Ministry of Natural Resources and Forestry
Ministère des Richesses naturelles et des Forêts
Ontario

Fish Culture Technical Bulletin
Best Management Practices

WALLEYE HARVESTING, TRANSPORTING, AND STOCKING PROCEDURES [1.]

Termination of the pond culture portion of a walleye project necessitates fingerling removal for stocking purposes. Exactly when walleye should be removed and the harvesting method remains a topic of discussion. Improper handling methods can kill delicate walleye fingerlings, particularly when water temperature is above 25°C. Before examining the methods used to harvest walleye, determination of the exact time of harvest is required.

It is generally conceded that walleye fingerlings become piscivorous (fish eaters) during their first summer, after consuming a diet of crustacean zooplankton and chironomid larvae. Walleye fingerlings select progressively larger feed items and piscivory is usually associated with a length of approximately 40-50 mm. Harvest usually occurs at this length or culturists will face cannibalism (as walleye seek out prey larger then chironomid larvae), or emaciation of fish (as fingerlings spend an inordinate amount of energy attempting to satisfy their own requirements with zooplankton or chironomid larvae).

Two comments should immediately come to mind when dealing with attempts to delay harvest. Firstly, cannibalism may be avoided if fish are cropped (partial harvest) and the remaining group retained at a low density. MNR's experience holding fish beyond 40-50 mm has been that walleye will grow in length but their condition factor, that is the ratio of weight to length, is very low. Some groups have reported that they are able to hold fish without cannibalism and with no appreciated loss of condition factor. If this is the case, then by all means continue culturing walleye but continue sampling as well. Check condition factor of the fish using the following formulae:

$$Condition Factor (\mathrm{K}) = \frac{weight\ (g)}{(fork\ length)^3\ (cm)} \times 100$$

If a value of < 0.8 is encountered and fish are > 55 mm you should consider harvesting and stocking fish.

Secondly, keep in mind that walleye held beyond the normal 40-50 mm may well have an excellent K value but this could be due to cannibalism! When performing weekly fish sampling, record the length and weight of individual fish, and take a look at the stomach contents.

Cannibalism problems can also occur at a shorter period of time than the usual 5-6 week rearing period if zooplankton populations collapse ("crash"). If attempts to rehabilitate a zooplankton population fail, then harvest of fingerlings should be given serious consideration. A small percentage of cannibals are more the norm than the exception, while significant numbers of cannibals suggest a harvest in is order.

HARVESTING WALLEYE

A. DRAINABLE PONDS

The advantages of a drainable system are particularly evident during the harvest period. Water levels can be drawn down and fish concentrated so their removal is relatively quick and efficient. Concrete sluiceways, such as those utilized at Blue Jay Creek Fish Culture Station, are a particularly effective method of confining fish. Most individuals working in walleye culture do not have the luxury of drainage sluiceways (or of drainable ponds). However, if you have the ability to control water level you will have a distinct advantage over those groups dealing with a non-drainable system.

Once the decision has been made to harvest, the first step is to commence the pond "drawdown". Start slowly at first, if you have a stop log system take out 1 log at a time. With quarter hectare ponds, draw down to seining levels over a 24-hour period. Smaller ponds may be drawn down in 6 hours or less. As the drawdown process continues, filamentous algae will begin to concentrate in the remaining water. This is a good time to get volunteers to remove algae using pitchforks, rakes etc. and pile the algal mass on the side of the pond. The more algae you can remove by hand, the less will remain to concentrate in your net and consequently stress your fish.

Water should be drawn down to a level of approximately 60-90 cm (2-3'). The easiest method for collecting fish from the shallow water is through the use of a seine net (Figure 1). Seine nets should be long enough to completely encircle the pool that remains in a drained pond. Seine net mesh is usually 1/8-3/16" with the width of the seine approximately 3-4'. Once the pond is drained to the 60-90 cm level, you may commence the seining procedure.

Fish Culture Technical Bulletin
Best Management Practices

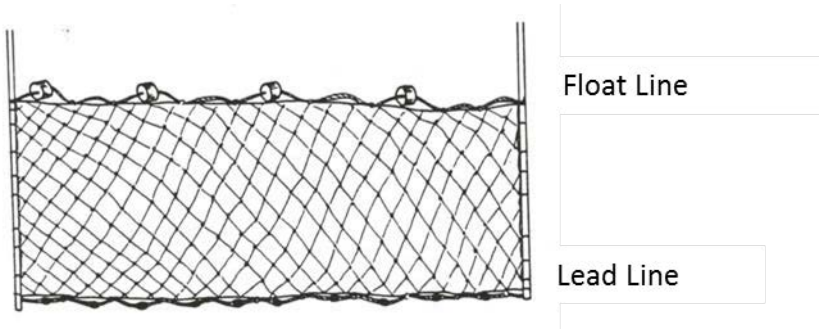

Figure 1. Seine net.

Equipment required: Seine net (¼" mesh)
Tubs Dip nets
Transportation tanks (see next section)
Oxygen cylinder

Procedure:

1. Fill two tubs with approximately 40 litres (L) of fresh water and place them on the side of the pond opposite of where you will commence seining. Using two people (A and B) each holding one end of the seine, slowly begin walking towards the tubs (Figure 2).
2. Approximately half way across the "pool" the two people should begin to walk towards the tubs. Trapped walleye will attempt to escape. If you have extra staff available, they might walk around the outside corner preventing walleye from swimming out.
3. As you approach the tub(s) make sure the lead line is ahead of the float (see Figure 1)

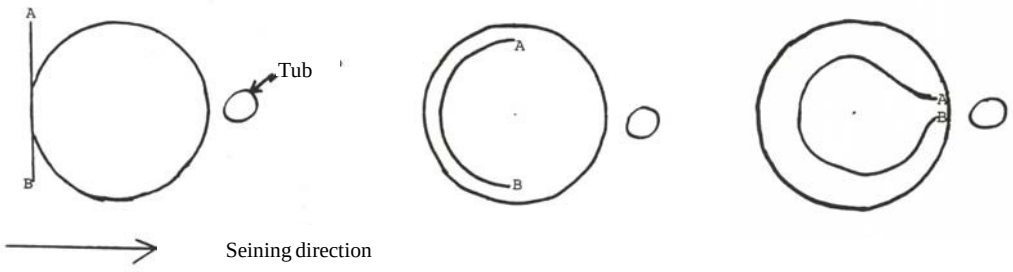

Figure 2. Pond seining.

4. When the two people have converged upon the tub they will reach a point where they simply run out of pond to seine. At this point, the lead and float line of the seine should be lifted QUICKLY so that a seine "bag" is formed. This prevents trapped fish from escaping.
5. There are now two options – lift the seine out of the water and carry it to the tub OR dip net the fish out of the seine into the tub. The "lift" system is momentarily stressful but it allows walleye to be placed in a washtub quickly and expedite the transfer to a raceway or holding unit.
6. Whichever method is chosen, there will soon be a tub full of walleye, aquatic vegetation, insects, etc. ACT QUICKLY to transfer this menagerie to fresh, clean water.
7. Algae, water boatmen, etc. can be removed by hand or by dip net. Make sure algae is removed from the raceway or else it will clog screens and drains.
8. If placing the tub directly into a transportation unit (information regarding transportation unit density is presented in the next section), the same conditions apply – get rid of the algae, boatmen, etc. and make sure oxygen is bubbling into the unit.
9. Repeat the seining process until the number of fish remaining is negligible.

Comments on seining

- Seining requires practice to become efficient and minimize the number of "drags" one must perform before the pond is empty.
- Watch the lead line! Make sure it remains on the bottom – if individuals using the seine are too far apart and move to fast, the lead line will come off the bottom and fish will escape. Watch to see the lead line does not get caught up on sticks, rocks, etc.

B. NON-DRAINABLE PONDS

Harvesting non-drainable ponds presents a unique challenge to the fish culturist. Non-drainable ponds may be harvested using a number of methods, however, the two most common are seining or through the use of impoundment gear such as a hoop or fyke nets.

Seining a large non-drainable pond often involves motor boats, larger seines, etc. but the principle used with non-drainable ponds is the same as drainable ponds.

Evening seining has proven to be an effective method of removing walleye from ponds in Parry Sound District. Walleye fingerling will migrate to the surface of the pond at dusk and periodic cropping enables the fish to be harvested over time.

Fish Culture Technical Bulletin
Best Management Practices

TRANSPORTING

Transportation of walleye fingerlings to the stocking site is a relatively simple procedure, yet the conditions imposed upon fish during transportation can make the difference between a successful and unsuccessful planting. Minimizing stress is the obvious goal of fish transportation, but the culturist should be aware of the particular stresses which can affect fish quality. This section will deal with weighing fish and loading transportation units, transporting walleye fingerlings, and stocking fingerlings

LOADING FISH FOR STOCKING

Equipment required: Transportation units (see next topic)
Tubs or garbage pails
Platform balance (100 kg if possible)
10-20 kg balance
10 L bucket

Procedure:

1. Determine number of fish per kilogram (kg).
   - Fill 10 L bucket.
   - Tare (zero) 10 kg balance and set for 500 grams (g).
   - Randomly dip net walleye fingerlings from raceway or holding unit.
   - Gently shake dip net after removing from unit and discard excess water.
   - Net walleye until 500 g or more is reached. (If 500 g of fish is exceeded, do not pick fish out, rather re-adjust scale until balance is level).
   - Quickly hand count fish into transportation unit and record number. For example if 600 fish weigh 500 g, then the average weight is 0.83g/fish.
   - Repeat this sampling at least two additional times. Calculate average of three samples and if < .05 g/fish difference, terminate sampling, otherwise re-sample.
   - Remember to determine the average weight of the fish for each pond.

2. Load fish into transportation units.

   - When the average weight of the fish has been determined, the number of fish destined for the stocking site can be loaded. Use the following formula:

     Total amount of fish to weigh (kg or g) = # fish required x ind. fish wt. (g)

For example, “Gull Lake” is to receive 10,000 fingerlings (stocking rate is 100-125 fish per hectare). It has been determined that the fish weigh 0.8 g/fish, then the weight of fish to load is 10,000 fish x 0.80 g/fish = 8,000 g or 8 kg.

- Use the large platform scale with garbage pails or tubs.
- Fill garbage pail approximately 1/3 full of water and tare (zero) scale.
- Load fish in 5 kg intervals – load transportation units at 20-25 g/L fish.
- Remember to minimize the amount of time fish are actually in a garbage pail/bucket/tub, etc. Fish should be kept in the holding unit or in the transportation tank. The weighing period should be extremely brief.
- Keep an eye on the fish during the weighing period. If they start to roll, terminate weighing as soon as possible and return the fish to the holding unit for recovery.

TRANSPORTATION UNITS

Transportation units have been constructed from a variety of insulative materials, however, the most commonly used today is fibreglass. Fibreglass tanks have an excellent insulative capacity and are easy to clean; however, they are expensive and may be out of reach of most district walleye project budgets. An economical alternative is the standard ¾” plywood tank. Although the insulative capacity of plywood is not as good as fibreglass, the tank may be used on short haul trips (<150 km) with block of ice used to moderate water temperature. Transportation units should have a bottom drain and a hinged lid. A hole is cut in the lid section and a metal dish with drilled ¼” holes suspended for the placement of block ice. Fibreglass cloth is used around seams and corners to prevent leaks. The unit should be painted a light colour in order to reflect sunlight (heat). The inside of the transportation unit should also be smooth with an easy to clean, and disinfect, surface.

Water quality

The most important water quality parameters to consider when transporting walleye fingerlings are temperature and oxygen. Walleye fingerlings are generally harvested during the warmest temperature of the year; consequently, their metabolic rate will be at its highest while oxygen solubility will be at its lowest. Steps must be taken to avoid potentially lethal problems that can occur between the loading site and the stocking site.

Temperature

As mentioned, an easy and effective method of controlling transportation unit temperature is through the use of block ice. Never place a large block of ice directly in the water of a transportation unit, but in a drip tray suspended over or integral to the lid. Walleye should be shipped in the 19-21°C temperature range if possible. Fish culturists should stop and check water temperature with a hand held thermometer every half hour. If temperature begins to rise, ice blocks may be broken into small chunks to melt faster or, as a last resort, crushed and placed directly in the unit.

Oxygen

Oxygen is an even more important parameter than temperature because adequate oxygen levels may suppress some of the deleterious effects of ammonia and CO_2 (metabolic waste products). Oxygen concentration should be kept at 6 ppm or higher to avoid potential problems.

Perhaps the most common method of aerating transportation units is through the use of a compressed oxygen cylinder and an oxygen stone or plastic tubing. Oxygen is bubbled directly into the unit with the flow rate controlled by a regulator valve. An effective flow rate should cause the water to bubble, but not boil.

Additional advice on transportation of fingerlings may be obtained from local ministry fish culture station staff.

Comments on Transportation

- Disinfect all transportation units before loading with water – use a single or dual quaternary ammonia compound and RINSE well.
- Always start oxygen bubbling BEFORE weighing any fish. Initial oxygen demand is very high as fish are stressed from handling, weighing, etc. Starting the oxygen flowing prior to the introduction of fish minimizes the risk the fish will undergo due to oxygen debt.
- Stock fish as soon as possible after removal from the pond to minimize stress.
- Again, use common sense – keep an eye on the fish and look for signs of stress (i.e. fish gasping near surface of tank). Increase oxygen flow rate if necessary.

Fish Culture Technical Bulletin
Best Management Practices

STOCKING WALLEYE

When the stocking destination is reached, a few simple procedures are required before releasing fish. The temperature of the water should be taken and compared with the transportation unit. It is good practice for a bucket of water from the stocking site to be added to the transportation unit every 5 minutes until temperature is identical.

The best site to release walleye fingerlings is an area of discussion. Since fingerlings occupy a weeded shoreline habitat, this area is the obvious release point. After releasing fingerlings observe their behaviour and remain at the stocking site for a few minutes until they have recovered. Fish will sometimes take a few moments to recover from the stress of transportation and handling. Your presence at the stocking site might be sufficient to discourage predation.

[1.] Adapted from: Walleye Culture Manual. OMNR, 1986. Peter D. Richard and Julian Hynes.

Fish Culture Technical Bulletin
Best Management Practices