

Cape Cod's Vernal Pools: Nonprofit Conservation and Advocacy Strategies

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Introduction

Cape Cod, Massachusetts has been a hub of remarkable conservation efforts since the arrival of the indigenous Wampanoag and Nauset peoples on the peninsula. This ongoing commitment to conservation is intertwined with the peninsula's geological history, shaped by millions of years of activity. As the Laurentide ice sheet receded to the North, a variety of depressions and deposits formed that shape the land today. Kettle ponds, moraines, and vernal pools can all be tied back to glacial ice retreat around 18,000 to 25,000 years ago, but other natural processes like mudslides and local erosion can also contribute to their formation.

Vernal pools, also known as ephemeral ponds, are temporary bodies of water that form in the springtime from snowmelt and rain. These pools are often shallow, which prohibit fish and other predators from inhabiting them. This unique characteristic has created an ideal environment for the spawning and breeding of many amphibian species, some of which are endangered. Vernal pools often dry up in late summer or early fall, and return again the next spring, with enough rain. These pools provide a unique habitat for amphibians, who utilize these environments to breed, lay egg masses, and develop into juvenile frogs.



Reclaimed cranberry bog in Brewster; an ideal alternative amphibian habitat to vernal pools.

Without vernal pools, Cape Cod could see a decrease in amphibian species and overall biodiversity. With the entire peninsula facing sea level rise, increased development and land use, and the habitat loss of coastal dunes and freshwater wetlands, among many others, it is imperative that we preserve these habitats that many semi-aquatic amphibian species require to reproduce. These include the Wood Frog, Grey Treefrog, Spring Peeper, Fowler's Toad, Four-Toed Salamander, Spotted Salamander and the threatened Spadefoot Toad. Many species often live and feed in the forest and dunes for the majority of their life, but need ponds to both migrate and reproduce.

Amphibians are often recognized as "environmental indicators" due to their permeable skin, which makes them highly susceptible to the effects of pollution. Their presence is crucial for assessing environmental changes, and reduced populations can dramatically disrupt the delicate balance of the food

web. Alongside their complex role in the ecosystem, amphibians are territorial, have annual migrations, and Wood Frogs can even freeze themselves during the winter due to the accumulation of natural antifreeze components in their blood. While visitors and community members are familiar with frequently seen species like Piping Plovers and Grey Seals, it can be difficult for many to truly understand the value of these amphibians and the environments they rely on. Stated best by herpetologist Robert Cook, “This lack of familiarity has led to much myth and misunderstanding about amphibians, and a false impression of their abundance, diversity, and ecological importance”.

Certifying a Vernal Pool

Certifying a vernal pool with the Massachusetts Natural Heritage and Endangered Species Program is a challenging process; out of the many potential vernal pool sites on Cape Cod, only 357 are yet to be certified. The program accepts documentation from outside scientists, resource managers, and interested individuals and organizations. The pool must provide important wildlife habitat consistent with 'Vernal Pool Habitat' in the Wetlands Protection Act.



MassMapper GIS Map of Potential Vernal Pools.

Vernal pools are divided into two categories: Obligate Species and Facultative Species. Obligate species, like fairy shrimp and wood frogs, require vernal pools for all of or part of their life cycle and serve as direct indicators of vernal pool habitat. Facultative species, while not entirely dependent on vernal pools, are still known to use vernal pools or a similar wetland habitat to complete their life cycle - this includes species like spring peeper and gray treefrog.

To certify a vernal pool, surveyors must provide evidence of the pool's physical characteristics, proof of no fish population, and documentation of multiple obligate or facultative species. To properly submit the form, the surveyor must include at least 3 kinds of specified maps, among many other requirements.

In getting the vernal pool certified, this protects the vernal pool and the 100 feet boundary around the vernal pool under Massachusetts Wetlands Protection Act. This certification also ensures that harvesting limits are in place that prevent more than 50% of the trees within 50 feet of the pool from being cut. Finally, under Massachusetts Environmental Title 5, septic tank and distribution boxes must be

located at a minimum of 50 feet away from the boundaries of certified vernal pools. These regulations allow for increased protection of the vernal pool as recognized by the state of Massachusetts.

Methods

Through phone interviews and email conversations, I was able to speak with a variety of knowledgeable experts and community members across Cape Cod. Some members, like Bob Cook and David Fryxell, were able to provide me with articles I was able to utilize in my work.

With 15 towns each having a local conservation commission and often a land trust and/or ponds organization, there are a wide variety of environmental organizations on Cape Cod. In research, I had the opportunity to speak with employees, previous employees, and volunteers of the following organizations:

- **Brewster Conservation Trust**
- **Brewster Ponds Coalition**
- **Cape Cod National Seashore**
- **Dennis Conservation Land Trust**
- **Eastham Conservation Foundation**
- **Eastham Open Space Committee**
- **Mass Audubon**
- **Wellfleet Conservation Trust**
- **Yarmouth Conservation Trust**



Amphibian egg mass at Mother's Bog, Brewster, Massachusetts.

Findings

Widespread Programs in Cape Cod Conservation Non-Profits

Owning, Maintaining, and Monitoring Land

The majority of Cape Cod conservation organizations are actively engaged in identifying, purchasing, and maintaining conservation lands, either as sole owners of properties or as holders of conservation

restrictions.¹ These properties are often prioritized based on a variety of factors, with overlapping considerations on groundwater and water resource protection, wildlife preservation, passive recreation, specific habitat presence and biodiversity, and their location in relation to other owned properties as an opportunity to create walking trails.

Organizations like the Yarmouth Conservation Trust focus on securing conservation restrictions, and ensuring that the land owners are complying with proper land maintenance and usage. With so many towns in Cape Cod growing in both size and density, there is often not much land left available for purchase. This commitment to ensuring current and future conservation efforts on private land and without owning land could be crucial to the long term preservation of Cape Cod's natural spaces.

Educational Programs

A crucial part of securing the future health of amphibians and vernal pools is providing engaging and accessible education resources. Cape Cod's conservation community is fortunate to have a plethora of organizations creating educational materials.

In 2023, Dennis Conservation Land Trust partnered with an AmeriCORPS member to teach the children of a local elementary school to spot fairy shrimp and wood frog eggs in a vernal pool behind their school. Alongside Brewster Conservation Trust, both organizations have picture book story walks alongside vernal pool trails, with specific material on vernal pools and amphibians. Brewster Ponds Coalition (BPC) uses education materials and programs that engage with a variety of community members; Recent adult programs have included talks on invasive species, decentralizing wastewater treatment, and learning to love your natural lawn. BPC also has naturalist guided eco paddles and educational walks that community members from all around Cape Cod can participate in!

Eastham's Open Space Committee and Conservation Foundation occasionally host educational talks in their public library. The Cape Cod National Seashore hosts evening springtime walks hosted by interpretation rangers, as well as providing an annual newsletter given to visitors.

This year, Mass Audubon has a spring lecture series, with all April events centralizing around vernal pools. Participants have the opportunity to discuss bird migrations in the context of vernal pools in an academic setting, with a paired field visit to a local vernal pool.

Common Conservation Programs

Community Science Initiatives

¹ Organizations with land holdings include: Wellfleet Conservation Trust, Eastham Conservation Foundation, Brewster Conservation Trust, Dennis Conservation Land Trust, Eastham Open Space Committee, and Yarmouth Conservation Trust

Herpetologist David Fryxell and the Dennis Conservation Land Trust have utilized their community's passion towards ecological preservation by creating a range of community science initiatives. In December 2022, scientists and volunteers of their Community Science Committee mapped out the town of Dennis, identified named potential vernal pools, and assigned groups to search for vernal pools each spring and collect evidence to certify them with the state.

Surveying Vernal Pools and Species Present

Robert Cook with Cape Cod National Seashore (CCNS) created a wonderful monitoring program beginning in 2002, continuing for 10 seasons. National Park Service employees counted egg masses in 40 vernal pools at the CCNS site each spring, as well as collecting data on pond water quality and landscape. Employees also monitored frog and toad calling during the spring and summer, with calls having scores based on how loud their choruses are, which allowed for them to provide a baseline on the species' distribution, habitat, and abundance. With 10 seasons of data, employees were able to determine that each species occupancy rate was relatively stable, as well as learning more about how spring peepers are able to live in a variety of habitat types. One species that jumped out to them was the limited presence of Pickerel frogs in Wellfleet, only being recorded in kettle pond lakes near the Wellfleet - Truro town line, perhaps providing information about their mobility and ecosystem needs.

Unique Conservation Programs

Variable Opportunities for Community Engagement

Brewster Ponds Coalition has created and maintained a variety of community member groups to encourage participation in Brewster conservation efforts. Currently, 53 volunteers test 19 ponds for cyanobacteria biweekly during the summer months. This group of citizen scientists consists of 53 active volunteers! Events to help neighborhoods build rain gardens and catch basins to remediate stormwater and runoff from entering local water bodies have also been conducted on an as-needed basis.

BPC's Pond Protection Program gives Brewster residents the opportunity to pledge to not use pesticides, fertilizers, and flush harmful things into their water systems. This program was created in collaboration with a mother and her children living on Sheep Pond.

National Connections

Brewster Pond Coalition also has a variety of scientific research being conducted on a local and regional area. The organization has partnered with NOAA to fly satellites over ponds and vernal pools to get a unique perspective on their typical size and distribution. Combined with BPC's work on GIS

systems to map possible water pathways and experiments on phosphorus flow from septic systems to local water bodies, they are an excellent example of different focuses that conservation groups can have, even without owning any properties!

Species Specific Plans

Cape Cod National Seashore made local headlines when they closed Provincetown roads on rainy nights to ensure the safety of migrating and reproducing Eastern Spadefoot Toads. Car collision is among the top current and future threats to amphibians on Cape Cod, stated by wildlife biologist Robert Cook, so accommodating to different species breeding and migrating times could be an excellent strategy to omit unnecessary casualties.

Applying to Unique Fundraising and Grant Opportunities

Brewster Conservation Trust is currently seeking funding through the Massachusetts Conservation Land Tax Credit and State Conservation Partnership Grant for upcoming conservation projects. Meanwhile, Dennis Conservation Land Trust has grant applications pending to hire permanent staff for overseeing community science efforts across Cape Cod and assisting with evidence gathering.

Wellfleet Conservation Trust is exploring opportunities with State Conservation Partnership Grants, which offer funds of up to \$85,000 for eligible private 501c3 conservation groups.

Yarmouth Conservation Trust has the chance to receive grant funds every 7 years when their Open Space and Recreation Report is published by the town. Unfortunately, many state and federal grants are geared towards land acquisition, which is often not available in densely populated and developed areas of Cape Cod.

Being a statewide conservation organization, Mass Audubon has a more stable budget and can secure government funding through larger federal legislation, such as the Infrastructure Act.

The Future of Vernal Pool Conservation

Diversifying state and federal grants to accommodate for the needs of every organization, outside land purchasing, would be able to provide a more realistic budget to conservation groups with a focus on education, advocacy, and conservation restrictions. Many conservation groups also need more federal funding for research processes in ecology and applied environmental science, as the collection of this data is imperative to a healthy future of Cape Cod's residents and ecosystems.

Conservation organizations have proposed improving and expanding the Massachusetts Conservation Land Tax Credit to address the lengthy approval process for credits. Each organization can only apply for this grant for one property every 3 years, significantly prolonging the time it takes to

complete a land donation and potentially discouraging potential donors. Furthermore, both the landowner and the conservation group must undergo numerous appraisals to determine the property's value, adding to the time required for processing by the state.

Not to be undersold, the value of community collaboration gives individual conservation groups the ability to increase local awareness and interest in protecting their natural spaces.

Other Amphibian Threats

There is still much to be done in ensuring healthy populations of amphibians on Cape Cod. Continued land development, pesticide usage, wetland draining, water and air pollution, introduced diseases, acidic rain, groundwater withdrawal, and Chytrid fungus all continue to impact amphibians on Cape Cod. But with active preservation and research into vernal pools, conservation groups may be able to better ensure their ability to reproduce.

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