Report of the

FORAGE TASK GROUP

March 1992

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Presented to: Standing Technical Committee
Lake Erie Committee
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I. INTRODUCTION

This report briefly describes 1991 forage status for each basin of Lake Erie as viewed by the Forage Task Group (FTG). The FTG's annual synopsis of forage status collates some results of independent assessment activities conducted by members of the group. A separate endeavor by the FTG to estimate rainbow smelt consumption by lake trout is presented under a separate cover. Recommendations for future activities of the FTG are outlined in the last section of this report (Section III).

II. FORAGE STATUS

A) Eastern Basin (Summarized by L. Witzel)

Forage fishes known to comprise important components of piscivore diets in eastern Lake Erie include rainbow smelt, alewife, gizzard shad, white perch, and spottail and emerald shiners. Relative contributions of these species to the diets of fish predators varies with annual fluctuations in abundance.

The status of forage fish in the eastern basin of Lake Erie has been determined annually by independent bottom trawl assessments conducted in the fall by OMNR, NYDEC, and PFC. Indices of relative abundance of forage fish are summarized in annual agency reports to the Lake Erie Committee. Other forage indicators monitored annually in eastern Lake Erie include predator growth rates, piscivore diet composition and zooplankton size structure.

The summary of forage status reported below is based largely on annual trawl assessments conducted by OMNR in offshore (using a 10-m trawl) and nearshore (using a 6.1-m trawl) waters of Long Point Bay, Lake Erie. All indices of abundance from OMNR trawl surveys are reported as geometric mean catch per trawl hour (GMCPTH).

Smelt are the most abundant forage species available to predators in the offshore waters of eastern Lake Erie. Smelt typically comprise 90 percent or more of index trawl catches (by number) in Long Point Bay and are generally the dominant food item found in the diets of salmonids and walleye.

Recruitment of YOY smelt in 1991 (GMCPTH=37.5) was poor, much less than in 1990 (GMCPTH=585). The 1991 year class of smelt was the weakest observed by OMNR since trawl assessment began in 1984. This observation is supported by PFC trawl surveys in which a 10 times reduction in relative abundance of YOY smelt was observed from 1990 to 1991.

Relative abundance of yearling and older (YAO) smelt in 1991 (GMCPTH=48.0) was marginally less than in 1990 (GMCPTH=54.9), making this the second consecutive year a decline was observed in Long Point Bay. This recent, downward trend (1989-1991) was also observed in NYDEC trawl assessment. In contrast, PFC trawl indices showed an increase in abundance of YAO smelt from 1990 to 1991. Yearlings were the dominant age group in OMNR and PFC index trawl catches.

OMNR trawl surveys have characterized the 1991 year class of emerald shiners as being moderate to strong. The offshore survey showed a slight decrease in YOY recruitment from 1990 (GMCPTH=1.5) to 1991 (GMCPTH=1.4). This contrasts sharply to the nearshore survey, which showed an increase in YOY

abundance (GMCPTH=1.0 vs 2.9). Similar conflicting results were observed between OMNR surveys for adult (YAO) emerald shiners. The offshore survey indicated a decrease in relative abundance of adult shiners from 1990 to 1991 compared to an increase in abundance in the nearshore survey for the same period.

Trawl surveys in Inner Bay and Outer Long Point Bay have shown similar annual variations in relative abundance of spottail shiners since 1980. Recruitment of YOY shiners in 1991 was relatively poor (GMCPTH Inner Bay=6.6; Outer Bay=32.0), down considerably from 1990 indices (GMCPTH Inner Bay=17.7; Outer Bay=233). Adult (YAO) spottail shiner abundance also decreased from 1990 to 1991. Decreased availability of YOY and adult spottail shiner in 1991 was evident in New York waters. OMNR and NYDEC trawl surveys show an AYD recruitment pattern for YOY spottail shiner during the last six years, with strong year classes being produced on even years.

Widely conflicting trends in abundance indices of clupeids and shiners between surveys (nearshore vs offshore) and among areas (agencies) may be attributable to large variations in catches associated with widely clumped distributions of these species.

Trawl catches of YOY white perch were higher nearshore than offshore in Long Point Bay, except in 1985 and 1991. Patterns of YOY white perch recruitment have not been consistent between nearshore versus offshore surveys. Nearshore recruitment of YOY white perch has alternated between strong (or moderate) and poor year classes since 1984. Consistent with this pattern, the 1991 year class was poor. In contrast, the offshore trawl indices indicate a progressive increase in YOY white perch recruitment since 1986. NYDEC surveys also indicate that recruitment of YOY white perch increased from 1986 to 1990 and declined sharply in 1991.

In summary, the availability of forage fish in eastern Lake Erie appeared to be low to moderate in 1991 compared to recent years, primarily due to poor recruitment of YOY smelt and a decrease in abundance of adult smelt. Increased abundance of emerald shiner and YOY alewife in 1991 were offset by reduced smelt abundance.

B) Central Basin (Summarized by R. Knight)

Assessment of central basin forage was made from ODNR and PFC bottom trawl catch data, ODNR growth trends for walleye and yellow perch, and walleye prey-size selectivity and diet composition (ODNR data). Following is a general summary of these data through 1991:

Relative abundance estimates for the six targeted forage species were generally low to moderate compared to historical data series. Gizzard shad, spottail shiners, and rainbow smelt of all ages were of low abundance in both Ohio and Pennsylvania waters. However, Ontario commercial fishermen apparently encountered large numbers of smelt (mostly age-1 fish) in the central basin during 1991; thus, fish distribution may have accounted for the poor smelt catches in southern areas. Alewife were below average abundance in ODNR date, but of moderate abundance in PFC surveys. Large numbers of age-0 alewife were captured in gill nets near Fairport Harbor, Ohio (M. Rawson, personal communication), but did not appear in trawl catches in this area. Trout-perch were caught in moderate abundance in ODNR trawls (data were not available from other waters). Emerald shiners were the only species to produce a substantial

year class as evidenced in ODNR trawl data. High numbers of age-1 and older emerald shiners also were observed, supporting high index values for age-0 shiners in 1990. However, emerald shiners of all ages were of low abundance in PFC catches.

Walleye size-at-age and feeding characteristics reflect forage fish availability. In 1991, age-1 walleyes in the central basin were the smallest since 1988, but were near the long-term average. In contrast, age-2 walleyes experienced fast growth in 1991, attaining sizes well above any recorded during the 1980's. The fall diet of age-1 and older walleye comprised 45 percent clupeids, 29 percent shiners, 23 percent smelt, and 3 percent Morone spp. (data courtesy of Jim Francis, The Ohio State University). Sizes of clupeids from walleye stomachs indicated differences among walleye age groups. Age-1 walleye ate clupeids averaging 101 mm, age-2 walleye ate 112-mm clupeids on average, and age-3 fish ate 125-mm prey. Compared to historical data, these values were higher than normal for age-1 fish, but near normal for older walleye. This further suggests that forage fish availability was relatively low for small walleye, but higher for large walleye, as reflected in the growth data. Relatively high abundance of age-1 walleye may be a contributing factor as well.

Yellow perch size-at-age may reflect annual changes in invertebrate forage. ODNR trawl data show that age-0 yellow perch were significantly larger in 1991 than in 1990, possibly indicating high availability of zooplankton, their primary prey. This trend reversed with older fish; age-1 perch were of similar size between years, while older perch were smaller in 1991 than in 1990. Although diet data are unavailable from 1991, yellow perch generally switch from plankton to benthos/plankton to benthos/fish in successive years of life. Thus, observed growth trends suggest relatively low availability of benthos in 1991.

C) Western Basin (Summarized by K. Muth)

Summer and fall stock assessment data for young-of-year (YOY) and forage fishes in western Lake Erie, provided by the Ohio Department of Natural Resources (ODNR) and the U.S. Fish and Wildlife Service (FWS), were evaluated and compared to historic data to determine potential food availability for piscivorous fish. In general, abundance of most forage species in 1991 appears to be lower than it was in 1990. However, some differences in YOY abundance indexes recorded by the two agencies are evident and causes for these differences are unknown. Differences in sampling techniques may be a contributing factor.

Fall abundance indexes for both YOY and older spottail shiners, emerald shiners, and trout-perch were much lower in 1991 than last year, and all indexes were below the 10-year averages for these species. These trends were confirmed by data from both agencies and differences between data sets were minor. In contrast, YOY abundance indices for clupeids provided by ODNR indicated lower abundance levels in 1991 than in 1990, while 1991 FWS index values for these species were not only more than double the indexes reported in 1990, but were also substantially higher than the 10-year averages. Examination of the FWS trawl data indicates larger numbers of clupeids are collected during the night tows and this may contribute to higher index values. Whatever the clupeid abundance is this year, the importance of these species as a food resource for walleyes may be reduced because the bulk of the walleye population consists of younger age groups less than 399 mm in length, and these smaller predators tend to feed on smaller prey. Large clupeids in the fall may not be suitable food for the smaller walleye.

Growth of YOY fish, as determined by fall length measurements, was better in 1991 when compared to 1990 data, and average lengths this year for most species exceeded the 10-year averages. Length values (mm) for key species (sample size in parentheses) are as follows:

Walleye	Y. Perch	Drum	Alewife	G. Shad	E. Shiner	S. Shiner	T-Perch
181.6	89.9	118.7	130.2	110.9	69.6	85.0	78.9
(136)	(133)	(32)	(87)	(87)	(40)	(45)	(12)

Data on invertebrate forage availability, as determined from yellow perch and white perch stomach contents, is not yet available. However, circumstantial evidence suggests plankton and benthos availability was high. Planktivorous forage fish growth was high, indicating high food availability. Likewise, growth of older yellow perch in 1991 was apparently high, and perch growth is usually linked to benthos availability.

III. FUTURE PLANS

The 1991 charge to the Forage Task Group represented a significant departure from the types of assignments that the group had previously received. Presently, addressing very specific resource questions appears to be more effectively accomplished by the FTG than direct pursuit of the broader, long-term objective to "develop a model to describe forage abundance, diversity and production across a wide range of predator densities". The FTG remains supportive of the long-term objective, but has found that very specific, identifiable tasks are more readily accomplished and will likely expedite progress toward the long-term objective.

During 1992, the FTG expects to complete a bioenergetics evaluation of walleye predation upon rainbow smelt. Other rainbow smelt predators will also be examined using the bioenergetics approach, to the extent that data are available. In addition, the FTG could participate in an eastern basin fisheries acoustic demonstration project to examine rainbow smelt distribution and abundance.