

large, fast-growing fish as do the warmer ponds in southern states.

## Investigation and Planning

Undertake pond construction and management only after thorough study of the situation. After reading about ponds, examine the pond (or potential pond sites) in as much detail as possible. Several sections of this bulletin suggest characteristics of the pond and its fish population that can be measured and analysed. Consider hiring a professional fishery biologist to analyse the pond and devise a management plan.

Pond design and construction are highly important to the success of the fishery. If you intend to build a pond, see the section on that subject in this bulletin and contact the U.S. Soil Conservation Service office in your county about engineering design services.

## Management Overview

After planning carefully, act with moderation. Overmanagement and applying management techniques simply because the manager knows how to do them (or is fascinated by the activity) are common mistakes that may detract from efficiency and success in achieving a desirable fishery. Knowing when to leave things alone is important.

The usual steps in managing a Michigan pond for fishing are:

1. Build or rebuild for best depth and slopes (Chapter 3).
2. Eradicate all fish in the pond (Chapter 9).
3. Stock suitable fish (Chapters 5, 6, 7, and 8).

If it is a trout pond, restocking will generally be done each year. If it is a warmwater pond, the fish (unless hybrids) will almost always reproduce, and no further stocking should be done—except when panfish are used, whereupon overpopulation and stunting usually occur, and the population must be “renovated” by eradication and restocking.

The interrelated ideas of **balance** between predator and food organ-

isms and of the **happy medium** or having the right amounts (rather than too much or little) of certain things in the pond are important to management for sustained quality of fishing. To maintain the pond as a good place for fish to live, water fertility, other chemical characteristics, and temperature must stay within certain limits—and there will be a happy medium for each pond condition where fish will best thrive.

There can be too little water fertility, a range of fertility in which the pond life functions well, or too much fertility. With too little fertility, not enough plant and animal life will grow to feed many fish. With excessive fertility (all too often the case in Michigan), plants clog the pond, organic matter accumulates in great amount, and the pond becomes unstable for fish because organic rotting from time to time reduces dissolved oxygen to insufficient levels. Too much artificial feeding results in the same problem.

Growing fish in a pond is much like growing cattle on a pasture. Both fish and cattle grow well and yield much meat as long as there are enough breeding stock, and the food supply isn't overgrazed. Too many fish or cattle ruin the food supply. Undernourishment and poor growth follow.

For example, if you stock two small, identical ponds with unequal numbers of fish, 1,000 in one and 10,000 in the other, each pond will have about the same total weight of fish a year later. But the fish in the pond stocked with 1,000 will be larger than those in the pond stocked with 10,000. **Don't overstock**, and don't let the fish become too numerous!

In ponds managed as trout or bass fisheries, angling harvest must be carefully restricted if fish are to live long enough to reach large size. On the other hand, where panfish are present, severe cropping of small-sized fish is needed if overpopulation is to be avoided. Keeping panfish populations in check by angling alone is rarely if ever successful in Michigan, however.

**For best bass fishing**, panfish should be excluded from Michigan ponds. This contrasts with manage-

ment in more southerly states. There, apparently due to warmer water and longer growing seasons, bass prey more heavily on panfish, control their abundance, and maintain a productive predator-prey balance. Bass in Michigan ponds usually don't eat enough bluegills or other panfish to maintain such a balance because bass are overfished. The result of having panfish in a Michigan pond, with or without bass, is a panfish overpopulation and consequent stunted growth of all kinds of fish in the pond. Predation by bass, however, may stave off the panfish overcrowding if bass over 15 inches are protected. Adequate numbers of large bass might need to be present to exert effective control.

Despite the disadvantages of panfish in our climate, they need not be completely disregarded. Various options for their management in Midwestern ponds exist. The pond can be treated with toxicants to eradicate all fish after panfish overpopulation and poor growth have developed and then restocked, but with loss of a year's fishing each time this is done. Sterile hybrid panfish can be used instead of ones that reproduce, but these are expensive, hard to obtain, and there are almost always fertile “mistakes” among the hybrids, which means that eventually a breeding population develops. Another alternative is simply to accept and enjoy fishing for stunted panfish. Such fishing is ideal for small children who like to catch lots of little fish.

## Ponds for Commercial Fish Production

Some pond owners envision financial profit, either by raising fish to sell or by charging anglers a fee to fish. Both “fish farming” and “fee-fishing” are different pond uses than sport fishing. Ponds must be managed differently to support more fish in commercial ponds. Special management skills, careful management and larger investments in facilities and equipment are required for a successful commercial operation. If