

7.3 VERNAL POOLS AND THE SURROUNDING FOREST

BACKGROUND

Vernal pools and the adjacent forest provide critical habitat for numerous wildlife species, but vernal pools are easily overlooked because they are small and dry seasonally.

Vernal pools form in shallow depressions or basins, and may appear as simple pools of water, with little or no vegetation growing in them. To be considered a vernal pool, the pool can't have a permanently flowing outlet and it must hold water for at least two months after spring ice-out (See N.H. Administrative Rules Env-Wt 101 for the official state definition).

Vernal pools differ from other wetlands in that they have a seasonal cycle of flooding and drying—this cycle determines what wildlife use vernal pools. Many flood, then dry each year, though some pools may hold water for several years between drying.

Vernal pools are unique wetlands that provide critical habitat for several amphibian and reptile species. Fish are major predators in wetlands, but they are unable to maintain viable populations in vernal pools (because the pools dry up). As a result, vernal pools provide critical breeding habitat for amphibians whose tadpoles and larvae are especially vulnerable to fish predation. These species include spotted salamanders, blue-spotted/Jefferson salamanders, wood frogs, and the state-endangered marbled salamander.

Other non-amphibian species use vernal pools. Fairy shrimp, small crustaceans, require vernal pools for all life stages. State-endangered Blanding's turtles and state-threatened spotted turtles feed on amphibian eggs in vernal pools and also use them for basking, mating and overwintering. These turtles also use vernal pools as stopover habitat when migrating, because pools provide moist refuge and abundant food. Many mammals, birds and snakes also forage at vernal pools, including song birds, wood ducks, ribbon snakes, bats, and raccoons.

While vernal pools offer essential habitat for many wildlife species, the forest surrounding the pools is equally important. For example, wood frogs and the salamanders that breed in vernal pools spend more than 11 months in the forest.

OBJECTIVE

Manage vernal pools and the surrounding forest to provide amphibian, invertebrate, and turtle habitat by maintaining pool hydrology, water quality, forest-floor integrity, and sufficient canopy cover.

CONSIDERATIONS

- Many vernal pools meet the statutory definition of wetland and are subject to state wetlands regulations pertaining to timber harvesting.
- Marbled salamanders and Blanding's turtles are listed as endangered, and spotted turtles as threatened species by the State of New Hampshire, and are protected under the N.H. Endangered Species Conservation Act. The N.H. Natural Heritage Bureau can tell you if these or other listed species have been documented on or near your property.
- In preparation of a timber harvest, it may be necessary to mark the perimeter of vernal pools when they contain water in the spring, so they can be identified during the dry season or during winter.

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- When a vernal pool fills with water, how long it holds water, and the type and abundance of amphibians and invertebrates it supports can all change dramatically from year to year. Animals that use the pools are adapted to this variation. Though some species may not be present at a particular pool in a given year, that pool and its surrounding forest may still be high-quality habitat.
- Although reptiles and amphibians are small, they travel long distances. Juvenile wood frogs and salamanders may disperse to vernal pools as far as one-half to several miles from the pool in which they were born. These movements maintain genetic variability within amphibian populations and recolonize sites where local amphibian populations are gone.
- The vernal pool and the surrounding forest make up the functional vernal pool system, but each serves different functions. Breeding habitat includes the vernal pool basin and a forested buffer extending 200 feet from the pool edge. The pool basin is the physical breeding location for vernal-pool-dependent species and a nursery for their eggs and larvae. The buffer helps protect the pool's water quality by filtering sediment and pollutants, providing shade, and slowing surface run-off. The buffer also provides leaf litter, which serves as the foundation of the vernal pool food chain and as shelter for adult and metamorphic amphibians immediately after they emerge from the pool. Core habitat extends from the breeding habitat out 950 feet from the pool edge. It provides habitat for amphibians of all ages during the nonbreeding season and provides aestivating and basking habitat for spotted and Blanding's turtles.
- The lack of long-term studies in the northeast means we still lack much knowledge about the specific effects of timber harvesting on vernal-pool-dependent reptiles and amphibians. Relevant research and experience suggests that within the core habitat:
 - Excessive compaction or scarification of the soil during timber harvesting may reduce leaf litter and burrows and reduce the amount of suitable upland habitat available to wood frogs and mole salamanders (i.e. spotted, blue-spotted/Jefferson, and marbled salamanders). Maintaining natural topography maintains the volume and timing of water reaching vernal pools.
 - Vernal-pool-dependent amphibians and reptiles are most sensitive to disturbances that alter water quality or temperature within the pools, alter the length of time the pools hold water, or alter the air and soil temperature in the forest surrounding the vernal pools.
 - Wetland buffers intended to protect water quality may be too narrow to allow amphibians to complete their entire life cycles.
 - The effects of temporary forest openings are less in a forested landscape than in a developed one.
 - As forest-opening size increases, the negative effects of habitat drying and increased soil and air temperature also increase. However, the specific effects of opening size vary and aren't completely understood. In most cases the negative effects of timber harvesting on vernal-pool-dependent species are temporary and decrease with time as the forest regenerates.
 - Canopy cover reduced below 55 percent will probably have at least a temporary negative affect on vernal-pool-dependent amphibians—until the canopy or understory cover fill in.
 - Openings such as wildlife food plots, pastures, fields, and landings create barriers to reptile and amphibian dispersal because they are often hot and dry. These openings are most likely to create barriers when they are located directly between adjacent wetlands.
 - Vehicle ruts can reduce the length of time a pool holds water by directing water away from the pool. Ruts at any distance from a pool can create breeding "traps" for amphibians, since wood frogs and salamanders will often deposit eggs in ruts. Most ruts dry too quickly to allow the eggs to develop completely.

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RECOMMENDED PRACTICES

- ✓ Mark the locations of vernal pools before a harvest and preferably in early spring when vernal pool waters are highest. Alert equipment operators. Include locations and management recommendations in the forest management plan.
- ✓ Locate openings such as landings, main skid trails, roads, wildlife food plots, pastures, and fields as far as reasonably possible from vernal pools. Avoid locating permanent, nonforest openings directly between two adjacent vernal pools.
- ✓ In the vernal pool basin:
 - Avoid running machinery through vernal pool basins, even during dry periods, to avoid changing the pool's ability to hold water.
 - Avoid adding slash (woody material) to vernal pools. Where significant amounts of slash fall into the pool, remove it by hand or some other low-impact method. If the pool contains water, leave the slash until the dry season. Removing it when the pool holds water can disrupt amphibian egg and larval development.
 - Avoid removing trees with crowns immediately overtopping any portion of the pool to maintain water temperature and nutrient inputs.
- ✓ Within 200 feet of a vernal pool:
 - Limit tree removal to individual trees or small groups of trees. Locate groups where advanced regeneration or shrub cover occurs to help maintain shady conditions after the overstory is removed.
 - Avoid removing stumps, stones, or other large cover objects.
 - Maintain as much of the existing understory vegetation (i.e., small trees, shrubs, herbaceous ground cover) as possible.
 - Limit the activity of heavy equipment.
 - Locate main skid trails and truck roads outside this buffer.
 - Avoid applying herbicides or insecticides.
- ✓ Beyond 200 feet:
 - Limit the area that is scarified, stumped, or regraded to that necessary to accomplish silvicultural or wildlife objectives.
 - Retain as much existing dead and down woody material, stumps, stones and leaf litter as possible.
 - Avoid or minimize rutting by following best management practices (BMPs). When possible, harvest on frozen ground (preferable) or in dry summer conditions.
 - Retain as much understory vegetation as possible where its removal isn't required to meet other objectives.



CROSS REFERENCES

3.1 Timber Harvesting Systems; 4.1 Water Quality; 4.2 Wetlands; 6.3 Dead and Down Woody Material; 6.13 Wildlife Species of Greatest Conservation Need.

ADDITIONAL INFORMATION

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N.H. Dept. of Resources and Economic Development, Division of Forests and Lands. 2004. *Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire*. State of New Hampshire. http://extension.unh.edu/resources/files/Resource000247_Rep266.pdf Accessed March 13, 2010.

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