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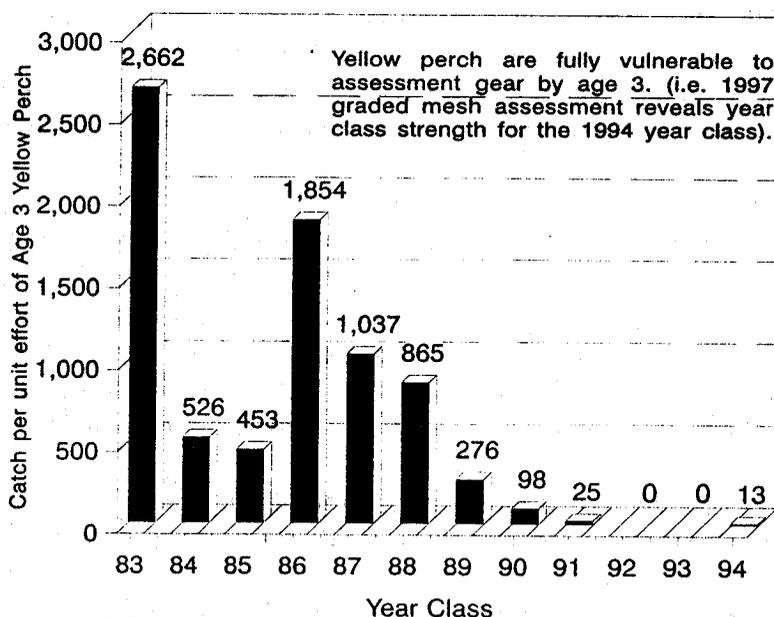
To: WDNR SER/NER Water Staff  
WDNR Bureau of Fisheries Management and Habitat Protection Staff  
UW-Milwaukee CGLS Staff  
Yellow Perch Task Group Members  
Wisconsin Federation of Great Lakes Sport Fishing Clubs  
Wisconsin Commercial Fisheries Association

From: Jim Thompson

Subject: A Preliminary Report on the Spring/Summer 1997 Cooperative Yellow Perch Research Effort - Lake Michigan off Milwaukee.

**Introduction:** Since 1990, WDNR has documented poor recruitment in the yellow perch population in the Wisconsin waters of Lake Michigan (Figure 1). Management agencies in Michigan, Indiana and Illinois report similar findings. All four states have taken action to curtail sport bag limits, and commercial fishing has been closed entirely, except for a limited tribal fishery in Michigan.

Figure 1. Age 3 yellow perch year class strength in Wisconsin waters of Lake Michigan, 1983-1994.



Based on WDNR graded mesh gill net survey catches standardized to 1,000 ft. effort per mesh size (1-3").

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In addition to these management actions, the Great Lakes Fishery Commission (Lake Michigan Technical Committee, Yellow Perch Task Group (YPTG)) and academic institutions around the lake have formulated a variety of strategies to study the recruitment problem. In Wisconsin, the UW-Milwaukee Center for Great Lakes Studies (CGLS) and WDNR collaborated on a 1997 work plan to initiate research into the problem. This work plan also included portions of the YPTG recommendations. This report summarizes the 1997 work on the Milwaukee South Point (Green Can) Reef (GCR).

**Component #1: Early Life History.** Principal Investigator: Fred Binkowski, CGLS.

**Objectives:**

1. To compare the performance of early life stages of yellow perch derived from Lake Michigan with those derived from three reference sites (Green Bay, Lake Mendota, Lake Ontario).
2. To examine whether manually spawned yellow perch eggs differ from those naturally spawned when they are incubated, hatched and reared under laboratory conditions.
3. To establish a captive broodstock of Lake Michigan strain yellow perch using the progeny of the Lake Michigan site.
4. To document egg mass abundance on the spawning reef.

**Job Goals:** To obtain ten manually fertilized egg masses and ten naturally fertilized egg masses for transport to CGLS laboratory. Utilize SCUBA effort to document egg mass abundance.

**Methods and Discussion:** Peak yellow perch spawning in the Milwaukee area usually occurs during early-mid June. Gear was deployed earlier (May 20) than usual as a precaution against accelerated spawning activity. Sampling methods included three modified double-ended fyke nets, commercial monofilament gill net (2 ½" stretch mesh), and SCUBA effort (WDNR Dive Team). Historically, gill net was the primary gear type used in this assessment, however we chose to modify and use fyke nets in order to maximize the chances of finding undamaged fertilized egg masses in the netting gear, to minimize delayed mortality and to be consistent with the gear type in the YPTG protocol.

In an attempt to document egg mass abundance, we utilized diving effort on two 300-meter transects, a 300-foot long "fenceline" consisting of a four foot high section of small mesh webbing, and by diving on the fyke nets themselves. The idea behind the "fenceline" was to utilize it as an obstacle to entrain egg masses drifting along the substrate with the current. The target area was within a one-mile radius of the Milwaukee South Point navigation buoy, approximately two miles off South Milwaukee on a rock/rubble reef complex in 20-50 foot depths.

We obtained six usable egg masses of each group, naturally and manually fertilized. Although this fell short of the goal, six of each group was sufficient to proceed with the experiment, and the results will be reported by CGLS after laboratory work is completed and analyzed. In addition to the usable eggs, an additional five egg masses were obtained that were not usable, primarily

because of their condition (fragmented or small). The effort put forth in obtaining these 12 usable egg masses was considerable. The gear was in the water from May 20 - June 18, fishing around the clock with the exception of a seven-day period in late May when high winds made work prohibitive. Table 1 summarizes catch totals.

**Table 1. 1997 Lake Michigan Yellow Perch Spawning Assessment (Total Catch / Gear Type)**

	Double-ended Fyke Nets	2 1/2" mesh Commercial bottom gill net	TOTALS
Males tagged	5,160	0	5,160
Males not tagged	6,706	2,551	9,257
Total Males	11,866	2,551	14,417
Unknown sex NT	11	0	11
Females tagged	3	0	3
Females not tagged *	0	17	17
Females spawned (ripe) @	2	6	8
Females sacrificed (green) #	3	15	18
Total Females	8	38	46

\* Gill netted fish were not tagged.

@ Ripe females were not tagged.

# Females were sacrificed as part of toxicological study.

In addition, divers found 9 naturally fertilized egg masses of which 6 ribbons were good. Of the females spawned manually, 6 egg masses were usable (all from commercial net).

**TOTAL PERCH CAPTURED = 14,474 ( 0.32% FEMALE )**

Double-ended fyke nets were set on 20 May 1997 and fished thru 17 June 1997.

Locations:

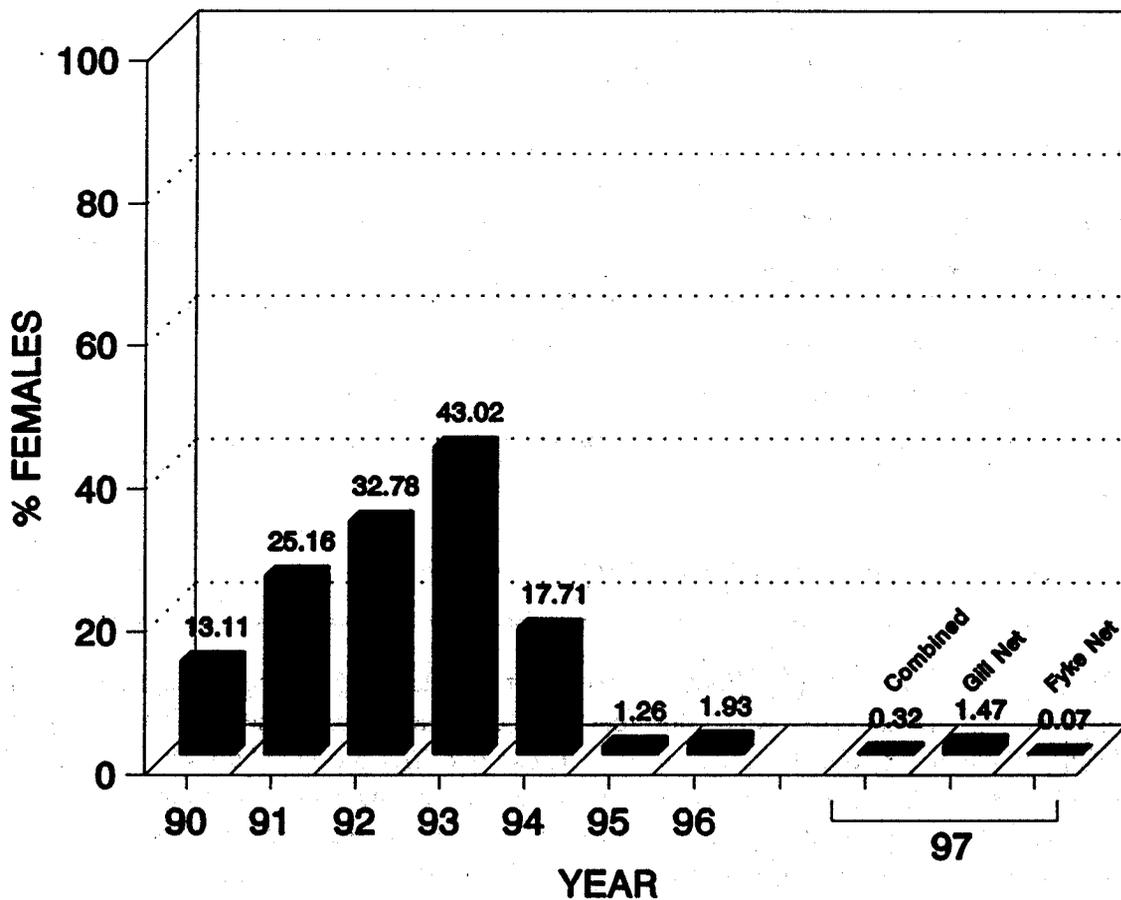
Fyke #1 N 42°59.296	Fyke #2 N 42°59.050	Fyke #3 N 42°58.676
W 087°49.917	W 087°50.379	W 087°50.461
(35-40')	(25-27')	(20-22')

Commercial bottom mono gill nets were fished on one night sets, 5000'/night on June 12 and June 18 (47-63').

Despite a total fyke net catch of 11,885 fish, only eight females (.067%) were captured in this gear. The commercial gill net effort was 5,000 feet/night on June 12 and June 18. The total catch was 2,589 fish, of which 38 were female (1.47%). These two lifts produced all six of the usable manually fertilized egg masses. Since the fyke net sets were producing such low female/male ratios, we decided to have the commercial nets set in deeper water. The female/male ratio improved in the deeper water (45-60') during the gill net effort and the divers subsequently found two additional usable naturally fertilized egg masses in this contour. So it was our observation that in this location, females in spawning condition were more concentrated in deeper water. This is atypical compared to data from previous spawning assessments in this location. Typically, females tend to "stage" in these depths until shortly before they are ready to spawn, then move onto the reef to spawn. For some reason(s), more spawning activity this year in this location seems to have occurred in deeper

water, with nothing apparent in the temperature profiles as an explanation. It is important to note that despite this anomaly, spawning female concentrations were still very low, and even when the gill net effort is taken alone, the densities are consistent with what we have seen during the last two spawning assessments (Figure 2). This assessment is gender-biased; behaviorally males stay on the spawning grounds longer than females and can be expected to comprise a larger proportion of the catch, so these percentages cannot be directly compared to year class strength. It is clear however, that these data are consistent with spawning densities in recent years, and are indicative of the extremely low female population.

**Figure 2. Percent female yellow perch captured in yellow perch spawning assessments, 1990-1997.**



Pre-97 gear was exclusively gill net.

## Egg Mass Abundance (WDNR NER Dive Team)

All of the usable naturally fertilized egg masses were collected by the divers on the transects or in the substrate in the vicinity of the nets. Diving on the 300-meter transects to search for eggs began on June 9 and concluded on June 17. Without an effort of this magnitude, a very significant portion of the early life history component would not have been accomplished. Given the scarcity of females, we were fortunate to have obtained the eggs that we did. Table 2 summarizes the Dive Team effort.

Dates	5/20	5/21	6/3	6/4	6/9	6/11	*6/12	6/16	6/17	Totals
# Divers	4	4	5	5	5	4	4	5	6	
Total Bottom Time (hrs.)	3:48	1:29	3:19	2:14	3:27	2:38	2:14	5:51	6:40	31:40
Egg Masses Found on transects	-	-	-	-	0	0	-	0	2 <sup>@</sup>	2
Egg Masses Found near nets	-	0	0	0	0	0	0	5	2	7
Transect Area Covered	-	-	-	-	6,000 m <sup>2</sup>	2,400 m <sup>2</sup>	-	4,800 m <sup>2</sup>	4,800 m <sup>2</sup>	18,000 m <sup>2</sup>
# Egg Masses/1000 m <sup>2</sup>	-	-	-	-	0	0	-	0	.42	.11

\* Dove on INHS nets off Kenosha.

@ Transect depths were 20-25' and 18-20' until June 17, when they were moved to 45-53' and 50-60'.

On June 16 and 17, an additional 12,800 m<sup>2</sup> (approx.) of bottom area was inspected by swimming each fyke net, anchor to anchor (770') and by "free-swimming" a pre-designated linear distance between nets. This yielded seven egg masses (.55 egg masses/1000 m<sup>2</sup>). The 300 foot "fenceline" was swam by two divers on June 4, 9, 11, and 16 but did not entrain any egg masses.

**Component #2: Lakewide Tagging Study - Yellow Perch Task Group (Lead Office: Illinois Natural History Survey (INHS)).**

### Objectives:

1. Describe the interstate movements of yellow perch in Lake Michigan.
2. Determine if spawning site fidelity exists in the lake (do spawners return year after year to the same site?).
3. Estimate local spawning population sizes and mortality rates.

Job Goals: To tag and record biological data on 3,000 yellow perch in the waters off Milwaukee, and 2,000 off Kenosha. Through angler and assessment recaptures, a data base established by INHS will be used to track tagged and recaptured fish.

Methods and Discussion: Fyke nets were set in three locations within the target area. We chose three separate contours in 20-40 feet based upon our earlier experience and pre-assessment soundings. Each location was marked using differential GPS. Standard double-ended fyke nets (4' diameter, 35' length, 3/4" stretch mesh black tarred webbing, 100' lead) were modified for offshore fishing on rock substrate as follows:

- 4' sections of 2" diameter iron pipe were lashed to the bottom of every other hoop to add weight, and act as a deterrent against rolling.
- 4' sections of 2" diameter PVC (plugged on both ends) were lashed to the topside of the same hoops as flotation to assist in keeping the net upright against the current.
- a bridle of 1/2" twisted polypropylene rope was sewn around the sides of the entire net to act as a frame, adding rigidity to each set.
- double-spaded anchors were welded one on top of another "piggybacked", and bar stock was welded to each anchor to bring the total weight up to approximately 80 lbs./anchor.
- king (anchor) lines were lengthened to 300' each, bringing the total set length to 770'/net.
- four conventional fyke net anchors were set perpendicular (2 per side) to each set to minimize swaying, bringing the total number of anchors/set to eight.

Fish captured in the fyke nets were processed aboard the lift boat, or shuttled to the R/V *Neeskay* for processing. We tagged a total of 5,163 fish off Milwaukee (Table 1). Time and logistical considerations precluded our setting nets off Kenosha. Lakewide angler and assessment recapture information will be used to track tagged fish.

**Component #3: Toxicology.** Principal Investigator: Candy Schrank, WDNR Bureau of Fisheries Management and Habitat Protection.

Objectives:

To obtain information on the reproductive and toxicological status of yellow perch from Lake Michigan as well as information on gonadal quality.

Job Goals: To capture and transport live fish of both sexes and pre-determined length increments to lab facilities aboard the R/V *Neeskay*, or to CGLS.

Methods and Discussion: This is an ongoing study which began in Fall, 1996. Blood, tissue and internal organ samples, including teste and ovary samples were obtained from live fish from Lake Michigan. A reference site (Lake Mendota) with a self-sustaining population of yellow perch was chosen, and identical samples were taken from fish at this site. Samples are taken during each phase of the reproductive cycle. The reproductive and toxicological endpoints from the samples taken from the two populations will be compared to determine what differences (if any) exist between them. The null hypothesis is that there is no difference in gonad quality between the two sites that would influence subsequent survivorship.

#### **Component # 4: Predation - Yellow Perch Task Group.**

**Objectives:** To quantify alewife predation on yellow perch larvae.

**Job Goals:** To capture actively feeding alewife during the period larval yellow perch are vulnerable to predation, and remove and preserve alewife stomachs for subsequent identification of contents.

**Methods and discussion:** Graded mesh gill net sets were used to obtain alewife of various sizes. Nets were suspended one meter beneath the surface at dusk and after dark in the 5 and 10 meter contour to optimize catches of alewife actively feeding near shore. Netting occurred over a three week period post-hatch, in the vicinity of the Green Can Reef. Crews on board the WDNR work vessel measured all alewife captured, removed the stomachs and preserved each one in individually labeled vials for subsequent analysis of the contents. A total of 336 alewife stomachs were preserved, and the results will be reported separately after the stomach contents are analyzed.

Alewife are known predators of larval yellow perch. Previous studies suggest that when significant onshore movements of spawning alewife coincide with the appearance of larval yellow perch in these nearshore areas, predation can have a severe impact on yellow perch year class strength (Mason and Brandt, 1996). Many factors can influence the extent to which this overlap between onshore movement of alewife and the presence of larval yellow perch occurs. The timing of the perch hatch and the factors which stimulate alewife onshore movements are of primary importance. These interactions have not been fully investigated as of yet in Lake Michigan and should be the topic of significant future research.

#### **Summary and Future Plans:**

Field sampling for each of the components of the 1997 effort has been completed. Collection of laboratory data and subsequent analysis will be an ongoing process, and results will be reported as they become available.

We will conduct the yellow perch young of the year (YOY) assessment beginning in late August, to be followed by the winter graded mesh assessment in December/January. Plans for next years' research effort will be formulated during the months ahead. The Southern Lake Michigan Work Unit's role is to function as the field support unit for all research into the recruitment problem in Wisconsin waters of Lake Michigan. To a great degree, our 1998 research support role will be dependent upon the funding that becomes available to CGLS. One proposal has been approved, and several others are under consideration and it is anticipated that funding decisions will be made sometime this Fall. If approved, funds will become available in time for Spring 1998 work.

**Acknowledgments:** Special thanks to Dr. J. Val Klump, Director, CGLS for the use of the Research Vessel *Neeskay* during this assessment, and to the crew of the *Neeskay*, Capt. Ron Smith and First Mate Greg Stamatelakys, and to Dr. Russell Cuhel and Duane Moser, CGLS

scientists who re-scheduled research cruises in order to accommodate our schedule. We also thank the Milwaukee Fire Department for their assistance in re-filling the Dive Team's oxygen tanks with frequency and on short notice.

### References

Mason, D.M., and Brandt, S.B., 1996. Effect of alewife predation on survival of larval perch in an embayment of Lake Ontario. *Can. J. Fish. Aquat. Sci.* 53: 1609-1617.

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