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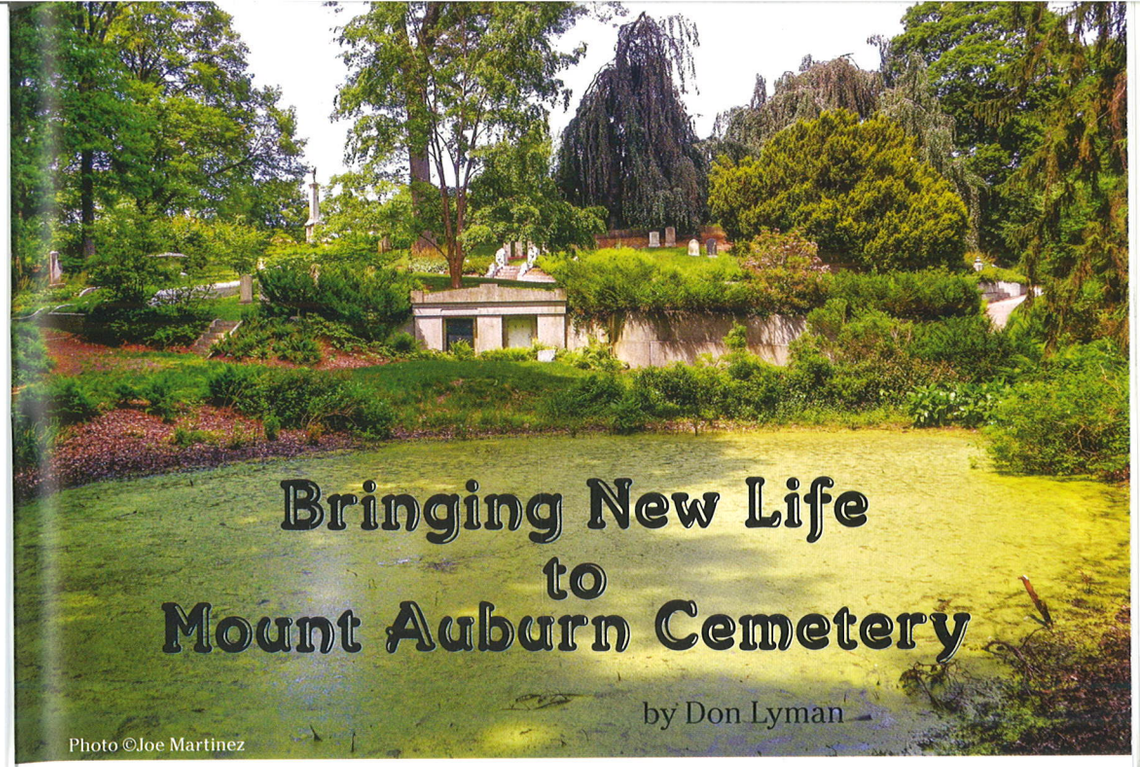


Bringing New Life to Mount Auburn Cemetery

by Don Lyman

Photo ©Joe Martinez

When he noticed the silence of calling amphibians at one of the most famous birding destinations in Massachusetts, a local herpetologist decided to do something about it...

On a mid-April evening herpetologist Joe Martinez walks slowly through the darkness of Mount Auburn Cemetery, his headlamp illuminating the road in front of him. Three Harvard graduate biology students follow close behind. Martinez stops to point out a monument to Nathaniel Bowditch, an early American mathematician and navigator. A lot of famous people are buried here, Martinez says, including renowned Harvard scientists Asa Gray and Louis Agassiz.

Suddenly Martinez hears something. He asks the students to listen. A distant chorus of high-pitched, single note whistles drifts through the cool night air and across the rolling landscape dotted with headstones and crypts.

"Ah, this is good. Sweet stuff to hear," says Martinez. "If you listen very carefully in the distance, those are peepers."

Until a few years ago, explained Martinez, the cemetery was totally silent, but then he and Patrick Fairbairn, a member of the Watertown Conservation Commission, decided to launch a project to reintroduce Spring Peepers, Gray Treefrogs, and American Toads to Mount Auburn Cemetery.

"The idea came about when Patrick and I were at Dell Pond observing the Spotted Salamanders migrating, and noted the complete silence of the place," said Martinez.

Martinez said the silence of the cemetery's only vernal pool was in contrast to virtually every other vernal pool he and Fairbairn visited. These small temporary ponds, formed by fall and spring rains and melting snow, are the primary breeding habitat for several frog and salamander species, and typically resound with loud choruses of male frogs calling for mates this time of year.

"We wondered if it was possible to bring in some spring-breeding frog species to

restore a bit more life to the place," said Martinez.

So Martinez, who works in the Herpetology Department at Harvard University's Museum of Comparative Zoology (although Harvard is not involved in the project), drafted a proposal to reintroduce the amphibians to Mount Auburn. He obtained approval from the Watertown Conservation Commission, Mount Auburn Cemetery, and a permit from the Massachusetts Division of Fisheries and Wildlife to capture and transport tadpoles.

"We have undertaken many habitat creation and enhancement projects over the past two decades," Paul Kwiatkowski, Mount Auburn Cemetery's conservation and sustainability manager, said in an email. "And when Joe Martinez proposed the reintroduction program, it fit perfectly with our stewardship goals." Kwiatkowski said those stewardship goals include protecting and enhancing the cemetery as a resource for wildlife.

Martinez and Fairbairn also wanted to reintroduce Wood Frogs, another common vernal-pool-breeding species, but MassWildlife's Natural Heritage and Endangered Species Program turned down the request because they believed Wood Frogs required more forested habitat than was present at Mount Auburn.


Photo © Bill Byrne

A calling male Spring Peeper, first of the three reintroduced amphibians to be heard in decades at the cemetery.

Mount Auburn was consecrated in 1831 as the nation's first garden cemetery. Kwiatkowski said that removal of trees and shrubs beginning in the late 1800s to create ornamental Victorian landscapes, and turf and lawn installations in the 1900s, might have contributed to the frogs' disappearance. If habitat destruction didn't do the frogs in, Martinez guesses heavy pesticide use in the 1950s and 1960s (when mosquito control efforts included the blanket, aerial spraying of DDT and other pesticides throughout many Massachusetts communities) probably did.

Green Frogs and American Bullfrogs managed to persist in the cemetery, said Martinez, although they could have been temporarily eliminated, too, but were able to reestablish their populations when new recruits made their way back into Mount Auburn from the nearby Charles River. Unfortunately, with the heavy urbanization of Watertown and Cambridge, which share the cemetery, there were likely no remaining local populations of vernal-pool-breeding frogs and toads to repopulate the area.

Interestingly, Martinez thinks Spotted Salamanders – which also breed in vernal pools but spend much of their lives underground – were able to survive, in part, by using crevices under crypts and monuments in the cemetery. These structures provided them with artificial habitat similar to their natural subterranean hiding places, and presumably allowed some to escape lethal pesticide exposure or the effects of substantial habitat alteration. Martinez notes that the salamanders also utilize the burrows of Short-tailed Shrews, small mammals that are also found in Mt. Auburn, and which also offer protection from surface-based threats.

Martinez estimates that the toads, peepers, and treefrogs have probably been absent from Mount Auburn for 50 years or more. There is no proof of the historical presence of peepers,


Photo © Andrew L. Rotch

An adult American Toad spotted and photographed by a member of the cemetery staff. The support of Mt. Auburn's management and grounds staff in recording sightings and improving the habitat has been crucial to the success of the project.

but Martinez found a record from the former Peabody Museum of Salem that indicates two American Toads were collected at "Mt. Auburn, Mass" in 1858. He also uncovered 8 specimens of juvenile Gray Treefrogs collected at "Mt. Auburn, Cambridge, Mass," that were placed in the Harvard Museum of Comparative Zoology's Herpetology collection in 1856. Given the presence of those two species in the cemetery at that time, peepers were undoubtedly also present; hence, the project is definitely one of reintroduction, not introduction.

Rather than releasing adult frogs and toads in the cemetery, Martinez decided to put tadpoles of the target species into Dell Pond because at least some individuals of these species (maybe most) have a strong homing instinct: When it came time for them to breed as mature amphibians, they would try to get to get back to the same habitat where they developed as tadpoles and metamorphosed into juvenile adults. Released adults might not be inclined to settle down, and in fact might well try to return to where they originated. But juvenile adults that underwent metamorphosis on site would likely imprint on the local habitat and regard the cemetery as their home.

In preparation for the new arrivals, Fairbairn said the Mount Auburn Cemetery installed a variety of wetland plants in and around Dell Pond, which measures approximately 55 feet wide by 85 feet long. The plants included sedges, Arrow Arum, Blue Flag Iris, Solomon's Seal, Buttonbush, and Sweet Pepperbush. "The dense, diverse new vegetation improved terrestrial and aquatic habitat for the American Toads, Spring Peepers, and Gray Treefrogs by increasing cover and forage," Fairbairn said in an email, "and it added singing perches for the two frog species."

The original plan Martinez formulated was that he would stock toad tadpoles for 3 years, Gray Treefrog tadpoles for

the next 3 years, and finally, Spring Peepers for the next 3 years, waiting 5 years from the end of each introduction to evaluate its success. So each spring from 2011 to 2013, he collected toad tadpoles at wetlands in Norwell and South Weymouth, and transferred them to Mount Auburn. Most were released into Dell Pond, although a small batch was also placed in Auburn Lake, another of the six water bodies located within the cemetery's borders that provide potential amphibian breeding habitat.

During the initial years of the project, Martinez introduced nearly 6,000 toad tadpoles into Mount Auburn. The original plan was altered, however, because about 150 Spring Peeper tadpoles were incidentally collected along with the toad tadpoles and were "piggy-backed" along with them into Dell Pond in 2012 and 2013. Given the increasing success of this species in the cemetery, Martinez doesn't think he will need to introduce any more of them after his Gray Treefrog introductions are completed. He has introduced 1,550 Gray Treefrog tadpoles (both newly-hatched and late-stage) since 2014, and, according to the plan, has one spring to go. Juveniles were seen at several locations this past spring and early summer, indicating at least some from the first introduction have survived. Assuming they continue to survive, these animals will be adults this coming spring, and Martinez hopes to hear their breeding calls.

To monitor the success of the project, Martinez said he listens for toads and peepers calling, a sure indication they've reached reproductive age. He also looks for eggs in the water, and for metamorphs – tiny frogs and toads that have recently metamorphosed from tadpoles – on land. He will consider all the reintroductions a success if, after 5 years from the last release, each species is breeding in three or more of the six water bodies where he believes reproduction is possible.

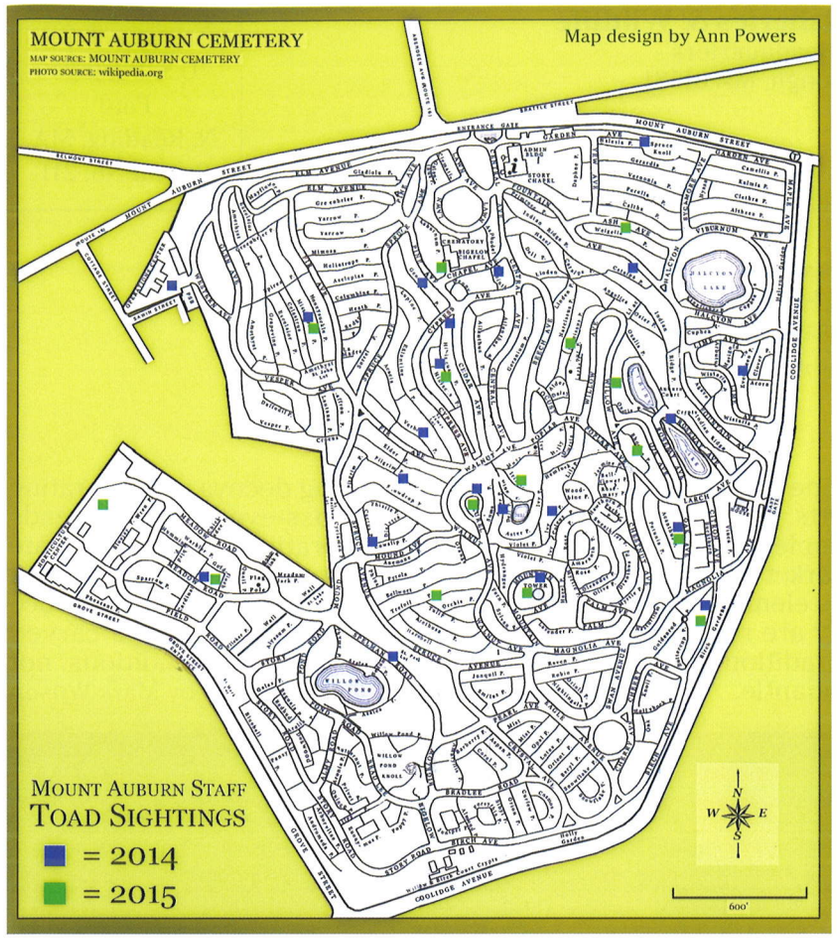
His work is paying off. Martinez said newly metamorphosed toads produced by breeding Mount Auburn toads were first seen in 2014, not only at Dell Pond, but also at Halcyon Lake, a permanent


Photo © Bill Byrne

If the first year of tadpole introduction was successful, Gray Treefrogs, last of the 3 species to be reintroduced, should be breeding in the cemetery this spring.

water body in the cemetery. By this past spring, they were breeding at yet another site, Willow Pond. This was the second year in a row Martinez has heard Spring Peepers calling at Dell Pond, and they also appeared for the first time at Halcyon. The cemetery's ground crew notifies Martinez each time they see a toad in the course of their work, and they report that toads have now been spotted pretty much all over the 170-acre cemetery.

Martinez, who has a bachelor's degree in biology and a doctorate in education, feels the project is important on several levels, including increasing the local biodiversity of a unique urban nature reserve and enhancing the visitor experience by allowing sightseers, birders, and other visitors to hear frogs calling in the spring, and to observe the animals



A map of toad sightings indicates the species is now distributed throughout the cemetery's terrestrial habitats.

throughout the spring and summer. All of these factors also make or enhance the cemetery as a prospective educational resource for local schools.

Richard Primack, a conservation biologist at Boston University who is not involved in the project, said that by seeing and hearing frogs in an urban area, people understand the connections between the quality of the environment and the ability of species to live in the urban environment.

"If the frogs are able to live, to some extent it means that the environment is also clean and healthy," Primack said in an email. "And people will be motivated to be concerned about protecting the environment."

When Martinez and the graduate students arrive at Dell Pond, they are greeted by a loud chorus of a dozen or so male Spring Peepers calling. As they explore the shoreline they manage to spot a few of the inch-long frogs, and see a few Spotted Salamanders as well. But Martinez says he is most proud of the 14 adult American Toads they find hopping around the edge of the pool, because they are the first species he tried to establish at the cemetery.

"They didn't reach breeding age for 3 years," said Martinez. "So, the verdict was out until 2014, when I heard them calling, and saw metamorphs in early July of the same year, indicating that breeding had occurred."

"The restoration of these amphibians to this habitat is a labor of love for me," says Martinez. "They are amazing, wonderful creatures and every bit as exciting to see and hear as the feathered migrants that draw hundreds of birders to Mt. Auburn every year. As native species, they belong here. I expect they will be thriving here long after I am gone, so they are, in a sense, my legacy..."

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