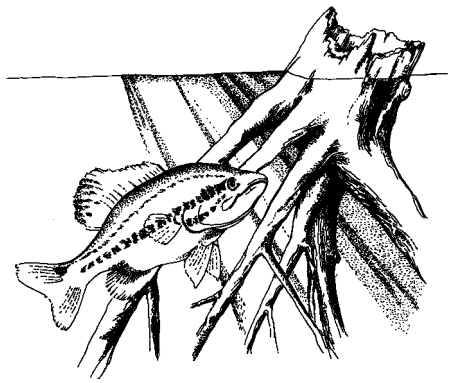
PRIVATE LAND PARTNERSHIPS
WORKING TOGETHER FOR WILDLIFE

# BUILDING AND MANAGING PONDS

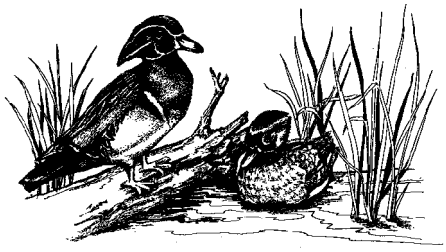
Small and large, deep and shallow, ponds abundantly dot Michigan's landscape. People, fish, and wildlife love the resources that these small bodies of water provide. Michigan landowners have built an estimated 50,000 ponds on farms and near rural households to store water for irrigation and livestock, to provide fire protection, to attract wildlife, and to raise fish for recreation. Deep water ponds are great places for fish production because of their cooler temperatures and reduced vegetation. Although shallow ponds are not as valuable for fish production, they provide suitable sites for cattails, bulrushes, and other vegetation that create food and cover for wildlife.

The type of pond to construct depends upon your goals. If you want to raise bluegills, bass, or trout, then make the pond deep. If your goal is to attract ducks, frogs and wetland birds, then build it shallow. Some landowners try to achieve both goals with a single project and usually fail, especially if the pond site is smaller than several acres. For more information on creating shallow water ponds for wildlife, see the chapters on Marshes and Wetland Restoration Techniques. Landowners interested in pond development for other uses should consult with their Michigan State University Extension office or the U.S. Natural Resource Conservation Service.



## Deep Water Ponds

To successfully raise fish you must ensure a balanced fish population, provide appropriate water temperature, and limit growth of emergent (cattails and bulrushes) and submergent (pondweed and milfoil) plant species. The Michigan Department of Natural Resources Fisheries Division has information about how many fish and what species to stock to meet your pond's size and shape. Minimum depth for sustaining warm water species like bass and panfish is 10 feet. For trout and other cold water species, the minimum is 12 feet or more unless a cold spring or stream feeds the pond. The entire pond need not be this deep, but unless 25 to 50 percent of its surface area lies at such depths, the pond will not provide the right amount of dissolved oxygen in winter and range of temperatures in summer that fish need to survive. Even though some fish may live in shallower ponds, they will not grow as fast nor as large as they would in better habitat. In addition, they



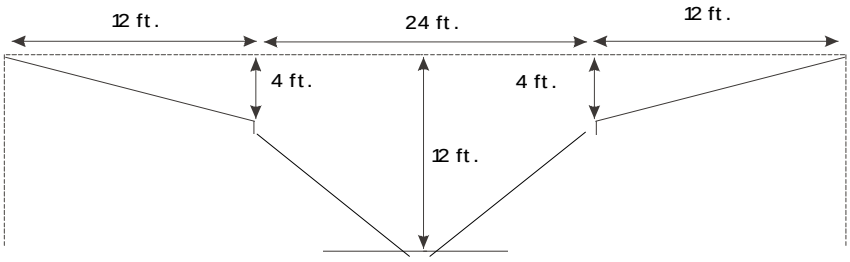
wood duck

are vulnerable to winter and summer kills. Fish ponds should be 1/2 acre or more in water surface area.

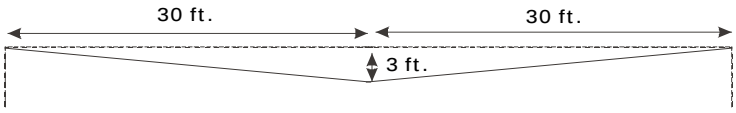
Minimizing the amount of shallow edge around your deep water pond will reduce emergent vegetation, most species of which grow in water less than four feet deep. For this reason, create steep slopes to a depth of four feet or more. Slopes should range from a minimum ratio of 2:1 (2 feet of horizontal per 1 foot drop) to a maximum of 3:1 (3 feet of horizontal per 1 foot drop). Minimize the amount of edge by constructing a circular or rectangluar shaped pond.

## Shallow Water Ponds

Wildlife species attracted to constructed shallow water ponds (depending on size) include waterfowl, songbirds, shorebirds, wading birds, amphibians, and reptiles, as well as some upland birds and mammals. Although a portion of the pond can be six feet or deeper--to reduce emergent plant growth and to maintain an opening useful to waterfowl and other wetland birds--depths ranging from six




Example of a deep water pond with minimal shallow edges, due to a 3:1 slope reaching 4 ft deep, a deep water level of 12 ft. to facilitate a diversity of fish species, and a 25% open water area, 24 ft. across, which provides the correct temperatures and amounts of dissolved oxygen, depending on the season.




Example of a shallow water pond with maximum shallow area due to a 10:1 slope reaching 3 ft. deep at a horizontal length of 30 ft. The total width of the pond is 60 ft. to reduce impact of predators on young birds.

inches to four feet are most productive for a variety of wildlife. Ponds deep enough to house fish can have a negative impact on the production of wildlife such as frogs, toads, salamanders, and even ducklings. Wildlife ponds often host some of the same plants as marshes, including cattails and bulrushes in the shallow areas and pondweed and other submerged plants in the deeper spots.

For shallow ponds, increasing the amount of edge makes the pond more productive for wildlife. Irregular-shaped projects or long, rectangular ones with scalloped edges will have more edge, increasing its wildlife value. Slope design should be flatter, ranging from 3:1 to 10:1 (horizontal:drop), and projects that are at least 60 feet wide reduce the impact of predators on ducklings and other young birds.

## Constructing a Pond

Generally, ponds should be dug on fairly level areas not suited for wetland restorations. Many parts of Michigan are favorable because of the flatter topography and groundwater which lies close beneath the soil surface. Water will slowly seep through gravel, loam, and sand layers of a dug depression with a high water table. Conversely, surface run-off will readily fill basins constructed on clay soils. While some people have excavated springs to create ponds, we do not recommend it. Remember that springs provide important wildlife habitat to wild turkeys, frogs, salamanders, and turtles. For more information on springs, see the chapter on Seasonal Wetlands.

Most landowners thinking of building a pond assume that low areas offer the best location. Actually, upland sites may be better because the groundwater table generally follows the land's contours, and it may be fairly close to the surface at higher elevations. Upland excavation most certainly will be better than in the low spots, as they may be muck-filled and more difficult to work with. Excavation projects in lowlands or wetlands should be avoided and may require a permit from the Land and Water Management Division of the Michigan Department of Environmental Quality. Marshes, lowland woodlands, brushy wetlands, bogs, and other wetland types provide important wildlife habitat, and converting them to deep or shallow ponds is not recommended.

The Natural Resources Conservation Service, an agency of the U.S. Department of Agriculture with offices in most Michigan counties, have soil surveys on record that can tell landowners how well certain soils on their property will hold water. Soils for pond construction should contain a minimum of 20% clay. It is important when constructing ponds to know water-holding capacity, depth to water, and expected fluctuations of water in the soil because excavation will have to go below that level to maintain water. This information is also helpful if the source of water for the pond is runoff.

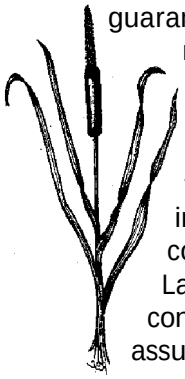
The best way to determine water table depth is to review a soil survey with an NRCS staff member to get an idea of expected normal conditions, then dig test holes when the water table is likely to be at its lowest, usually in the hot, dry

leopard frog

part of the summer. Spring and summer groundwater depths often vary by two to four feet or more in Michigan, which is why many shallow ponds dry up in summer. This condition typically occurs where the soil is sandy or the slope too great. Although the drying process may have a negative impact on fish stocks in deeper ponds, it actually helps promote a diversity of plant growth in shallow ponds. When water returns to the site, typically in fall, wildlife will greatly benefit.

In addition, be sure not to dig the pond too deep. A thin layer of impermeable soil, such as clay, may be what holds the water table where it is. Puncturing this soil layer is much like pulling the plug of a bathtub.If this layer of soil is broken, the water table will no longer exist at the previous level and the created pond will be dry.

Operators of earthmoving equipment all too often do not take groundwater tables into account when they contract with landowners. An agreement to create a pond that is 15 feet deep, for example, could produce a pond with only 12 feet of water if the groundwater table lies three feet below the surface. In this instance the operator would have to dig to a depth of 18 feet in order to satisfy the agreement. Landowners are advised to get a written agreement from the contractor that guarantees water depth, not depth of the excavation. Another misconception is the common belief that water seeping into a test hole must come from springs. Landowners and their contractors all too often assume the "spring-fed" depression they dig will fill with water. In truth, the water flowing into the test hole is probably groundwater seeping through sand or gravel. This water will fill a depression only to the level where it currently exists.



An option is to create a pond by impounding existing surface water. For example, field ditches that furnish a constant flow of water can be dammed with an earthen berm. Adding a spillway will allow you to control water depth. For more information, refer to the brochure on Wetland Restoration Techniques. However, such ponds usually require the periodic removal of silt and other sediments. Also, such projects require a permit from Michigan Department of Environmental Quality and may also need to be coordinated with the county drain commissioner's office. Further, runoff and stream water are rarely as pure as groundwater, which has been well filtered and is free of phosphorus and other pollutants. On the other hand, groundwater may be low in oxygen and contain iron, copper, or other minerals that are detrimental to fish. For this reason, if a fish pond is desired, one should test the water source before 'building' the pond.

The actual design of your project will be based on your goals. Also, design considerations will have to take into account the soil type and terrain and the aesthetics desired. Keep ponds away from woodlots to minimize loading from leaves and other nutrients, and locate them away from homes and buildings for maximum wildlife use. Keep in mind excavating costs can soar if dirt must be moved farther than 150 feet. The most cost-effective ponds, then, are those

invasive species: garlic mustard, glossy buckthorn, and purple loosestrife

that are no wider than 300 feet. However, they can be bigger if the budget allows.

The least-expensive ponds are usually those that require the removal of excavated dirt (spoil) only once. With the help of the contractor, plan where you will put the spoil. Many landowners are amazed at the large volume of spoil, which typically takes up 20 percent more storage volume once it is removed because it loses its compact nature. A half-acre pond, for example, with a quarter-acre that is 18 feet deep, may easily require a full acre of land for spoil disposal. Place the spoil on an upland site and take precautions to prevent erosion back into your pond.

## Management Considerations

Ponds offer opportunities for wildlife and fish management. Those that have a reliable supply of water year around function natural-

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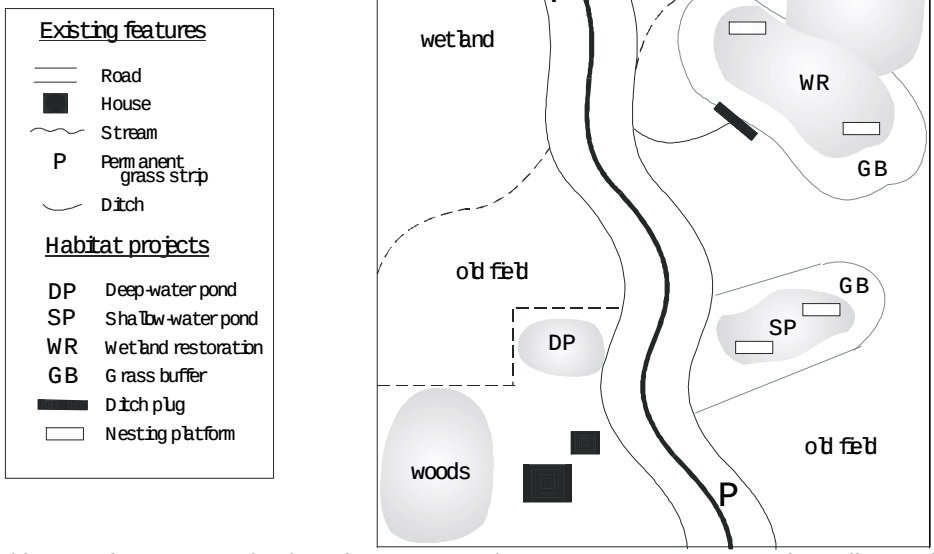


This map is an example that demonstrates the many management options discussed throughout this chapter. The option(s) you choose should depend not only on your goals, but the location, condition, and present use of your land.

ly and can best be managed by protecting the water source. The hydrology (water availability) of your pond is critical in maintaining the water quality and quantity. A berm around the pond that is one foot high by four feet wide and is vegetated will help to filter surface water from sediments and contaminants before reaching the pond.

Within at least 100 feet of the pond, avoid the application of pesticides and fertilizers, and do not continuously plow or mow to the water's edge. Creating a buffer zone of grassy vegetation at least 100 feet around the pond will help protect the pond. For seeding rates and other information, refer to the Grass Planting chapter. Fence the pond and buffer zone to restrict livestock access. Continuous use by cows, horses, and sheep can damage vegetation and pollute the water source with manure. Do not let the pond become a collection point for trash or debris. Consider building loafing platforms to attract waterfowl and turtles. To learn more, refer to the chapters on Frogs, Turtles, and Snakes, and Homes for Wildlife.

Unavoidable problems could include the invasion of garlic mustard, glossy buckthorn, or purple loosestrife. The latter is a beautifull, purple-flowered invader that can quickly take over a wetland by outcompeting native plants. This noxious weed has little value to wildlife and can be difficult to eliminate because of its strong root-stock. The best method is to dig it out by hand before it becomes firmly established. If already established over a large area this plant may be cut in winter, and then sprayed with the herbicide Rodeo until June. However, it may be easier to identify the plant after June when it blooms, at which time Rodeo can also be used. Be sure to follow all label directions.

In summary, deep ponds can hold fish and shallow water ponds can attract wildlife to your property. However, landowners should think about the many considerations involved, including construction and maintenance costs. Government cost-sharing programs for pond creation are rare. If your property is located in a lowland area, you may be able to restore a wetland instead of creating a pond. This option wold most likely create better habitat for a variety of wildlife. Because of the high priority for restoring drained wetlands and the relative lower cost of these projects compared to pond creations, there are several programs that cost share restorations. Refer to the other chapters in the Wetlands Management section for more information.


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**Private Land Partnerships:** This partnership was formed between both private and public organizations in order to address private lands wildlife issues. Individuals share resources, information, and expertise. This landowner's guide has been a combined effort between these groups working towards one goal: Natural Resources Education. We hope this manual provides you with the knowledge and the motivation to make positive changes for our environment.

FOR ADDITIONAL ASSISTANCE: *CONTACT YOUR LOCAL CONSERVATION DISTRICT*