Muskie Hatchery Stirs Interest in Aquaculture at Fleming College

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No one thought that in its first year of production, a tiny 6-tank muskellunge (*Esox masquinongy*) research facility would produce more than 200 fall fingerlings for reintroduction into Lake Simcoe, located in southern Ontario. The research facility, which was converted from a college classroom into a hatchery, is located at Sir Sandford Fleming College (SSFC) in Lindsay, Ontario. It is part of a collaborative effort aimed at restoring muskellunge populations for the Lake Simcoe Muskellunge Restoration Project and for restoration efforts in the Green Bay, Wisconsin. Among a host of partners, the main organizations involved are Muskies Canada Incorporated, an organization dedicated to muskellunge sports fishing and research, and the Ontario Ministry of Natural Resources (OMNR).

The muskellunge rearing program has been guided by fish and wildlife program coordinator Al Chamberlain and supervised by fisheries technician and instructor Sasha Fernando. The facility is staffed with student workers and committed student volunteers. The program is based on rearing methods and culture techniques pioneered by Chamberlain as part of successful muskellunge restoration efforts in Spanish River, Ontario.

One of the key elements of the hatchery was to design and construct a facility based on a budget that may be realistic for smaller fish culture enthusiasts and sport clubs to reproduce and successfully rear fish. Each tank was built out of marine grade plywood reinforced with a series of 2x4s and lined with a fish friendly pond liner. Rearing units are 100% recirculation, with water quality being maintained by a single submersible pump filtering water through a series of bio-filters. Two bio-filtration aerators and a strict daily routine of observing fish behavior, siphoning waste and waste feed, and adding make-up water also contributed to the facility's success. The other important aspect of this facility was the design of a multi-stage rearing system that significantly decreased levels of stress by reduced handling of fish. This system consists of rearing units that allow next to no physical handling of the fish from egg incubation to the grow-out stage.

The eggs were taken from a wild egg collection on Georgian Bay of Lake Huron from healthy self-sustaining populations of muskellunge determined to be genetically suitable for the target stocking sites by the OMNR. The eggs were brought in no more than two hours after fertilization in the field. Eggs were incubated in linear egg trays that were held within early rearing units. Once the eggs were hatched out, the sac fry were transferred to early rearing units by simply inverting the trays while still immersed in water. Depending on size, densities, and survival rates of individual families, the early rearing units were then replaced by advanced rearing units (larger versions of the early rearing units). The transfers were carried out in a similar fashion, inverting early rearing units into advanced rearing units. Again,

Early rearing units with egg incubating trays

Continued on page 93

Continued from page 58

once the muskellunge reached the appropriate size and density, the advanced rearing units were finally removed for fish to occupy the full tank. Early and advanced rearing units were constructed from industrial plastic barrels cut in half lengthwise with six windows cut out and covered in specific sized mesh to allow for water circulation. Rearing units were kept afloat in the main tanks by attaching strips of Styrofoam to the sides.

The muskellunge were fed with pellets from swim-up and converted to live feed one to two weeks prior to stocking at the fall fingerling stage. Pellets were presented to the swim-up fry through the use of clock feeders placed on top of floating mounts directly in early and advanced rearing units. To stimulate feeding, one-inch air stones were placed underneath the clocks to create water flow. This put pellets in motion as they dropped into the water column, mimicking the aquatic organisms that muskellunge feed on. This was the basis of feeding throughout the early rearing to advanced rearing stages. Clock feeders were eventually changed to 12-hour belt feeders when the muskellunge were released into the full rearing tank. Aerators, also acting as bio-filters, were placed directly under belt feeders to create water flow. Again, this gave the pellets some action as they dropped into the water, stimulating the predatory ambush instincts of the muskellunge, as they look for movement in their food. The fry started on a 0.3 mm pellet and eventually moved on to 2.5 mm before they were introduced to live feed.

At the early and advanced rearing stages, densities were kept high to stimulate pellet feeding. This was also meant to increase the mimicking behaviors fish display during the feeding process. This proved to be a very successful method in rearing the muskellunge to grow-out stages. As part of the process, strict daily observations were made throughout each stage of the rearing period due to the carnivorous nature and high risks of cannibalism among muskellunge. Any fish displaying cannibalistic behavior were removed immediately and transferred to tanks designated as "cannibal tanks" for a second chance at pellet feeding.

When converted to live feed, referred to as the naturalization process, substrate was added to the rearing tanks acting as natural cover for the muskellunge to further stimulate predatory instincts. Live feed was then added using a ration of three to four minnows per muskellunge per day, size graded to a ratio of four to one (i.e., a four-inch muskellunge can consume a one-inch minnow). Outdoor ponds on the Fleming campus that support a self-sustaining population of fathead minnows (*Pimphales promelas*) were used for feeding during the naturalization process. These minnows were harvested as necessary through a variety of netting and trapping methods, mainly seining and clover traps.

After the one to two week naturalization process, the muskellunge were tagged with coded wire tags (CWTs). They were then transported and released the same day or given a recovery period, being held in the facility for another week before stocking. Considering the recreational value of these fish, the CWTs will be treated as a presence or absence mark by use of a metal detector if encountered in the field during fisheries assessment and management projects.

After a very successful pilot year, producing close to 3,000 fish, and to date stocking approximately 1,600 fall fingerlings averaging 7–10 inches, the SSFC facility will continue in its 5-year venture with all the associated organizations. In the near future, the college will hopefully incorporate the cool water fish culture practices being developed into the Fish and Wildlife Technician and Technologist programs and other aquaculture-based courses. It is anticipated, with continued success, that this hatchery will develop into a research facility with the capabilities of exploring the many aspects of muskellunge and cool water culture and education in Canada. A once waning interest in aquaculture is now barely evident at the college, with the newly developing muskellunge hatchery and directly next door, a cold water facility rearing salmon for the Lake Ontario Atlantic Salmon Restoration Program. Interest is very high as fish and wildlife students and many other students that attend SSFC for a variety of programs related to the environment and natural resources line up for involvement, or at least to take a look at the fish.

Presently the college facility is nearing the end of its first cycle but is now exploring uncharted territory, holding 100 pellet-fed fall fingerlings to the yearling stage for release in the spring of 2008. ☙