DOWNSTREAM

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A Newsletter Provided by
MDC Division of Watershed Management

Vernal Pools; Nature's Unique Race Against Time - by P. Packard and D. Clark

MDC Division of Watershed Management Staff study a vernal pool in early spring.

What Are Vernal Pools?

Vernal pools are temporary bodies of water that vary tremendously in size. Some may be the size of a big puddle, while others may cover several hundred square feet. To be considered a vernal pool, a confined basin must hold water for at least 2 to 3 months a year, and a permanent fish population must not be present. During wet periods, the pool may have a temporary inflow and outflow, but as the season progresses these conditions must discontinue. Finally, the pool must be used by either *obligate* vernal pool species that breed exclusively in this type of habitat, or *facultative* species that will use any resource that is available.

Where Are Vernal Pools Found?

Vernal pools can be found virtually anywhere where there is a confined basin which retains water from snow melt, runoff, high ground water, rainfall, or stream overflow. There are vernal pools in deciduous, coniferous and mixed forests, fields, along roadways, or in depressions created by dirt roads, gravel pits, and quarries. The species utilizing the pool will vary according to the surrounding habitat.

What Animals Live in Vernal Pools?

Many animals such as deer, raccoons, mink, small mammals and birds stop to drink from vernal pools. Reptiles, such as Ribbon snakes, American toads, green frogs, Eastern newts, gray tree frogs, leopard frogs, pickerel frogs, and bullfrogs, inhabit vernal pools. Spotted turtles often spend time in vernal pools during the early spring because they tend to warm up sooner than larger water bodies. Here, turtles can prey on the larvae of species breeding in the pool. Some species, like the spotted, Jefferson, and marbled salamanders have evolved reproductive strategies that enable their young to develop quickly, before the pool dries out. Insects such as caddisflies, diving beetles, whirligig beetles, damselflies, dragonflies, water scorpions, mayflies, midges, springtails, and water mites are also commonly found in vernal pools. Snails, fingernail clams, ostracods (similar to land snails but they swim), and fairy shrimp are found in some pools. All of these animals play critical roles in the vernal pool ecosystems as they either feed on some species or are food for others. Two of the most common inhabitants of vernal pools are the Wood frog and the Spotted salamander.

- Wood Frog -

The Wood frog (Rana sylvatica) is common throughout Massachusetts. As their name implies, they spend most of the year away from water in upland forests. They are easy to identify because of a pronounced eye mask, which is a readily visible dark marking that extends backwards from the eye. Wood frogs are often the first amphibian to appear in vernal pools in spring. In fact, they have been seen crossing ice to get to a vernal pool. Wood frogs may be heard calling during the day and they are most vocal when water temperatures are at least 50° F. Wood frogs lay their eggs in communal masses, and some pools may hold dozens of egg masses. Counting the number of egg masses is a quick and reliable way to measure the relative abundance of wood frogs in a pool. One female wood frog will lay 1 egg mass per year. Counting egg masses from year to year will provide a rough trend in the population.

- Spotted Salamander -

Spotted salamanders (*Ambystoma maculatum*), like wood frogs, are quite common and spend most of their lives on dry ground. Spotted salamanders are primarily fossorial (live underground) and can be found under logs, stones, and in

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small mammal burrows in mixed or deciduous woodlands. Spotted salamanders are easy to identify from their size (up to 7 ¾ inches) and dark color with multiple round yellow or orange spots. Spotted salamander egg masses can be quickly distinguished from wood frog eggs (see photo below right). The easiest clue is to see if individual eggs can be distinguished within the mass. Spotted salamander eggs can be counted within the mass, while eggs within wood frog masses will look like a continuous ball with no clear separation between eggs. Unlike wood frogs, spotted salamander populations cannot be monitored through egg mass counts. Female spotted salamanders may lay 1-10 eggs masses each and individual salamanders may not breed every year.

The Fairy Shrimp is one tiny but environmentally important creature that can only live in a vernal pool. The eggs of this 'obligate' species must go through a dry cycle before they can hatch and therefore, could not survive in a permanent waterbody.

Why Are Vernal Pools Important?

Some species breed exclusively in vernal pools and individuals may return to the same place as they were born to reproduce. If particular pools are eliminated or become inaccessible due to barriers created by development or other disturbances, individuals as well as entire populations may be at risk. This could eventually lead to species extinction. Protecting pools becomes especially important for many rare species that have already been affected by habitat destruction and fragmentation, environmental factors, or over harvesting. The unique habitat created by vernal pools is not only important for the species that breed there, but also because they provide a food source for many animals living in the surrounding area. Frogs, salamanders, and newts may be eaten by mammals, birds, reptiles, and other amphibians. Insects and other invertebrates hatched in the pool also become a food source. The web of life begun in the pool continues even after the pool has dried as the energy produced becomes utilized by terrestrial species.

How Can You Tell if it Really is a Vernal Pool?

There are many ways to determine if the body of water you are observing is a vernal pool. One way to tell is to wait for a rainy night in late winter or early spring. Listen for the sound of "quacking" ducks. These are not ducks at all but the wood frog's breeding chorus. Look for insects in the water, and get to know the species found there.

Check for egg masses attached to submerged vegetation or dead branches. However, use care to not disturb or detach the egg masses because this is believed to increase predation by other species. This is especially true if the egg masses fall to the bottom. These masses are relatively large and easy to see and are often found grouped together. Very often they will appear to be green. This is due to algal growth and does not mean that there is something wrong with the eggs. Try to figure out what species these egg belong to. Most (but not all) egg masses are from spotted salamanders and wood frogs. Both of these are very common in our area and breed early in the season. With a little practice, it becomes easy to distinguish between salamander and frog egg masses.

Egg masses shown here are those of the Wood frog at left and the spotted salamander at right. Note the caddisfly at center, eating some if the salamander eggs.

What Can You Do to Protect a Vernal Pool?

The best way to protect a vernal pool is through certification. Pools are certified by the Natural Heritage and Endangered Species Program (a division of MassWildlife). There are three methods available: 1.) the obligate species method, 2.) the facultative species method, and 3.) the dry pool method. To certify the pool using the obligate species method, a photograph clearly showing water in the pool and evidence (pictures work best) of breeding activity of obligate vernal

pool species must be presented. Species include wood frogs, spotted salamanders, fairy shrimp, Jefferson salamanders, marbled salamanders, and spadefoot toads. To follow the facultative species method, photos of the pool both full AND dry must be submitted along with evidence of breeding activity of toads, frogs, newts, insects, clams, or snails. The dry pool method can be used if there is evidence that some of the facultative species, such as fingernail clam shells, snail shells, caddisfly cases or the exoskeletons of dragonflies and damselflies, are present. Along with this evidence, a picture of a dry pool must be submitted. These methods are explained in more detail at the Natural Heritage Programs Website: *www.state.ma.us/dfwele/dfw/nhesp/vpcert.pdf.*

Some of the Laws Protecting Vernal Pools...

The Wetland Protection Act, Surface Water Quality Standards, Forest Cutting Practices Act Regulations, Title 5 of the Massachusetts Environmental Code, and local bylaws protect vernal pools. If you suspect that a vernal pool habitat is being degraded due to building, excavation, dumping, or other activities, contact your local Conservation Commission. They will take the necessary steps to help preserve the valuable habitat and tell you what you should do to help.

Certification of vernal pools helps to ensure their survival. There are many resources available; many good sources of information on the certification process, species typically found in vernal pools, and ecology and conservation publications. If you are interested in protecting a vernal pool, talk to your local Conservation Commission. They will assist you and may be able to tell you where other pools are located.

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While not a reptile that is exclusive to vernal pools, the spotted turtle is an excellent example of a 'faculative' species that will thrive in a vernal pool while it is active.

Further Reading

If you'd like to know more about vernal pools...

Beebee, T.J. 1996. Ecology and Conservation of Amphibians. Chapman and Hall Publishing Co., London.

Behler, J.L. and F.W. King. 1979. National Audubon Society Field Guide to North American Reptiles and Amphibians. Chanticleer Press, Inc., New York.

Bishop, S.C. 1974. Handbook of Salamanders. Cornell University Press, Ithaca.

Bragg, A.N., 1965. Gnomes of the Night (The Spadefoot Toads). Oxford University. Press, Great Britain.

Colburn, E.A., 1997. A Citizen's Step-by-Step Guide to Protecting Vernal Pools.
Mass. Audubon Society, Lincoln, MA.

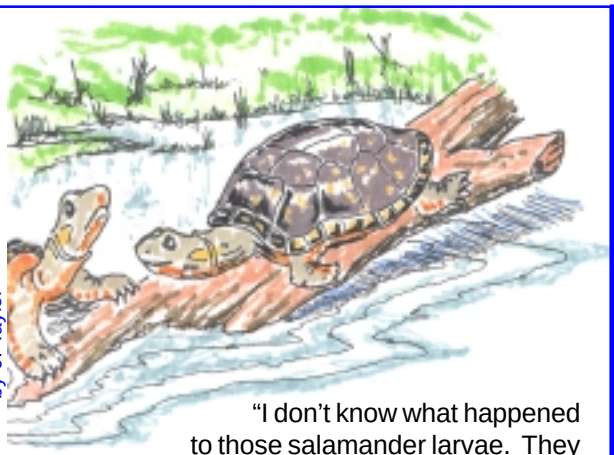
Kenney, L.P. and M.R. Burne. 2000. A Field Guide to the Animals of Vernal Pools. Natural Heritage & Endangered Species Program, Westborough, MA.

Klemens, M.W., 2000. Turtle Conservation. Smithsonian Institution Press. Washington and London.

Massachusetts Division of Fisheries & Wildlife's Natural Heritage & Endangered Species Program, Route 135, Westborough, MA 01581. 508-792-7270 ext.200.
www.state.ma.us./dfwele/dfw/nhesp/vpcert.pdf

And Another Thing...

by J. Taylor



"I don't know what happened to those salamander larvae. They couldn't have just grown legs and walked away!"

Downstream is produced twice yearly by the Metropolitan District Commission/Division of Watershed Management of The Commonwealth of Massachusetts, and includes articles of interest to residents of the watershed system communities. Our goal is to inform the public about Watershed Protection issues and activities, provide a conduit for public input, and promote environmentally responsible land management practices.

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Who Lives in a Vernal Pool?...

This collage shows some of the residents who enjoy life in the vernal pool environment (although not all at the same scale). Clockwise from the top left they include; The adult marbled salamander, the ribbon snake, the wood frog, wood frog tadpoles, a spotted salamander larvae holding a fingernail clam, a spotted salamander egg mass, and wood frogs laying eggs. Within this issue of Downstream, we describe the basics of exactly what vernal pools are all about....

We value the contribution your well cared for land provides and welcome the opportunity to work with you. Please send us questions or comments which we will address in subsequent newsletters, or contact us if you wish to learn more about programs and assistance available to help landowners. Our address is shown below.

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INSIDE

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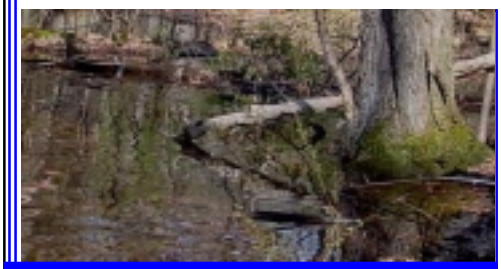

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