



**SHALLOW WATER DEVELOPMENT
 AND MANAGEMENT FOR AMPHIBIANS
 AND OTHER EPHEMERAL WETLAND
 WILDLIFE**



Photo courtesy U.S. Fish and Wildlife Service

Background

The purpose of this jobsheet is to provide instruction on “how to” construct and maintain a woodland shallow pond designed to provide seasonal water in the winter, spring and early summer each year. This type of habitat has several names including:

- | | |
|----------------|------------------------------|
| Vernal pool | Amphibian breeding pond |
| Ephemeral pond | Upland depressional wetland |
| Woodland pool | Wildlife Drinking Water Pond |

A properly functioning vernal pool will pond water for at least two months during the growing season between late winter and mid summer each year, going dry in some summers thus effectively eliminating fish survival and predation.

Wildlife species targeted include those recognized by the State of Tennessee as species of Greatest Conservation Need due to declines in their numbers and habitat. Species targeted include pond breeding amphibians such as the Gray Treefrog, Mountain Chorus Frog, Southern Cricket Frog, Four-toed salamander, and the Barking Treefrog. Other species benefitting may include the American toad, Fowlers toad, spring peeper, Leopard frog, Southern spotted salamander, Tiger salamander, and forest bats that feed over shallow water habitats.

Siting Considerations

Locate sites on upland areas outside of floodplains. Locate pools in a manner to minimize or eliminate fish introduction potential from outside water.

Sites must consist of soils with slow to impermeable layers within the upper 3 feet, with sufficient clay content to pond water; or be connected to a groundwater discharge area, such as a seasonal seep, sufficient to provide seasonal surface water.

Sites must be contained within woodlands, or wooded on at least three sides. Wooded areas around pools (life zones of terrestrial core habitat) must be at least 500 up to 1,500 feet wide on at least two sides.

Locate sites in a landscape position with the potential to receive some runoff, with a drainage area above the pool about five times larger than the pool area. Avoid sites with continuous water inflow or outflow. Favor nearly level or gently sloping sites to limit excessive environmental damages and costs. Avoid sites receiving storm drainage inflow from roads.

A natural swale within a larger “flat” may be the most cost effective site requiring only a small dike constructed on the lower end, although shallow excavation of pit ponds is acceptable. Avoid manipulating sites meeting wetland criteria.

Locate sites as close to permanent water sources (ponds, lakes, streams) as possible; preferably within 0.5 mile. Proximity to these waters enhance colonization by amphibians and foraging by bats.

Whenever possible plan multiple pools to reduce inbreeding and predation. Build pools 300-600 feet apart. Vary the size of pools to provide a diversity of hydroperiods (ponding conditions).

Develop pools away from frequently traveled roads to reduce species mortality during migrations.

Construction Specifications

A pool should be a minimum of approximately 0.05 acres (50x50 foot square, or a 50 foot diameter circle) up to a maximum water surface area of one half acre (150 foot square, or 170 foot diameter circle). Select a circular, ovate, or oddly shaped construction pattern for the aesthetics of a natural depression.

Shallow Water Development (Vernal Pool)

The maximum depth must not exceed three feet with an average depth not to exceed 6-24 inches. The average depth should be deeper for sites with higher soil permeability or lower average annual rainfall amounts. Sites should be graded shallow to deep. Some soils may also need compaction with a rubber tired tractor after reaching the excavation depth.

Design the pool without an outlet drain to reduce the potential water loss to only evaporation. The site must be a "closed outlet" depression.

Minimize tree clearing of the construction site to the extent practical. The optimum condition is to maintain sufficient canopy cover to shade the pond for most of the day to help control undesirable aquatic weeds such as filamentous algae. The pool should receive daily no more than 4 hours of full sun. Create brush piles for habitat near the pool with the slash from tree/brush clearing. Avoid burning or burying brush if possible due to cost and habitat loss.

Disposal of spoil material in order of preference should be as follows:

- Feathered on each side and along the downslope area of the pond to blend into the landscape, leaving the immediate upslope area undisturbed to receive runoff. Care must be taken to avoid stacking spoil material around the bases and within drip lines of adjacent trees to be retained.
- Pushed toward the center of the pond as an "earthen pier" or "nesting mound".
- Stockpiled in mounds on the outside edge of the pond parallel to the land slope where the spoil cannot wash back into the pond.
- Hauled from the site.

All spoil material and the pool area should be seeded after construction with a temporary cover of millet (May-July) or winter small grain such as winter wheat (Sept-Oct), depending on the construction period. Sow browntop millet at 40 pounds/acre. Sow wheat at 90 pounds/acre. Do not lime or fertilize. Mulch the seeded area for soil stability and to hold soil moisture. Quick germination of a temporary cover will provide soil stability, and when the pond fills it will provide a fertility that will enhance the colonization of aquatic insects.

To accelerate rate of colonization by amphibians spread some topsoil, including leaves, sticks, and

larger woody debris back across the pond bottom after construction PRIOR to sowing temporary cover.

To enhance salamander egg attachment sites, upright broadleaf plants able to survive spring to mid-summer ponding and drying out in late summer may be planted after construction. Consider species such as arrowhead (*Sagittaria latifolia*), water lilies (*Nymphaea odorata*), cow lilies (*Nuphar luteum*), irises (*Iris pseudacorus* or *Iris versicolor*) and lizardtail (*Saururus cernuus*). These species (except irises) are prone to aggressively spread, so plant only a small portion of the pond (i.e. shallow fringes). Only plant upland depressions with little risk of escape to natural wetlands. Plant bulbs, tubers or bare root plants on two foot centers.

If too many trees are removed during construction, replant seedlings around the pond edges in the first planting season following construction.

Operation and Maintenance

Exclude all domestic livestock from the pool.

If sedimentation occurs the depth should be checked. Remove deposition if average depth of pool becomes less than 6 inches.

Maintain an unharvested 50 foot buffer around pool boundary. Harvest no more than 50% of trees within the 500-1,500 foot core terrestrial life zone to protect amphibian species. Limit harvesting periods to outside peak amphibian migration periods (Feb. to June). Leave coarse woody debris after harvesting.

Do not disturb the pool bottom when it's dry.

To increase habitat value install logs and brush piles around the pool edges, preferably on north facing slopes subject to cooler summertime temperatures.

Avoid any ditching around pools.

Avoid pesticide applications within 350 feet of pool boundary.

Maintain forested corridors (habitat connectivity) between multiple pools. Locate log roads, landings, and skid trails away from corridors and pool areas.

USDA cost share program participants must comply with contract requirements. This job sheet may not meet contract requirements. Other job sheets are available from the Natural Resources Conservation Service. For additional information, contact your local USDA Service Center, Natural Resources Conservation Service office or your local County Soil Conservation District office.

The United States Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means of communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint, write U.S. Department of Agriculture, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal employment opportunity provider and employer.