

New Jersey's Vernal Pools

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What Are Vernal Pools?

Vernal pools are confined wetland depressions, either natural or man-made, that hold water for at least two consecutive months out of the year, and are devoid of breeding fish populations. Here in New Jersey, the rural portions of the Skylands, Piedmont, and Coastal Plain landscapes are home to the majority of our vernal pools. These unique ecosystems provide habitat to many species of amphibians, insects, reptiles, plants, and other wildlife.

Vernal pools come in an array of forms: isolated depressions within upland forests, seasonally flooded meadows, floodplain swamps, abandoned gravel pits or quarries, and even derelict swimming pools. However, no matter what the structure or genesis of the pool is, all vernal pools either dry out completely or draw down to very shallow levels that are unsuitable for fish. Fish are highly predatory on amphibian eggs and larvae. Over the course of evolution, several species of salamanders and frogs exploited these fish-less water bodies. Today, these species exhibit "hard-wired" instincts and behaviors that are geared exclusively towards fish-free vernal habitats.

Amphibians that are dependent upon vernal pools are known as "[obligate vernal pool breeders](#)". In New Jersey there are seven species - two frogs and five salamanders - that fit this category. Another 14 species of New Jersey's amphibians also use vernal pools for breeding, but unlike the 'obligate' species, these species can successfully reproduce in habitats that contain fish. These species are known as "[facultative vernal pool breeders](#)".

Obligate and Facultative Vernal Pool Breeding Amphibians

Obligate Vernal Pool Breeding Amphibians:

Eastern tiger salamander (*Ambystoma t. tigrinum*) **ENDANGERED**

Marbled salamander (*A. opacum*) **SPECIAL CONCERN**

Spotted salamander (*A. maculatum*)

Jefferson salamander (*A. jeffersonianum*) **SPECIAL CONCERN**

Blue-spotted salamander (*A. laterale*) **ENDANGERED**

Wood frog (*Rana sylvatica*)

Eastern spadefoot toad (*Scaphiopus holbrookii*)

Facultative Vernal Pool Breeding Amphibians:

Green frog (*Rana clamitans melanota*)

Bullfrog (*Rana catesbiana*)

Pickerel frog (*Rana palustris*)



Southern leopard frog (*Rana utricularia*)
 Carpenter frog (*Rana virgatipes*) **SPECIAL CONCERN**
 Northern spring peeper (*Pseudacris crucifer*)
 Northern cricket frog (*Acris crepitans*)
 New Jersey chorus frog (*Pseudacris triseriata kalmii*)
 Upland chorus frog (*Pseudacris triseriata ferarium*)
 Northern gray treefrog (*Hyla versicolor*)
 Southern gray treefrog (*Hyla chrysocelis*) **ENDANGERED**
 Pine barrens treefrog (*Hyla andersonii*) **ENDANGERED**
 Four-toed salamander (*Hemidactylium scutatum*)
 Long-tailed salamander (*Eurycea l. longicauda*) **THREATENED**

In addition to amphibians, there are several reptiles that inhabit vernal pools on a seasonal basis, primarily to eat the eggs and larvae of amphibians:

Wood turtle (*Clemmys insculpta*) **THREATENED**
 Spotted turtle (*Clemmys guttata*) **SPECIAL CONCERN**
 Mud turtle (*Kinosternon subrubrum*)
 Eastern painted turtle (*Chrysemys p. picta*)
 Common snapping turtle (*Chelydra s. serpentina*)

Vernal Pool Protection in New Jersey

New Jersey has recently adopted legislation to protect vernal pools. Although the NJ Freshwater Wetlands Protection Act has been in place since 1989, it has done little to protect vernal pools because wetlands smaller than 1 acre (many vernal pools in NJ are ~ 0.25 acre) are exempt from the regulatory protection. Thus prior to the rule, vernal pools could be filled, drained, or modified with a general permit. The new vernal pool (or 'vernal habitat,' as it is known in regulatory language) regulations protect vernal pools that are known meet the following certification criteria:



- Occurs in a confined basin depression without a permanently flowing outlet.
- Provides documented habitat for obligate or facultative vernal habitat species (these species are identified in N.J.A.C. 7:7A, Appendix 1).
- Maintains ponded water for at least two continuous months between March and September of a normal rainfall year.
- Free of fish populations throughout the year, or dries up at some time during a normal rainfall year.

For further information on New Jersey's vernal pool certification process go to:
www.state.nj.us/dep/landuse/announce/announce.html

The Vernal Pool Survey Project

Through grants provided by the U.S. Fish and Wildlife Service and the DEP's Division of Science, Research and Technology, the ENSP initiated the Vernal Pool Survey Project in November of 2000. The main objectives of this project are to map and inventory vernal pools

statewide and determine the status, range and distribution of [obligate \(dependent upon\) vernal pool amphibians](#). Because staff resources are limited, the ENSP is relying primarily on trained volunteers to conduct herptile surveys at vernal pools. As data is collected on vernal pools, the information is integrated into the land use regulatory databases of the Department of Environmental Protection to implement vernal pool protection.

A Call for Vernal Pool Volunteers

This coming March we will hold our second set of vernal pool training seminars, which will include both a lecture covering vernal pool ecology, protection, and species identification, as well as a field trip to a vernal pool to demonstrate survey techniques. At each training, volunteers can select a survey area, which can be either specific pools or tracts of land containing complexes of pools. ENSP staff will provide maps of selected areas, data collection sheets and a variety of educational materials to help you locate the pool and identify the various amphibians and reptiles you may encounter. Survey efforts will be focused between February and June, which is when amphibian activity at vernal pools is at its peak.



Because the protection of vernal pools depends upon the documentation of certain amphibians and reptiles, we encourage anyone who cares about wildlife and these sensitive, biologically rich wetland habitats to become a volunteer. We at the ENSP can't do it alone! Please stay tuned to this web page to see when and where this year's seminars will take place.

How Does the DEP Implement Vernal Pool Protection?

The primary way in which DEP's [Land Use Regulation Program](#) (LURP) is implementing vernal pool protection is through cross-referencing land use permit applications with mapping of certified vernal pools. When a permit is applied for, LURP staff will review maps showing all locations of certified vernal pools.



Projects proposed in vernal pools may need to be redesigned to avoid adversely impacting them or the permit may potentially be denied. However, this protection can only be applied to vernal pools that have been certified. Thus, vernal pool protection in New Jersey is highly dependent upon the generation of a comprehensive map of all the certified vernal pools in the state.

The other method in which DEP intends to protect vernal pools is through Landscape Mapping. This statewide digital mapping, available online since fall 2001, contains critical habitat for all of New Jersey's endangered, threatened, and special concern animals. The intended purpose of this mapping is to guide sensible land use planning at the state, county and municipal level. Once

mapped and inventoried, vernal pools will be incorporated as a data layer into these critical habitat maps.

Identifying Vernal Pools - <http://www.dbcrssa.rutgers.edu/ims/vernal>

The critical process of locating potential vernal pools for survey begins at the Center for Remote Sensing and Spatial Analysis (CRSSA) lab at Cook College, Rutgers University. Using a collection of computer-aided analysis techniques and field surveys, GIS (Geographic Information Systems) analysts have been delineating potential vernal pool locations in New Jersey. The Center has compiled a number of GIS abiotic data layers (including soils, wetlands, glacial sediment, and bedrock geology information) to be used in conjunction with digital elevation models and color aerial photographs to identify on-screen regions where vernal pools are likely to occur. Vernal pool likelihood is based on existing vernal pool locations. Various GIS methods have been used to identify and rank areas in each data layer based on vernal pool occurrence. This procedure, which seems to identify areas where large vernal pools are likely to occur, is followed by intensive on-screen scanning of 1-meter digital aerial photographs used to locate smaller potential vernal pool locations.



While this research is performed, an interactive Internet mapping site has been developed to enable volunteers and the public to locate potential vernal pools and, in general, introduce those interested to the project. The site features digital aerial photographs as well as other mapping resources aimed at assisting users unfamiliar with aerial imagery. Find this exciting vernal pool information at <http://www.dbcrssa.rutgers.edu/ims/vernal>.

Initial efforts by CRSSA focused on the northern Ridge and Valley and Highlands (Skylands) regions, with 840 and 728 pools identified, respectively. Since this early estimate, an additional 1,580 potential pools have been identified in the north. The Piedmont province boasts 2,043 possible pools. In the south of the state, the Coastal Plain may be home to 6,853 pools, 4,947 of which are in the Outer Coastal Plain and the remainder in the Inner Coastal Plain. Fieldwork begins with a “groundtruthing” process to find the potential vernal sites and see if they are actually vernal. ENSP biologists, CRSSA staff, and volunteers armed with topographic maps and handheld GPS (Global Positioning System) units have surveyed well over 500 sites across the state. The success rate for groundtruthing is high, with nearly 80% accuracy.

Photo Credits:

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Marbled salamander - Tony McBride

Pine Barrens Treefrog - Tony McBride

Spotted salamander (juvenile) - Tony McBride

All vernal pools: NJDF&W-ENSP