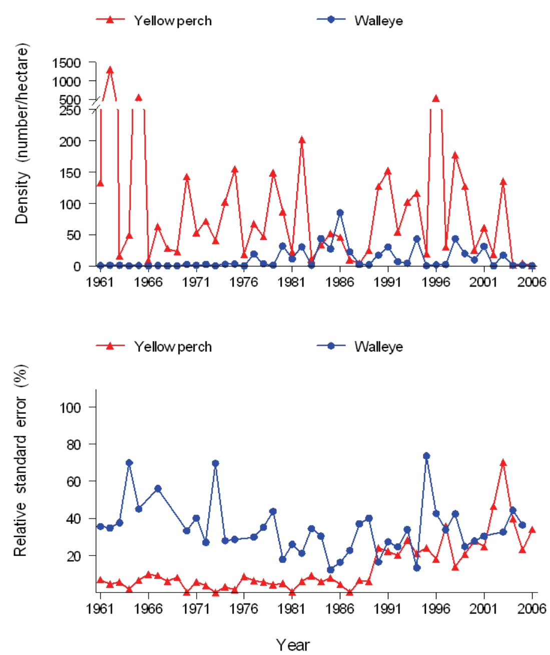

Figure 7. Density (top) and relative standard error (bottom) for age-0 yellow perch and walleye as number of individuals per hectare in western Lake Erie near East Harbor State Park, Ohio, during autumn 1961-2006.

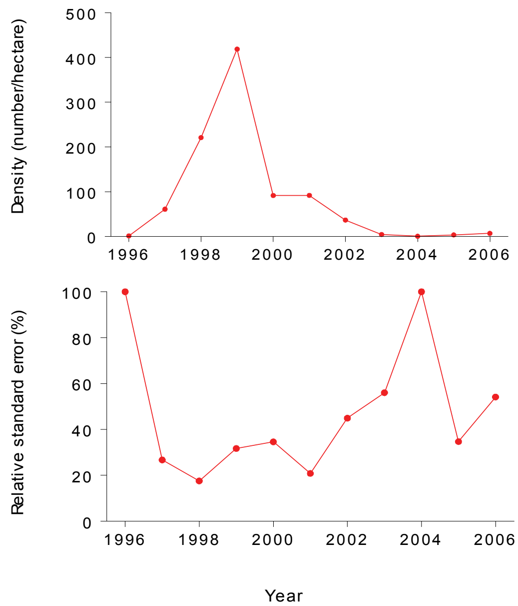

Figure 8. Density (top) and relative standard error (bottom) for age-0 and older round goby as number of individuals per hectare in western Lake Erie near East Harbor State Park, Ohio, in autumn 1996-2006.

For most species examined, mean total lengths of YOY in 2006 were similar to their respective 20-year means (Table 2). The mean total length for gizzard shad in 2006 (116 mm) was, however, somewhat greater (16%) than the long-term mean. Although the mean total length of yellow perch was slightly greater than the long term mean, the sample size was quite small (N = 10), suggesting that this result be interpreted with caution. Although sample sizes for white bass (N = 12) and freshwater drum (N= 11) were small, mean total lengths of both species were well below their respective 20-year means.

Yellow perch and white perch diets in 2006 - We collected 41 yellow perch stomachs, all of which contained food, during the summer trawling session (Table 3). During summer, yellow perch consumed primarily zooplankton and benthic macro-invertebrates (67% and 31% respectively, by weight), followed by fish (2%). *Bythotrephes longimanus* dominated the zooplankton component of the summer diets (41% of total diet by weight). *B. longimanus* (73%) and *Daphnia galeata* (68%) were the most frequently occurring food items in yellow perch stomachs examined. *Hexagenia spp.* dominated the benthic component of the summer diets in both percent weight (26% of the total diet) and frequency (46%). Fish were found in 24% of yellow perch stomachs, but contributed only 2% of the total diet by weight. Round goby and rainbow smelt were the only identifiable fish consumed. We collected only two yellow perch stomachs, both of which contained food, during autumn 2006. We determined that sample size was insufficient to characterize diet.

During summer, we collected 34 white perch stomachs, all of which contained food (Table 4). Zooplankton and benthic invertebrates collectively accounted for more than 99% of the mean prey weight. *Daphnia spp.* and *B. longimanus* were the dominant zooplankton taxa by percent weight and were among the most frequently consumed prey of white perch during summer. *Hexagenia spp.* dominated the benthic macroinvertebrate component of the diet by percent weight and was the most

Table 2. Mean total lengths (mm) of age-0 fishes from bottom trawl catches near East Harbor State Park, Ohio in western Lake Erie during autumn, 1987-2006. Sample sizes are in parentheses and SE=standard error. Scientific names of species are listed in Table 1.

	2006		**20-year mean**	
Species	**Mean total length (N)**	**SE**	**Mean total length**	**SE**
alewife	- (0)	-	106	4.2
gizzard shad	116 (101)	3.1	100	3.1
rainbow smelt	58 (101)	0.9	57	2.0
emerald shiner	60 (111)	1.1	59	1.6
spottail shiner	82 (80)	0.6	77	2.0
trout-perch	80 (68)	1.5	76	1.0
yellow perch	91 (10)	1.4	84	1.6
walleye	- (0)	-	186	3.7
white perch	74 (100)	0.9	75	1.6
white bass	86 (12)	4.4	123	6.1
freshwater drum	62 (11)	7.5	104	3.7

Table 3. Diet of age-2 and older yellow perch collected during summer 2006 near East Harbor State Park, expressed as mean percent (%) weight of all prey items and percent frequency of occurrence (% Frequency).

	Summer (n=41)	
Prey Item	**Mean % Weight**	**% Frequency**
Bythotrephes longimanus	41.3	73.2
Daphnia spp.	1.1	4.9
Daphnia galeata	24.3	68.3
Copepoda	< 0.1	7.3
Total Zooplankton	**66.7**	
Chironomidae	1.0	9.8
Nematoda	0.0	0.0
Rotifera	0.3	4.9
Hydracarina	1.8	2.4
Dreissena spp.	1.7	19.5
Hexagenia sp.	26.1	46.3
Total Benthos	**30.9**	
Rainbow smelt *Osmerus mordax*	< 0.1	2.4
Round goby *Neogobius melanostomus*	2.4	2.4
Unidentified fish	< 0.1	17.1
Total fish	**2.4**	

frequently consumed prey by white perch during summer. Chironomidae and Amphipoda were also consumed relatively frequently during summer. Although *Dreissena sp.* and *Trichoptera sp.* were also recorded fairly frequently, they collectively accounted for less than 1% of the weight of prey. Fish accounted for less than 1% by weight of the prey consumed by white perch in summer.

We collected 41 white perch stomachs during the autumn trawling session (Table 4). Benthic macroinvertebrates contributed more than half of the mean percent weight of white perch diets, followed by fish (25%), and zooplankton (19%). *Hexagenia spp.* and Chironomidae dominated the prey recorded, both by percent weight and frequency. The zooplankton portion of the diet was dominated by weight and the frequency portion by Copepoda. Unidentified fish accounted for the major portion of the fish component of the autumn diets. Emerald shiners, gizzard shad, and round goby were also consumed.

Yellow perch and white perch diet trends - Consumption of zooplankton by yellow perch during summer increased from 6% by weight in 2004 to 67% in 2006 (Figure 9). In contrast, benthic macroinvertebrates declined in yellow perch summer diets from 71% by weight in 2004 to 31% in 2006. The proportion of fish in the summer diet exhibited no trend during 2002-2006 and was less than 5% in all years except 2004. Sample size (N = 2) was insufficient in 2006 to characterize autumn diets and compare with previous years.

The proportion of benthic macroinvertebrates in summer diets of white perch increased from 14% (by weight) in 2004 to 50% in 2006 (Figure 10). The proportions of zooplankton and fish in the summer diets of white perch during 2002-2006 exhibited no trend during those years. However, the percent composition of zooplankton in white perch autumn diets decreased from 40% by weight in 2004 to 19% in 2006. The mean annual proportions of benthic macroinvertebrates in the autumn diets of white perch during 2002-2006 ranged from approximately 20% to 60%. The proportion of fish in the autumn diet of white perch increased from 17% in 2003 to 43% in 2005 but decreased in 2006 to 25%.

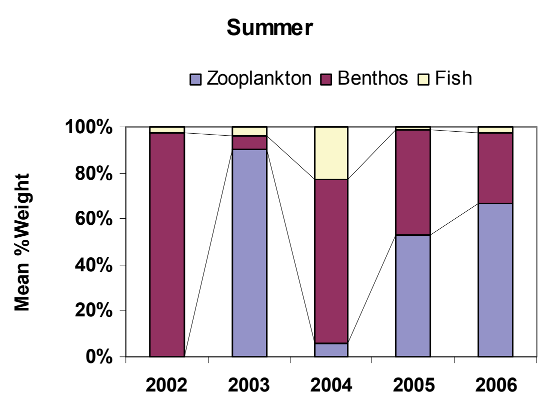

Figure 9. Mean percent weight of zooplankton, benthos, and fish in stomachs of yellow perch collected in Lake Erie near East Harbor State Park, Ohio. Stomachs were collected in summer during 2002-2006.

Table 4. Diet of age-2 and older white perch collected during summer and autumn 2006 near East Harbor State Park, expressed as mean percent (%) weight of all prey items and percent frequency of occurrence (% Frequency).

	Summer (n=34)		**Autumn (n=41)**	
Prey Item	**Mean % Weight**	**% Frequency**	**Mean % Weight**	**% Frequency**
Bythotrephes longimanus	24.4	50.0	2.4	4.9
Bosmina sp.	0.0	0.0	0.6	14.6
Daphnia sp.	0.0	0.0	< 0.1	2.4
Daphnia galeata	25.8	41.2	1.9	7.3
Copepoda	< 0.1	14.2	14.2	39.0
Chydoridae	0.0	0.0	0.1	4.9
Sididae	0.0	0.0	< 0.1	2.4
Total Zooplankton	**50.2**		**19.2**	
Amphipoda	8.4	29.4	4.1	9.8
Ostracoda	0.0	0.0	5.5	2.4
Chironomidae	8.9	35.3	20.8	61.0
Nematoda	0.0	0.0	1.7	4.9
Rotifera	0.0	0.0	2.0	2.4
Trichoptera sp.	< 0.1	5.9	< 0.1	2.4
Dreissena sp.	< 0.1	8.8	< 0.1	17.1
Hexagenia spp.	32.2	58.8	21.4	61.0
Total benthos	**49.5**		**55.5**	
Rainbow smelt *Osmerus mordax*	0.1	5.9	0.0	0.0
Emerald shiner *Notropis atherinoides*	0.0	0.0	7.3	7.3
Gizzard shad *Dorosoma cepedianum*	0.0	0.0	4.7	9.8
White bass *Morone chrysops*	0.1	2.9	0.0	0.0
Round goby *Neogobius melanostomus*	0.0	0.0	0.3	2.4
Unidentified fish	0.1	26.5	13.0	51.2
Total fish	**0.3**		**25.3**	

Benthic Macroinvertebrates - We identified 11 taxa in the benthic samples (Table 5). *Dreissena sp.* composed the largest proportion of the individuals recorded, followed by Chironomidae. Oligochaeta, Gastropoda, Nematoda, and Ephemeroptera collectively accounted for 17% of the benthic macroinvertebrates in the samples. *Dreissena sp*. density in 2006 decreased by 36% and the proportion decreased by 7% from levels recorded in 2005 (2,363/m^2 and 62%, respectively) (Bur et al. 2006). This continued a decreasing trend in dreissenid abundance since 2004, whereas abundance increased during 2001-2004. Densities of Chironomidae, Trichoptera, and Hirudinea in 2006 were the highest recorded since benthic samples were first taken in 1997. In contrast, the density of Ephemeroptera in 2006 was the lowest since 1997.

Table 5. Composition of benthic macroinvertebrates offshore of East Harbor State Park, Ohio in 2006 (n = 12 samples), shown as number per square meter and percent (%) composition.

Taxon	**Mean number/m2**	**Percent composition**
Dreissena sp.	1,515	55%
Chironomidae	690	25%
Oligochaeta	183	7%
Gastropoda	107	4%
Nematoda	91	3%
Ephemeroptera	86	3%
Trichoptera	35	1%
Hirudinea	29	`1%
Sphaeriidae	11	<1%
Amphipoda	6	<1%
Hydracarina	2	<1%
Total	2,755	100%

Zooplankton - We identified 11 zooplankton taxa in 2006, including nine in the summer sample and nine in the autumn sample (Table 6). Cyclopoid copepods accounted for the largest proportion of zooplankton collected in the summer sample, followed by calanoid copepods. Bosminidae composed the largest proportion of zooplankton collected in the autumn sample, followed by cyclopoid copepods.

The densities of cyclopoid and calanoid copepods, and *D. galeata* were much greater in summer than in autumn samples in 2006 (Table 6). For cyclopoid copepods, this seasonal difference has been observed since 2002. Similarly, *B. longimanus* was detected at relatively low density (190/m^3) in the summer, but was not recorded in the autumn sample. *B. longimanus* was not detected in fall 2005 (Bur et al. 2006) and was not detected in either summer or autumn 2004 (Bur et al. 2005). In contrast, Bosminidae was much more abundant in autumn than in summer 2006, a seasonal difference that has occurred in each year since 2001 except for 2004. *Dreissenid sp*. veligers increased from summer to autumn 2006, continuing a seasonal difference that has occurred since 2004. Chydoridae was absent from the summer sample, but was present in the autumn. Chydoridae has been present only in autumn samples since 2004. *D. retrocurva*, Sididae, and *Leptodora sp*. had relatively consistent seasonal proportions in both the summer and autumn. However, copepod nauplii, which had a relatively high density (1,116/m^3) in the summer sample, were absent from the autumn sample.

Calanoid copepods, the most abundant zooplankton taxon recorded in 2005 (Bur *et al.* 2006), were 25% less abundant in summer 2006 than in summer 2005, and 78% less abundant in autumn 2006 than in autumn 2005 (Table 6). Density of *D. galeata* was 32 times greater in summer 2006 than in summer 2005 (79/m^3, Bur et al. 2006). This species was not detected in autumn 2005 samples but was recorded at a relatively high density (757/m^3) in autumn 2006.

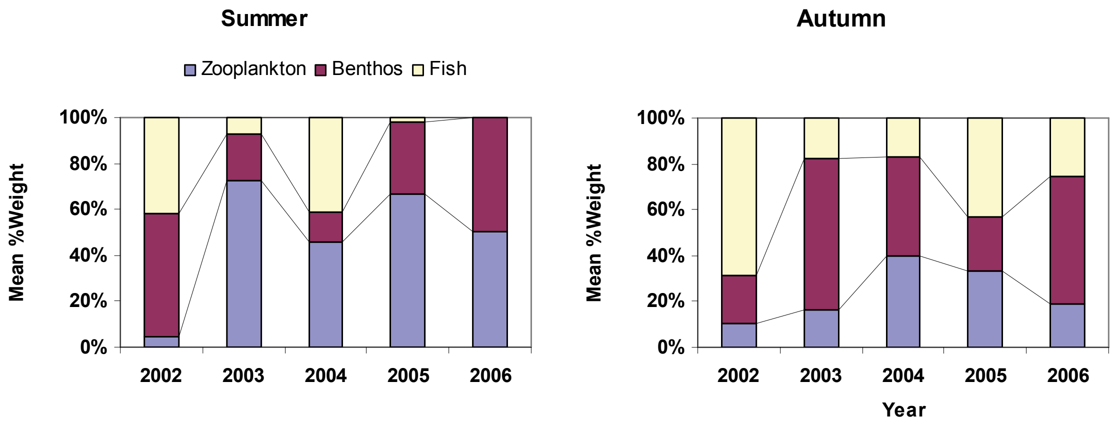

Figure 10. Contributions of zooplankton, benthos, and fish to the diet of white perch collected in Lake Erie near East Harbor State Park, Ohio. Stomachs were collected in summer and autumn during 2002-2006.

Table 6. Mean individuals/m^3 and percent (%) composition of crustacean zooplankton taxa in western Lake Erie near East Harbor State Park, Ohio in 2006. Abbreviation: ND = taxon not detected in sample.

	Summer (n = 6)		Autumn (n = 6)	
Taxon	**Mean number/m^3**	**Mean % composition**	**Mean number/m^3**	**Mean % composition**
Cyclopoid copepods	6496	31%	3293	22%
Calanoid copepods	4212	20%	1615	11%
Daphnia retrocurva	3587	17%	1930	13%
Daphnia galeata	2590	12%	757	5%
Bosminidae	1783	9%	6817	45%
Copepod nauplii	1116	5%	ND	ND
Sididae	920	4%	172	1%
Bythotrephes longimanus	190	1%	ND	ND
Leptodora sp.	66	<1%	50	<1%
Chydoridae	ND	ND	22	<1%
Dreissenid sp. veligers	ND	ND	552	4%

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