Report of the

FORAGE TASK GROUP

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I. INTRODUCTION

This report addresses progress made by the Forage Task Group (FTG) in addressing three charges, or short-term objectives, assigned by the Standing Technical Committee (STC). These charges are: (1) assemble and integrate indicators of forage status, (2) identify newly emerging sources of forage data, and (3) standardize sampling procedures. In addition, future plans of the FTG are discussed and brief descriptions of forage status are provided for each basin of Lake Erie.

II. PROGRESS IN ADDRESSING CHARGES

A) Analyze Indicator Variables

Annually monitored indicators that appear to have utility in assessment of the Lake Erie forage base include: (1) forage fish relative abundance and age composition, (2) forage fish growth rates, (3) predator growth and maturity rates, (4) piscivore diet composition, (5) yellow perch food consumption rates, (6) walleye prey-size selectivity, and (7) zooplankton size structure. Monitoring of these indicators by participating agencies has thus far been on a unilateral basis. The following describes some of the progress made on the long-term analysis of these indicators:

(1) **Relative Abundance.** Each agency represented on the Forage Task Group conducts its own annual trawl assessment to produce relative abundance indicators for forage fishes. Over much of Lake Erie, these ongoing trawling programs continue to represent a primary source of information for insights concerning forage status. Although these data are characteristically accompanied by large variances, they often represent the most readily available information shared among agencies.

(2) **Forage Fish Growth Data.** Forage fish growth data are available from ODNR since 1969 from both summer and fall surveys. Changes in forage fish size at age might be used to detect effects of species interactions (predation, competition) and changes in the food chain. ODNR has analyzed size and relative abundance data to search for effects of walleye predation and have a manuscript currently in review. This study concludes that walleye predation offers a plausible explanation of changes observed in forage fish size-structure in western Lake Erie over the past 20 years. However, effects of competition with age-0 white perch also may be evident as well.

Long-term data series are also available from USFWS, OMNR, PFC and NYSDEC. However, similar analyses that link prey size and walleye predation have not yet been conducted with these other data sets.

(3) **Predator Growth.** As with forage fish growth data and relative abundance indices, predator growth rates represent a widely available indicator of forage status collected by all participating agencies. The utility of this indicator is described in the brief descriptions of forage status provided later in this report.

(4) **Piscivore Diet Composition.** Predator food habits represent an indicator of forage status where standard procedures are available (Appendix A). All participating agencies collect these data and a framework has been established for a collaborative study. Standard collection procedures, a coding

format and computer programs for analysis have been developed as FTG endeavors. However, pooling food habits data remains constrained by a significant backlog in processing this information and lack of specific study objective for a joint food habits investigation.

(5) **Yellow Perch Food Consumption Rates.** Consumption models were developed at the Ohio Cooperative Fish and Wildlife Research Unit by Rob Hayward (yellow perch) and Donna Parrish (white perch) in conjunction with ODNR. Field data extend back to 1983 for yellow perch and to 1988 for white perch. These models need refinement (specifically, validation of the temperature/evacuation rate algorhythm), but should be available within the year. Stomach samples from 1988-89 require processing, but 1990 and other years are completed. Daily ration estimates can be used to monitor changes in feeding behavior, to verify growth data, and to provide an indirect assessment of the availability of invertebrate forage (benthos for yellow perch, plankton for white perch), which is otherwise difficult to quantify.

No other agency represented by the Forage Task Group has pursued yellow perch food consumption rates as an indicator of forage status.

(6) **Walleye Prey-Size Selectivity.** Data are available from ODNR since 1979 in western Lake Erie and since 1983 in the central basin. Because walleyes are size-selective feeders, changes in prey size should reflect changes in availability. ODNR has correlated mean prey (clupeid) size with walleye instantaneous growth rates and found a significant inverse relationship exists for small (500 mm) walleyes. That is, growth decreases as walleyes become less selective for size (e.g. mean prey size increases). This relationship does not seem to hold true for larger walleyes. Additional analysis is necessary to verify these results and to examine some potential confounding variables. Hopefully, clupeid availability to walleyes will be measured more accurately with this indicator than from bottom trawl index values, which are extremely variable and probably underestimated for pelagic forage fishes.

No other agency represented by the Forage Task Group has pursued walleye prey-size selectivity as an indicator of forage status.

(7) **Zooplankton Size Structure.** Zooplankton samples have been collected by ODNR in the western basin since 1988 following the guidelines set forth by FTG. All samples (1988-90) have been processed and analysis is underway. Size structure of plankton will be used to ascertain the predator-prey balance within the fish community following the work of Ed Mills, Cornell University. Changes in plankton size/species composition also may reflect effects of zebra mussels on the plankton community. Additionally, plankton were measured from white and yellow perch stomachs to determine if plankton nets were sampling all available organisms (which they apparently do not). Further results will be available by summer, 1991.

New York has been collecting zooplankton samples using FTG guidelines since 1984. Some results from this annual assessment are presented in the eastern basin forage status summary.

B) Identify Emerging Sources of Forage Data

No new promising sources of data were added to the seven previously identified forage indicators during 1990. However, the FTG will remain watchful for any additional sources of information that become apparent during 1991.

C) Standardize Sampling Procedures

Progress in standardization occurred with the completion of a food habits sampling protocol (Appendix A). This document provides quantifiable recommendations for gear, minimum sample requirements, standard temporal stratification and precision for measurements. This represents a companion document to the previously developed food habits coding format and SAS programs for data analysis. With these standard procedures, a framework now exists for pooling food habits data among agencies.

III. FUTURE PLANS

Efforts in 1991 will shift emphasis to addressing the "analysis and integration of indicator variables" as our principle assignment. Further progress in other areas, such as standardization, must logically await a specific objective for an interagency study. Such an objective will likely be the outcome of additional analysis of the forage indicators. In addition, the FTG may be assigned the analysis of a species-specific forage issue during 1991-92.

IV. FORAGE STATUS

A) Eastern Basin (Summarized by D. Einhouse and L. Witzel)

Forage status in the eastern basin of Lake Erie is being monitored by independent, annual assessment programs conducted by NYSDEC, PFC, and OMNR. Forage fish relative abundance indicators are produced by each of these agencies and summarized in annual agency reports to the Lake Erie Committee. Other annually monitored forage indicators in this basin include predator growth rates, piscivore diet composition, and zooplankton size structure.

Eastern basin forage fishes that are known to comprise important components of piscivore diets include rainbow smelt, alewife, gizzard shad, white perch, spottail and emerald shiners. The relative contribution to the diet by each species varies in response to annual fluctuations in abundance. However, the relative importance of rainbow smelt to eastern basin predators may be similar to the significant role of gizzard shad in the western basin.

rainbow smelt:

The status of rainbow smelt in eastern Lake Erie was determined by independent bottom trawl assessments conducted by OMNR, NYDEC and PFC in their respective jurisdictions. Of these, the OMNR survey was the most intense in terms of the number of tows per station, combined trawling effort, and sampling design. Surveys by OMNR and PFC were conducted in the fall and provide indices of abundance of age groups for the major species. The NYDEC conducted its survey in July, prior to when YOY smelt were fully vulnerable to the trawl.

OMNR trawl indices indicate that the relative abundance of YOY smelt was substantially smaller in 1990 than in 1989 (geometric mean No. of YOY smelt caught per trawling hour was 586 in 1990 versus 2,186 in 1989). This observation was supported by PFC trawl indices (mean No. YOY smelt caught per 10-minute tow was 634 in 1990 versus 1,700 in 1989).

Eastern basin smelt stocks have followed a pattern of alternate year-class dominance (AYD) between 1984, which was a strong year class, and 1987, the most recent poor year class. Three moderate year classes were produced in succession from 1988 to 1990 of which 1989 was the strongest.

Researchers have postulated that AYD in smelt stocks during 1963-1974 was caused by cannibalism of YOY by yearling and older smelt. The divergence from AYD to moderate-strength year classes in recent years coincides with the reduction (through natural and fishing mortality) of the strong 1984 year class from the population and progressively smaller recruitment of yearling smelt. Year-to-year fluctuations in abundance of yearling smelt declined in an AYD fashion since 1984.

emerald shiner:

The 1990 trawl assessments conducted by OMNR, PFC and NYSDEC again depicted somewhat different trends in emerald shiner abundance. OMNR trawling characterizes the 1990 year class as moderate, while NYSDEC and PFC 1990 trawling programs suggest an increased abundance of YOY emerald shiners. These programs produced even more divergent results characterizing yearling-and-older abundance of emerald shiners. OMNR trawling found increased abundance of yearling-and-older emerald shiners, attributable to a strong 1989 year class. PFC found yearlings to be scarce and NYSDEC found only a slight increase in yearling abundance relative to 1989.

These different views of emerald shiner abundance are perhaps attributable to unacceptably large variances often associated with trawl catches of minnows. However, as described in the 1990 FTG Report, these various indices of abundance also may portray the abundance trends of different local stocks whose dynamics are not in any basinwide synchronization. Again in 1990, emerald shiner abundance appeared to be within the broad range of abundance observed over the past decade.

spottail shiner:

Widely conflicting observations between trawl programs conducted by OMNR, PFC and NYSDEC also are apparent in descriptions of the 1990 status of spottail shiners. OMNR indices perhaps suggest moderate to strong YOY abundance and a much smaller adult population, PFC found all age groups depressed in 1990, and NYSDEC found a marked increase in abundance of all age groups during 1990. As with emerald shiners, it is not clear whether these conflicting views of spottail shiner status reflect real differences in abundance of local stocks or inadequate sampling methodology in characterizing a shared resource.

alewife:

The 1990 OMNR nearshore and offshore trawling indices suggest a decline in YOY alewife abundance relative to 1989. However, this interpretation should be viewed with caution because nearshore and offshore trawl assessments have not agreed well where YOY alewife are concerned. OMNR's nearshore Outer Bay survey suggests this species has followed a pattern of AYD with poor year classes produced on odd numbered years. The 1987 year class recruited strongly into this index fishery, but not the offshore index fishery. The latter indices suggest that the 1990 year class was moderately strong in what appears to be a general increase in YOY recruitment since 1985.

PFC trawl indices are in general agreement with those of OMNR that found somewhat better YOY alewife production in 1989 than 1990 but, nevertheless, 1990 appeared to be a generally good recruitment year relative to the overall time series of data collection.

gizzard shad:

OMNR and PFC both produce indicators of YOY gizzard shad abundance. The OMNR portrayal of YOY gizzard shad suggests 1990 produced a moderately poor to poor year class relative to recent years. This characterization is bolstered by information from two OMNR trawling programs that have produced parallel trends in YOY gizzard shad abundance in recent years and, hence, adds confidence to these trawl indices as recruitment indicators. The PFC assessment of YOY gizzard shad suggests increased abundance in 1990. However, the PFC cautions that trawl indices from their agency were based on relatively few samples in 1990 due to equipment failure.

zooplankton:

Since 1985, zooplankton size structure has been indexed according to FTG guidelines in New York's portion of Lake Erie. The purpose of this endeavor has been to explore the relationship between zooplankton size and planktivorous forage fish abundance. Some results from this exercise are presented in Figure 1. The June bar diagram portrays crustaceous zooplankton size and density during a period prior to the impact of YOY fishes. By contrast, the September bar diagram portrays these attributes during a time when YOY fishes should be preying heavily upon zooplankton. In other lakes, the size distribution of zooplankton can often be explained by the relative abundance of forage fishes. Information collected thus far shows considerable differences occurred in zooplankton size and density between years and spring and fall periods. In most years, it appears that September zooplankton sizes are depressed relative to June samples. Perhaps such differences in Lake Erie can be at least partially attributed to the abundance of forage fishes. A more detailed examination of planktivorous fish abundance relative to the information presented in Figure 1 will be forthcoming as a longer data series becomes available.

B) Central Basin (Summarized by K. Muth)

The evaluation of overall forage fish abundance in the central basin of Lake Erie, as determined by summer and fall stock assessment data collected by the Ohio Department of Natural Resources and the U.S. Fish and Wildlife Service in 1990, indicates forage availability for piscivorous predators increased this year when compared with forage availability in 1989.

The YOY smelt abundance index for 1990 was less than the long-term average, but was much higher than in 1989 and generally higher than most indices obtained since the production of the strong year class in 1984. Typically, smelt are most abundant in the eastern part of the central basin and this distribution pattern was again evident in 1990. The YOY emerald shiner index indicates the establishment of a strong year class for the first time since 1986 and this species is usually most abundant in the western part of the central basin as was the case in 1990. Index values for YOY spottail shiner and alewife were low in all areas of the central basin and neither of these species have provided much forage availability during the past 10 years. The abundance index for YOY gizzard shad, while higher in 1990 than in 1989, was about equal to the long-term average with nearly uniform distribution throughout the central basin so this species should supplement the forage availability provided by smelt and emerald shiners. Abundance of trout-perch, as determined for all age groups combined, was among the highest recorded in the past 10 years. However, this species is usually not a preferred prey for most predators and its contribution to the total forage availability may not be important, particularly when the abundance of several other forage species is high. Finally, the abundance index for YOY white perch, particularly in the western part of the central basin, indicates another strong year class was produced in 1990.

One potential indicator of improved forage abundance might be improved growth of predators if food availability is a limiting factor. With the combination of declining walleye stocks and the apparent increased abundance of several key forage species in 1990, we determined that both the average length and weight of walleyes in the central basin increased in 1990 when compared to the values measured in 1989. Average total length of age-1+ and age-2+ walleyes increased by 14 mm and 6 mm respectively with average weight values increasing by 63 g and 62 g respectively (ODNR unpublished data). While such increases are small and might be caused by normal year-to-year growth fluctuations, they may signal a trend of increasing growth that will become more evident in future analyses. Such an increasing growth trend seems to be emerging for walleyes in the western basin.

Other indicators of improved forage availability such as changes in predator maturity rates, altered fecundity, changes in plankton size structure and abundance, and liver and fat content indices for walleye and white bass have not yet been analyzed.

C) **Western Basin** (Summarized by R. Knight)

Assessment of western basin forage was made from Ohio, Ontario, and USFWS data for relative abundance (bottom trawl catches), predator growth and maturity rates, diet compositions, walleye prey-size selectivity, and forage fish length frequency distributions. Following is a general summary of trends in these data through 1990.

Relative abundance estimates for the six targeted forage species generally were moderate to high compared to historical data series. Most notable were moderate to high densities of age-0 gizzard shad and emerald shiners in surveys from all agencies. USFWS data also indicate that spottail shiners were abundant during fall, though this was not evident in ODNR fall surveys. Trout-perch, smelt, and alewife also were moderately abundant. Overall, forage fish abundance in the western basin during 1990 appeared to be well above historical averages.

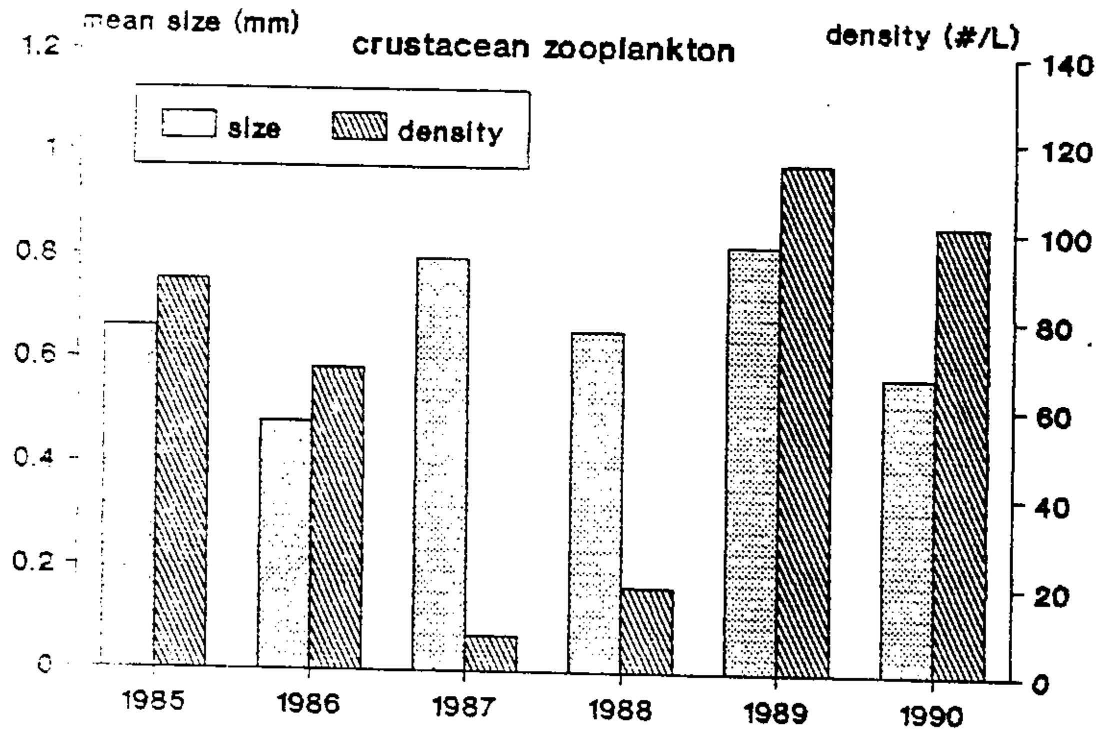
Preliminary data for predator growth and maturity rates indicate that food was not limiting for most predators during 1990. Walleye growth and maturity rates increased over those of recent years, probably due to abundant soft-rayed forage fishes (clupeids and shiners). Yellow perch also increased in average length and weight from last year, but remain below historical averages for most age groups.

Diet composition data for several predator species were not completely available for this report, but some observations bear mentioning. Walleyes fed heavily on gizzard shad and were selective for prey size. Clupeids from walleye stomachs collected during fall ranged from 62 to 145 mm (mean=94 mm), which indicates a high degree of selectivity that was probably related to the substantial densities of shad. Emerald shiners were observed in stomachs of yellow perch, white perch, white bass and walleyes, but not in enormous quantities. Hopefully, the high densities of age-0 shiners observed during fall will increase spring (1991) forage availability relative to previous years. The diversity of benthic invertebrates in perch stomachs appeared to increase in 1990 over previous years, which may reflect improvement in this forage component.

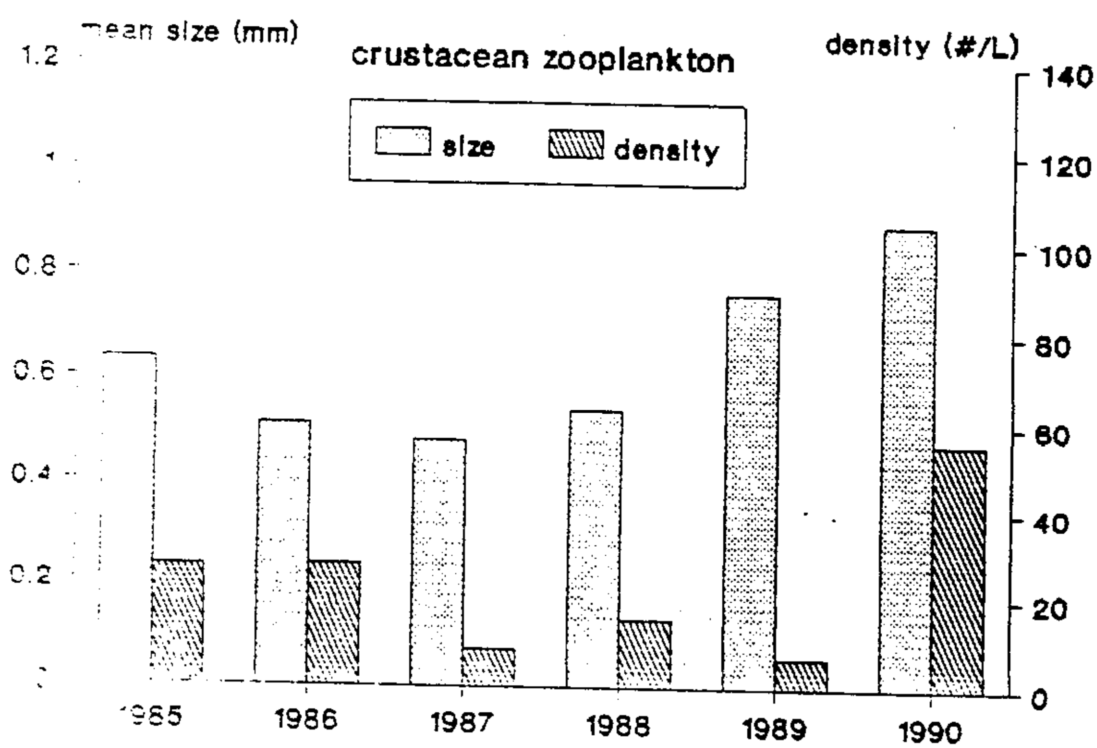
Forage fish length frequency data collected by the USFWS and ODNR during fall of 1990 indicate very little deviations from historical trends for most species. However, age-0 emerald shiners were smaller in 1990 than in recent years. A late hatch as a function of relatively cool summer water temperatures might explain this change.

In summary, forage fish availability in the western basin appeared high in 1990 compared to previous years, primarily due to substantial gizzard shad and emerald shiner production. Other species also experienced above-average recruitment, including white perch which probably produced their largest year class to date (USFWS and ODNR data). Predator growth rates generally reflected this abundance of forage fishes, though declines in predator (walleye) stock abundance probably were important as well. Improvement in yellow perch growth rates and the diversity of invertebrate prey may signify some recovery of western Lake Erie benthos.

June



September



APPENDIX A

STANDARDIZED FOOD HABITS DATA COLLECTION PROCEDURES

DRAFT SAMPLING PROTOCOL
RECOMMENDED FOOD HABIT DATA COLLECTION PROCEDURES

Prepared by Michael Bur, U.S. Fish & Wildlife Service
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I. Objectives:

1. Develop a generalized, interagency food habit collection and analysis procedure to examine interactions between prey and predator. Which in turn, the diet information could be used to assist in the evaluation of fish community structure and also the importance of invertebrates.

II. Rationale:

The standardization of food habit collection and analysis would facilitate the rapid and efficient comparison of data between agencies. There are several methods of collection which are utilized by the different agencies on Lake Erie. For example the U.S. Fish & Wildlife Service uses one of several trawl nets (9-m bottom trawl, 12-m bottom, 9-m rock-hopper trawl or one of two mid-water trawls) primarily, and as a supplemental collection procedure experimental gillnets are used. It would be an expensive venture to change the type of gear so that all agencies would be using the same type of trawl. Instead there should be an understanding of the two basic types of collection methods- passive (gillnet) and active (trawl).

There are also differences in the processing of stomach samples such as measurement of individual food items. Frequency of occurrence, numerical, volumetric, and gravimetric are all methods of quantifying the food organisms; they may be important when used individually or collectively. It is important to understand that all of these analyses have their merit and that each agency has their own needs. The goal of this effort is to present a standard set of procedures that will enable any agency to effectively use information from another agency or agencies that will correspond with their needs.

III. Stomach Collection Procedures

1. <u>Methods of collection.</u> The three most common methods used to collect fish for stomach or gut analysis have been: 1) trawl, 2) gillnet, or 3) creel samples.

Most agencies use some type of <u>trawl</u> to assess fish populations. The trawl is an effective method for collecting fish for food habit studies because it is widely used and the fish are immediately removed from their habitat with no delay. An advantage is that you can do both a quantitative and qualitative analysis on the stomach contents. Digestion of the stomach contents is minimal if the fish has been feeding only recently. A drawback on this method is the possibility of regurgitation. The depth the trawl is fishing (>12 meters increases regurgitation) and the speed of retrieval (slow it down to reduce regurgitation) play a role in regurgitation. Another drawback is that trawls select for small fish because there is avoidance by larger, faster swimming fish.

The <u>gillnet</u> is used effectively to catch fish that are actively feeding, but there are potential problems to consider such as: 1) is this a "standardized" gillnet (same mesh sizes ? and mono or multifilament); or 2) by the time you retrieve the fish the stomach contents have been digested to some extent. The latter may preclude quantitative analysis because you do not know the time ingestion occurred or the length of time the fish was in the gillnet. Fishing duration and water temperature affect digestion rates. The advantage of this approach is that since the fish were likely feeding, you are able to examine the diet from a stand point of prey (prey-size) selectivity, as does Ohio Division of Wildlife. Hayward et al.(1989) suggest that you may be able to quantify the food from gillnet captured fish by using water temperature and time in the gillnet. Gillnets are good at capturing the larger fish that may avoid the trawls.

Samples obtained from the sport fishermen's <u>creel</u> are another method to analyze the food habits. This method of collection is economical and offers a way to collect large samples. Caution should be taken when examining the stomach contents because these predators are actively feeding and the food items may be a result of bait consumed which may be the only food. To avoid problems this method should be considered only as qualitative. Regurgitation is another potential problem.

An important consideration in your sampling procedures should be to use the technique that best suits the type of species you wish to collect. Also, include seasonal considerations in your sampling, such as anoxic conditions or the affects of a thermocline. As an example, do not use a bottom trawl to sample a species that would normally occupy a strata above the bottom. Another consideration is that the sampling procedures may have been previously established for trend analysis; so sampling techniques may be inflexible. And finally, the consensus (among the FTG members) is that active gears should be used when possible.

2. <u>Sample size</u> is an important consideration in your study design. The Forage Task Group recommends 10 fish, per size/age group, per station as an initial guideline for a minimum sample size. However, the minimum required sample should be modified accordingly, once variances are known. Additional considerations in determining sample size requirements include time of sampling, season, basin (geographic distribution), depth and strata. Larger sample sizes (up to a point of diminishing returns) produce more confidence in statistical analyses. These are just some examples of variables that would help determine sample sizes.

3. <u>Diel sampling, Seasons, and Age/size classes</u>

<u>Diel sampling</u> can reveal interesting information about the daily feeding habits of fish. Sampling at different hours of the day will show feeding modes (when they exist) and allow for the calculation of daily feeding rates. For more information read "Fisheries Techniques" edited by L.A. Nielsen and D.L. Johnson, 1983.

<u>Seasons</u> are important in defining the diet of fishes. Instead of using months, which are adequate, standard seasons would be more useful in discussing food habits of Lake Erie fish. The seasons that would be most useful are Spring (April - June), Summer (July - August), and Fall (September - November). I use these dates because Lake Erie water temperatures warm slower than air temperatures. Besides water temperatures, other factors play a role in seasonal sampling, such as reduced feeding during spawning (most Lake Erie fish spawn in the spring). Feeding rates slow during the spawning period. When collecting predator stomachs the abundance and distribution (vertical as well as horizontal) of these fish will vary with the season (freshwater drum will move into deeper water with the onset of cool water temperatures, while walleyes move into the shallows during spring and fall). Also, the abundance and preferred size range of certain prey fish are associated with seasons, such as the presence of gizzard shad in the preferred size range for walleye during the months of July and August. After August (but not exclusively) shad usually grow out of the preferred size range. Every year is different, but based on the "average" year the stated months for each season are most useful.

<u>Size ranges</u> are not only important for categorizing prey, but also predators. Because larger predators can consume larger prey, their diets will differ from the smaller individuals of the species. In order to determine the diet of predator species in Lake Erie you have to collect a representative sample of different age/size classes. The age/size classes of the species you collect should reflect the size specific differences in the diet. For example, a first year walleye has a more diverse diet (benthos, plankton,

and fish) than a yearling or older walleye (almost exclusively fish), but for a species which would have a good deal of total length overlap at different ages, it would be more appropriate to examine the diet based on only size classes. Caution should be exercised in pooling food habits data to avoid clouding differences that can be attributed to various size classes. The Forage Task Group recommends measures of predator-size accompany all food habits collections.

4. Preservation or examination of the stomach samples should occur immediately after capture to prevent any further digestion. If preserving is to be done, there are two general methods practiced on Lake Erie. The first method is fast freezing, which entails placing the fish into an ice bath directly, to slow digestion while sorting through the catch and then placing the fish into the freezing medium (dry ice or fast freezing freezer) to stop digestion. The other method entails removing the stomachs and placing them into a fixing and/or preserving medium, such as 10% formalin or 45-70% aqueous solution of alcohol (Nielsen and Johnson 1983). Making a slit in a large stomach will facilitate the fixing. The stomachs can then be returned to the laboratory for examination after preservation.

IV. Sample Processing

1. The first step is to record necessary data such as: species, sex, maturity, length, weight, capture location, date time, type of gear, and scale samples for aging. The stomach or whole fish should have information associated with it for entry into your data storage device.

2. Decide what type of information are required for the study before beginning your identification process of the food items. The objectives of the study will dictate the level of identification required. If for example you are examining the size of prey fish that walleye consume then you may not wish to identify invertebrates beyond the category "invertebrates". If you are looking at comprehensive diets, identification down to the lowest taxonomic level is what you may need. Again the study design will help you decide what identification process you will need.

3. The next step is the measurement of the identified food items. The easiest technique is the enumeration of the each food item (or category), simply by counting. This allows for determination of the importance or dominance of an item by its number or frequency of occurrence. As a minimum, frequency of occurrence should be calculated. Measurement of the volume of a particular food item (a single prey fish) or category (larval midges) by volume displacement is a very easy and rapid method of measurement. The third method is gravimetric measurement which involves the weighing of a food item either by wet weight (blotted on a towel prior to

weighing or dry weight (drying the food item at a constant temperature for a designated period of time). Weighing is more time consuming than volume displacement, but can produce more accurate quantitative estimates.

As a standard minimum level of precision for food habits measurements, volume should be 0.1 ml; wet weight should be 0.1 g,; and dry wet should be at least 0.01 g. Also, measuring the total length of a food item, particularly prey fish when determining size-selectivity can be an important measure. Precision of length measurements should b 1 mm. Reconstruction of total lengths of partially digested fish can be accomplished, as described by Pikhu & Pikhu (1970) and Knight (1984).

Quite possibly the easiest part to standardize is sample processing. One of the reasons for this is that it is far easier to change the analysis technique than to change the sampling gear and less costly. Comparison of food habits from fish collected with different gear may be obtainable when examining trends after several years of data collection.

Standardized (Food Habit Data Collection Procedures) may be an inappropriate term, perhaps "comparable" would work better; quite simply, this working document is meant as a guideline or framework for the comparison of food habit data and not necessarily a recommendation for radical change of current sampling procedures.

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Table I. Summary of Forage Task Group recommendations for the collection of food habits from Lake Erie fishes.

Gear:	Active gears (i.e. trawl) retrieved slowly, where possible. Passive gear are acceptable.
Minimum Sample:	10 fish, per size/age, per station, initially, until variances can be established.
Standard Seasons:	Spring (April to June) Summer (July to August) Fall (September to October)
Fixing/Preserving Mediums:	10% formalin as a fixative and 45-70% alcohol as a preservative. Alternatively, fast freezing can be performed.
Minimum Recorded Variables:	<u>Predator</u>; species, size (length and/or weight), sex, maturity, location, date, time, and gear. <u>Prey</u>; identify frequency of occurrence by taxonomic group as a minimum required observation.
Precision Level for Prey Measurements:	Volume 0.1 ml Wet Weight 0.1 g Dry Weight 0.01 g Total Length 1.0 mm