Fish Pond Management (Acre) 399

DEFINITION

Managing impounded water for the production of fish or other aquatic organisms.

PURPOSES

- Provide favorable habitat for fish and other aquatic organisms.
- Develop and maintain a desired species composition and ratio.
- Develop and maintain a desired level of production.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to warm-water and cold-water ponds, lakes, and reservoirs not managed for commercial aquaculture purposes.

CRITERIA

General Criteria Applicable to All Purposes

All measures implemented under this practice shall comply with all applicable federal, state, local, and tribal laws, rules, and regulations.

Federal and state threatened, endangered, candidate, rare, and other sensitive species shall be carefully considered in aquatic habitat improvement and included in the management plan. No plan shall have long-term adverse effects on threatened or endangered species or species of concern.

All practices implemented under this practice shall meet or exceed the requirements of the appropriate standard; i.e., a constructed pond will meet or exceed the requirements in the Pond Standard (378).

The site will be protected from flooding, sedimentation, and contamination.

Undesirable aquatic vegetation shall be controlled.

Criteria to Develop and Maintain a Desired Species Composition and Ratio

Stocking rates and species selection and combinations shall depend upon the size, depth, water temperature, and water quality of the area to be stocked.

Species selection(s) and stocking rates shall follow a pond management plan developed with the client and in accordance with Table 1.

Criteria to Develop and Maintain a Desired Level of Production

The desired level of production shall be maintained through liming, weed control, harvesting methods, and maintaining aquatic organism health. Desired water quality condition shall be addressed in the pond management plan.

CONSIDERATIONS

A desirable fishery can be sustained in properly designed and managed ponds. The one outstanding reason for poor fish production in ponds is lack of adequate management. Even when ponds are built to specifications and properly stocked, continued management and maintenance are essential to sustaining desirable yields.

Consider the potential impacts on the pond and fishery resources from land use activities in the watershed. Consider the impacts of sediments, nutrients, and pesticides on the aquatic organisms.

Consider the effect on additional uses (e.g., livestock watering, recreation, irrigation, etc.) on the fish and/or aquatic organisms.

Consider the use of native species. Precautions will be considered to prevent the fish in the pond, lake, or reservoir from escaping into adjoining waters.

Cold-water fisheries such as trout require a normal water temperature range of 50°-65°F (10°-18° C) with a surface water temperature that rarely exceeds 72°F (22°C).

Consider the provisions needed for the treatment of water released from the pond to be in compliance with applicable federal and state discharge requirements.

Consider providing additional fish and wildlife habitat within or around the impoundment for cover and breeding purposes.

PLANS AND SPECIFICATIONS

Specifications for this practice shall be prepared for each site. Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation. The plan will include a location map and plan view of the site; statement of purposes; permit requirements; evaluation methods for determining the population dynamics; and the kind, amount, or quality of materials to be used.

Watershed Protection and Adjacent Habitat Development

The quality of pond water and the aquatic life it supports is greatly influenced by the surrounding land use and drainage area. The drainage area must be protected against erosion and excessive nutrient runoff. The water in ponds shall be protected from contamination from barnyards, septic tanks, or other sources.

Ponds influence the abundance and diversity of wildlife on adjacent land. Therefore, ponds and adjacent land should be planned and managed as a component of a resource management system that considers overall environmental impacts, as well as land use objectives.

Livestock Exclusion

Livestock shall be excluded from the pond unless a livestock watering facility is developed to provide the animals with controlled access to the pond.

Management for Fish

1. Species Selection and Stocking Rates

a. Cold Water Ponds

Normal water temperature is cooler that 18°C (65°F) and surface water temperature rarely exceeds 22°C (72°F). Rainbow trout are most suitable. Brook trout are suitable but often have a lower survival rate than rainbow. Brown trout are suitable and are tolerant to higher temperatures than either rainbow or brook, but are more difficult to catch.

Table 1 provides guidance in determining initial stocking rates for ponds of medium fertility. Use lower stocking rates for less fertile waters and higher rates for fertile waters. A simple test for alkalinity will give an indication of fertility. Consider the medium fertility range of 40-120 mg/l of $CaCO_3$ alkalinity. Trout normally do not reproduce in ponds, so restocking should be planned at 2-3 year intervals, depending upon growth and harvest rates. If adult trout are present, do not restock with small fingerlings.

Commercial fish production, hatcheries, or raceways require more detailed analysis to determine stocking rates and a fisheries biologist should be consulted.

b. Warm Water Ponds

Historically, largemouth bass and bluegill have been the most popular fish to stock in warm water ponds. In light of management problems, bluegills should only be stocked when population controls are planned. Hybrid sunfish are being used with success and are available commercially. Forage fishes such as golden shiners or fathead minnows, when stocked with largemouth bass or channel catfish, will result in earlier development of catchable-size fish. Other warm water species including channel catfish, yellow perch, and redear sunfish may be stocked. Northern pike, muskellunge, walleye, crappies, and bullhead are not recommended in ponds less than 2 acres in size. It is illegal to stock grass carp or White Amur in Michigan.

Table 1 provides guidance in determining initial stocking rates according to pond size. Largemouth bass and bluegill, if properly managed, should not require restocking since reproduction will replenish harvest. Channel catfish may successfully reproduce if provided secure nesting sites such as nail kegs, drain tiles, milk cans, or hollow logs. Hybrid sunfish require restocking, but do not restock with small fingerlings if adult bass or channel catfish are present.

2. Supplement Feeding

Natural food supplies in the pond will sustain the fishery stocked at the rates shown in Table 1. With intensive management and supplemental feeding, higher fish populations and harvestable yields can be produced. Feed should be provided at the same time and from the same place every day during the growing season. The optimum growing season for trout can be considered to be the period when water temperatures range from 10°-18°C (50°-65°F) while for channel catfish and sunfish the optimum growing season can be considered that period when water temperatures are above 15°C (60°F). Hybrid sunfish respond well to supplemental feeding. Only offer the amount of food that can be consumed in 15 minutes. Excess food will be harmful to water quality.

3. Fish Population Control

Maintenance of a “balanced” fish population requires careful management. Managing the harvest is most important in warm water ponds stocked with several species of fish. Aquatic plant control described in another section is a prerequisite to fish population control.

a. Cold Water Ponds

In trout ponds harvest 25 to 50 fish/ac./yr. depending upon growth rate and planned restocking. Records must be kept of fish removed. Natural mortality should be accounted for in that 20 to 50 percent of the fish may die annually after reaching 8 inches in length.

b. Warm Water Ponds

Maintaining a "balanced" population of largemouth bass and bluegill is difficult but possible. Overharvesting of bass is a leading cause of stunted panfish populations. Bass must not be fished until they have had a successful spawn, generally occurring the second or third year after stocking. In fertile ponds, harvest no more than 35 lbs/ac/yr. of bass and in less fertile ponds no more than 25 lbs/ac/yr. Records must be kept of fish removed.

Manage the bass harvest to sustain a "balanced" population consisting of individuals in all year classes. It takes 4 to 5 lbs. of forage fish to produce 1 lb. of bass. A "balanced" bass population will serve as a check on the panfish or forage fish.

TABLE 1 - FISH STOCKING

Species	Size-inches	No./Ac	Dates
COLD-WATER PONDS			
Trout	2 - 4	125 - 200	April - May
Trout	4 - 6	90 - 150	September - October
Trout	6 - 10	80 - 130	April - June
WARM-WATER PONDS			
Largemouth or Smallmouth Bass alone	2 - 4 6 - 10 12	100 25 - 50 6 - 8	July - August April - October October or May
Bass with minnows	2 - 3	500 adult minnows, then after minnows spawn, stock bass as above	April - May July - August
Largemouth Bass with bluegills-sunfish hybrid	1 - 2	Stock bass as above and 500 fingerling hybrids	July - August
Channel Catfish with minnows	2 - 3 2 - 4	500 adult minnows, then, after minnows spawn, 100 fingerling catfish	April - May July - August
Largemouth Bass Bluegill Channel Catfish (Pond >0.75 acre)	5 - 6 1 - 2 2 - 4	100 500 100	July - August

Bluegill and channel catfish may be harvested as soon as they are considered big enough to eat. A good pond should yield 200-300 fish/ac/yr. Channel catfish and hybrid sunfish will require periodic restocking, depending upon the rate of harvest. In some ponds, particularly neglected ponds, total fish eradication and restocking may be necessary. Completely draining the pond for two weeks is recommended.

Fish toxicants are approved for use in Michigan but a permit for their use is required for ponds with outlets in Michigan or ponds of joint ownership.

4. Water Quality Management

The following practices may be useful in certain situations. Consult with the NRCS State Biologist or DNR Fisheries Biologist before making recommendations.

a. Aeration

Commercial aerators or circulators may be needed to prevent fish kills or add oxygen to groundwater-fed ponds. Aerators or circulators will allow ponds to support fish at shallower depths than the recommended 10-12 feet of water.

b. Fertilization

Fertilization of waters in Michigan is generally not recommended.

c. Clearing Muddy Water

If fish are present, apply hydrated calcium sulfate (agricultural gypsum) at the rate of 525 lbs. per acre foot. Do not use quicklime or gypsum board.

5. Aquatic Plant Control

Aquatic plant control is often needed even in properly designed and constructed ponds. Chemical control is short-lived and sometimes requires more than one treatment per year. Attack the cause of the problems before or concurrent with pond treatments. Nutrient rich water is a common cause of luxurious aquatic plant growth. An intensive effort should be made to prevent nutrient sources such as runoff from barn lots, runoff from agricultural fields, and runoff from fertilized lawns and underground sources such as malfunctioning septic systems, from entering the pond. The following techniques may be useful in treating nuisance aquatic plant growth:

a. Mechanical Removal

Physical removal can be accomplished by hand-pulling and raking or with commercial weed cutters and harvesters. Hand-pulling and raking can be effective in small ponds or spot treatments on such areas as swimming beaches. Commercial weed cutters and harvesters are usually too expensive for use in ponds. Mechanical removal allows for immediate use of the harvested area, and plants removed from the water are not available to deplete dissolved oxygen. Filamentous algae and macrophytes can be removed mechanically.

b. Habitat Manipulation

1. Floating 8 mil black plastic on the pond surface for 4 weeks has proven successful in controlling pondweeds, coontail, and water milfoil. However, this technique has failed to control Chara and emergent macrophytes. Treat only 1/3 of the pond at a time.

2. Shading with dyes is still considered experimental and has mixed results.

3. Dredging: Properly designed and constructed ponds will not have shallow areas requiring dredging. However, as a renovation technique, dredging shallow water areas to a depth of 6 feet in cold water ponds and 14 ft deep in warm water ponds will minimize rooted macrophytes. Sloping shorelines on a grade of 2:1 will minimize suitable habitat for rooted macrophytes.

4. Sand Gravel Blanketing: To reduce rooted aquatics in small ponds or isolated areas such as swimming beaches, perforated black plastic blanketed with sand and gravel has proven somewhat effective. The minimum thickness plastic recommended is 8 mil. Gravel provides a less desirable substrate for plants and should be used in place of sand, where possible.

c. Chemical Control

1. Prudent use of approved chemicals can be an effectively environmentally safe

technique for controlling aquatic plants in fishponds. Two questions must be answered before making recommendations. First, what use is being made of the pond and pond water? Second, what plant or group of plants are to be controlled? These two answers greatly influence the selection of the chemical(s) to be used. Herbicides recommended for water weed control carry complete instructions for their use on the container label. Special restrictions vary greatly among different herbicides. READ THE ENTIRE LABEL BEFORE APPLYING.

2. Some aquatic herbicides are classified as a "restricted use pesticide" and require a person applying and purchasing the herbicide to be a certified applicator.

3. See Michigan State University Extension Service publication, E-1554 "Managing Michigan Ponds" for recommendations for aquatic herbicides.

4. Only treat up to 1/3 of the pond with herbicides at a time to reduce the amount of decaying vegetation that leads to low dissolved oxygen levels.

OPERATION AND MAINTENANCE

Develop an operation and maintenance plan that includes the following actions that are required for the successful management of the pond, lake, or reservoir:

1. Evaluation of habitat conditions on a regular basis;

2. Management of fish and other aquatic organisms including removal of undesirable and overpopulated organisms;

3. Management and control aquatic vegetation;

4. Monitoring and maintenance of desired water quality conditions;

5. Periodic inspection and maintenance of structure components; and

6. Detection and identification of fish pathogens and instructions for collecting and preserving samples.

REFERENCES

- Managing Michigan Ponds for Sport Fishing, Extension Bulletin E-1554, Revised April 1994.

- Catfish Farming, USDA Farmer's Bulletin No.2260.

- Inland Fisheries Management in North America, Second Edition. Chapter 21, Small Impoundments. Kohler, C.C and W.A. Hubert editors. American Fisheries Society, 1999.

- Fish Stocking Combinations for Farm Ponds. SIU Fisheries Bull. No 4, Fisheries Research Laboratory, Southern Illinois University, Carbondale, Illinois.

- Suggest Procedures for the Detection and Identification of Certain Finfish and Shellfish Pathogens (Blue Book) Fish Health Section, American Fisheries Society, 2004.