



Kevin Tolan observing a vernal pool in Addison County © Emily Anderson

What Landowners Need to Know About Vernal Pools

Vernal pools are ephemeral wetlands that fill in wet periods, usually in the spring, and dry up later, usually in the late summer.

Unlike marshes, fens, and seeps, these unique ecosystems are unconnected to permanent streams or other water bodies. They rely on surface runoff from snow melt and spring rains to fill, and bedrock or hardpan to retain water. Their wet-dry cycle prevents fish and large insect predators from becoming established.

Vernal pools are important because:

- Species such as Spotted Salamanders, Wood Frogs, Jefferson and Blue-spotted Salamanders, fairy shrimp, fingernail clams, and the state-Endangered Spotted Turtle rely on them to survive.
- They provide flood control.
- They are commonly used as hunting grounds for Barred Owls and Broad-winged Hawk, and by megafauna like moose and bears for drinking water and as a respite from heat.
- They funnel nutrients back into the forest, which may improve the quality of future timber harvests from the surrounding land.

That's why, if you (or your neighbor) are the proud owner of forested land, you'll want to know if there's a vernal pool before making any big construction, farming, or timber harvesting decisions.

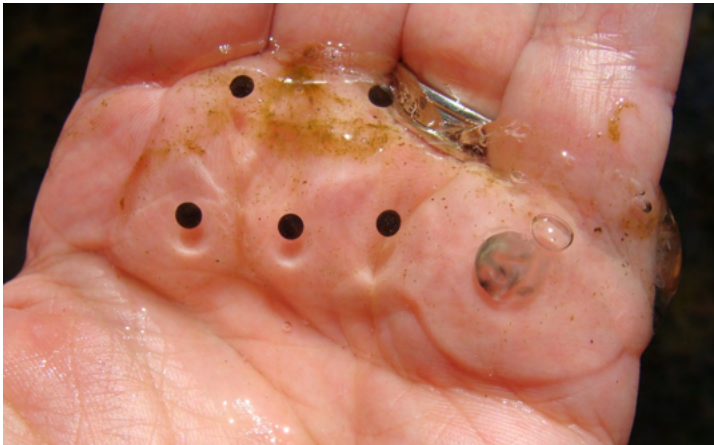
Vernal pools are at risk. Because they are temporary, vernal pools are easily missed in land surveys. Until they're officially confirmed, they can't be documented in the state's Wetland Inventory. As a result, they have historically been developed over, both accidentally and intentionally.

Reporting vernal pools to the Vermont Vernal Pool Atlas (vpatlas.org) ensures that they're afforded the protections granted to vernal pools.

How to Find and Confirm a Vernal Pool

1. Find local pools to visit. Visit and explore the Vermont Vernal Pool Atlas (vpatlas.org) to see if there are any confirmed, probable (visited but not officially on the record), or potential (satellite imagery suggests) vernal pools nearby. If you know of pools that aren't currently included in the Atlas, register and report them!

2. Learn to spot the eggs. While vernal pool-breeding salamanders are only above ground for a few nights each year, their large, gelatinous eggs are very visible. And since only four species' eggs are commonly encountered during vernal pool surveys, it's easy to learn how to identify them.



Blue-spotted Salamanders lay eggs singly in loose sheets on the pool bottom, eggs are laid singly or in small, loose masses.



Spotted Salamander egg masses are oval, elongate, or kidney-shaped. Unlike other egg masses, the outer jelly matrix is very firm.



Wood Frog egg masses have 800 - 2,000 embryos. The egg mass lacks a surrounding gelatinous matrix, giving it a lumpy appearance.



Egg masses of Jefferson Salamanders tend to be cylindrical or cigar-shaped, and much smaller than those of the Spotted Salamander.

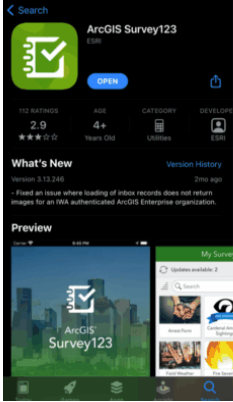
3. Try to get landowner permission. Even if the pool is not on your property or public land, if the land is not posted with No Trespassing signs, you are legally allowed in Vermont to walk it and visit any potential pools. However, no pool will be officially confirmed and recorded in the state's wetland inventory unless you get landowner permission. This is as simple as knocking on their door, calling, or texting them to explain that you're surveying for vernal pools to add to vpatlas.org. If the pool is on public lands, write the associated township (or state/federal) as the landowner and no additional permission is needed for confirmation.

4. Visit the pool(s). Try to visit them in the weeks following the first warm rainy nights of spring, after amphibians have migrated and laid eggs.

5. Record the data. Fill out our survey form (shortlink to download survey form] with some information about the vernal pool and the species present, or use Survey 123. We'll take that information and put it into VPAtlas and make it official!

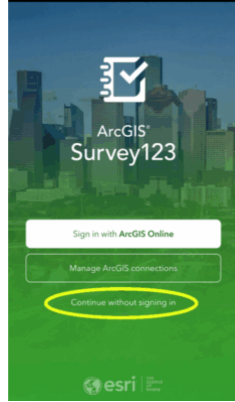
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Download "ArcGIS Survey 123" from App Store or Google Play



2

Click "Continue without signing in"



3

Click the QR icon in the search bar



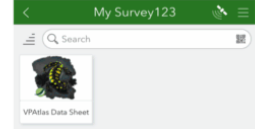
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Scan the QR code with your camera.



5

The survey is now downloaded!



For more details and instructions, check out our guide at the Vermont Atlas of Life val.vtecostudies.org/projects/vermont-vernal-pool-atlas.



What to Do If You Have a Vernal Pool on Your Land

Development and Agriculture: It's integral to conserve not only the vernal pool basin—the vernal pool depression up to the spring high water mark—but also the surrounding "life zone"—the area surrounding a vernal pool that amphibians disperse to after breeding, and where they spend 11 ½ months of the year.

While the legal buffer distance for development is only 50 feet for class 2 wetlands, which includes vernal pools, if your goal is wildlife conservation, the recommended minimum life zone is 400 feet surrounding the basin. Research done in Woodstock's Marsh-Billings-Rockefeller National Historical Park by conservation biologist emeritus Steve Faccio estimated that a life zone of 575 feet would encompass 95% of a pools' salamander breeding population.¹ However, more recent studies have estimated the protected area should be even larger.²

Timber harvesting: Harvesting timber near a vernal pool can be compatible with its conservation, as long as thoughtful silvicultural practices are used that preserve or contribute to the health of the forest and maintain a shaded and damp forest floor.

In the depression: Rutting, siltation, or compaction in the pool depression (including everything up to the high water mark during the spring) can alter the pool's water-holding capacity, disturb eggs or larvae buried in the organic layer, and alter the environment in which organisms live.

1. Heavy equipment should not be permitted in pool depressions at any time of the year.

¹ doi.org/10.1670/155-02A

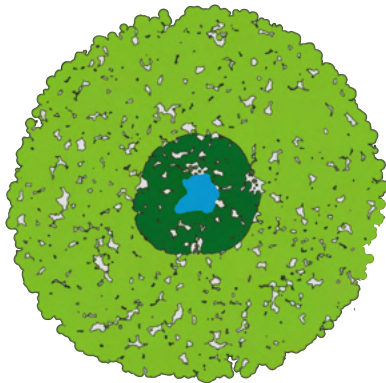
² doi.org/10.1139/cjz-2019-0228

2. Avoid locating landings, skid roads, or haul roads through or near—especially uphill of— these depressions.
3. Avoid harvesting operations in the pool depression, even during the winter. This can disturb woody vegetation that may serve as egg attachment sites or provide shading.
4. Avoid leaving slash and tree tops from forestry operations in the pool as they can hinder amphibian movement and alter water chemistry. However, if slash or other woody debris accidentally falls into the pool during the breeding season (April to June), it is best to leave it in place to avoid disturbing egg masses or other breeding activity.

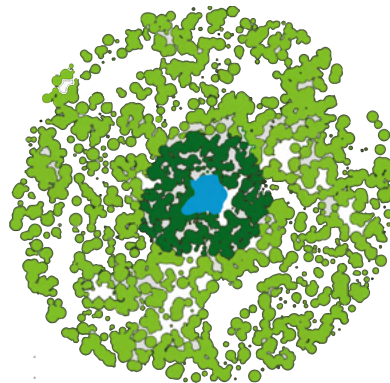
In the surrounding forest: Uplands adjacent to vernal pools should be dominated by areas of uncompacted leaf litter, coarse-woody debris, and closed canopies for maintaining a suitable forest floor microclimate. These microhabitat components are most likely to be maintained during light to moderate partial cuts within this management zone.

1. Harvesting operations should occur only on frozen ground and outside of the season when juveniles and adults are active on the forest floor.
2. Maintain or encourage a closed canopy stand in a mature state that will provide shade, deep litter, and woody debris around the pool. This will ensure that the temperature and relative humidity at the soil surface be maintained in the cool, moist condition necessary for amphibians.
3. Limit harvesting to uniformly distributed light to moderate partial cutting, leaving a minimum of 75% canopy cover within 100 feet of the pool, and 55% canopy cover between 100 and 400 feet of the pool.

Dimensions used in this example: Vernal Pool: ~100' diameter (0.75 acres)
100' Buffer Zone: ~1.5 acres **400' Amphibian "Life Zone":** ~13 acres



100' Buffer — 89% Canopy Cover
 400' Buffer — 95% Canopy Cover



100' Buffer — 75% Canopy Cover
 400' Buffer — 55% Canopy Cover

4. Maintain a shaded forest floor without ruts, bare soil, or sources of sedimentation/erosion. Ruts deeper than 4 inches can disrupt migration routes of salamanders. If ruts fill with water, amphibians may deposit eggs in ruts that do not hold water long enough to produce juveniles.