

Spring 5-1-2006

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Recommended Citation

Maine Forest Service, "Vernal Pools - Important Wildlife Habitat" (2006). *Forest Service Documents*. 239.
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Vernal Pools—Important Wildlife Habitat

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Vernal pools provide important habitat to many common and specialized forest-dwelling organisms in Maine. They also provide an opportunity for landowners interested in managing their forestland to benefit wildlife. Timber harvesting, recreational and development activities should avoid direct disturbance to vernal pools and limit impacts to the immediate surrounding forest.

What are vernal pools?

A vernal pool is a natural, temporary to semi-permanent body of water occurring in a shallow depression that typically fills during the spring or fall and may dry during the summer. Vernal pools have no permanent inlet and no viable populations of predatory fish. In Maine, vernal pools are also defined by the animals that use them for breeding, including:

- ✿ Three amphibians:
 - ✿ Spotted salamander
 - ✿ Blue spotted salamander
 - ✿ Wood frog
- ✿ And one crustacean (invertebrate):
 - ✿ Fairy shrimp

To review, vernal pools are:

- ✿ Fishless,
- ✿ Seasonal (hold water at least 2 ½ months),
- ✿ Naturally occurring water bodies.

In dry seasons, vernal pools may appear as small, grassy openings in the forest. They may also have compacted, water-stained forest floor litter. A search through the forest floor may reveal insect-castings, fingernail clams, snails and/or caddisfly cases.

Why are vernal pools important?

Vernal pools provide essential breeding and nursery habitat for several organisms. Salamander larvae consume live animal prey including mosquito larvae. Adult and juvenile amphibians are mostly terrestrial, and account for a substantial amount of the animal biomass (collective weight) in the forest floor surrounding vernal pools. They have several important roles in the forest ecosystem:

- ✿ They are food for higher predators (snakes, turtles, birds, and mammals).
- ✿ They consume a large quantity of forest floor insects and other invertebrates.
- ✿ They play an important role in dispersing and releasing aquatic nutrients into the surrounding forest system.

Vernal pools are also important habitats for several of Maine's rare, threatened and endangered species including state-listed turtles, snakes and dragonflies. When connected by intact forest, they can serve as stepping stones within the forest landscape between larger wetlands. They function as resting and feeding refugia for many amphibians, birds and mammals.

Why do vernal pools need to be fishless?

Many amphibian eggs have toxic compounds or physical properties that help deter predators such as fish. Vernal pool-dependent amphibians lack these protections and their eggs and young are vulnerable to aquatic and terrestrial predators. Not all vernal pools go dry every year, but they must have some feature that excludes fish such as annual drying, low oxygen concentrations in the summer, or shallow conditions that permit winter freezing to the pool bottom.

How do vernal pool-dependent organisms survive if pools are seasonal?

Vernal pool-dependent organisms have several strategies for survival. Fairy shrimp have an extremely short adult life cycle and a long-lasting desiccant-resistant egg stage. Adult amphibians only use the vernal pools for a few weeks in the breeding season. Once they have mated and the eggs have been deposited, they move into the surrounding forest where they spend ≥90% of the calendar year. A complete lifecycle (transformation from egg → larvae → juvenile → adult) takes approximately 3 to 5 months.

Where are vernal pool amphibians when they aren't in the pool?

After breeding, adults leave the pool and disperse into the surrounding forest. Their permeable skin is vulnerable to desiccation and they require the cool, damp places provided by overstory shade, uncompacted fallen leaves and decaying fallen logs. Adult wood frogs travel as far as ¼ mile from pools,

and often forage in nearby forested wetlands. They hibernate in well-drained soils of upland forests. Salamanders are generally found within 750 ft of the pool perimeter. They shelter in root channels, under logs, and inside small mammal burrows.

Juvenile wood frogs and salamanders disperse into the forest, and may be concentrated within 100 ft of the pool perimeter during the first months after metamorphosis. They will feed, shelter and overwinter in this “nursery zone”. Juveniles require the same shaded damp refugia as the adults.

How can I help conserve vernal pools on my property?

The amphibians that breed and develop in vernal pools rely on the pool itself as well as the immediate surrounding forest to complete their life cycle. Limiting impacts in these areas is important. The key habitat qualities that should be conserved within 750 ft of the pool basin are:

- ✿ **Water quality**
- ✿ **Forest cover**
- ✿ **Uncompacted soil**
- ✿ **Woody debris**

The Department of Environmental Protection has rules that govern activities adjacent to “Significant Vernal Pools” (Chapter 335). In addition, detailed guidelines for forestry and development activities near vernal pools are available from the Maine Audubon Society. Some general recommendations are summarized below.

Within the pool itself: Maintain the basin depression and its vegetation and water quality in an undisturbed state.

- ✿ Disturbance can reduce the pool’s ability to support amphibian and invertebrate life.
- ✿ To investigate the pool on foot, limit activities within the pool. Be particularly careful to:
 - ✿ Minimize disturbance to the pool bottom (especially, discourage entry by dogs).
 - ✿ Do not put objects (hands, clothing, footwear) that have been chemically treated (for example with insect repellent) in the pool.
 - ✿ Leave egg masses undisturbed.
- ✿ Do not conduct harvesting or development activities within this area.
- ✿ **Important:** ATV’s are prohibited from vernal pools except when pools are frozen and snow-covered (12 MRSA §13157-A. subsection 27).

In a 100 foot radius around the pool:

- ✿ Maintain a closed canopy forest (at least 75% cover) of trees generally larger than 5 inches diameter to provide shade, litter (nutrients) and coarse woody debris.

- ✿ Avoid soil compaction: limit entrance of vehicles such as logging equipment and ATV’s.
- ✿ Leave fallen and decaying logs and branches to serve as moist refuges for juveniles and adults.
- ✿ Avoid using chemicals such as herbicides.

Beyond 100 feet: Maintain an intact forest in as large an area as possible within 750 feet of the pool.

- ✿ Avoid construction of trails and roads for motorized vehicles.
- ✿ Maintain at least 50% canopy cover; develop less than 25% of this area.
- ✿ Limit harvest openings to less than an acre.
- ✿ Do not disturb downed logs and debris and leave scattered older or dying trees for creation of future moist refuges.
- ✿ Limit the use of chemicals; especially avoid using herbicides and insecticides in early spring and late summer/early fall when amphibians are migrating.

Further Reading :

- Calhoun, A.J.K. and P. deMaynadier. 2004. *Forestry habitat management guidelines for vernal pool wildlife.* MCA Technical Paper No. 6., Wildlife Conservation Society, Bronx, NY.
- Calhoun, A.J.K. and M.W. Klemens. 2002. *Best development practices: Conserving pool-breeding amphibians in residential and commercial developments in the northeastern United States.* MCA Technical Paper No. 5, Wildlife Conservation Society, Bronx, NY.
- Calhoun, A.J.K. 2003. *Maine Citizen’s Guide to Locating and Documenting Vernal Pools.* Maine Audubon Society.

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