WETLAND RESTORATION USING THE GROUND WATER TECHNIQUE

HOW TO BUILD A GROUND WATER WETLAND

A ground water wetland fills with water the way a hand-dug well does, by exposing a high water table near the surface. Check for a high water table near the center of a potential restoration site. Dig a hole at least 3 feet deep with a post-hole digger, soil auger, or shovel. Watch for water seeping into the hole from the bottom and sides. A high water table will fill the hole partially or completely with water; listen for the slurp of water as a soil auger is removed. Clay soils are not needed to build a ground water wetland because the depression simply exposes the water table. A seasonally high water table can be hard to detect during the summer or any period of drought (Biebighauser, 2007). Dig a test pit in April and revisit in July to find the water table at its spring peak and also around the time the pool should dry.

The high water table under Pools 2 and 3 fluctuates during the spring then drops up to a foot below the surface by mid-summer. The restoration goal is to flood the pool basin through midsummer by removing soil to deepen the basin and increase connectivity to the seasonally high water table.

1

G. GRESS/ TNC

Prior to restoration, Pools 2 and 3 were not holding water during the spring when amphibians rely on this habitat for breeding.

2

B. LEPPO/ PNHP

The basins contained saturated soils and water-loving plants, but they did not hold water long enough to support aquatic animals.

3

B. LEPPO/ PNHP

A soil auger removed a plug of soil and exposed the high water table. At the end of June 2009 the water table was 3 inches (Pool 2) and 8 inches (Pool 3) below the surface.

4

B. LEPPO/ PNHP

A construction level, survey rod, and tape measure were used to determine the basin length, width, and depth before and after restoration. The amount of soil removal needed to expose the water table and increase springtime flooding was calculated.

5

K. KING AND M. BERTRAM/ TNC

Prior to construction the vegetation, leaf litter, and topsoil were removed from the basin and reserved.

6

K. KING AND M. BERTRAM/ TNC

The dimensions of the pool basins were checked periodically to provide guidance to the equipment operators so that they could match the restoration design.

7

K. KING AND M. BERTRAM/ TNC

To lower the profile, an excavator with a 40 inch bucket removed 16-19 inches of mineral soil from each basin.

8

K. KING AND M. BERTRAM/ TNC

The excess mineral soil from each basin was spread (not compacted) in a nearby flat upland to avoid erosion into the deepened basin.

A WOODLAND OASIS

A vernal pool is like a small oasis of food, water, and shelter for all kinds of woodland wildlife. Large game species such as turkeys, deer, and bears frequent vernal pools, along with a variety of other wildlife including bats, ducks, songbirds, turtles, and snakes. Vernal pools are unique among wetlands because they support specialized pool-breeding salamanders, frogs, insects, and crustaceans.

Vernal pools are especially susceptible to damage and destruction because they are easily overlooked. They are often small in size, nestled in a forested setting, and isolated from permanent wetlands and streams (Colburn, 2004). They can be difficult to recognize as a wetland during the summer when they are typically dry.

Life in a vernal pool is intimately connected to the surrounding forest. Disturbances in the surrounding uplands can negatively affect pool health. Activities such as logging and development can dramatically change conditions in a pool such as how long it stays flooded, water temperatures, and abundance of aquatic vegetation. Water quality in vernal pools can quickly deteriorate with the inflow of sediments from erosion, chemicals from nearby roads, or polluted run-off from agricultural and residential areas. Efforts to control mosquitoes, including fish stocking and application of pesticides, can harm many other animals that use vernal pools.

9

K. KING AND M. BERTRAM/ TNC

The excess soil location was seeded with wheat and covered with clean straw for erosion control.

10

K. KING AND M. BERTRAM/ TNC

Once the basins were bowl shaped with gradually sloping sides, the excavator placed the reserved topsoil into the deepened basin.

11

K. KING AND M. BERTRAM/ TNC

After returning leaf litter and plants to the basins, wheat or oat seed and clean straw were spread within the construction area to control erosion and deter invasive plants.

12

K. KING AND M. BERTRAM/ TNC

Stone shelters for toads and other small animals were constructed in the terrestrial habitat just outside of the vernal pool basin.

13

K. KING AND M. BERTRAM/ TNC

A few days after construction the wheat and straw provided erosion control during a steady rainfall.

14

T. COLEMAN/ TNC

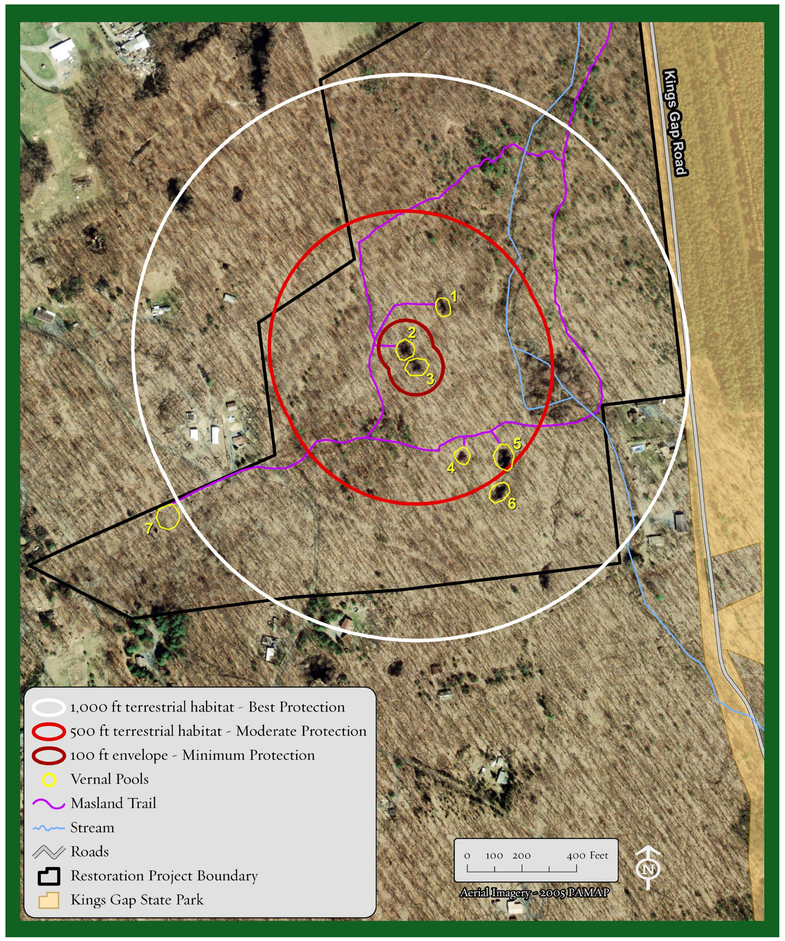
The restored pools were designed to have a maximum depth of 19 inches (Pool 2) and 16 inches (Pool 3).

THREE IMPORTANT VERNAL POOL ZONES

The vernal pool basin or depression is the area that floods in the fall or spring. This is where vernal pool amphibians and invertebrates breed and lay their eggs, and their young hatch out, feed, and develop (Brown and Jung, 2005). The vernal pool basin is the core wetland area protected by state and federal regulations. The vernal pool basin should be designated as a 'no disturbance zone.'

The vernal pool envelope is the upland habitat immediately surrounding the pool basin and extends 100 feet from the pool's high water-mark. The envelope should also be designated as a 'no disturbance zone.' The forest surrounding the vernal pool protects water quality and 'feeds' the aquatic food web with inputs of wood and leaves. Thick, moist leaf litter and abundant woody debris in the vernal pool envelope shelters high densities of adult amphibians in the spring and recently emerged juvenile salamanders and frogs in the summer (Calhoun and deMaynadier, 2008).

The vernal pool terrestrial habitat, which extends 1000 feet from the edge of the pool's high water-mark, serves as an animal travel corridor between pools and helps protect water quality. This zone also encompasses the upland habitat around a pool where nearly 95% of its breeding salamanders spend most of the year feeding and overwintering (Brown and Jung, 2005).



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UPPER SUSQUEHANNA COALITION

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PNHP Pennsylvania Natural Heritage Program

MESSIAH COLLEGE