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VERNAL POOLS

Overview of Vernal Pools in New Hampshire
Our state is rich in natural resources and vernal pools are an integral part of the states ecosystem. Vernal pools provide habitat that is critical to the survival of certain wildlife species. Amphibians and reptiles such as frogs, toads, salamanders, and turtles use them for mating and breeding.

Because vernal pools are small, isolated, as well as dry much of the year, they can be easily overlooked and inadvertently damaged or destroyed. Efforts to protect vernal pools will depend upon improving public awareness of these unique, fragile ecosystems.

What are vernal pools?
Vernal pools are small bodies of standing fresh water found in the spring of the year. Usually temporary, they derive their name from *vernalis,* the Latin word for spring because they result from various combinations of snowmelt, precipitation, and high water tables associated with the spring season. For a vernal pool to exist, there must be a source of water and an enclosed basin that traps the water for some period of time. The depressions may be natural or of human origin, and they dry out most years. Because of its periodic drying, vernal pools do not support breeding populations of fish.

To meet the definition of a vernal pool, four criteria must be met:

- It contains water for approximately two months during the growing season;
- It occurs within a confined depression or basin that lacks a permanent outlet stream;
- It lacks any fish population;
- It dries out most years, usually by late summer.

Where are vernal pools found?
Vernal pools are found throughout New Hampshire's landscape in a wide variety of vegetation types. Although generally isolated, they are sometimes connected to each other by small drainages known as "vernal swales."

What makes vernal pools special?
The vernal pool is a unique microhabitat in which a number of wildlife species prosper. Some species are so well adapted to this environment that they are not able to successfully reproduce elsewhere

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What species are found in vernal pools?

The short flooding duration of vernal pools favors species that can carry out their breeding cycle very quickly. In New Hampshire these species include spotted, Jefferson's, and marbled salamanders, wood frogs, and fairy shrimp.

Spotted and Jefferson's Salamanders These salamanders breed in vernal pools and both arrive at pools around the same time as wood frogs, between mid-March and late April. These species are known as "mole" salamanders because of their subterranean lifestyles. Mole salamanders spend most of their lives in underground rodent burrows and tunnels and crevices under rocks and other debris. Adults emerge from their underground homes and migrate to vernal pools during the first warm, rainy evenings of spring. Although their breeding season may last a few weeks, males and females in any given pool complete courtship, mating, and egg-laying in just a few days.

Marbled Salamanders The marbled salamander lives underground most of the year, but adults breed in the fall, selecting dry beds of autumnal pools to breed and lay eggs. Males leave the sites soon after breeding, while females stay behind to guard and incubate the eggs. When water fills the breeding pools, females leave. The eggs hatch into aquatic larvae, that will remain in the pool until they metamorphose in late fall or early spring.

Wood Frogs Wood frogs are terrestrial except during the breeding season. They live in woodlands, where they forage for food among leaves and debris on the forest floor. In winter, they hibernate under rocks, moss, leaf litter, or in rotting logs and stumps. Wood frogs are often the first amphibians to emerge in spring, at which time large numbers of males and females migrate to breeding sites during the first warm rains (from late March to late April).

Breeding is completed within a couple of weeks, after which adults return to the woods, leaving clear, jelly-like egg masses behind. Eggs will hatch into tiny tadpoles in about three weeks, depending on water temperature. Tiny wood frog tadpoles grow and eventually metamorphose into juveniles after an average of 67 days. The juveniles, which look like miniature adults, gather in large groups along the shore of the pool before dispersing into surrounding woodlands.

Fairy Shrimp Many invertebrates also breed in vernal pools. Fairy Shrimp, which are small crustaceans, are the only species that are unique to these habitats in our area. As their name implies, these small creatures look like tiny shrimp. Measuring anywhere from ½ to 1 inch long, they are most easily seen as they swim along just below the water's surface. They swim on their backs, with their legs pointed upwards. As the pools dry up, fairy shrimp lay their eggs in the soil and leaf litter on the bottom of the pool. Adult shrimp die off when the pools dry completely, and the eggs remain dormant until the pools fill again in the following spring.

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Why should vernal pools be protected?
Vernal pools should be protected for their habitat value for both obligate and facultative species. Obligate" vernal pool species are those who rely on vernal pools for all or portions of their lifecycle and are unable to successfully complete their lifecycle without vernal pools. In New England the easily recognizable obligate species are the fairy shrimp, the mole salamanders and the wood frog.

"Facultative" species are those organisms that can use vernal pools for all or portions of their lifecycle, but are able to successfully complete their lifecycles in other water bodies. Examples of facultative species are spring peepers, American toads and bullfrogs.

Vernal pools are small and often nondescript, and isolated from other wetlands. They are also more sensitive to disturbance than other types of wetlands. Breeding populations of some species may be severely impacted as a result of the destruction of just one pool. In addition, the destruction of a vernal pool can sever an important link in a larger wildlife migration corridor that can have negative consequences on many more animals.

What are the threats to vernal pools?
Land use adjacent to pools affects their value as productive amphibian breeding sites. The loss of surrounding trees results in decreased shading, rising water temperatures, decreased oxygen content, increased evaporation, and shorter flooding cycles. There may also be less debris to provide cover, nutrients, and attachment sites for egg masses. Many of the amphibians and reptiles that use vernal pools spend most of their year in the surrounding habitat, both uplands and wetlands.

Changes to the forest surrounding a vernal pool, such as clearing trees, putting down sod, or building and paving, will have a detrimental impact on the species that use the nearby vernal pool. Roads provide a lethal barrier to many species that must cross it to reach a vernal pool. Heavy traffic on the rainy nights when salamanders and frogs migrate can cause high mortality and impact local populations. Road salt and other chemicals from the road may also have an effect on the water quality in nearby vernal pools. The upland area around the pool is just as important to survival of the species as the vernal pool itself.

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What can people do to protect vernal pools?

- Do not clean up in and around vernal pools. Leave trees, bushes, and understory vegetation, as well as brush, logs and dead trees alone.
- Leave a buffer of natural vegetation around the pool for as great a distance as possible back from the edge of the pool's high-water mark. A buffer of at least 100 feet will help maintain water quality, but will do little to protect amphibians living around the pool. Vernal pool breeders require large areas of natural habitat around their pools in order to survive.
- Do not fill in the pool, even when it is dry, by dumping leaves or other debris in it.
- Avoid activities that alter the movement of surface water of the upland area that drains into the pool. Digging ditches and similar activities can change runoff into the pool, thereby altering its flooding cycle.
- Do not dig into the bottom of the pool, even when it is dry, as this will disturb the non-permeable layer of soil that allows the pool to flood.