UW- STEVENS POINT NORTHERN AQUACULTURE DEMONSTRATION FACILITY

WALLEYE PROJECT- 2007

By Gregory J. Fischer, Facilities Manager

Introduction

From April through October, 2007, the UW Stevens Point Northern Aquaculture Demonstration Facility (NADF) continued to cooperatively work with the Lac Courte Oreilles Tribal Fisheries Program (LCO) providing approximately 203,450 fry, 76,053 fingerlings (1,082/lb), and 9,606 extended growth (8/lb) walleyes for the tribes' lake stocking program. The information presented in this case study describes the methods used from beginning to end in a "cookbook" style how the NADF incubated and raised the walleyes in two 0.4 acre outdoor earthern ponds (approx. 391,000 gallons) utilizing several types of organic and inorganic fertilizers, various aeration systems and forage minnows. Implications of this years research in walleye rearing and management suggests that you can produce approximately 500 pds of extended growth walleye in a 0.4 acre outdoor earthern pond. Size and number of fish will be determined by time of harvest from the pond, initial stocking numbers, good water quality parameters and proper feeding protocol. The intent of this report is to provide information to assist other aquaculture and hatcheries that are raising walleyes and other coolwater fish.

Egg Collection and Fertilization Methods

Adult male and female walleye were collected by NADF and WiDNR staff using fyke nets set in lakes on April 17 from Big LCO Lake near Hayward, WI. Eggs were stripped by hand from female walleyes into plastic containers and milt was added from several males utilizing both wet and dry methods. More than one male was utilized for several reasons; because milt from a single male may not be capable of fertilizing eggs, and for maintaining genetic diversity. After eggs and milt are in the pan, clean water was added and the combination stirred with a soft brush or feather. Stirring continued for several minutes and a slurry of bentonite clay was added

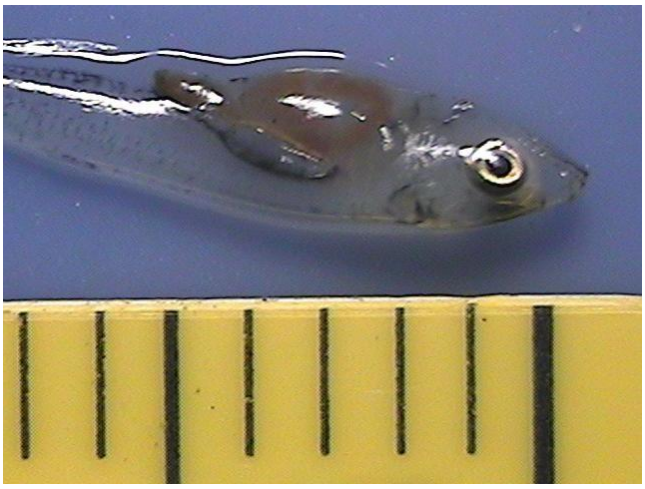
to the mixture. Stirring the egg/clay mixture continued for several minutes and additional clean water was added. The egg/clay mixture is then rinsed off with clean water and placed into a larger bucket or cooler of clean water. Water in the container was freshened periodically to keep oxygen levels up and maintain water temperature. Water hardened eggs were transported to NADF for incubation in the bell jar incubation system located at the facility.

Due to fish health concerns (VHS) ovarian fluid was collected for screening from female broodfish and several egg treatments were field tested by NADF. All ovarian samples collected were negative for VHS. The three egg treatments tested were:

1. Untreated Control
2. 100 ppm/Iodine mixed in w/milt and sterilized water during fertilization step and then clayed on boat.
3. 100 ppm/Iodine/10 minute bath after water hardening in sterilized water.

Egg Incubation

Approximately 630,000 eggs were placed in McDonald style egg jars with of various treatments for incubation on April 17. Water temperature was maintained between 48-50°F throughout incubation, temperature was increased to 59°F during hatch out to aid in hatching. Initial water flow through jars was approximately 0.4 gpm and then increased to 0.7 gpm once eggs became eyed. Dead eggs were removed daily from the hatching jars through siphoning. A modified chicken waterer with a 15 minute (1,600 mg/l) formalin drip was used daily after egg eyeup to control fungus. Formalin treatments were discontinued nearing egg hatchout. Fry hatched May 3 through May 13. Total average hatching percentage was 61%. Hatching percentage results of egg treatments were:



1. Untreated Control: 63%
2. Iodine w/milt: 25%
3. Iodine after water hardening: 75%

Strong swimming fry were stocked into two (2) prepared 17,600 sq.ft (0.4 acre) outdoor earthen ponds May 7-14. Pond 1 was stocked with approximately 82,950 fry and pond 4 was stocked with approximately 96,100 fry. Additionally, approximately 203,450 walleye fry were provided back to the LCO Natural Resources Department and stocked into local lakes for conservation purposes on May 10. All fry numbers were determined volumetrically.

Fingerling pond production

Two different types of organic fertilizer, soybean meal and alfalfa meal, in conjunction with inorganic fertilizer were used in separate outdoor rearing ponds at NADF to do some comparison evaluations. The fertilizer type, cost, and application rates are as follows:

Pond 1: Pond number 1 was filled partway and prepared approximately one week in advance of filling with 400 pounds of alfalfa meal, 2.25 gallons liquid 28% nitrogen urea, and 1.0 lb. granular 0-45-0 phosphorous fertilizer. Granular phosphate was liquidfied with warm water before application. A total of 600 pds of alfalfa

meal costing $120.00, 3.0 gallons of 28% nitrogen costing $18.00, and 2.0 lbs. of 0-45-0 phosphorous fertilizer costing $0.56 was added during May-June to stimulate plankton blooms. Supplemental aeration was provided via the facilities main 5 h.p. rotary blower and two round membrane diffusers.

Pond 4: Pond number 4 was filled partway and prepared approximately one week in advance of filling with 400 lbs of soybean meal, 2.25 gallons of liquid 28% nitrogen urea, and 1.0 lb. of granular 0-45-0 p-phosphorous fertilizer. Granular phosphate fertilizer was liquidfied with warm water before application. A total of 700 pds. of soybean meal costing $105.00, 3.38 gallons of 28% nitrogen costing $21.00, and 2.5 pds. of 0-45-0 phosphorous fertilizer costing $0.70 was added during May-June to stimulate plankton blooms. Supplemental aeration was provided via the facilities main 5 h.p. rotary blower and two handmade pvc airlifts. Pond water quality parameters were monitored on a daily basis.

Pond 2 & 3: Additional fertilizer was added to Ponds 2 and 3, after fingerling walleye were placed into them for extended growout, to increase pond turbidity for decreased bird predation and to assist with vegetation control. The total extra fertilizer added was 400 lbs of alfalfa meal costing $80.00 and 1.5 gallons of liquid 28% nitrogen urea costing $9.00.

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Fingerling Production Results

Walleye fry were observed around edges of the ponds in daylight and at night with lights in May. Plankton populations were average, but seemed adequate as sampled fish condition was good. Early fish sampling in both ponds yielded good numbers of fish per seining attempt which hypothetically meant good numbers in the ponds. Pond temperatures as well as the plankton populations increased in June.

Small fingerling walleyes from both ponds were sampled on a weekly basis to assess length, weight, and fish condition. Length and weights varied for both ponds. Fish condition was excellent. in ponds. Ponds were monitored daily for temperature (ºC), oxygen (ppm), pH and seechi disk readings(m) throughout fingerling production (Figures1 and 2).
Lowest oxygen levels observed during fingerling production were in Pond 4 during May at 2.5 ppm. Pond 2 oxygen levels during fingerling production were not recorded lower than 5.0 ppm. during this phase. The low oxygen level recorded in pond 4 may have been detrimental to the fish in the pond. Fresh water was added at this point to alleviate the problem.

On June 15 we moved approximately 8,076 fingerlings averaging 24.9 mm (3,846 fish/kg)(1,748/lb) from pond 4 into pond 3 for further rearing. Pond 4 was fully drained on June 20 and approximately 30,708 fingerling walleye averaging 32.8mm (2,222 fish/kg)(1,010/lb) were collected. Fry to fingerling production return in pond 4 was 40.4%. An additional 8,620 fingerlings harvested from pond 4 were placed into pond 3 bringing the total number of fish in pond 3 for further rearing to 16,696. Pond 4 was left dry.

On June 15, we moved approximately 11,686 fingerlings averaging 32.4 mm (2,381fish/kg)(1082/lb) from pond 1 into pond 2

for further rearing. Pond 1 was fully drained on June 19 and approximately 53,965 fingerling walleye averaging 37.5 mm (1,724 fish/kg)(784/lb) were collected. Fry to fingerling production return in pond 1 was 79.1%. Pond 1 was left dry. Average cost to produce the fingerling walleye was $0.0032/fish not including labor or capitol costs. A fish health assessment was performed on the walleye fingerlings on June 14 during NADF Field Days by Dr Robert Smith of Clayton Veterinary Care and a certified clean bill of health was provided.

LCO Natural Resources picked up 76,053 excess fingerlings on June 20 and 21 for stocking purposes.

Extended Growth Production Summary

Ponds 2 and 3 were initially stocked with 11,686 and 16,696 fingerlings respectively to investigate the capacity of 0.4 acre ponds in regards to rearing extended growth walleye.
Ponds were stocked periodically with a total of 539 gallons (4,312 lbs)(1,960kg) of forage minnows of various sizes ranging < 1"to 2" from June through October. Poundage ratio of forage minnow to walleye was approximately 4:1.
Walleyes from both ponds were sampled on a weekly basis to assess length, weight, and fish condition. Fish condition was excellent. Ponds were monitored daily for temperature, oxygen, pH and seechi disk readings throughout advanced fingerling production (Figures 3 and 4). No observed water quality parameter issues were apparent.

Extended growth walleyes were harvested from the pond 2 and 3 on October 11 and 12 respectively. Ponds were drawn down slowly through the use of gate valves and dam boards located in the concrete funnel structure at the rear of the ponds. Fish were collected and held in the external concrete collecting kettle with fresh water and aeration. Approximately, 9,606 extended growth walleyes 1,151 lbs (522 kg) were harvested from the two ponds. The harvested walleyes averaged 7.3" (185 mm) in length, average fish weight was 54.3g (8/pd). No significant losses were recorded during harvest. A small portion of fish had to be removed from the weeds and mud. The walleyes were hauled by the Red Cliff Fish Hatchery and Bayfield State Fish Hatchery staff for LCO. Fish were stocked by LCO Fisheries Department into local lakes for conservation purposes. All fish underwent a fish health assessment and were tested negative for VHS before leaving the facility.

Extended growth (E.G.) walleyes were harvested from the pond 2 and 3 on October 11 and 12 respectively. Ponds were drawn down slowly through the use of gate valves and dam boards located in the concrete funnel structure at the rear of the ponds. Fish were collected and held in the external concrete collecting kettle with fresh water and aeration. Approximately, 9,606 extended growth walleyes 1,151 lbs (522 kg) were harvested from the two ponds(33.8% survival). The harvested walleyes averaged 7.3" (185 mm) in length, average fish weight was 54.3g (8/lb). No significant losses were recorded during harvest. The walleyes were hauled by the Red Cliff Fish Hatchery and Bayfield State Fish Hatchery staff for LCO. Fish were stocked by LCO Fisheries Department into local lakes for conservation purposes. All fish underwent a fish health assessment and were tested negative for VHS before leaving the facility.

Total estimated cost to produce the extended growth walleye was $16, 143($1.68 per fish) which includes forage, fish health testing, fertilizer, and miscellaneous expenses. No labor or capitol cost was included in this estimate. Due to fish health concerns (VHS) extended growth walleyes were held for a longer period of time than was anticipated. This caused an increase in cost of approximately $4,000 (VHS testing and minnow feed) and may have reduced fish numbers in ponds due to cannibals.

Discussion

We doubled the capacity of the ponds with this years harvest of 1,151 pds as compared to the harvests of 2005 (511 pds) and 2006 (507 pds). But, due to the increased holding time this year the total number of fish harvested (9,606) fell between 2005 (11,744) and 2006 (7,876) harvests. The 2007 extended growth walleyes were larger and heavier than the previous years.

Implications of this in walleye rearing and management suggests that you can produce approximately 500 pds of Extended Growth (EG) walleye in a 0.4 acre outdoor earthern pond. Size and number of fish will be determined by time of harvest from the pond, initial stocking numbers, good water quality parameters, and proper feeding protocol.

For 2008, we hope to replicate the poundage produced in each pond but will harvest the EG walleyes earlier in the fall resulting in higher numbers of fish to meet target quotas.

Acknowledgements

Special thanks go to Paul Christel and Bill Nebel at LCO Natural Resources Department for working with us on this project. Also would like to thank the WiDNR Tommy Thompson State Fish Hatchery for helping us collect walleye eggs on behalf of LCO to start the project. Carey Edwards and Gervase Thompson from the Les Voigt and Brule River State Fish Hatchery and Francis Cadotte from the Red Cliff Tribal Fish hatchery assisted LCO with hauling the fish. Mark Duffy, Larry Deragon, and Shelly Gurnoe assisted with harvesting of fish. NADF technicians Kendall Holmes and Dan Duffy were assisted by college interns, Abby Purdee (UWSP) and Ryan Huber (UWSP) to provide the necessary expertise monitoring ponds, sample counting and harvesting walleyes to complete the project.

Questions or comments regarding this project can be directed to Gregory Fischer, NADF Facility Manager, at 715-779-3461 or email gfischer@uwsp.edu

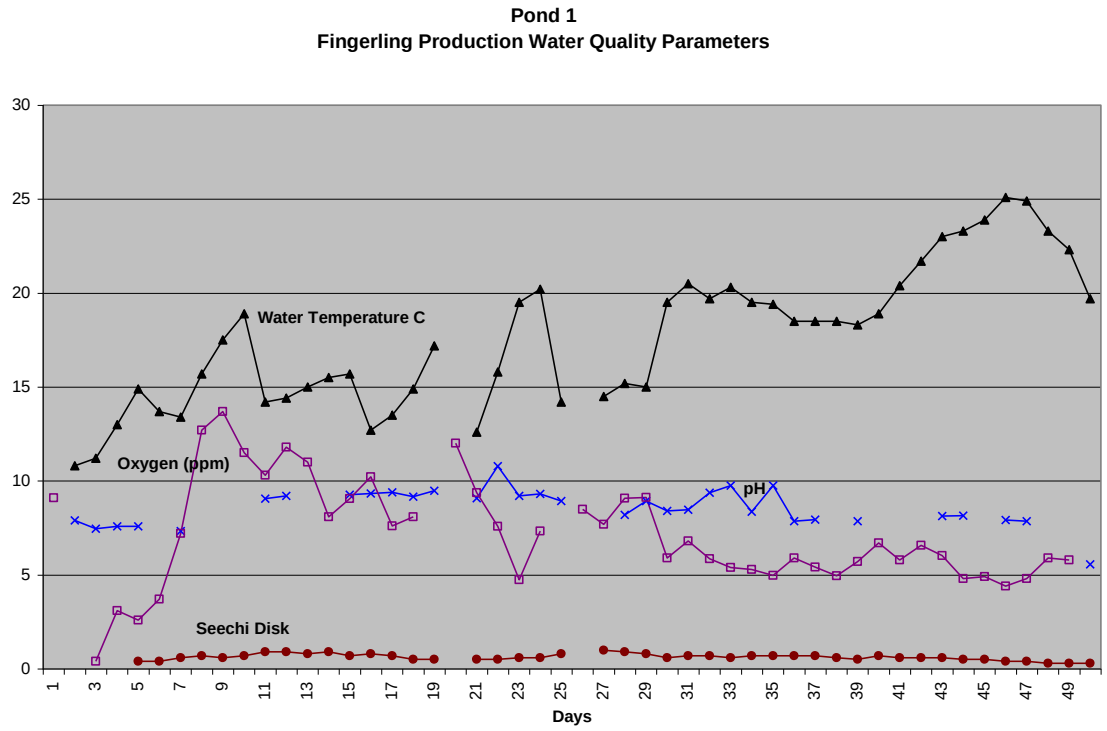

Figure 1.

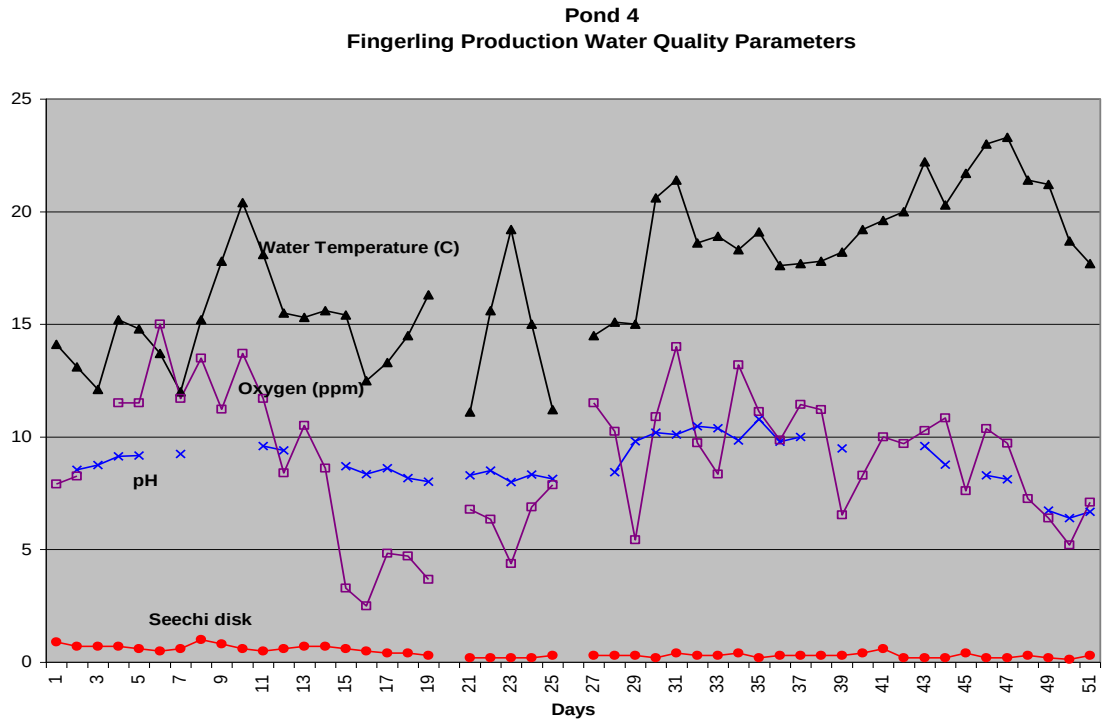

Figure 2.

Pond 2
Advanced Growth Fingerling Production
Water Quality Parameters

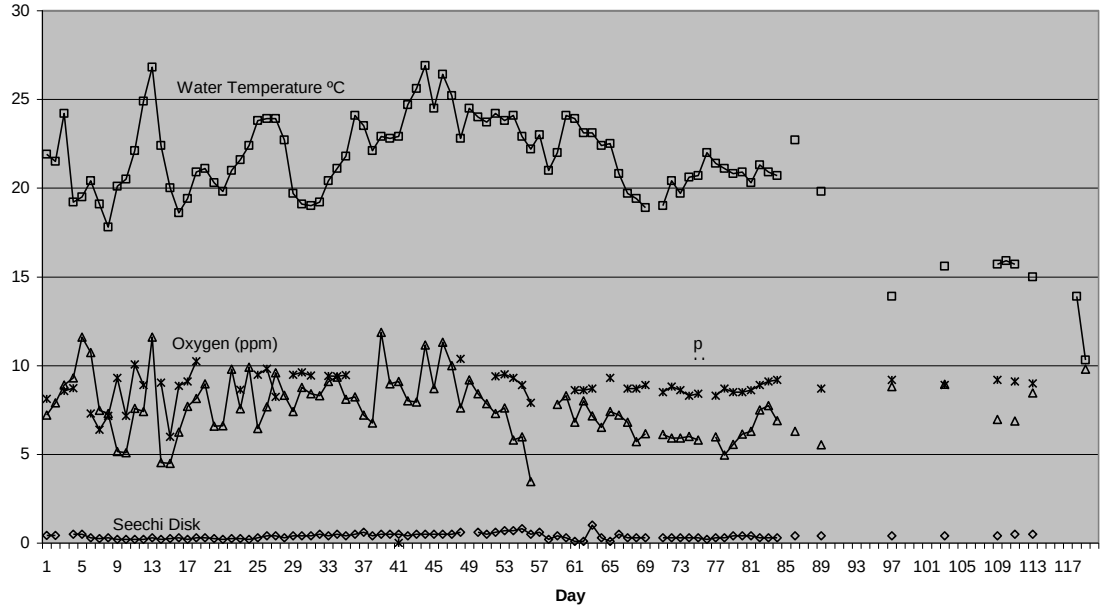

Figure 3.

Pond 3
Advanced Growth Fingerling Production
Water Quality Parameters

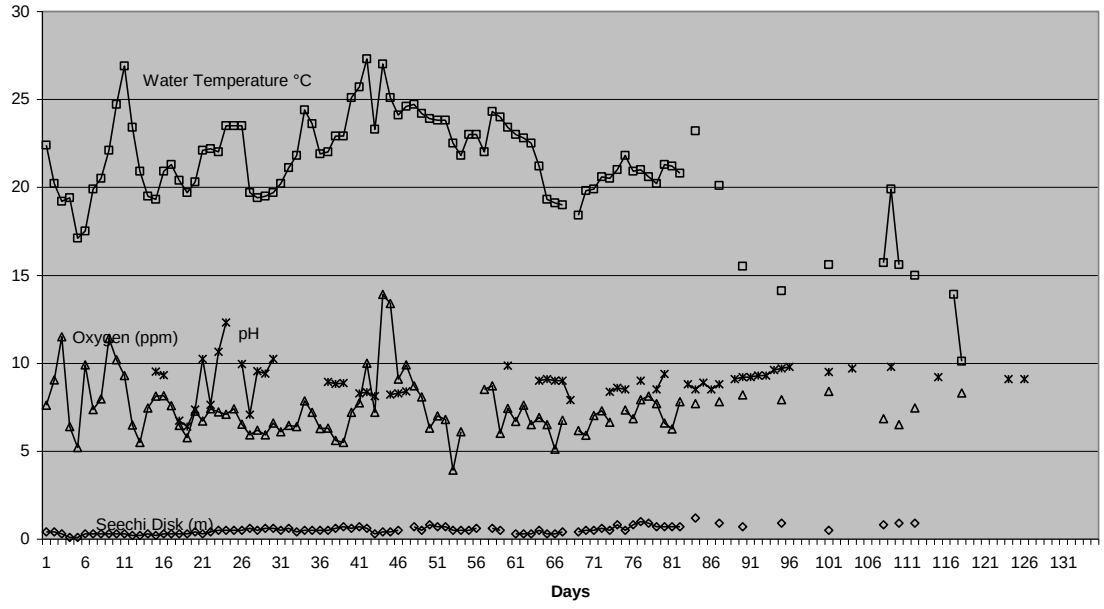

Figure 4.