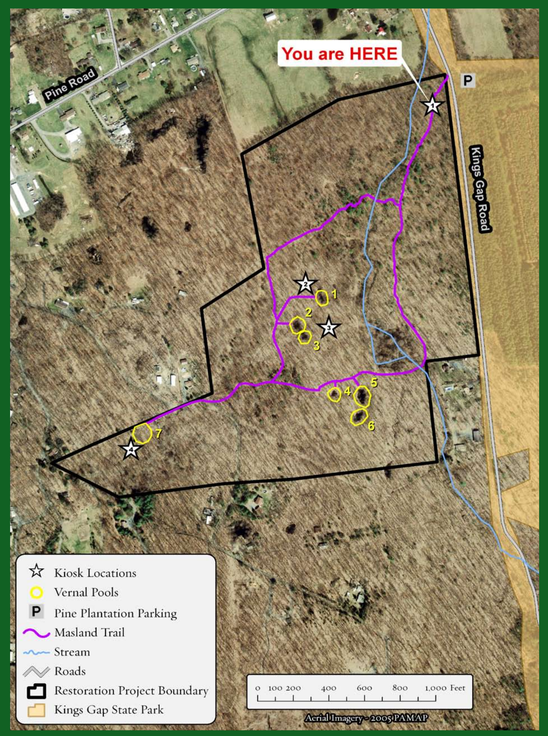
FIELD GUIDE TO VERNAL POOL RESTORATION

In August of 2010, five vernal pools on this 70 acre preserve were restored using three techniques. These pools were not holding water well compared to others in the area. The goal is to increase water retention so that vernal pool indicator animals (displayed at far right) can successfully reproduce in these pools. To learn more, take a tour of the demonstration sites located on the map below. At Pool 1 (Kiosk 2), discover how the Liner Technique restores wetlands where a high water table and clay soils are absent. Next, visit Pools 2 and 3 (Kiosk 3) where the Ground Water Technique takes advantage of a high water table. Finally, learn more about the Surface Water Technique at Pool 7 (Kiosk 4) which utilizes clayey soils. You will also find information about how to start a vernal pool restoration (Kiosk 2), the wetland and upland habitats vernal pool species need (Kiosk 3), and basic Best Management Practices (Kiosk 4). Before you go, visit Pool 4 which was restored using the Liner Technique, and Pools 5 and 6 which were designated as control sites (i.e., no alterations were made).



PENNSYLVANIA VERNAL POOLS

Wild Waters of the Forest

THE POOLS

Buttressed tree — B. LEPPO/ PNHP

Sphagnum moss — C. EICHELBERGER/ PNHP

Vernal pools fill with water in late winter or early spring. During the summer dry phase, look for buttressed trees and sphagnum moss that indicate periodic flooding.

Wet Pools in May

J. DERR/ TNC

J. DERR/ TNC

Dry Pools in July

J. DERR/ TNC

J. DERR/ TNC

Plants and animals that live in these pools must withstand harsh conditions. When the pools dry up, species must be able to survive until the pools fill again in early winter.

POSSIBLE PLANTS

B. LEPPO/ PNHP

Blister sedge
Carex vesicaria

G. GRESS/ TNC

Buttonbush
Cephalanthus occidentalis

B. LEPPO/ PNHP

Cinnamon fern
Osmunda cinnamomea

B. LEPPO/ PNHP

Winterberry
Ilex verticillata

C. EICHELBERGER/ PNHP

Northeastern bulrush
Scirpus ancistrochaetus

M.CURRIE/ TNC

Highbush blueberry
Vaccinium corymbosum

M.CURRIE/ TNC

Now you see it, now you don't

Woodland vernal pools are temporary bodies of water that are typically wet in the winter and spring but dry-up by mid-summer. Vernal pools are primarily found in forested areas and are characterized by absence of fish, lack of flowing water, small size, shallow depth, and presence of plants and animals that can withstand a period of drought *(Brown and Jung, 2005).*

Many species of amphibians (frogs, toads, and salamanders), insects, and crustaceans are adapted to breed in vernal pools. This is because vernal pools provide an ideal nursery where their young can mature. Protecting these pools and the surrounding 1000 feet of upland habitat is critical for protection of water quality, amphibian breeding, and terrestrial habitat for adult and juvenile amphibians *(Brown and Jung, 2005).*

CHECKLIST FOR VERNAL POOL IDENTIFICATION

- ☑ **Ephemeral:** Typically dries up every summer and refills in late winter or early spring.
- ☑ **No fish:** Seasonal drying maintains a fishless environment that is necessary for successful reproduction by indicator species.
- ☑ **No flow:** No permanent inlets or outlets of flowing surface water.
- ☑ **Indicator species:** Presence of mole salamanders (Jefferson, Marbled, or Spotted), Wood Frogs, Eastern Spadefoot, or Fairy Shrimp.
- ☑ **Wetland plants:** Presence of water-loving plants. Note that some vernal pools will not have any wetland vegetation.
- ☑ **Dry phase:** Evidence of water-stained leaves in a depression, buttressed and/ or water-stained tree trunks, presence of sphagnum moss and/or other wetland plants growing in dry soil, and wetland soils.

TAKE THE PLUNGE!

- Visit the **The Nature Conservancy's Vernal Pools** Website at ***nature.org/pavernalpools***
- Visit the **Pennsylvania Seasonal Pools Registry** at ***WaterLandLife.org/54***

Literature Cited:
Brown, L. J. and R.E. Jung. 2005. An introduction to Mid-Atlantic seasonal pools. EPA-903-B-05-001. U.S. Environmental Protection Agency, Mid-Atlantic Integrated Assessment, Ft. Meade, Maryland.

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INDICATOR ANIMALS

M.CURRIE/ TNC

Spotted Salamander
Ambystoma maculatum
- Like all mole salamanders, spends most of the year underground
- Breeds in March, often forms large breeding congregations

M.CURRIE/ TNC

Marbled Salamander
Ambystoma opacum
- Only fall-breeding mole salamander (August–September)
- Females lay their eggs in dry pool beds and guard them until the pools flood

C. EICHELBERGER/ PNHP

Jefferson Salamander
Ambystoma jeffersonianum
- First mole salamander to arrive in the spring (February–March), often crossing snow and ice
- Note: The Blue-spotted Salamander (*Ambystoma laterale*) is a similar species that is rarely encountered in Pennsylvania

M.CURRIE/ TNC

Wood Frog
Lithobates sylvaticus
- Raucous call sounds similar to people laughing or ducks quacking
- Breeds February-March; lays soft egg clusters in large communal rafts

M. REDMER

Eastern Spadefoot
Scaphiopus holbrookii
- Like mole salamanders, a 'fossorial' species that spends most of the year underground
- Named for webbed feet adapted for digging, prefers sites with sandy soils

L. KENNEY

Springtime Fairy Shrimp
Eubranchipus vernalis
- Lays tough eggs that can pass unharmed through the gut of a bird or lie dormant for decades in a dry pool bed
- Eggs hatch when the pools fill with water in winter or early spring

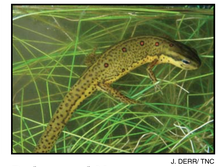
OTHER COMMON ANIMALS

M.CURRIE/ TNC

Green Frog
Lithobates clamitans

C. EICHELBERGER/ PNHP

Spring Peeper
Pseudacris crucifer



J. DERR/ TNC

Red-spotted Newt
Notophthalmus viridescens

B.LEPPO/ PNHP

Swamp Darner
Epiaeschna heros

B. MOUL

Meadowhawk
Sympetrum sp.

R. KOVAL

Four-toed Salamander
Hemidactylium scutatum

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Western Pennsylvania Conservancy

PNHP
Pennsylvania Natural Heritage Program

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