



Excavated Ponds for Wildlife

Landowners frequently ask natural resource agencies how they can improve their land for waterfowl and other wildlife. Many people wonder if excavating ponds will help. They often inquire about excavating, or deepening existing wetlands to provide more open water. This brochure will outline when and where dug ponds, or "dugouts", can be beneficial, and provides construction guidelines for optimum wildlife benefit.

SHOULD YOU CONSIDER A DUGOUT FOR YOUR PROPERTY?

It's well known that wetlands provide excellent wildlife habitat. Many wildlife species are dependent on or otherwise utilize wetland habitats, including waterfowl, wading birds,



shorebirds and songbirds, furbearers such as beaver, muskrat and mink, and a variety of reptiles and amphibians like turtles, snakes, frogs, salamanders, and toads. It may be less understood that *all* types of wetlands, even those that don't always have standing water, provide valuable, even essential, wildlife habitat. For example, [temporary and seasonal wetlands](#) typically contain standing water only during spring and early summer or after heavy rains. Yet these wetlands are very important for waterfowl during spring migration and breeding. They are usually the first to thaw in the spring and support thriving populations of aquatic invertebrates, which are an essential food source for ducks and geese during migration and egg formation.

Seasonal and temporary wetlands are also critically important breeding areas for toads,

frogs, and salamanders. Because these wetlands generally dry up later in the growing season, they are not inhabited by fish, which prey on amphibian eggs and larvae. Other wetland types that typically do not contain standing water include [wet prairies](#), [sedge meadows](#), [scrub-shrub](#) and [forested wetlands](#). Again, these wetlands provide habitat for many wildlife species, including species of special concern such as yellow rails and bitterns. Even non-wetland wildlife such as pheasant and deer often rely on these “drier” wetland types for food and cover.

Recognizing that all wetland types have potential habitat value, when is it appropriate to consider altering an existing wetland? The best candidates are those that have been either previously altered or degraded by drainage or sedimentation, or wetlands that have become dominated by invasive plant species such as reed canary grass and hybrid cattail. Dugouts should be considered only where other wetland restoration options are not possible. Before deciding to excavate a pond in an existing wetland, landowners should determine if other options, such as ditch plugs, tile breaks, or dikes would work. Wetlands restored by reducing drainage are always preferable to dugouts. **Wetlands that have not been previously disturbed and that support characteristic native plant communities should generally not be altered.**

An alternative to altering existing wetlands is to create new wetlands by excavating in upland areas. This may be a viable option where the groundwater table is high, or the size of the surrounding watershed is large enough to maintain sufficient water levels. In the latter case, landowners should exercise caution if wetlands are already present nearby and should verify that the watershed can provide adequate runoff to support the additional wetland area.

A final factor to consider is the surrounding landscape. If the main interest is providing nesting habitat for waterfowl, dugouts should be constructed only if there are other wetlands

within one-half mile. Waterfowl use dugouts primarily for courtship and territorial sites, and must have other wetlands to fulfill feeding and brood-rearing needs. A complex of wetland types interspersed with upland nesting cover provides optimum waterfowl habitat. A mix of wetlands and uplands is also important for certain amphibians (toads, some frogs, salamanders) and for aquatic turtles, which lay their eggs in uplands.

The “Permits and Technical Assistance” section at the end contains information on who to contact for additional guidance.

CONSTRUCTION GUIDELINES

1. DEPTH AND SLOPES. Waterfowl and most other wetland wildlife species need shallow water. When filled with water, your dugout should be no more than 4 feet deep. In mid-summer, much of your dugout should be less than 3 feet deep. Your pond should generally have the following depths when it is full (as in spring):

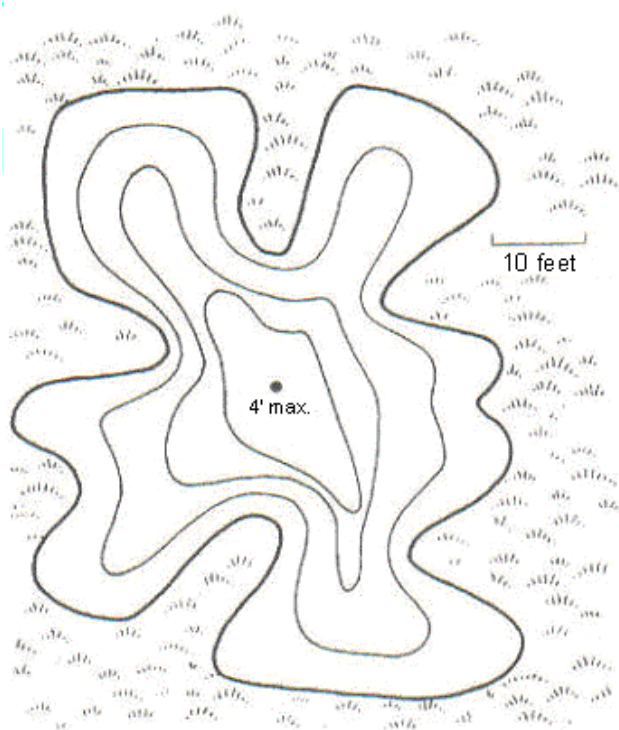
Water Depth (feet)	Percent of Pond at this Depth	Likely Result
0 – 1.5	25 – 40	wet meadow and mixed emergent vegetation; usually dry by July
1.5 – 3	25 – 50	cattails and emergent vegetation/open water; dry in drought
3 – 4	< 20	mostly open water/submerged aquatic plants; dry in severe drought

Steep slopes prohibit growth of desirable vegetation, encourage erosion, and reduce wildlife use. Grade the slopes of your basin as flat as possible, 10:1 (horizontal:vertical) or flatter if possible. The bottom of the pond should have variable, undulating depths. This allows an interspersed of vegetation and open

water, which is attractive to waterfowl. Some biologists prefer to construct dugouts with one deep side to ensure water availability and allow for viewing of waterfowl. Figure 1 shows an example of a good basin design from the perspective of slopes and depths.

2. **SIZE.** Wildlife will use all sizes of wetland, but bigger is usually better. In building a pond for waterfowl, consider a minimum size of 2500 square feet (equal to a square with 50 foot long sides). Larger, irregularly shaped ponds are preferred.

FIGURE 1. Diagram of a good basin design; this design emphasizes shallow slopes and depths (each line represents one foot of depth), and good shoreline features. Adjacent uplands are seeded to native grasses.



3. **SHORELINE FEATURES.** A pond that has an irregular shoreline and many points and bays is more attractive to waterfowl and most other wildlife than a dugout with a straight shoreline. Plan your dugout to have as much shoreline as possible, as in Figure 1.

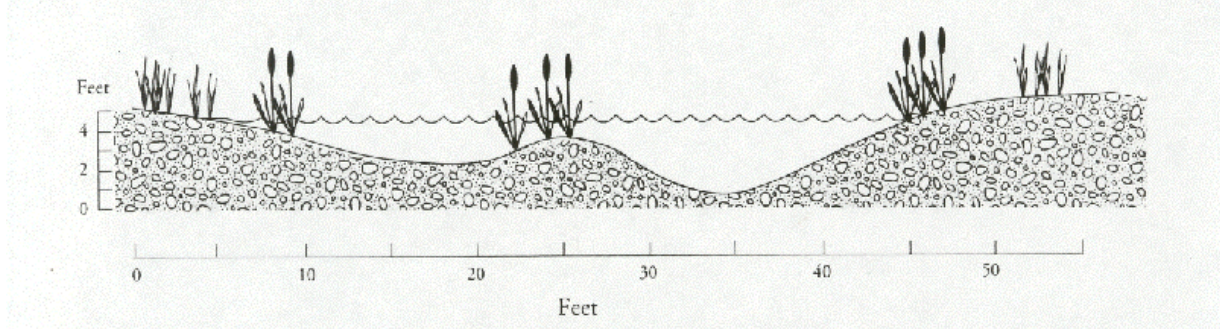
4. **NUMBER AND DISTRIBUTION.** For nesting waterfowl, your dugout should be near an existing shallow marsh for brood-rearing purposes. If you have adequate space and funding, you can consider digging more than one dugout. In general, two closely spaced small dugouts will receive more use than one larger dugout. If you construct more than one pond, space them about 100 to 300 feet apart. Ponds can be closer if tall vegetation screens the ponds from each other (breeding ducks are territorial and won't tolerate others of the same species if they can see them).

5. **ISLANDS.** Dugouts are generally too small to include an island. Studies have shown that unless islands are 300 feet or more from shore, duck nests are almost certain to be destroyed by predators. As an alternative, use nest baskets, boxes or floating rafts for nesting. A floating log, anchored in place, provides an excellent site for waterfowl and turtle loafing. (Note: Canada geese will nest successfully on small islands near shore; however, because of the current abundance of Canada geese and potential nuisance problems, the DNR does not encourage providing nest sites for this species.)

6. **SPOIL.** Excavating a pond means you end up with a lot of soil removed from the dugout; this is called "spoil". When excavating in an existing wetland, remove the spoil from the wetland. Placing the spoil in the wetland can trigger the need for a permit. Check with the appropriate agencies (see list at end) to determine if you need a permit.

The top 6"-12" will probably be black topsoil (or peat, if excavating an existing wetland), high in organic matter. This should be saved separately for later spreading over the excavated bottom (see section 7). The remaining soils should be moved to an upland site and spread evenly. It is important that this material be removed from the wetland basin and not piled adjacent to the dugout. The edge of the dugout should have a continuous slope below and above the water surface, as shown in Figure 2.

Figure 2. Cross section of wetland bottom showing smooth, shallow grade at waterline and undulating bottom contours.



Finally, all disturbed uplands and spread spoil should be seeded to native grasses for a minimum of 150 feet around the dugout. This will provide optimal cover for wildlife, minimize weed growth, and prevent the spoil from eroding back into the basin. Providing 4 acres of upland nesting cover for each acre of wetland is best for duck production. For optimal waterfowl habitat, do not plant trees near your dugout; these serve as predator perches and dens, and will reduce waterfowl use. Use nest boxes to attract wood ducks. Remember to get any necessary permits before you start digging! (See the section on Permits, below.)

7. FINAL TREATMENT. In general, the clay and sand underlying most mineral soils are less fertile and may not support adequate plant growth. In order to establish a food chain in your dugout, it may be necessary to provide an organic base (your county soil and water conservation district can provide advice). If needed, this can be accomplished by spreading 4"-6" of black topsoil over the entire excavated area. This can be the topsoil originally removed from the site when digging started. Another technique is to spread 2"-6" of clean upland hay over the excavated surface. Both can be used simultaneously. **Do not use topsoil that previously had reed canary grass or purple loosestrife growing on it. Also, do not use**

reed canary grass hay. Once covered with water, either of these bases will quickly allow vegetation and insects to grow, providing the building blocks for a desirable marsh.

It's not absolutely necessary to plant aquatic plants in your basin -- they will generally establish themselves naturally in time, given a suitable site. However, wetland plant communities left to establish on their own tend to have lower plant diversity and lower overall quality. Landowners interested in establishing a diverse, high quality wetland plant community should consider seeding and planting. See the references in the "Additional Resources" section for more information.

OTHER CONSIDERATIONS

In general, a bulldozer or scraper is best for constructing ponds as they can be fairly precise in "sculpting" the landscape. A backhoe (power shovel) or excavator can do a good job, and a dragline can produce fair results. The nature of your project will likely determine to a large degree exactly which equipment is used. Use a dozer, scraper, or backhoe for dry sites. If it's a wet site, a backhoe or dragline must be used. Minimize the disturbance to existing vegetation around the dugout or undesirable weed growth will be encouraged.

PERMITS AND TECHNICAL ASSISTANCE

Wetlands are protected by several laws, and a permit may be required for your project if you propose to alter an existing wetland. **Contact your [county soil and water conservation district \(SWCD\)](#) for guidance on the need for permits and for technical assistance.** You may also contact your [local DNR area wildlife manager](#) for technical assistance. Additional information on wetland permits is available at these web sites:

- [“Wetland Regulation in Minnesota”](#)
- [Minnesota Dept. of Natural Resources -- Public Waters Permit Program](#)
- [Minnesota Board of Water and Soil Resources – Wetland Conservation Act](#)
- [U.S. Army Corps of Engineers – Section 404 Program](#)

You may also elect to download a copy of the [“Minnesota Local/State/Federal Application Forms for Water/Wetland Projects”](#). Complete the form and submit it to the various agencies as directed on the form, and they will respond regarding the need for a permit or other approvals.

Financial assistance may be available through various government programs *for restoring drained or degraded wetlands*. Check with your [county soil and water conservation district \(SWCD\)](#). These programs are not likely to fund projects that would alter existing, undisturbed wetlands. You may also want to check with local sporting or conservation clubs for potential cost-share assistance.

ADDITIONAL RESOURCES

Guidance on Wetland Restoration, Seeding and Planting:

[“Wetland Vegetation in Restored and Created Wetlands”](#) by Dan Shaw, Minnesota Board of Water and Soil Resources, 2000.

[“Native Seed Mixes Recommendations”](#), Minnesota Board of Water and Soil Resources, 2002.

[“Restore Your Shore” CD-ROM ordering information](#), Minnesota Department of Natural Resources, 2002

[“Lakescaping for Wildlife and Water Quality”](#), by C. Henderson, C. Dindorf, and F. Rozumalski, Minnesota Department of Natural Resources, 1999

[“Landscaping for Wildlife”](#), by C. Henderson, Minnesota Department of Natural Resources, 1987.

General Wetland Information – Internet Web Sites

[U.S. Environmental Protection Agency, Office of Wetlands and Watersheds](#)

[“Wetland Plants and Plant Communities of Minnesota and Wisconsin”](#)

[“Midwestern Ephemeral Wetlands”](#)



Internet Addresses for Referenced Web Sites:

Soil and Water Conservation District Contacts:

<http://www.shorelandmanagement.org/contact/index.html>

DNR Area Wildlife Manager Directory:

<http://www.dnr.state.mn.us/contact/locator.html>

“Wetland Regulation in Minnesota” Brochure:

<http://www.bwsr.state.mn.us/wetlands/publications/wetlandregulation.html>

MnDNR Public Waters Permit Program:

http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/index.html

Minnesota Board of Water and Soil Resources – Wetland Conservation Act:

<http://www.bwsr.state.mn.us/wetlands/wca/index.html>

U.S. Army Corps of Engineers Section 404 Program:

<http://www.mvp.usace.army.mil/regulatory/>

Minnesota Local/State/Federal Application Forms for Water/Wetland Projects:

http://files.dnr.state.mn.us/waters/forms/pub_app.pdf

“Wetland Vegetation in Restored and Created Wetlands”:

<http://www.bwsr.state.mn.us/wetlands/publications/index.html>

Native Seed Mixes Recommendations:

<http://www.bwsr.state.mn.us/wetlands/publications/nativeseedmixes.pdf>

“Restore Your Shore” CD-ROM Ordering Information:

<http://www.comm.media.state.mn.us/bookstore/viewbook.asp?stocknum=9-74>

“Landscaping for Wildlife and Water Quality” Ordering Information

<http://www.comm.media.state.mn.us/bookstore/viewbook.asp?stocknum=9-53>

“Landscaping for Wildlife” Ordering Information:

<http://www.comm.media.state.mn.us/bookstore/viewbook.asp?stocknum=9-15>

U.S. Environmental Protection Agency, Office of Wetlands and Watersheds

<http://www.epa.gov/owow/wetlands/>

“Wetland Plants and Plant Communities of Minnesota and Wisconsin”:

<http://www.npwrc.usgs.gov/resource/1998/mnplant/mnplant.htm>

“Midwestern Ephemeral Wetlands” Brochure:

<http://herps.ipfw.edu/wetlands/ephemeral/brochure.pdf>