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REARING OF WALLEYE IN THE MOSS LAKE BORROW PIT,
DELTA COUNTY, 1975

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SUMMARY

Walleye fingerlings were successfully raised in the Moss Lake Borrow Pit from 1971-1974. The pit was stocked again in 1975 with 200,000 walleye fry. This was a reduction in stocking of 20% with the intention of producing larger fingerlings for introduction into Little Bay de Noc, Lake Michigan.

Plankton populations were monitored at various times during the spring. Some 64,366 (32.2% of the plant) fingerling walleyes were seined from the pond between June 30 and August 14, 1975. The objective of producing more large fingerlings was realized (18,678 fingerlings over 2.1 inches). A continued stocking level of 200,000 fry was recommended. The cost of each walleye harvested was 3.95 cents.

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INTRODUCTION

The Moss Lake Borrow Pit, located in T40N, R19W, Section 4, Delta Co., is seven acres in size. It was used in 1971, 1972, 1973 and 1974 to raise walleye pike from fry to fingerling stage. Excellent success was obtained during these years, with 38,663 or a 25.7% return in 1971; 52,075 or 20.8% in 1972, 70,692 or 28.2% in 1973 and 68,175 or 27.2% in 1974. These annual successes, plus an apparent resurgence of small walleye pike in Little Bay de Noc, prompted a continuation of the program in 1975.

METHODS

Preparation & Stocking of the Borrow Pit

Residual walleye pike, that were not harvested with the seine during 1974, were eliminated by a chemical treatment with Fintrol concentrate on August 13, 1974. A concentration of 5.0 parts per billion was used, and a complete kill was realized.

To enhance and maintain zooplankton populations, torula yeast was added to the Moss Lake Borrow Pit. Manual applications to the surface of the water were made on May 12, 19, 27 and June 3, 9, 16 and 23, 1975. One hundred pounds was applied each time (about 14 pounds per acre).

Three live crates containing partly decomposed hay were set up at select locations around the pond to encourage the development of zooplankton and serve as a "sanctuary" for the plankton. It was thought that the decomposing hay would stimulate the growth of bacteria, protozoa and ultimately zooplankton. Different kinds of zooplankton should then filter out of the 0.25-inch mesh live crates and be available to the walleye fingerlings. Because of the 0.25-inch mesh screen, walleyes would be prevented from entering the cage and exhausting the food supply. It was also theorized that good zooplankton populations in the vicinity of the live cages would attract fish and facilitate capture and harvest.

On May 24, 1975, 200,000 swim-up walleye fry were stocked in the borrow pit. The fry were the progeny of wild adult walleyes captured in Little Bay De Noc earlier in the spring.

Fingerling Harvesting Techniques

Two 150-foot seines were tied together and used for the primary harvest tool. The seines were nylon, 12 feet deep and with 0.25-inch mesh.

Excessive growth of filamentous algae in 1974 which hindered seining operations prompted the construction of rigid screen traps to capture walleye fingerlings. Because catches during 1974 with such

traps were impressive, 5 rigid screen traps were installed in 1975. Two were 8 feet long and 3 feet wide; the others were 6 feet long and 3 feet wide. The screen was 0.125-inch mesh, and the frames were made from 2-inch square white pine. A 0.125-inch mesh screen was used as a lead. The traps were set at select locations around the shoreline in depths approximating 2.0-2.5 feet. Lengths of lead varied from 15 to 25 feet.

RESULTS

Spring-Summer Observations

A Wisconsin-style plankton net was used to monitor zooplankton populations in the Moss Lake Borrow Pit during 1975. A one hundred foot transect was set up on the north shore to monitor zooplankton populations (the same transect utilized in 1974). Tows were made on May 12 and 27 and June 4, 9, 16 and 23.

The Daphnia pulex population of the borrow pit was large, with many individuals represented from early May through the middle of June. These cladocerans approximated 18.6 organisms per liter on May 12, 11.3 per liter on May 27, 2.8 on June 4, 8.8 on June 9 and 13.4 organisms per liter on June 16. Only an occasional Daphnia pulex was found on June 23. In early May the Daphnia pulex population was composed of many small early instars. Individuals grew in size throughout May and early June. Ehippial eggs began to show up in a few females by early June, and by the middle of the month, the population was on the decline. Ehippial eggs occurred in windrows on the shore at this time.

The cyclopoid copepod population was never large throughout the rearing period. Cyclops sp. approximated 1.0 per liter on May 12, 0.83 per liter on May 27, 0.10 per liter on June 4, only a trace on June 9, 0.50 per liter on June 16 and only a trace on June 23. Throughout the period, the population consisted of instars of different age, from nauplii to adults.

The limnetic cladoceran Bosmina sp. appeared in the zooplankton population in late May, and finally disappeared by the latter part of June. It never numbered more than 0.24 organism per liter. A population of the cladoceran Holopedium sp. began to develop in early June. It became extremely numerous and numbered over 100 per liter throughout the month. The size of this zooplankter is extremely small, and it's doubtful if it ever had any value as a food item for the walleye.

A colonial rotifier (Conochoiloides sp.?) appeared in the zooplankton population in late June and became very numerous.

Experience has shown that a good population of Daphnia pulex is indicated when the Wisconsin-style plankton net reveals 8-18 organisms per liter of water. Populations of this organism in 1975 were comparable to those encountered during zooplankton tows in 1974.

The cyclopoid copepod population was most numerous in early May. It then declined significantly, perhaps reflecting intense predation by

walleye fry.

During the yeast application on June 9, large schools of walleye approximating 0.75 inch were observed in the open waters of the pond. Fish samples were obtained on June 16.

Fry Harvest Operations

Seining was commenced on June 30 and was terminated on August 14. Total yield for the ten days was 64,366 fingerlings (32.2% of the plant). When harvest operation was commenced, fingerlings averaged 1.8 inches; they averaged 3.0 inches when operations ceased (Appendix I & II). No evidence of cannibalism was found.

The screen traps were fished during the first week of harvest and operations. Only about 250 fingerlings were captured in the traps due to extremely warm shoreline temperatures which caused the walleyes to move off shore, so their use was discontinued.

Post Harvest Operations

Residual walleye fingerlings prompted chemical reclamation on August 15, 1975. Rotenone (2.5%), at a concentration of 1.0 part per million was used, and an estimated 1,000 fish were killed.

Examination of the pond indicated that the nutrient levels in the borrow pit are sufficient to produce adequate zooplankton populations in 1976. Some partially decomposed hay which was applied over the pond in 1973 is still in evidence on the shoals.

Analyses of food habits of walleye pike fingerlings were made on June 16 and 23, 1975. Daphnia pulex was the preferred food item on both occasions. Midge larvae pupae had been eaten to a minor degree.

Parasites were not encountered during the analysis of the food habits. The walleyes were in good condition, and nearly all had a moderate to large strip of fat on the intestine.

DISCUSSION

Harvest Techniques for Walleye

Unusual weather conditions prompted the modification of normal seining techniques. Much of the latter part of June and all of July was quite warm with little or no precipitation. Water temperatures rose significantly and remained in the high 70's to the low 80's for a number of weeks. Those abnormally warm water temperatures apparently caused the walleyes to move off shore and seek the coolest water available. This was in the middle of the pond near the bottom. For the past several years, a 150-foot long seine was adequate to capture schools of walleyes. In 1975, however, it was necessary to tie two of the seines together to reach the middle of the pond where the majority of fish were concentrated.

Enhancement of Zooplankton Populations with Hay

The live crates containing partly decomposed hay which had been set up around the pond did harbor considerable numbers of ostracods and snails but few cyclopoid copepods or cladocerans. No difference in zooplankton numbers within or in the vicinity of the live crates was noticed. The live crates were removed from the water after several weeks.

Attempts at Marking Walleye Fingerlings

An attempt was made in 1975 to mark walleye fingerlings with a left-pelvic fin clip. On two occasions in late June, fingerlings were captured and transferred to Thompson Hatchery for marking. A combination of anesthetic, handling and excessive water temperatures resulted in stress from which most of the fin clipped fish died soon after marking or within a few days. Another attempt was made in late June at the Moss Lake Borrow Pit. Mortality was excessive and the marking experiment curtailed.

By mid August, walleye fingerlings had attained an average length of 3.0 inches and water temperatures had cooled into the upper 60's and low 70's. It was felt the fish could then survive the stress of marking, so on August 14, 1,705 walleyes were marked with a left-pelvic fin clip and introduced to Little Bay de Noc. No immediate mortality was observed.

Additional Observations and Management Recommendations

For the fifth consecutive year, it was demonstrated that large numbers of walleye fingerlings of a desirable size can be quite economically produced for the fishery manager. The total 1975 project cost was \$2,544 (Appendix III); 64,366 fingerlings were harvested; so each fish cost 3.95 cents.

It was hoped that reducing the number of fry introduced to the pond by some 20% would result in the survivors attaining a larger size and thus be better able to compete when introduced into Little Bay de Noc. This appeared to be the case in 1975, for a greater number of larger fish were harvested than ever before (18,678 fingerlings over 2.1 inches). It appears that the percent of fish surviving to fingerling size increased also. In the Moss Lake Borrow Pit, the percent of fish harvested has varied from 20.7% in 1972 to 32.2% in 1975.

Good populations of Daphnia pulex developed in the pond during 1975. Unicellular algae blooms were nonexistent. It is felt torula yeast was instrumental in maintaining the cladoceran bloom through most of June. It is possible the addition of more yeast per acre would prevent the Daphnia pulex population from forming ephippial eggs and declining.

It is suggested that walleye fry stocking rates continue at 200,000 or about 29,000 per acre. This appears to be the point where survival is maximal and good growth obtained.

Considerable assistance in walleye fingerling harvest was given by the Youth Conservation Corps, members of the Upper Peninsula Game Protectors Association, Mead Rod and Gun Club and Sport Fishing Unlimited. Their help was sincerely appreciated.

APPENDIX I
DATA SUMMARY

Number planted -	200,000 swim-up fry
Weight planted -	1.8 pounds
Number harvested -	64,366
Weight harvested -	123.8 pounds
Percent harvested -	32.2
Number of walleyes removed by chemical treatment -	1,000
Total number of walleyes produced in the Moss Lake Borrow Pit -	65,366
Percent survived during 1975 -	32.7

APPENDIX II
SUMMARY OF 1975 HARVEST OPERATIONS

<u>Date</u>	<u>No. of Walleyes</u>	<u>Average Length</u>	<u>Average Weight</u>
June 30, 1975	3,360	1.80"	0.8 grams
July 1, 1975	6,363	1.80"	0.9 grams
July 7, 1975	7,758	1.97"	0.8 grams
July 8, 1975	10,810	1.92"	0.9 grams
July 9, 1975	8,324	1.81"	0.8 grams
July 11, 1975	9,073	1.97"	0.9 grams
July 16, 1975	4,870	2.11"	1.42 grams
July 17, 1975	5,819	2.14"	1.41 grams
July 22, 1975	2,756	2.50"	1.57 grams
Aug. 14, 1975	<u>5,233</u>	3.00"	2.94 grams
	64,336		

APPENDIX III

1975 PROJECT COSTS

I. Fertilization with torula yeast

Salary - Biologist	\$ 203.84
C.E.T.A. employee	<u>146.44</u>
C.S.S.& M.	19.25
Torula yeast	<u>200.00</u>
Sub-total:	569.53

II. Spring & summer observations and harvest operations

Salary - Biologist	407.68
C.E.T.A. employee	418.40
Fish culturist	241.44
Fish Area Manager	201.60
Force account	384.00
W.I.N. employee (6 man days)	- - -
Youth Conservation Corps (6 days expended - 8 individuals each day)	- - -
C.S.S.& M. - Vehicle expense	99.77
Travel expense	<u>79.75</u>
Sub-total:	1,832.64

III. Chemical reclamation

Rotenone	86.76
Salary - Biologist	29.12
C.E.T.A. employee	20.92
C.S.S.& M. - Travel expense	2.75
Vehicle expense	<u>2.10</u>
Sub-total:	141.65
Grand total:	\$ 2,543.82