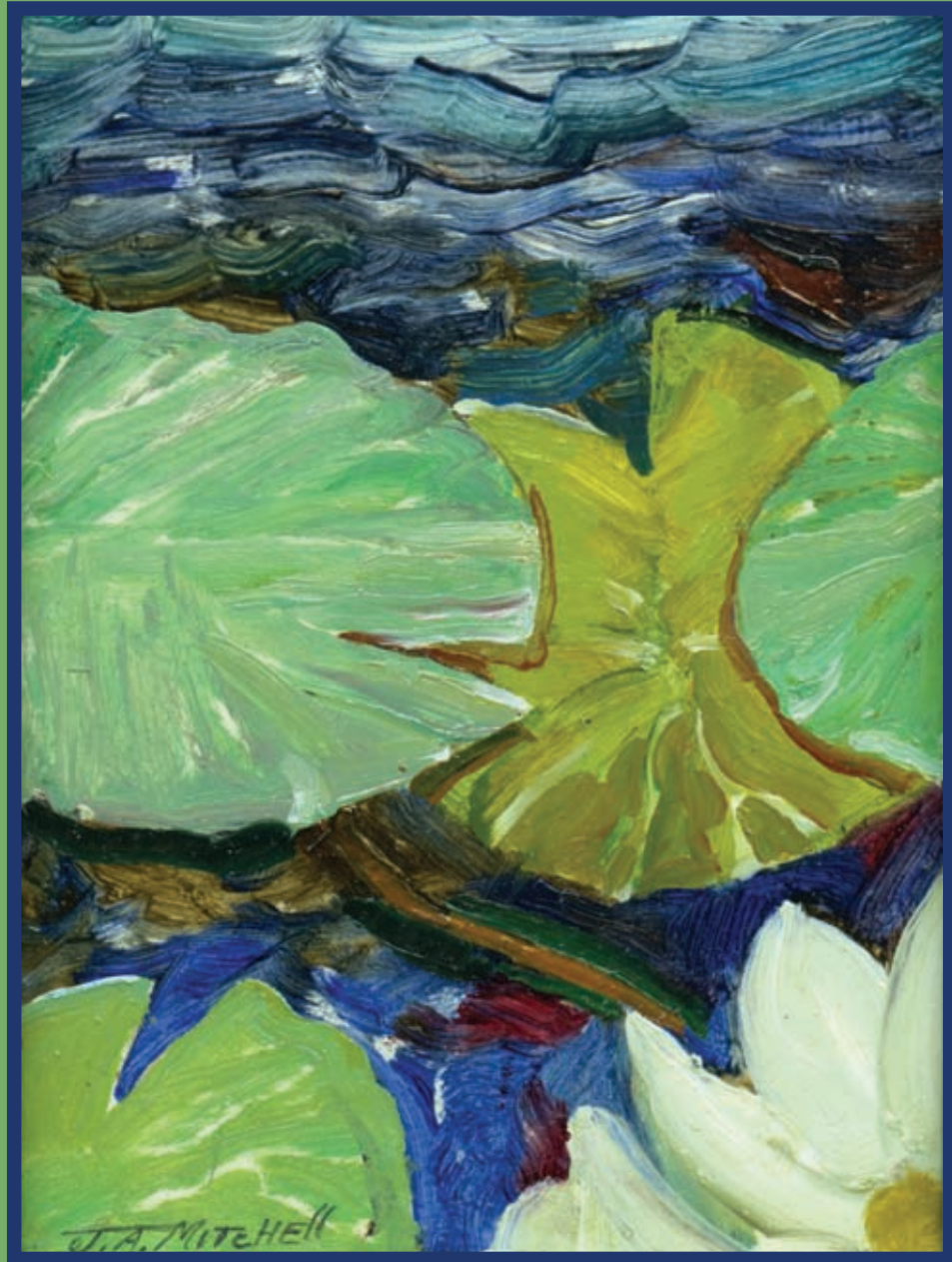


SUMMER 2013

SANCTUARY

THE JOURNAL OF THE MASSACHUSETTS AUDUBON SOCIETY



The World in Water
Lives in Ponds

Three Legs of the Stool— Observations on Mass Audubon's Mission

By the time you read this letter, I will be six months into my tenure as president of Mass Audubon. I've spent this time experiencing a complete immersion in the organization, meeting staff, Board members, Council members, volunteers, donors, and other supporters and partners. I've visited sanctuaries and learned about virtually every facet of Mass Audubon's programs, operations, and institutional aspirations. My days (and nights) have been absolutely packed with activities that have enabled me to make observations and formulate ideas about the organization. I'm being careful about making assumptions and reaching conclusions too early from all this, but I do have a few observations that I'd like to share with *Sanctuary* readers.



Henry Tepper hiking in Utah

First, thankfully, there have been no major surprises—Mass Audubon is, as you know, a strong, dynamic, programmatically rich, and fiscally healthy organization. It has an extraordinarily dedicated contingent of staff, volunteers, and Board members, all of whom demand and achieve strong results on the ground. There are challenges, of course, but Mass Audubon is fundamentally very sound.

My second observation is that Mass Audubon is truly a highly mission-driven organization. That is to say, virtually everyone I've met here, regardless of his or her role, has been welcoming, patient with my endless questions, highly informative, and best of all fiercely proud of and informed about Mass Audubon's mission of protecting the nature of Massachusetts for people and wildlife. Our staff, volunteers, and Board members understand the power of the "three-legged stool" of conservation, education, and advocacy that underpin our mission. But they also understand that it's not enough to have a great mission; what really matters is how effectively they *implement and advance* that mission. They accomplish this by constantly finding ways to *integrate* the three legs of the stool—a process that

creates exciting and effective synergies.

For example, at Wellfleet Bay, Sanctuary Director Bob Prescott and his staff don't restrict themselves to managing a beautiful sanctuary with outstanding birding and a state-of-the-art nature center that is a showcase for sustainable design and energy conservation. The sanctuary has also become a leader in efforts to protect and study endangered sea turtles such as Kemp's ridleys. The staff and volunteers then integrate these efforts into Wellfleet Bay's educational programs, enriching them dramatically. And our sea turtle rescue and conservation work has become a critical part of Mass Audubon's advocacy on behalf of ocean conservation, water quality, and climate change mitigation.

At sanctuaries such as the Boston Nature Center, Arcadia, Drumlin Farm, and Broad Meadow Brook, our educators, working in collaboration with the incredibly resourceful Stu Weinreb, Mass Audubon's statewide director of capital projects, and Lucy Gertz, our statewide education projects manager, have created what we call nature play areas. To adults, these simple playgrounds might look prosaic and underwhelming. They include piles of sand, rocks and smooth pebbles, fallen logs, metal or plastic cylinders, crisscrossed piles of branches and twigs, and other knickknacks. But to children, especially city-dwelling kids who don't often have the chance to enjoy unstructured play in woodlands or meadows, these new nature play areas are like magnets and offer endless fun. They also provide a welcoming entry into the natural world and often lead children to venture more boldly into the woods.

Mass Audubon's staff and volunteers have developed significant expertise in designing and constructing these nature play areas, and we have been contacted by public and private organizations from across Massachusetts and beyond to provide advice on how to create these natural amenities. What could be better? We are providing opportunities to bring more children into the out-of-doors, our example is being duplicated beyond the borders of our sanctuaries, and our educational advocacy efforts can point to this highly successful innovation.

I've seen these and countless other examples of ways that Mass Audubon powerfully and creatively integrates the three parts of its mission in the short time that I've been here. I can't wait to see what's next!

Henry Tepper, President

SANCTUARY

SUMMER 2013

Volume 51 Number 3



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Pond Lily



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Sanctuary is a journal about natural history and the environment that is published by Mass Audubon three times a year. Opinions expressed herein are those of the authors and not necessarily those of the Massachusetts Audubon Society. To respond to stories in this issue, email us at sancmag@massaudubon.org.

Sanctuary (ISSN 0272-8966), South Great Rd., Lincoln, MA 01773. Published three times a year. Memberships are \$750 guardian; \$500 patron; \$250 sponsor; \$150 protector; \$100 contributor; \$80 explorer; \$65 family; and \$48 individual. Reprints of this issue are available. Write or call the publications office at Mass Audubon, Lincoln, MA 01773, 781-259-2167; or email *Sanctuary* at sancmag@massaudubon.org. Printed in the U.S.A.



Mass Audubon works to protect the nature of Massachusetts for people and wildlife. Together with more than 100,000 members, we care for 35,000 acres of conservation land; provide school, camp, and other educational programs for 225,000 children and adults annually; and advocate for sound environmental policies at local, state, and federal levels.

Founded in 1896 by two inspirational women who were committed to the protection of birds, Mass Audubon is now one of the largest and most prominent conservation organizations in New England. Today we are respected for our sound science, successful advocacy, and innovative approaches to connecting people and nature. Each year, our statewide network of wildlife sanctuaries welcomes nearly half a million visitors of all ages, abilities, and backgrounds and serves as the base for our work. To support these important efforts, call 800-AUDUBON (800-283-8266) or visit www.massaudubon.org.

A Day on Long Pond

Every Fourth of July the great American naturalist Edwin Way Teale used to select a spot near a shed on his farm and spend the whole day there, recording the things that happened in that singular place.

Last summer I decided to do the same thing on a pond I know, not far from my house.

This hundred-acre body of water is somewhat unique among the thousands of ponds in populated sections of New England in that more than two-thirds of its banks are still wild, and town ordinances promulgated in the 1950s have managed to keep powerboats away—thus ensuring a modicum of silence. Once clear of the built-up eastern shore, you are surrounded by wide waters, wooded banks, marshes, and two coves half-covered with lily pads.

On this particular day in late August, I launched myself early in the morning, and, equipped with enough food and drink to supply me for the rest of the day, set out. I began by coasting along the southeastern shore and found myself paddling along a forested wall of oaks and hickories, punctuated by old trees, some of them storm blasted and harboring woodpecker holes and good perches for kingfishers.

I did have a destination in mind for this time of day—a narrow cove that offered shelter, warm morning sun, and a proximity to the shores. Here, I set myself adrift, lay back in the bottom of the canoe, poured a mug of coffee, and settled in to see what I could see and hear what I could hear by doing absolutely nothing.

For an hour or so, nothing did happen.

Then I heard the rattle of a kingfisher. A woodpecker was hammering away periodically back in the woods, and something—a frog probably, or perhaps an acorn from one of the overhanging oaks—plopped into the still waters.

As the day warmed, with a little more paddling, I rounded the point of the first cove and drifted into the second.

Painted turtles were out by then, crowding onto exposed logs and rocks. No snappers that day, even though I knew they were there, having seen a few monsters on other occasions. I've also seen muskrats in this cove, and one afternoon I saw two fawns dashing to-and-fro through the shallows, sending up sprays of white water as they frolicked.

This turned out to be a curiously quiet day as far as pond life is concerned. Also hot, and after another hour or so I paddled out to the center of the lake to see if I could catch a little breeze. Drifting there, alone with the sky

and the quiet shores, I began to think—understandably—about the thousands of ponds that are spread out all across the New England landscape and how they came to be.

Some occur in wide floodplains of rivers as a result of past overflowing. Some are merely temporary vernal pools that, although dense with life in spring, including several species of endangered amphibians, dry up each year by summer. Some ponds have no outlets or inlets and were created by vast blocks of ice left behind by the glacier. In fact, most of the ponds around the region, this one included, were created by the late great glacier.

About 11,000 years ago, as the walls of ice slowly retreated northward, the millions of

tons of water originally contained within the ice had to go somewhere and the myriad ponds of New England are the result. This particular pond lies within a surround of low green hills, with a wide marsh at the southwest end and low ground on the northeastern side. The pond was originally part of a vast glacial lake, and as the meltwater receded some of the water was held in place by a range of low hills surrounding the pond after the lake dried up.

The mean depth of the pond is only about 8 feet, although I've found here and there deep pockets of 15 feet or so. Generally, because the pond is shallow, the water warms over the course of the summer months. But even in the heat of August you can dive down into the gloomy depths of these spring-fed holes and still feel the chill of January. It is an alien cold world in these springs, but they are the source of the life of the pond.

The groundwaters of the square-mile watershed feed the pond all summer long so that the water level stays fairly high. Furthermore, careful monitoring of the water quality in recent years—and the dictates of Title 5, which mandates efficient septic systems, plus a town-sponsored program of rain gardens and artificial wetlands on the eastern side—has managed to keep the waters relatively clean.

In spite of their small size, ponds of this sort are ver-



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itable zoological gardens of life. This pond harbors over six species of so-called game fish, as well as eels and many species of minnows such as dace. It has a wealth of aquatic insects and over 22 species of aquatic plants. Flycatchers show up periodically along the shore, as do kingfishers, black ducks, mallards, and spotted sandpipers. I've seen pied-billed grebes here; and cormorants, ospreys, ring-billed gulls in summer; and, of course, herons and the ubiquitous Canada geese. Reptiles and amphibians are common, especially green frogs and bullfrogs, and snappers and painted turtles occur in abundance—also a healthy population of black water snakes. Muskrats are common, periodically otters move through, and for a while there was a beaver colony at the southern end of the pond.

As with all ponds, these higher species are supported by a vast underclass of invertebrates, algae, and protozoa, and the pond also has a population of a unique species of freshwater jellyfish, *Craspedacusta sowerbii*, one of only a half-dozen species of freshwater jellies, or hydromedusae, in the world. They appear each year in late summer.

Geological and natural forces never sleep though. Over the eons since the glacier retreated this pond has lost depth. Native plant communities that have formed in the shallower coves creep outward from the banks, eventually forming grassy marshland, which at some point supports treed swamps, which in time will evolve into dry land.

Human occupation along the eastern shores has helped speed this process via organic pollution, and global climate change is currently a major part of this evolution.

Changing weather patterns in the region, warmer waters, and the rising tide of the coast, which is at present 35 miles away, will no doubt have some effect on this inland pond, and where it will be a century hence is anyone's guess. But for now, on a still, hot, August day, it is a pleasant enough place to waste time, listening for kingfishers and frogs.

By late afternoon I felt the need to cool off and paddled

over to a small isolated beach I knew of, dove in, and then sat in the sun for a while, drying off. The shoreline of this pond is where most of the action takes place. Turtle heads would poke up periodically among the lily pads as I sat there; a green frog hopped out of the water, turned, and settled by the water's edge; and a bit later I saw the rippling form of a black water snake. It approached the shore, swam within two or three yards of the indifferent frog, and slithered into a stand of arrowhead.

A kingfisher arrived, perched on an overhanging branch, and flew off, with its characteristic rapid-fire call. I saw a red-tailed hawk drift over, a ring-billed gull flew across the pond, later a cormorant sped over, and on the opposite shore from the little beach I noticed the stately form of a great blue heron. He suddenly lifted off and cruised over to a better post, emitting his guttural call all along the way.

The lazy summer day drifted on. I fell asleep for a while in one of the coves and when I woke up tree swallows and barn swallows appeared and began darting about, dipping their bills in the still water. I saw a drift of the tiny dime-sized jellyfish float by, and dragonflies and darning needles were flitting everywhere over the lily pads in the late-afternoon heat. Also abroad were fleets of water striders, and under the dark waters I could see back swimmers, and diving beetles, and some hideous dark thing slowly making its way along the bottom, a creeping waterbug maybe.

This turned out to be a quiet summer day, though, and as the shadows lengthened I slowly paddled back to watch the sun sink below the wooded hills. Frogs began to call as the light grew dimmer; the swallows continued to sweep the still waters of dusk, and gradually a purple glow spread across the horizon.

The world went still; darkness gathered, and, from one of the wooded coves to the south, I heard a single haunting call of a barred owl.

JHM

Stake-drivers and Sac-a-plombs

Birds, beavers, and the legacy of ponds and wetlands

by Wayne Petersen

Freshwater ponds are entities whose existence is variously perceived—sometimes with pleasure and sometimes with apparent disdain. But regardless of the human perspective, ponds are progenitors of life and home to a plethora of organisms both small and large.

Ponds are defined by their depth. Generally shallow—not more than 12 to 15 feet deep—and therefore able to support rooted water plants from shore to shore, most ponds are well lighted all the way to the bottom unless otherwise shaded by a blanket of floating duckweed or lily pads. Because of their relative shallowness, unlike deepwater lakes, ponds tend to maintain a fairly uniform temperature from surface to bottom, along with the capacity to seasonally change rather quickly, e.g., freeze in fall or thaw in spring.

For example, a pond may sometimes be sufficiently heated by the rays of the sun that even in a winter warm spell you can find a flotilla of whirligig beetles twirling in openings in the ice. In a healthy pond it is simply the combination of unpolluted shallow water and the warmth of the sun that are required to support the base of food chains, beginning with organisms as simple as diatoms and filamentous algae.

Despite a fundamental similarity, ponds are of many types and may be created in various ways. Some ponds are human-made, usually the result of damming a small stream or river; others are natural. Natural ponds may be maintained by groundwater or fed by subsurface springs, while others are periodically revitalized by rainfall or upland runoff. In Massachusetts most south-eastern coastal plain ponds are the product of glacial activity long ago. Many coastal plain ponds are roundish in shape, have relatively sterile sandy bottoms, and lack an entrance or exit stream. In many woodlands, small ponds called vernal pools exist that typically only hold water from late winter to midsummer before drying up. These unique ephemeral ponds are variously populated by an obligate breeding fauna—organisms that only



Least bittern

© JIM FENTON

reproduce in such places and that must have a rapid life cycle (e.g., fairy shrimp) or a reproductive cycle that allows the organisms to get out of the pools in early summer before they evaporate (e.g., wood frogs and spotted salamanders).

Beavers represent another source of ponds in many regions. Consummate engineers, beavers are famous for damming brooks and streams in order to flood neighboring woodlands to create ponds that will facilitate their feeding and breeding activities. Many beaver ponds are extensive and long-lived and ultimately provide homes and habitat for a host of other organisms. Once abandoned, however, these habitats formed by flooding eventually dry up, only to be followed by beaver meadows where the pond was previously. In time, the entire cycle will begin anew.

Regardless of how a pond was formed, it is normal for wetland plant communities to eventually develop along its edges and in its shallows. Common edge plants include a variety of sedges and grasses, along with an assortment of wildflowers and various woody shrubs. Emergent plants growing in many freshwater ponds include cattails, pickerelweed, arrowhead, and bulrushes, as well as a variety of submerged aquatic species such as fanwort, bladderwort, and various pondweeds (*Potamogeton* spp). The pH (i.e., acidity or alkalinity) of the water in a pond and its surrounding soil is often a primary determinant

of what assemblage of plant species will be present. If there is little or no current flowing through a pond, woody shrubs such as buttonbush, waterwillow (*Decodon verticillatus*), black willow, and red maple may become established around the shoreline or on floating mats of vegetation if there is sufficient mucky peat beneath them to support their woody root systems.

Regardless of these specific characteristics, a healthy freshwater pond hosts a rich diversity of organisms practically year-round. Some of the defining factors that will determine precisely what life a pond will support are how much sunlight the pond receives, how much oxygen and carbon dioxide are in the water, and what the concentration of different inorganic salts happens to be. Including the simplest life-forms—protozoa, diatoms, and unicellular algae—the major constituents in a healthy freshwater pond community are made up of a plethora of aquatic worms, insects, and their larvae, crustaceans, mollusks, fish, amphibians, and often several species of reptiles.

Besides these exclusively aquatic organisms, there are also bird and mammal species that are characteristically associated with freshwater ponds and wetlands. Foremost among the smaller mammalian denizens inhabiting local ponds are muskrats, beavers, river otters, and mink. Each of these species utilizes freshwater ponds in a specialized way, but probably none more exclusively than the muskrat or the previously mentioned beaver. Muskrats are herbivorous rodents and adept swimmers that characteristically build their homes out of accumulated aquatic vegetation fashioned into large mounds surrounded by water. The muskrats enter the internal chamber within these conspicuous mounds via submerged passageways that allow them to enter and exit unseen. If muskrats are in residence at a pond, they can be readily detected by the presence of their obvious mounded houses away from shore, or their conspicuous droppings on shoreline rocks.

Despite the abundance of aquatic invertebrate species, the renowned reputation of freshwater fish, and the appeal of semi-aquatic mammals that live in pond environments, for many naturalists and wildlife observers it is wetland birds that ultimately have the greatest attraction. A quiet pond and its surrounding vegetation afford great promise for attentive wildlife watchers. Unfortunately, however,

some of the pond and wetland species that are of greatest interest to dedicated birders are either notably uncommon or highly elusive breeders in the Commonwealth. Included among the less common species are pied-billed grebe, American and least bittern, king rail, and common gallinule—all species that are state listed by the Massachusetts Natural Heritage & Endangered Species Program (NHESP).

In addition to these rare nesters, there are a number of more familiar and conspicuous pond-associated birds whose haunts and habits are no less interesting. Among those most familiar are several species of native waterfowl—most notably the wood duck, American black duck, and mallard. During migration many Bay State ponds routinely host other species as well, including ring-necked ducks, lesser scaups, buffleheads, common goldeneyes, hooded and common mergansers, ruddy ducks, and American coots. Less obvious denizens of pond shores are species such as green herons, Virginia rails, soras, and spotted sandpipers.

An oft-pondered question is why some ponds seem so much more attractive to waterfowl than others. The answer generally depends upon the geographic location of the pond or the composition of the waterfowl food that the pond contains. Some ponds are simply situated in locations where human activities are sufficiently disruptive to render them unsuitable for use by waterfowl. In certain locations such as Martha's Vineyard, for example, many coastal ponds have been periodically breached, thus allowing salt water to enter, causing the water to become brackish and kill the aquatic plants and organisms relished by many migratory ducks (see page 17).

It may take years for a pond to revert to freshwater



Pied-billed grebe

© JIM FENTON

after a major breach has occurred. In other situations the water chemistry of a pond may not support the organisms or aquatic plants desired by ducks as forage. In either case, when one or the other of these conditions prevails the absence of waterfowl on the pond is usually obvious to vigilant sportspersons.

Certainly one of the most appealing aspects of the avian denizens of ponds and their associated wetlands is their elusiveness. Rails and bitterns residing in even the smallest wetland can practically go unnoticed to all but the most acute observer. Marsh birds rely upon their coloration for protection. However, some species take camouflage to a level seldom seen in many other bird species.

The American bittern for instance is warm brown and heavily streaked with longitudinal stripes that blend together in a way that renders the bird practically invisible when it is stealthily hunting frogs along the edge of a cattail-fringed pond. At the slightest alarm, the bittern quickly compresses its body and points its bill to the sky—a position that all but makes the bird resemble the cattails and bulrushes in its surroundings. It may hold this motionless position for several minutes before slowly stepping back into the neighboring vegetation where it truly becomes invisible.

Similarly, the Virginia rail closely resembles its surrounding wetland vegetation. While not terribly shy when located in the open, these odd birds more often prefer to go about their business deep among the cattails where they have the uncanny ability to slip between the most tightly packed stems of their surrounding vegetation without so much as moving a leaf.

Besides their cryptic coloration and often-furtive behavior, many marsh birds are best known by their vocalizations. To hear these birds to best advantage often means arising predawn and getting to a wetland edge by first light. At dawn on a mellow spring morning anytime from mid-April to late May, bitterns, pied-billed grebes, rails, and gallinules regularly add their peculiar vocalizations to the more familiar chorus of marsh wrens, swamp sparrows, and red-winged blackbirds. To the trained listener the soft cuckoolike cooing of the least bittern may literally be the only indication that this small wader is even present in the wetland.

More noticeable, if not bizarre, is the hollow pumping of an amorous male American bittern. Following several prodigious gulps, the bittern emits sounds not unlike that of an old-fashioned hand pump that, at a distance, may also take on the muffled quality of someone driving a post into the ground. It is this breeding sound that is the origin of such colorful colloquial names as “bog-pumper” and “stake-driver.”

If bitterns coo and pump, then grebes and rails hiccup and grunt. As fewer and fewer extensive emergent marshes and freshwater ponds seem attractive to nesting pied-billed grebes in Massachusetts these days, their unique hooting and hiccupping spring calls are less often heard than they once were. Fortunately, Virginia rails are still common enough in the Bay State



© JIM FENTON

Red-winged blackbird

that a dawn visit to a suitable wetland makes it possible to readily hear the metallic “kicking” of “singing” males, periodically interrupted by the grating, descending, pig-like grunting calls of males and females maintaining contact with one another. But try to see one! Like bitterns, they can be challenging at best to observe amidst their wetland surroundings. They silently disappear by sinking underwater and out of sight like a sack of lead, thus their early French-American name “sac-a-plomb.”

Taken in their entirety, freshwater ponds and their diverse seasonal and year-round inhabitants have few equals. So why is it that so many of these rich and productive biological communities are on the wane? The conservation message seems clear. When it comes to maintaining water quality and wetland integrity, no efforts should be spared in the future to keep these extraordinarily rich, productive, and aesthetically attractive systems healthy, contamination free, and ecologically intact.

Wayne Petersen is director of the Important Bird Areas program for Mass Audubon.

Pease Pond

by Bernd Heinrich



© RICHARD JOHNSON

Juvenile yellow-crowned night-heron

As we hurried along the worn cow paths past the apple orchard and down into the cool shady woods, our chatter mingled with the evening song of the white-throated sparrow. Finally we reached the alder thickets along the shores of Pease Pond, where our rowboat lay hidden. After bailing out the water, we took our seats, and with glimpses of a monster fish or two gliding underneath us (once in a while we even caught a sunfish, yellow perch, pickerel, catfish, or bass), we pushed through floating lily pads and pickerel weeds out into the pond. When the fish rose out of the water to devour the insects hovering on its surface, they left concentric circles on the glassy pond. Another late summer day would fade into night as the whip-poor-will sounded from the hill and bat silhouettes fluttered errat-

ically against a darkening sky. Some of the bats skimmed low over the water, which was riffled here and there by the V of a speeding water beetle. As it got darker, the lightning bugs (lantern beetles) shone their cool white lights along the shore. Each would make a rapid series of flashes, then pause for a second or two, and then repeat the flashes a few yards farther on. The white perch started to bite around this time, and the tugs we felt on our lines had an intoxicating effect on us. We stayed till our worms were gone, and then stumbled back up through the woods.

Excerpted from *The Snoring Bird: My Family's Journey through a Century of Biology* by Bernd Heinrich (HarperCollins Publishers, 2008).

Pondering the Pond Plants

What is growing in a freshwater pond, and why?

by Teri Dunn Chace

Many things may catch your attention when you view a pond. Overhanging trees, the shoreline muck, the reflections of passing clouds, birds overhead, and finally—the plants.

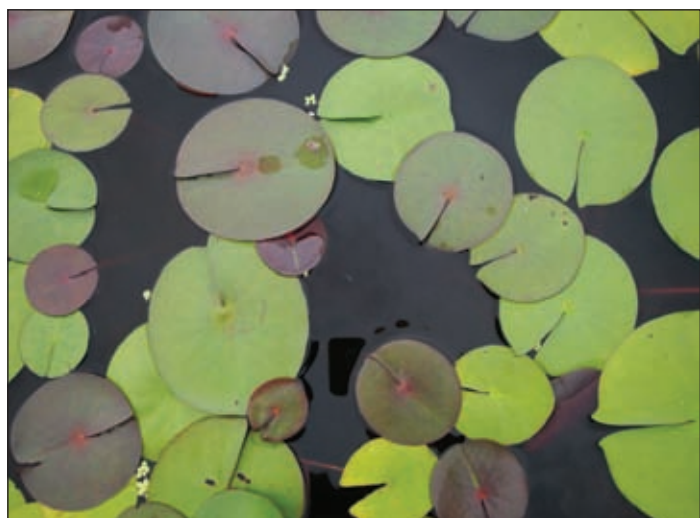
It is the plants that truly define a pond. Lakes, by contrast, are generally larger and have more vacant surface. Pond plants prosper in still water. Most don't do well in rushing streams, or in spray or agitation from rapids or waterfalls, or if buffeted by waves or tides. Many do not thrive even in wide slow-moving portions of flowing rivers. Typical pond plants like open calm waters. Such conditions allow them not only to root but to settle in, flower, and increase.

The most prominent and recognizable of all these plants is the pond waterlily, which here in New England is almost always the beautiful and sweetly fragrant white-flowered *Nymphaea odorata*. This is a native American plant. (The related *N. alba*, now naturalized in some places, is a smaller European import with more cup-shaped flowers of fewer petals.) Sometimes you may even spy a pink-hued pond lily, which botanists classify as the subspecies *N. odorata rosea*.

Pond lily blossoms open in the morning and close in the afternoon or evening, attract pollinators (mainly bees) with a luscious bounty of nectar, and generally last up to three days. Then, if fertilized, they turn to the business of going to seed, which involves pulling the developing pod down into the water while new blossoms right nearby unfurl. A pond full of these wild waterlilies may appear to be a mass of blooms; in reality it is a productive parade of buds, flowers, and seedpods.

Another showy substantial pond plant is the yellow pond lily, or spatterdock. Easily recognizable by its oval slightly elevated pads and perky gobletlike golden blooms, it's a waterlily relative, *Nuphar lutea*, or possibly one of its near relatives, *N. advena* or *N. variegata*. Like the white-flowered pond waterlily, it's scented, but not as pleasantly; one plant guide cryptically remarks, "its unusual fragrance can best be described as alcoholic." As well as the lily pads, these plants sport thin, ruffled, underwater leaves. Spatterdock is most commonly spotted in deeper colder ponds. It tolerates water with a higher pH, as is sometimes found in rocky mountains here in New England.

In all cases, these wild lilies indicate a good healthy pond of fairly clean water. Contamination tends to disable or kill them—especially road salt and pollutants such as farm, garden, lawn, and golf-course fertilizer, and weed-killer



© PAULA BILES

Lily pads

runoff. Because their leaves are big and broad, up to a foot across, they do a good job of covering the water surface, which in turn keeps algal growth at bay, cools the water somewhat on hot summer days, and provides shelter for baby fish and other vulnerable pond creatures.

Rather than populating surface area, a host of other common pond plants congregate on the margins, standing in the shallows and rooting in mud. Since their basic needs are well met—ample fertile soil, all the water they need, and sunshine—these tend to do quite well. Here in New England, you are likely to see patches of some or all of these species including pickerelweed, arrowhead, arrow arum, blue flag irises, and rushes or sedges.

These marginal plants within a pond ecosystem stabilize the banks and provide shelter and sometimes food for animals such as muskrats and certain species of birds. The fact that dense vegetation sometimes inhibits or blocks access to the center of the pond and deeper water can be beneficial, too—in a defensive sense. Predators and dogs may not get past—at least not easily—so ducklings, frogs, turtles, or frail young waterlilies beyond will have a chance to avoid disturbance.

Of these marginal plants, pickerelweed, *Pontederia cordata*, is probably the most easily identifiable. It's the one with the handsome purple flower spikes in mid-summer. The flowers often attract butterflies and the bright green leaves are lance shaped, typically about a



Spatterdock with duckweed



Pond with white waterlilies

foot long. It got its name from a folk legend that somehow pickerels spontaneously generated in the crowded patches. In fact, they and other freshwater fish merely find convenient shelter beneath stands of these plants.

Arrowhead, or duck potato, *Sagittaria latifolia*, also has distinctive, pointy, arrow-shaped leaves, with veins radiating from a central point. The plants are about a foot and a half tall, and have leafless stalks of small yellow-centered white flowers that poke up here and there and make a pretty sight. The small stout tubers, lodged in the muck below, are quite tasty to ducks, other waterfowl, and also small mammals.

Arrow arum, *Peltandra virginica*, on the other hand, is a bigger plant. Its stalks top out at about three feet, with arrow-shaped leaves up to a foot long. One reliable way to distinguish it from arrowhead is to examine a leaf more carefully: the three lobes radiate from a central vein. Also, the pale yellowish green flowers—when they appear—have what is known as a spathe-and-spadix arrangement, which is typical of all plants in the arum family, from Jack-in-the-pulpit to calla lily.

Blue-flowered irises, often called blue flag, *Iris versicolor*, are also common along pond banks. These robust wildflowers are cousins of garden irises, which appreciate ample soil moisture as well. Blue flag plants derive nutrients from pond water, thus acting as natural filters to help keep the water clear.

Various rushes, sedges, and grasses can also be found in the shallows of many ponds or at least gathering on the banks. They, too, prosper with plentiful water. Should the summer months prove dry and the shoreline recede, they will become ratty looking and even go dormant. They can prevent shoreline erosion, and well-established patches do a fine job during periods of heavy rain. Identifying these by name is not always easy because there are many and, to the untrained eye, they look similar. But you can at least differentiate them by

type: rushes have stiff, round, or strawlike stems; sedges tend to be sharply three cornered; and grasses have flat blades. Sedges have edges, rushes are round, as the old saying goes.

Duckweed, *Lemna minor*, is important to mention as well because it is so ubiquitous in our ponds and, also, so interesting. It is said to be the world's smallest flowering plant. Yet it forms such dense colonies that large surface areas may be coated with it, giving you the false impression that the water is not deep or that you can walk right out onto it. A few steps into a duckweed-filled pond will quickly disabuse you of that notion!

Close inspection of duckweed is fascinating. Individual plants measure .02 inches across. They have no leaves, stems, or true roots. You're looking at a structure called a thallus, which may be round or oval and may or may not have a reddish underside depending on the species. In any event, you ought to be able to observe a tiny rootlet or rootlets dangling under each thallus in the water.

Duckweed does bloom, but the inflorescences are a mere .004 inches across. More often, the plants reproduce by wee buds that develop in late summer, sink to the pond bottom, and overwinter there. In spring they produce a single gas bubble that conveys them to the surface. Despite their tininess, duckweed plants form extensive colonies and can have a profound influence on a pond by reducing temperature fluctuations, providing shade, and limiting evaporation rates.

Many creatures besides ducks eat it. You'd think they wouldn't provide much in the way of nourishment, but they do because of the variety of pond creatures that hide or lay eggs among them. A mouthful of duckweed is more like a spoonful of gumbo than a forkful of salad.

Teri Dunn Chace is the author of several books on water gardening and, most recently, War of the Weeds: How to Eradicate Invasive Plants (Timber Press, 2013).

Little Stalks of Horror

A serious and ongoing problem in many ponds, as well as in wetlands and all manner of waterways, is invasive plants. When alien plants make their way into one of these established ecosystems, they wreak havoc, altering their life and health.

Invasives arrive by various means and are commonly introduced by birds, wildlife, and also humans. People sometimes dump out aquarium plants into a natural or human-made water feature, and many aquarium plants lack local natural enemies and multiply like crazy in the wild. Signs at public ponds, lakes, river landings, and even highway rest areas often warn boat owners to prevent dispersal by hosing off their boat. The same applies to fishing gear and especially waders.

If you spot an encroachment, please act. Alert the landowner; if it is on public land, alert whoever is managing it. If it's on your property, please, do *not* use weed killers, many of which are detrimental to more than just the plants—herbicides can kill pond creatures, harm waterbirds, and move into and linger in adjacent soil and groundwater. Instead, yank out the offenders, repeatedly if necessary. Toss them a safe distance away and let them dry out, then dig them into the ground as added organic matter.

One of the most beautiful—and aggressive—of these invaders is purple loosestrife, *Lythrum salicaria*. This stately magenta-flowered perennial, between two and six feet high, is a sensation when it blooms in masses in late summer. It's often a favorite subject for photographers and painters; but to gardeners and land managers it's a thug and a villain.

It crowds out existing native vegetation steadily and relentlessly in any wet spot, including the margins of ponds. It does reproduce by seed, but individual plants also increase their rootstocks each season, sending up more stalks in ensuing years.

Purple loosestrife can be controlled if you catch it early enough by digging out young patches by the roots. Don't wait till the plants are well established; the root systems become as hefty as a buried tire and are insidious. When purple loosestrife blooms, cut off the flowering spikes immediately—you could use them in bouquets.

Common reed, *Phragmites australis*, is another bully. It has sturdy canelike stems that can grow up to 14 feet tall and an inch in diameter. Its leaves resemble corn foliage. In midsummer, dense, feathery, grayish purple flower plumes appear. The entire plant fades to tan when colder weather comes. The roots are spreading rhizomes that can go down as deep as six feet!



© JOHN D. BYRD

Purple loosestrife

Like purple loosestrife, it competes aggressively with native plants. Research suggests it is strongly allelopathic, secreting a substance that damages the roots of other plants. It can also suck the moisture out of its area, which of course is destructive to ponds, especially small or shallow ones. Using herbicides to get rid of this plant is risky, and digging it out is only practical with smaller younger plants. Repeatedly chopping back a stand will weaken it over time—do this early in the growing season before seeds can form and disperse.

Water milfoil, *Myriophyllum heterophyllum*, is a robust, fast-growing (up to an inch per day!), nonnative underwater plant. The stem is round, thick, and reddish. Slender leaves coat it in whorls, particularly on the upper reaches near the water surface. It may rear up out of the water by midsummer when its inconspicuous brownish flowers are forming and blooming. Its main and most successful mode of reproduction, however, is from fragments that root easily in pond sediment and quickly form colonies. Unchecked, water milfoil can outcompete native plants and choke the life out of a small pond.

Waterweed, *Egeria densa*, is a Brazilian invader. This submerged somewhat grassy plant is an aquarium favorite but becomes a menace in the wild. It is not much to look at, just spirals of small rough-textured leaves on long trailing stems that reach up to six feet. Given the chance, it forms dense mats, crowding out native vegetation. It rarely flowers but it readily spreads vegetatively, the stem and rhizome fragments rooting very easily.

Teri Dunn Chace

The Great Circle of the Pond

Life and death in the underwater world

by Michael J. Caduto

Years ago, on a bright mid-winter day, while walking atop the inky black ice of an old farm pond at Caratunk Wildlife Refuge in Seekonk, a movement caught my eye beneath the crystalline surface. There, paddling along as if it were summer, was a spotted turtle.

“How,” I wondered, “could this cold-blooded creature find enough oxygen to generate energy for moving about beneath the ice?” My investigation revealed that overwintering turtles can absorb oxygen through the surface of their exposed skin. As lactic acid accumulates in the bloodstream, chemical buffers—calcium, magnesium, and potassium—become more concentrated, neutralizing the acid. But scientists have yet to discover exactly how turtles survive when submerged all winter.

Ponds are places of endless discoveries of this sort that embody the larger realm of nature. They are very like living organisms themselves—absorbing the sun’s life-giving energy. Photosynthetic plants, algae, and autotrophic bacteria—those that produce their own food—form the base of the pond food chain. Although the green plants that we see growing in and around the pond, such as waterlilies and cattails, are important in shaping the pond environment, it is the minute algae and certain kinds of bacteria including blue-green algae whose energy production drives the pond’s life cycle.



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Life of a New England pond ecosystem

As sun catchers, algae are as important to a pond as grass is to a field. Free-ranging forms of algae called phytoplankton drift about in the open water. Other kinds of algae are attached to stems, leaves, rocks, and even animals. Many dragonfly nymphs, for instance, are heavily coated with algae.

Gaze down into a drop of fresh pond water under a microscope and these minute creatures appear as a community of otherworldly species. From the amorphous euglena, which gets around by waving a whiplike flagellum; to the beaded-necklace-shaped blue-green algae *Anabaena*, which produces a potent neurotoxin; to the gorgeous green moonlike spheres of *Volvox*—algae are among the more fanciful life-forms.

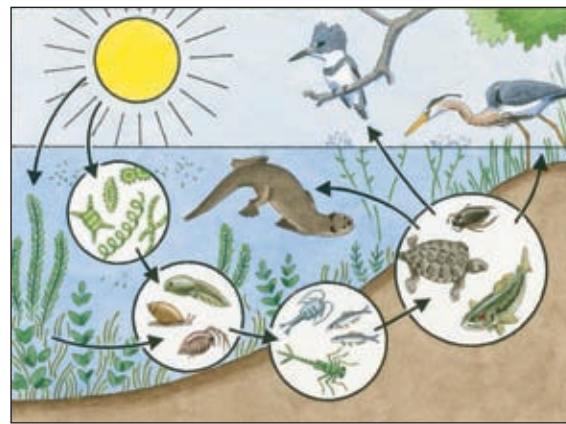
Diatoms, prolific during the spring and early summer, have their delicate silica-rich shells that are the most beautifully sculptured designs in the pond. Seven delicate arms of *Asterionella* radiate out from the center, while the finely etched spindle-shaped cells of *Navicula* grow in the classic hatboxlike form of many diatoms. The silica within diatom shells persists long after death, the remains building up in bottom sediments that can last for thousands of years and form a record of environmental conditions over time. In addition to being one of the most important organisms at the base of the pond food chain, diatoms leave remains that provide us with diatomaceous earth for our gardens. And much of our fossil fuel supply was formed from the ancient remains of countless diatoms.

While snails, mayfly nymphs, young fish, and other forms of pond life graze on the algae that cover stems, leaves, rocks, and bottom sediments, a most unusual microscopic herbivore known as a waterbear grazes alongshore on the foliage of mosses and liverworts. Waterbears, aka tardigrades, are named for their ursine body shape and lumbering gate, but they have twice the number of legs as a real bear, each of which has two claws on the end that facilitate movement as they forage.

A similar link in the pond's food chain are the tiny crustaceans and rotifers that eat free-floating and swimming plankton. The water flea *Daphnia* looks like a miniature rotund shrimp doing the backstroke. Its five pairs



Energy flow in a vernal pool from decomposing organic matter to predatory zooplankton, aquatic insects, and salamander larvae



Energy flow in a permanent pool from photosynthetic algae to aquatic predators

of legs move water toward the mouth while filtering out microscopic food particles. Another common crustacean is named the *Cyclops* for the single prominent eye set in the center of the head. Rotifers have mouths that are ringed with hairlike cilia whose movements draw in food. The Latin namesake of *rotifera* ("wheel bearer") was inspired by the motion of these cilia as they wave in a synchronous pattern that resembles a rotating wheel.

Diatoms, microscopic crustaceans, rotifers, and other forms of plankton are essential food for many insect larvae, including those of mosquitoes and the phantom midge larvae that live at or near the surface film of the water. These larvae belong to a group known as the neuston—organisms that exploit the surface tension in order to survive. Mosquito larvae rest on the surface with breathing tubes exposed to the air. Phantom midge larvae have floatation sacs to control buoyancy.

These larvae are in turn eaten by young fish, true bugs called water treaders,

whirligig beetles, and fishing spiders. Whirligig beetles have remarkable two-part eyes that are divided horizontally so they can focus simultaneously in the air and underwater as they gyrate frenetically along the surface in search of prey.

Fishing spiders measure up to four inches across by the tips of their legs. In the course of hunting the small fish, tadpoles, and insects that it feeds on, a fishing spider can dive for up to 45 minutes by breathing oxygen trapped in its thick pile of body hairs. Like other spiders, they paralyze prey with powerful venom and then inject enzymes that liquefy the internal organs of their victims so they can be sucked up and consumed.

When it comes to ghoulish predatory behavior, however, spiders more than meet their match in water scorpions. I once saw one eat four dragonfly nymphs in 45 minutes, leaving skins that looked like shrunken deflated balloons. Although they walk slowly, water scorpions can ambush prey with a lightning strike of the forelegs. When submerged they form a snorkel by holding together two posterior appendages and thrust-

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© BARRY VAN DUSEN

ing them up through the water's surface. Furthermore, as if these weren't enough survival adaptations for one insect to possess, the water scorpion can also fly.

Giant water bugs, *Lethocerus*, also feed by injecting enzymes into their prey and then sucking up the liquefied innards. They will ambush tadpoles, insects, crustaceans, and even frogs several times their own size. *Lethocerus* can grow to three inches long and has earned the nickname of "toe biter" because it packs a nasty bite if stepped on or handled. Then there's the female giant water bug of the genus *Belostoma*, which will lay and cement 100 or more eggs onto a male's back. He dutifully carries the eggs for about a week until they hatch and then cares for the nascent nymphs, protecting them from predators.

Moving up the food chain, the smaller predators, including giant water bugs and dragonfly nymphs, in turn become juicy meals for larger and more well-known denizens of the pond. Any foray to a neighborhood pond during the spring, summer, or autumn may lead to sightings of red-spotted newts, bluegill sunfish, brown bullheads, or largemouth bass swimming about on patrol for a meal. And this great circle of life extends even to the sky. I once watched a belted kingfisher swoop down from its perch on a dead branch to catch a dozen small fish during the course of a single hour.

With many predators, the only limiting factor is the size of a potential meal. I've witnessed a largemouth bass with the tail of a yellow perch sticking out of its mouth. Having eaten a fish of nearly the same size as itself, the bass was gradually digesting the near end of the perch while swallowing the far end over time. Fittingly, I've also seen a great blue heron force down a huge largemouth bass that seemed, at first glance, far too wide to squeeze through the heron's gullet. And I once witnessed an osprey flying to its nest with a painted turtle gripped tightly in its talons.

Common water snakes, otters, and mink are other high-echelon predators, both in the water and along the pond's edge. Swallows skim over the water in search of insect meals by day, and little brown bats

decay. In the midst of this unending drama of aquatic existence, countless eggs are laid and hatch to perpetuate life.

Perhaps the greatest allure of the pond is the fact that, no matter how much we learn of its secrets, there is still more to be discovered. We stare down into the waters and try to solve the mysteries by seeing beneath the surface, and, if we get the angle right and catch the light entering directly, we can penetrate the murky depths. To paraphrase Henry Thoreau, a pond is the earth's eye in which the beholder measures the depth of his own nature.

Michael J. Caduto is the author of 18 books, including Pond and Brook: A Guide to Nature in Freshwater Environments. To learn more about his aquatic programs, visit his website: www.p-e-a-c-e.net



Top to bottom: late spring, summer, and early autumn in a seasonal pool

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**The pond harbors
countless strands along
the food chain, and these
lines cross and interweave
to form an intricate web.**

swoop down to consume more than their own weight in mosquitoes and other insects each night.

But the sighting of a classic scavenger, such as a crayfish, begs the question: What happens when all these diverse inhabitants of the pond complete their life cycles? How do the dead remains of plants and animals once again become available in the form of nutrients that plants can use to grow and produce—to continue the circle of life? This is the role of the scavengers and decomposers, including fungi and bacteria.

Fungi are especially important because they are able to break down the lignin and cellulose of woody debris, and even the hard chitin in the exoskeletons of insects. Certain kinds of mud-dwelling bacteria can produce energy by breaking down organic matter anaerobically—without the use of oxygen. One acre of pond gives off about 90 cubic feet of methane each day during the growing season, which is enough flammable gas to fill a large SUV.

The pond harbors countless strands along the food chain, and these lines cross and interweave to form an intricate web. In the pond's circle of life, energy is produced, and is used by the pond organisms to live and grow and, eventually,

Poison Ponds

*Yet another thing to worry about: bird-killing bacteria is
infesting local ponds—and moving northward.*

by Jack Thorndike

On Thanksgiving Day 1994, a pair of duck hunters at DeGray Lake in Arkansas were shocked to find two dead bald eagles. By the end of the winter wildlife officials recorded 29 mysteriously dead eagles, around half of the eagles nesting in the area that year. Government scientists scrambled to discover what was killing the eagles, initiating an urgent research program the following year to find either toxins or an infectious disease that might explain why the eagles were dying.

By the winter of 1996, it was clear that the syndrome was spreading, killing more bald eagles and numerous waterfowl. Within a year whatever it was, was found outside Arkansas.

Over the next few years, as reports of dying eagles and waterbirds came in from other parts of the Southeast, wildlife managers catalogued strange behavior among the affected birds. American coots were seen staggering, swimming lopsided, or unable to fly, and eagles in affected areas were reported colliding with trees and rock ledges.

Laboratory analyses showed that the culprit was a neurological disorder resulting from lesions in the myelin layer of the affected birds' nerve cells. Ultimately, the disease was given a name—avian vacuolar myelinopathy (AVM)—and it cut a swath from Texas to North Carolina, killing over a hundred bald eagles and thousands of coots, along with other waterbirds, killdeer, and even great horned owls.

But nobody knew how the birds caught it.

As researchers followed the food chain, they found that during times of highest mortality the affected eagles' diet consisted mainly of impaired coots that primarily ate hydrilla, a leafy invasive water plant considered a nuisance in Southern states. Hydrilla was brought to the US from southern Asia in the 1950s for use in home aquariums, and by 2000 it had spread throughout the South and beyond. Susan Wilde, PhD, of the University of Georgia notes, "In every lake where eagles have died we've found that invasive plants are dominant."

By 2007 researchers had established that a previously unknown species of cyanobacteria (blue-green algae) was covering 20 to 90 percent of hydrilla leaf and stem surfaces in reservoirs where they found AVM. This new cyanobacteria species (in the order Stigonematales) produce a neurotoxin each fall

when the hydrilla die back, releasing nutrients that promote cyanobacteria growth. When migrating coots arrive at the reservoirs in mid-October, they find a toxic salad bar of these invasive plants.

"By late October," Wilde notes, "we're seeing dead coots, coots that can't fly, and a lot of other sick waterfowl like ring-necks, mallards, Canada geese, and some wigeons." Waterfowl sickness and death from AVM peak in November, giving eagles a gift that's too good to be true.

"Eagles are kind of lazy," Wilde says. "They're going to



Pond scene with kingfisher and swallow

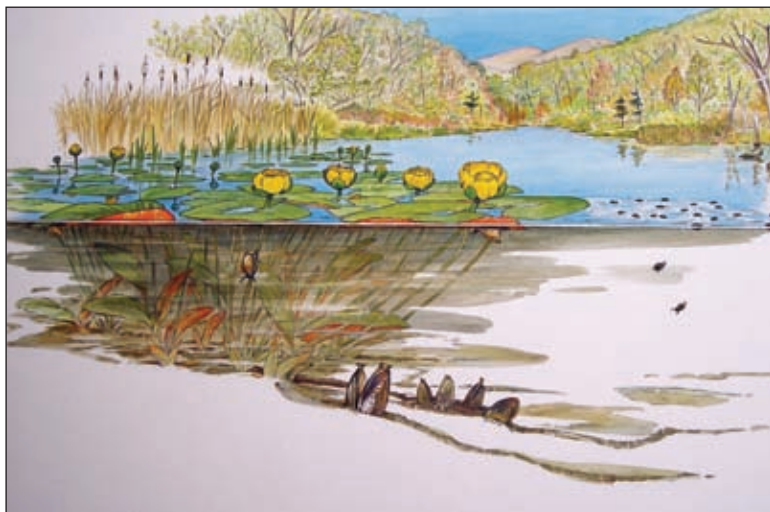
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pick the easiest prey out there, and birds that have been exposed to the toxin are pretty easy prey.” The eagles’ hunting strategy is to terrorize coots paddling on the reservoirs by flying over them so they bunch together in a raft for protection. Then the eagles dive-bomb the raft and the coots panic and disperse, some flying off while others dive underwater. When the divers resurface, even the healthy coots are disoriented and eagles can just pick them off.

But coots suffering from AVM are even simpler to catch, according to Wilde. “When they have AVM, they come up upside down and spluttering and they do a really bad job of defending themselves.” By mid-Fall, after weeks of feeding on *Stigonematales*-coated hydrilla, the coots are full of the AVM neurotoxin, which passes to the eagles that eat them. Eagle deaths peak in December and January.

This seasonal pattern repeats annually across the Southeast as AVM—a totally new disease—thrives in a human-affected ecosystem of unintended consequences. Because the affected Southern region had no glaciers in past ice ages, there are few natural ponds and lakes, making artificial reservoirs the predominant home for migrating waterbirds. Reservoirs are perfect habitat for invasive hydrilla because fluctuating water levels make it hard for native aquatic plant species to establish themselves. Eagles like to nest near reservoirs so they can feed on fish stocked by wildlife agencies. Coots and other waterbirds overwinter at the same reservoirs because they like to feed on the abundant hydrilla. And eagles feed on the coots because they are abundant.

Cyanobacteria were present at the dawn of life and are found almost everywhere on earth. AVM thrives on this motley collaboration of displaced natural forces and human interference in the South, but could such a lethal collection of factors assemble itself in the lakes and ponds of New England? It looks like many of the



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Cyanobacteria cloud the waters of clear well-functioning ponds, especially those with high levels of phosphorous.

elements are already in place.

Neurotoxin-secreting cyanobacteria are found throughout the northern US and cause health problems and lake closures every summer. Feeding on a flow of nutrients, and basking in the summer sun and warm waters, cyanobacteria produce algal blooms, turning water a murky green or brown color and frequently prompting state agencies to close water bodies to recreation. Dogs in at least seven states have died from ingesting the toxic cyanobacteria while swimming, and in 2003 a boy in Wisconsin died of a seizure and heart failure caused by cyanobacterial toxins after swimming in a pond with an active algal bloom.

Mark Mitch, PhD, of New England College has tracked algal blooms at French Pond in Henniker, New Hampshire, which has suffered frequent algal blooms in past years. “In French Pond we’re concerned about cyanobacteria because when they die their cells break open and they release a toxin into the water and that’s what makes them so dangerous.” Mitch notes that summertime algal blooms seem

to be determined by the amount of nutrients—mainly phosphorous—flowing into the lakes.

“If you have a particularly heavy rainfall in the spring when snow is melting, that seems to end up contributing a lot of phosphorous into the lake. Those end up being years when we have more cyanobacterial blooms.”

Daniel Goodenough, PhD, has spent summers on French Pond since the 1960s and has seen exactly that sequence. “The last really big bloom we had occurred five years ago when there were some early-spring torrential rains. An unbelievable amount of water came down, and the next summer we had an enormous bloom.”

Mitch lists the usual suspects for nutrient runoff—farms, fertilized lawns, and



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Green heron in green pond



Dabbling ducks are susceptible to cyanobacteria.

subpar septic systems—but cautions that each water body has a unique mixture of nutrient sources and other qualities, and that not all algal blooms contain toxic cyanobacteria. After the extreme outbreak at French Pond, an upstream dairy farm was closed and, while algal blooms still occur, they are shorter and less pronounced.

So, even though algal blooms can be managed, they can't be eliminated, and toxin-producing cyanobacteria will still inhabit New England's water bodies. Susan Wilde says that while scientists aren't sure whether *Stigonematales*—the AVM cyanobacteria—exists outside the South, similar toxic cyanobacteria live in the Northeast and could contribute to a disease like AVM.

As for hydrilla, the toxic cyanobacteria's favored host, it's clearly a problem in the South. Could it spread to New England? In a sense, it's already here.

"The first northeastern hydrilla population was found in New England in the late 1990s in Connecticut, then around 2003 in Maine and Massachusetts," says Amy Smagula, an aquatic biologist for the state of New Hampshire. Hydrilla spreads between water bodies by hitching a ride on boats and fishing gear. State agencies try to contain hydrilla by encouraging fishers and boat users to thoroughly clean their equipment after every use.

However, even isolated water bodies might be at risk from hydrilla infestation from migrating birds. "We're seeing a lot of infestations along migratory flight paths that don't have a lot of transient boat traffic or other means of introduction," Smagula says. She also notes that people who plant exotic flora like pink waterlilies may

inadvertently spread hydrilla and other invasives. State biologists have been able to reduce hydrilla populations by chemical treatment and other means, but complete eradication can be elusive.

The hydrilla growing in the South is a different strain from those in the North, and the Southern strain makes a better host for AVM cyanobacteria. Southern hydrilla plants have longer stems and can grow up to the surface, forming a dense vegetal mat, or canopy. *Stigonematales* is more likely to live near the surface, and waterbirds prefer to feed closer to the water surface, making Southern hydrilla an

effective vehicle for the neurotoxin. Smagula says that, while the northern strain is better adapted to New England's cold water and to the shorter growing seasons, northern hydrilla plants are shorter and less likely to reach the water's surface.

Though New England's cold climate may have protected our waterfowl and predators from AVM, that could change. As a result of climate change, New England states will eventually have longer, hotter summers, encouraging the spread of the southern strain of hydrilla that coots find so delectable. As climate change gathers momentum, the Union of Concerned Scientists has presented two scenarios: if we take serious steps to reduce our carbon output, northern New England will have a climate similar to Virginia's by 2100; if we do nothing, our climate will be more like Georgia's—well within the range to produce AVM.

New England currently has most of the ecosystem parts to support an outbreak of AVM. We have neurotoxic cyanobacteria and plenty of waterfowl and their predators. And since we've seen Northern hydrilla travel in a band from Cape Cod to the Erie Canal, there's no reason to believe that the more deadly Southern strain won't migrate as the climate warms.

"That's the kicker," says Susan Wilde. "A lot of the places where we now have AVM are in the Piedmont region, and the conditions there can move north with climate change."

Jack Thorndike is a freelance journalist who writes about the cultural and ecosystem implications of climate change. His blog is: keenforgreen.com/blogs/jack-thorndike

The Waters in Between

Portrait of a Vineyard pond

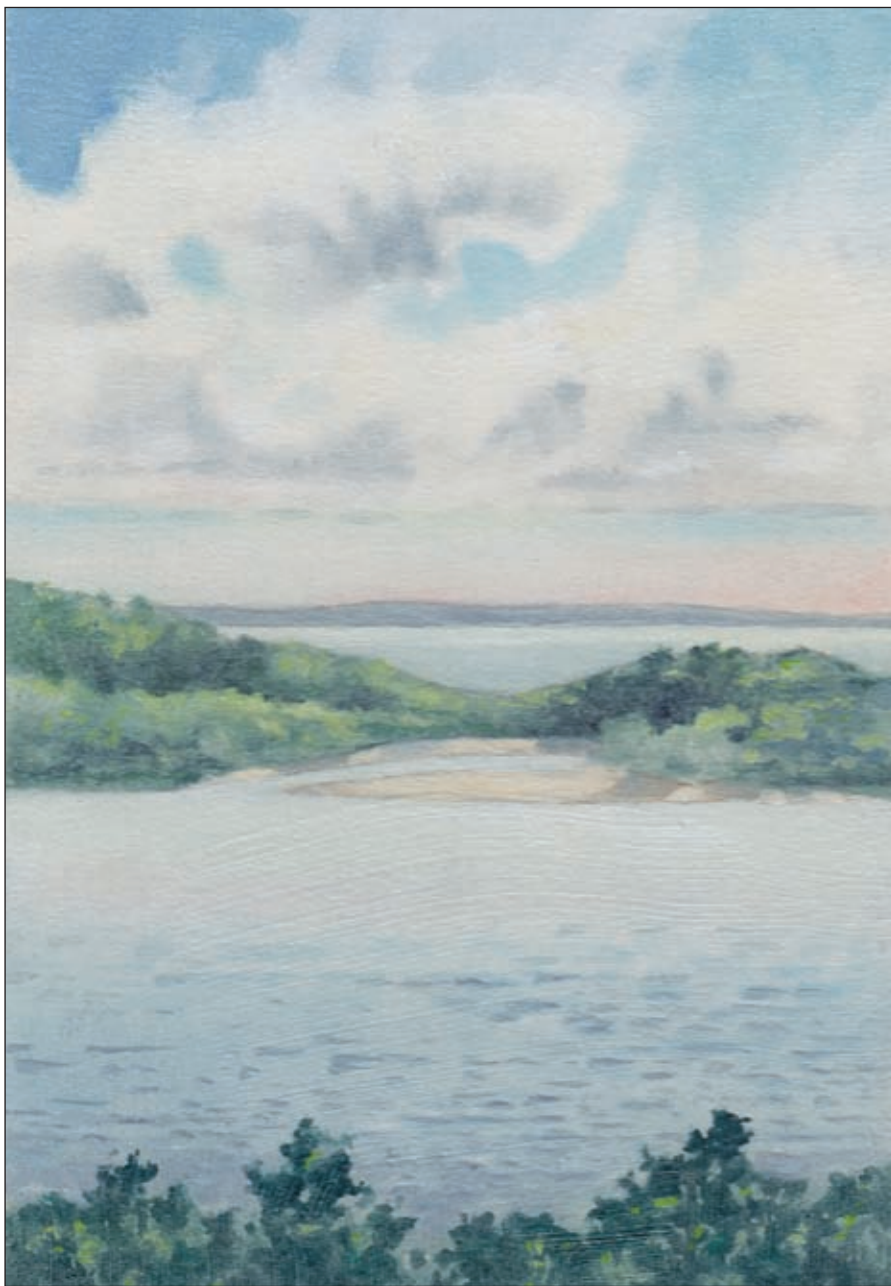
by Whit Griswold

A week or so before Christmas 2011, I started to take notice, for the first time in years, of a pond I've known well in West Tisbury on the north shore of Martha's Vineyard. This periodic tidal body of water, known as James Pond, lies along the western edge of our property. I can see it from the back porch, from the backyard, and even from my bed in the back bedroom upstairs. But partly because of this familiarity, over the years I've failed to fully appreciate it.

Separated from Vineyard Sound by a barrier beach that fronts on Lambert's Cove, James Pond covers just over 40 acres, and it's shallow—no more than six feet at its deepest. I often smell the pond before I see it. For six weeks in the summer, it stinks of decomposing weeds that have let go of the bottom and floated to the surface. It's a strong and sulfurous odor, and pungent, but to me it smells fecund, like the beginning of life itself. This is perhaps because I got my first whiff of it when I was three months old and moved to the house I now live in.

I learned to row on James Pond as a child, I caught perch in it, and I hunted ducks around its perimeter. But what really sparked my imagination, and still does, was the inlet that connected it to Vineyard Sound. When, as a kid, I rowed along the inlet's tight serpentine course in the family dinghy, I believed I was the first vessel through the Panama Canal, wondering what I'd find in the unknown expanse on the other side. With my ten-year-old pals, I spent whole afternoons trying to dam the inlet with rocks and driftwood and seaweed, urged on by thoughts of the Grand Coulee or the Zuider Zee.

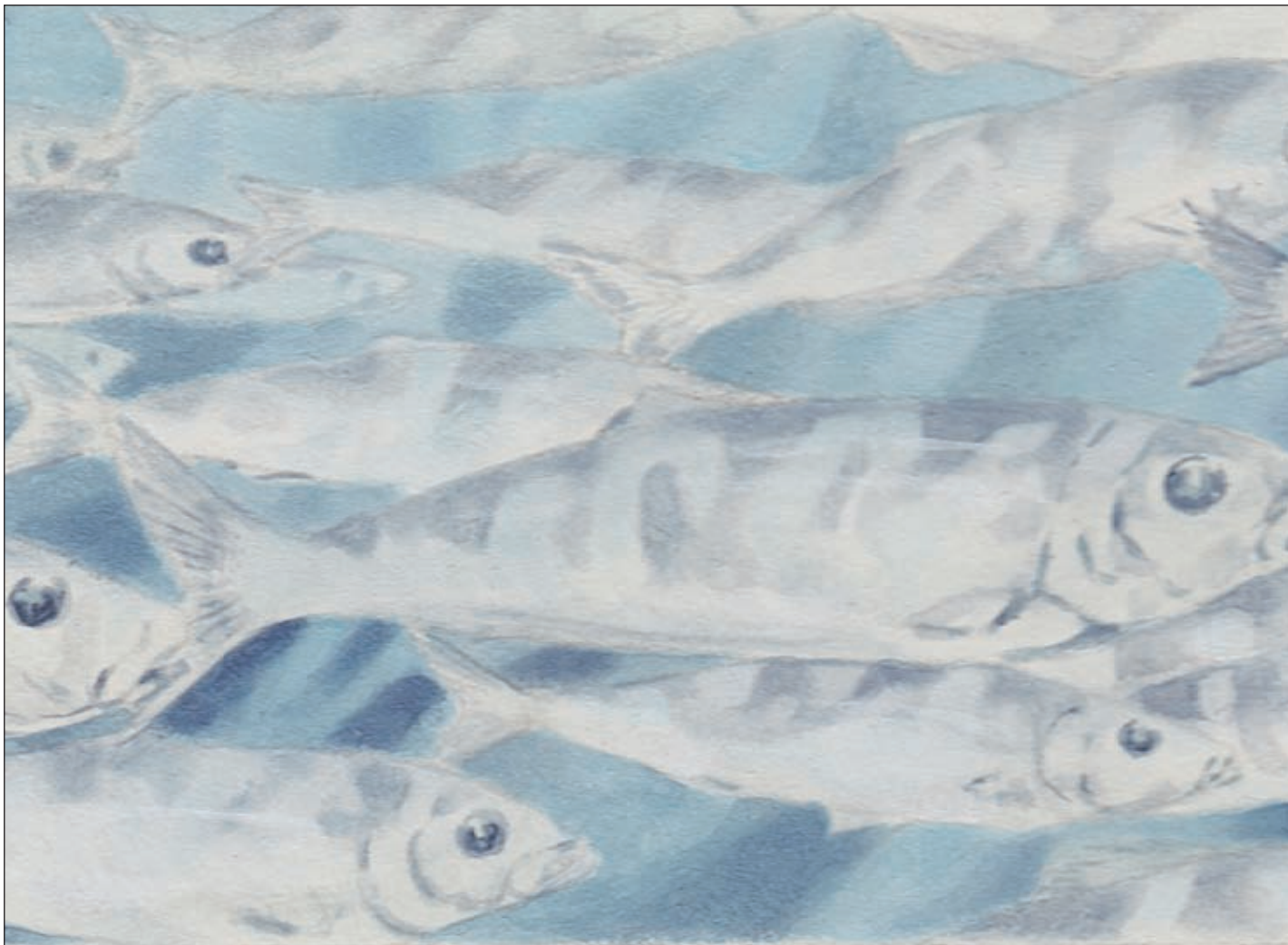
Then along came puberty and high school and all that, and the scope of my outdoor adventures widened, and my interest in the inlet and the pond waned. What a surprise, then, to have it awaken—loudly—half a century later. For the last fourteen months, I've spent at least half an hour every day sitting on a plastic stool at the edge of the pond—getting reacquainted.



© ROBERT SEAMAN

James Pond with Vineyard Sound in the distance

At first I planned to measure things, collect data, following a reflex to produce something tangible. But I'm no philosopher, nor a biologist, so I decided to record just four things—air temperature, wind direction and velocity, and water level—just enough to get my bearings. Every day I check the temperature up at the house, esti-



Herring were once abundant in James Pond.

mate the wind speed, and measure the water level with an aluminum yardstick that I jam into the pond bottom three feet from a rock that I rest my heels on.

This was also a test: could I discipline myself to go down there every day—with wet snow blowing sideways, or on hot summer days when the mosquitoes were merciless, or when there wasn't anything to see?

As it was, after a couple of weeks of regular observations, my first thought each morning was apt to be about the pond. What a relief, what a pleasure, to be propelled by curiosity rather than obligation or expectation. Soon enough, I started to notice things I'd never really seen before. I learned that if I just slowed down and opened up for a minute—a few deep breaths—something would appear, always, to turn a dull aspect dramatic, or at least more interesting.

I learned that there is always something worth noticing—even if I can't spell it, or measure it, or even name it: hundreds of black ducks and dozens of Canada geese dropping into the northwest corner of the pond, backlit by a faint frozen January sunset with colors, for example. Orion's left foot touching the western horizon

just before midnight. Two deer stepping delicately and deliberately along the opposite shore looking for...what? A gulp of sunlight? Three otters clambering up on a rim of ice to share a fish for dinner or eight cormorants lined up side by side, fishing their way around the pond like some sort of aquatic combine.

But, as is often the case with these sorts of revelations, the more I learned, the more I realized how much I didn't know and wanted to know about James Pond. Of course, its history goes back thousands of years before Europeans decided this place was theirs. But for now I found myself focusing on the period of my lifetime.

In the middle of the last century resourceful locals still made a few bucks from the pond by seining herring, trapping eels, and digging for clams. Other folks caught blue claw crabs and white perch, and in winter hunted ducks and geese.

Every April, herring ran into James Pond to spawn. They were so plentiful at one time that they were used as fertilizer. In more recent times, they were harvested primarily for bait, although their roe was a springtime treat for the family and friends of the local fishermen.

Now herring are in decline. The few that survive the increasingly efficient killing tactics of offshore seiners find that many streams have been dammed.

Americans have never developed a taste for eels, which also occur in James Pond, but to fishermen, including some well-heeled sports from around the globe, there's no better way to seduce a striped bass. So for a while one longed-lived local man trapped eels there.

The fact is James Pond isn't capable of sustaining fisheries of any real consequence, but there's no reason it couldn't be much healthier than it is now. The key to its revitalization would involve a steady influx of salt water, most people agree, and that means keeping the inlet open more than it is currently. To do so would require permits from the town, the Island, the state, and the federal government—a daunting prospect. It would also require the cooperation of the people known technically as the riparian owners, i.e., those who live on the pond. Some of these owners would probably support a rehab effort, but others would be happy to leave it just as it is—lovely to look at from the living room or deck but sadly lacking in biological diversity.

Going through the daunting legal process of managing the pond and the inlet would be a tall order, tall enough to have discouraged a couple of efforts that have taken place in recent years. So there the pond sits on the town's periphery, a treasure with very few advocates.

Several years ago, James Pond was closed to shellfishing by the Massachusetts Division of Marine Fisheries because of excessive levels of fecal coliform. It has not been checked in the last two or three years, and it won't be checked again until the West Tisbury selectmen or the shellfish warden petition the Division of Marine Fisheries to do so. Furthermore, access to the pond has become increasingly limited in recent years by landowners.

As both the year-round and seasonal population of the island increases, people on foot and on paddle boards, or in kayaks and canoes, show up now and then to enjoy the pond. Because James is a great pond—that is, more than 10 acres—its bottom is owned by the Commonwealth and it is open to the public for fishing, fowling, and navigation. A law to this effect has been on the books since 1641, when fishing and fowling were critical to the survival of those who were not even a generation into colonizing a wild threatening land.

In its early form the law reads, in part: "...It shall be free for any man to fish and fowl there, and may passe and repasse on foot through any mans propertie for that end.... The Proprietor of the land adjoyning shall have propertie to the low water mark.... Provided that such Proprietor shall not by this libertie have power to stop or hinder the passage of boats or other vessels in, or through



© ROBERT SEAMAN

Otters and cormorants are common around the pond.

any Sea, creeks, or coves, to other mens houses or lands."

Today, 372 years later, this law is still intact. And access is still a major issue on the Island. Here on billionaire-buffed, celebrity-saturated Martha's Vineyard, where the price of an acre of land would buy a starter home and put two kids through college for most people, issues like this can lead to contentious protracted legal brawls stoked by endless resources and entitlements usually reserved for royalty.

To address the kind of legal questions involved in the restoration and the issues of public access and subsequent pressure on James Pond would be overwhelming. But just letting it sit there, with the inlet increasingly compromised and the water quality worsening, doesn't seem quite fair—to the pond itself, nor to those who used to keep it vibrant—the kind of local people who didn't need courtrooms to know how to balance the needs of the pond, its inhabitants, and its neighbors.

As with most natural resources anywhere, both the means and ends of interested parties often conflict, as do laws and regulations that govern the use of James Pond. Questions beget more questions, and answers are ever elusive. Confused yet nonetheless determined to stay and do what I can, I remind myself of some of the highlights of my infatuation with the pond over the last fourteen months. The light tap of waves on my bare feet in summer, the birdlife year-round, an otter staring at me from 20 feet away.

I had to wonder about the open-eyed otter. Tickled to be seemingly accepted by this fellow traveler, I winked at it, as if we were sharing a little secret—the inner life of James Pond.

Whit Griswold is an editor and writer who lives on Martha's Vineyard.

JOURNAL ENTRY: *The Lily Pond at Dusk*

I have spent far more time sitting by ponds than I would care to admit, and a disproportional portion of that time has been invested at Wachusett Meadow's Wildlife Pond. My journal from August 24, 1996, records a pleasant early evening spent in such a fashion.

Reflected in the still waters of the pond at dusk, the backlit clouds drew my attention to the peculiar ability of the pond mirror, so near completely broken by the dense elliptical floating leaves of watershield to yet somehow still reflect the sky. Watershield, *Brasenia schreberi*, is a "lily pad" in the common sense, with stereotypical floating padlike leaves attached on long stems to the pond's shallow bottom. It differs in the smaller size of its, some would say, shield-shaped leaves, each of which would fit in the palm of one's hand. Watershield leaves greatly outnumber the much larger spatterdock and white waterlily leaves, a phenomenon brought about by the arrival of beavers, which have a predilection to consume the larger waterlily species as summer food.

Thousands of anything, be they flying ants, snow fleas, migrating broad-winged hawks, or in this view pancake-sized lily pond leaves, provoke my imagination. The unpatterned

celestial backdrop of countless points of starlight invites comparison to the dense cover of uncountable watershield leaves. Within the lily pad jungle, I also note a few small and scattered patches of water, which at night reflect the constellations, causing me to imagine this pond as a portal, connecting vast distances and far-flung energies to a single place—a beaver pond at dusk.

These ramblings of imagination were broken that night by the reality of a moving line, bisecting the pond: a beaver gliding smoothly amongst the lilies. The slack watershield stems allowed the pads to jump about as the beaver moved through them, leaving a wake of topsy-turvy stems and leaves. All eventually settled, and the reflections returned as leaves sprang to the surface again. The beaver slowed, and then stopped to feed on one of those constellations.

A chorus of bullfrogs started up at one end of the pond and traveled across, a deep rolling sound.

Pond life seems to move in phase. The swallows that skimmed the water surface at dusk disappeared, replaced by the popping sound of moving frogs; then the frogs quiet in the wake of beavers; and sunfish sweeping their nest bowls to pause, hide, then reemerge. The pond breathes, in a sense, waxing and waning from quiet to bustling in a scale of moments or minutes.

There is absoluteness about this time of summer, a startling realization of just how full of life it is, contrasted with a sense that life will rise no higher than this and soon these phases will cease to cycle. The mood of it all will remain into autumn; the watershield will give way, and the beavers will begin dragging woody stems from the pond edge in preparation for their so-called sleep of winter.

Joe Choiniere



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White waterlilies

The Case of the Missing Spadefoot

by Ann Prince

The eastern spadefoot toad is an enigmatic creature. While it is often mentioned as native to Cape Cod and other coastal areas in the state where it was formerly widespread, who among us have ever seen one? Where have all the spadefoots gone?

Ian Ives, director of Mass Audubon's Long Pasture Wildlife Sanctuary in Barnstable, is on the case. He's investigating the reasons for the spadefoot's disappearance and is working on a five-year project to reintroduce this elusive toad to Mass Audubon's Ashumet Holly Wildlife Sanctuary in Falmouth.

"Eastern spadefoots are the rarest toads in the state but were once common in southeastern Massachusetts," says Ives. "They were present in the coastal plain in sandy pine/oak habitat, and on dunes and barrier beaches, as well in floodplains near oxbows along rivers to the west." Now they are listed as threatened under the Massachusetts Endangered Species Act.

Ives explains why it is indeed rare to encounter even a token spadefoot toad. This cloistered amphibian lives most of its life buried underground and comes to the surface only when the weather is just right for mating. The very conditions that don't entice many humans to venture out, i.e., heavy, unrelenting, April rains, are what rouse the toads to dig out from their subterranean berths and make a cameo appearance.

Ives attributes the spadefoot's falloff to habitat loss, especially breeding sites. "Spadefoots are opportunistic breeders, adapted to super-ephemeral environments," says Ives. "That's what makes them unique; they like the shallowest of all pools, 4 to 12 inches deep, where there are no predators because the basins' water-retention time frame is so short-lived. But wetlands have been drained and vernal pools lost."

At Ashumet Holly Wildlife Sanctuary, there's evidence that a remnant population remained as recently as the early '90s when herpetologist Tom Tynning found a spadefoot there. This toad is distinctive, though some people mistake it for a Fowler's. A giveaway characteristic that makes identification easy is their trowel-like hindfeet that are equipped with nails enabling them to dig in a distinctive corkscrew manner. Their golden eyes with vertical elliptical pupils like a cat's, and their vocalization that sounds like baaing sheep also help clarify the spadefoot's identity.

"Probably residual pockets of the original populations still exist in places like Ashumet," says Ives, "but unfortunately they are not viable because, lacking nearby vernal pools, they have not been able to reproduce."



© IAN IVES

Spadefoot toad

Ives and several colleagues including Tom Biebighauser of the USDA Forest Service and Bryan Windmiller of Grassroots Wildlife Conservation are creating the conditions to establish a self-sufficient population at the sanctuary. Their project includes four breeding pools excavated to specifications in 2011 and 2012, two in an upland area that was formerly under cultivation and two in the sandy scrubby woodland. They have translocated thousands of headstarted hatched tadpoles and tiny toads to the sanctuary from Sandy Neck Barrier Beach in Barnstable, a stronghold for elsewhere-imperiled species.

"We are breaking new ground; no one has ever translocated spadefoots," says Ives, referring to their effort to take animals from one location that has a healthy population and transfer them to another site. Accompanying the effort is research to determine whether this process works and whether it's transferrable to other locations.

Ives says that established breeding adults remain at Sandy Neck while early-stage tadpoles are removed and then receive assistance in their development by students in local classrooms. For a few weeks schoolchildren and their teachers participate in a unique citizen science project, feeding and caring for the tadpoles until they are partially metamorphosed or have become baby toads.

They headstart around 3,000 of them each spring, then release the young spadefoots at Ashumet Holly with the hopes that their newly created pools will be all that they need to survive and eventually become reestablished as a species at the sanctuary.

Ann Prince is associate editor of Sanctuary.

Poetry

Edited by Wendy Drexler



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The Pond

by Ailsa Steinert

Water's need to break loose—stubborn
weave through the tangle—deft,

alive where the edge happens.
Stillness opens, catkins

and the flinty-scented shallows,
matted leaves of oak.

Silver scales of gnats, midges
over the grass fill my listening.

Dusk ripens—the fireflies
passing one by one.

Ailsa Kennedy Steinert taught English and Philosophy for many years at the Pingree School in South Hamilton. Her poems have appeared in The Comstock Review, Inkwell, and Orion; in the anthologies Rough Places Plain and Beyond Forgetting; and online in Blue Ocean Institute's Sea Stories.

Desire

by Myrna Patterson

What can I say of steadfastness?

How long must I wait to see the heron strut,
lift his yellow legs like fishing lines,
then drop them in slippery mud?

All morning he stands at pond's edge,
napping in sullen reeds. Drifting, I dip
my paddle into knotted roots, snag
weeds concealed in silt below.

Now, quick beak plunge, eye intent—
a fish! That simple.

And why wouldn't he get exactly what he wanted?

Myrna Patterson is a teacher, free-lance editor, and writer. Her first collection, Umbra, was published in 2004. She was a Massachusetts Cultural Council Poet-in-Residence and has received writing grants from Vermont Studio Center and Mesa Refuge.



© DESERT RIVERS AUDUBON, ARIZONA

Black-crowned Night-Heron

In the Field
Playing at the Pond

by Ann Prince

When they were growing up, my children and I loved to spend a summer day at a kettle hole pond in Plymouth, part of a 200-acre town park of woods and shoreline. From midmorning to late afternoon, we would play in a quiet cove at the north end where the water wasn't too cold, too deep, too rough, or too murky.

I wanted them to live the warm-weather days of their youth in care-free communion with nature—to be one with the stones, sand, rain, sun, dragonflies, flowers, frogs, and all the other animate and inanimate objects. Hours would pass as we waded, swam, splashed, and found infinite ways to amuse ourselves.

Human beings, it is now well documented, have an innate affinity with the outside environment and an inborn need to have close contact with nature. The challenge nowadays is to get them out of their homes, away from the ever-mounting assortment of artificial indoor distractions. So we made sure to get our fill of all the lovely pond and park had to offer.

Need I mention that water and electronics do not mix? And I didn't even own a cell phone yet, so we were tuned out and tuned in to the beautiful aquatic world.

The children were truly never bored there. We attempted to net for minnows, and we fished just for the fun of it. We'd use plastic cups to catch and release pollywogs, some partially metamorphosed, which were particularly fascinating to my young companions. Other times we'd toss a Frisbee or lightweight buoyant ball back-and-forth or start a game of monkey in the middle. Since the water near the edge is shallow and safe for swimming—no deeper than a medium child's waist level—and there were bordering floatation ropes that vigilant lifeguards wouldn't let anyone pass, I only had to keep a very close eye on my smallest offspring, which fortunately



Quick sketch by a passerby of Noel and his boat

was never more than a single child any given year.

The girls, Paige and Rima, their little brother, Noel, and I would find our way into the feathery and grassy pond weeds where we'd scare off the small sunfish called pumpkinseeds, and once encountered a 1½-inch baby snapping turtle, which in spite of its size tried to look menacing, mouth wide open and ready to bite down on a finger if it got too close. This revealed that undoubtedly larger snappers were lurking elsewhere, somewhere farther below in the unlit depths, perhaps

50 feet down and closer to the center of the 43-acre water body. I taught the children that adult turtles are known not to bother swimmers, so they were never scared.

Though these hidden prehistoric turtles captured our imagination, the alluring dragonflies and damsels, many iridescent and colorful, were compelling in a very different way. They'd find a perch on a limb or emergent vegetation, or fly above the pond looking for insect prey. Magnificent predators including scarlet skimmers, eastern pondhawks, and glittering turquoise bluet damselflies were especially common.

Admittedly, the greatest pleasures at the pond were the most time-honored. After our lunchtime picnic, we'd walk over to the ice cream stand and the kids would pick out a novelty popsicle such as the Rainbow, The Great White, or the Smile. Then, when the last drips were licked off tiny fingers, I'd watch my son as he'd entertain himself in the knee-deep water, running his toy boat with its mini-propeller in the back or counting the painted turtles basking on a log, as his sisters sunned themselves before going back in for a final swim of a delightful, and instructive, day.

Ann Prince is associate editor of Sanctuary.

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Putting Endangered Species in Our Public Trust

by Karen Heymann

Massachusetts is home to an extraordinary variety of plants and animals, natural communities, and ecosystems, and, in some cases, the largest remaining population of a species, or the best remaining example of an entire natural community or ecosystem globally. Residents of the Commonwealth have done more to protect conservation biodiversity than citizens have in most other states. Yet many plants, animals, and natural communities are not well protected, and more than 75 species known to occur in Massachusetts have been lost.

The Massachusetts Endangered Species Act (MESA) currently protects 432 plant and animal species classified as “endangered,” “threatened,” or “of special concern” using a flexible management tool called Priority Habitat mapping. This tool is essential to conservation of state-listed rare species and protection of biodiversity in the Commonwealth. Private landowners proposing development projects that have the potential to impact state-listed species may need to undergo a MESA review process. Despite the fact that most projects are able to advance without any restriction or permit, some citizens feel strongly that the state does not have the right to regulate private land use for species conservation. This type of conflict is currently playing out before the Massachusetts Supreme Judicial Court, and two proposed bills threaten to overturn the state’s endangered species program altogether. Mass Audubon is defending MESA before both the judicial and legislative venues.

The Massachusetts Constitution states that “the people shall have the right to clean air and water...and the natural scenic, historic, and aesthetic qualities of their environment...,” and the U.S. Supreme Court has ruled that certain principles such as the Public Trust Doctrine are inherent to a property title and therefore free the state of any duty to compensate a private property owner for regulating or restricting land use in cases of natural resource protection.

Species conservation benefits all of society, particularly as we move toward a more urban-dwelling culture reliant on the government to provide open space for exercise and recreation. Now more than ever, there is a need to return the concept of the Public Trust Doctrine, which has long granted citizens equitable access to



© RICHARD JOHNSON

*Juvenile yellow-crowned
night-heron*

surrounding natural resources and contributes significantly to our quality of life today.

The Public Trust Doctrine was first incorporated into written law by the ancient Romans, and later into the laws governing the 13 original colonies of the United States in 1776. “By the law of nature these things are common to all mankind—the air, running water, the sea, and consequently the shores of the sea. No one, therefore, is forbidden to approach the seashore....” Since that time, numerous court cases across the country have demonstrated its use not only in water resource protection and

management but also in the protection of land and wildlife.

For conservationists and environmentalists the doctrine encapsulates ideas of responsibility, sustainability, and a commitment to the generations that follow.

Mass Audubon’s Legislative Affairs office connects over 100,000 members with the legislative body that has passed critical land conservation laws such as the Community Preservation Act and the Open Space Bond Bill. Massachusetts citizens have permanently protected over one million acres of conservation land; yet land protection alone is not enough in the face of continued threats of land use change, habitat fragmentation, and climate change impacts.

Conservation of biodiversity must be the foundation of land acquisition and management efforts by state agencies and nonprofit conservation organizations, and through protection by private landowners. Many have already taken an important first step by joining a conservation group and learning more about our natural environment, but continued success will take even more effort. We need everyone to communicate with their state representatives and tell them to continue to support endangered species protection in Massachusetts. As current battles over species protection unfold, we will continue to update you through our Beacon Hill Weekly Roundup, so stay tuned!

Karen Heymann is Mass Audubon’s Legislative Director. She worked previously on environmental and agricultural policy in the US House of Representatives and as a farmer in western Massachusetts.

CANOE AND KAYAKING PROGRAMS

BERKSHIRE SANCTUARIES

Lenox, 413-637-0320

Goose Ponds Canoe Trips

July 29, September 15—8 a.m.-noon

Housatonic River Canoe Trips

August 4, September 2, October 13—
8:30 a.m.-12:30 p.m.

Buckley Dunton Lake Canoe Trips

August 5, September 8, October 7—
9 a.m.-noon

BROAD MEADOW BROOK

Worcester, 508-753-6087

Family Canoeing at Ekblaw Landing

July 22—1:30-3:30 p.m.

Family Canoeing on Rice City Pond

August 19—1:30-3:30 p.m.

Family Canoeing on the

Quinsigamond River

September 8—1:30-3:30 p.m.

BROADMOOR

South Natick, 508-655-2296

Fall Foliage Canoes

Weekends—September 29-October 21

CONNECTICUT RIVER VALLEY

Easthampton, 413-584-3009

Beaver Ecology Along the Mill River

August 24—6:30-8:30 p.m.

FELIX NECK

Edgartown, 508-627-4850

Shorebirds by Kayak

August 11—9:30-11:30 a.m.

IPSWICH RIVER

Topsfield, 978-887-9264

Paddle to Thatcher Island

Kayak Trip for Adults

July 21—10 a.m.-4 p.m.

Family Dusk Paddles

Owls on the Ipswich River:

July 27—6-8 p.m.

Discovering Wetlands:

August 10—6-8 p.m.

WACHUSETT MEADOW

Princeton, 978-464-2712

Canoe Rentals on Wildlife Pond

Through October

WELLFLEET BAY

South Wellfleet, 508-349-2615

Coastal Ecology by Kayak Field School

August 15-18, September 13-16

Kayak Trips on Outer Cape

Weekly tours in July and August

Call the individual sanctuaries for more information, fees, and to register.

For a full listing of Mass Audubon programs and events, visit our online catalog at www.massaudubon.org/programs.



Photo © Paul Blankman

Mass Audubon Photo Contest

Picture This: Your Great Outdoors

We're seeking photographs of people in nature and those that highlight the beauty of Massachusetts wildlife and landscapes.



Mass Audubon

Protecting the Nature of Massachusetts

For complete rules, visit:

www.massaudubon.org/picturethis

Deadline: September 30, 2013

Mass Audubon Preschool Programs



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BOSTON NATURE CENTER,

Mattapan

BROAD MEADOW BROOK,

Worcester

ARCADIA,

Northampton & Easthampton

DRUMLIN FARM, Lincoln

HABITAT, Belmont

JOPPA FLATS, Newburyport

MOOSE HILL, Sharon

STONY BROOK, Norfolk

WACHUSETT MEADOW, Princeton

For more information

www.massaudubon.org/education

MASS AUDUBON'S BIRDSEED DAY FUNDRAISER

Help support your local sanctuary's education and conservation programs with your purchase of birdseed. Call for an order form and information about dates and times of sales.

BERKSHIRE SANCTUARIES

Lenox, 413-637-0320

Ordering deadline: October 16

Pickup: November 2—9 a.m.-1 p.m.

For more information:

berkshires@massaudubon.org.

BROADMOOR

South Natick, 508-655-2296

November 2

For more information:

broadmoor@massaudubon.org

Birding Programs

BERKSHIRE SANCTUARIES

Lenox, 413-637-0320

Canoe Meadows Bird Walks

September 6, 13, 20, 27—8-10 a.m.

BLUE HILLS

Milton, 617-333-0690

Hawk Migration at Chickatawbut Hill

September 28, 29—10 a.m.-3 p.m.

BOSTON NATURE CENTER

Mattapan, 617-983-8500

Fall Bird Walk

October 12—8-10 a.m.

BROAD MEADOW BROOK

Worcester, 508-753-6087

Migration of the

Common Nighthawk

August 22—6-8 p.m.

Friday-Morning Birds

Every Friday from August 31-November 1—7-9 a.m.

BROADMOOR

South Natick, 508-655-2296

Hawk Watch at Pack Monadnock

September 14, 21—10 a.m.-3 p.m.

CONNECTICUT RIVER VALLEY

Easthampton, 413-584-3009

Flying Cigars...

The Chimney Swift

August 9—6-8:15 p.m.

Hawk Watch at

Sugarloaf State Park

September 14—9 a.m.-noon

FELIX NECK

Edgartown, 508-627-4850

Early Birders

June 27-August 29—8-9 a.m.

IPSWICH RIVER

Topsfield, 978-887-9264

Warm-Water Seabirds of

Stellwagen Bank

August 9—8 a.m.-1:30 p.m.

Birdwatcher's Getaway

for the Day Series

Once a month from September-December

JOPPA FLATS

Newburyport, 978-462-9998

Wednesday-Morning Birding

Every Wednesday starting August 7—9:30 a.m.-12:30 p.m.

Preregistration not required

WACHUSETT MEADOW

Princeton, 978-464-2712

Hawk Watching for Families

September 7—12:30-2:30 pm

Fall Hawk Migration for Adults

September 15—12:30-3:30 p.m.

WELLFLEET BAY

South Wellfleet, 508-349-2615

Birding Trips to Chatham's Islands and Barrier Beaches

Weekly tours from July through September

Introduction to Shorebirds Field School

August 2-4

Coastal Ornithology Field School

August 22-25



Family Programs

BERKSHIRE SANCTUARIES

Lenox, 413-637-0320

Insect Safari

July 26, August 19—10 a.m.-noon

Twilight World of Bats

July 26—7-8:30 p.m.

August 9—6:30-8 p.m.

Evening at the Beaver Ponds

August 7—6:30-8 p.m.

September 3—6-7:30 p.m.

BLUE HILLS

Milton, 617-333-0690

Nature Tales

Every Saturday, Sunday, and Monday

Holiday—10:30 a.m.

Animal Encounter

Every Saturday, Sunday, and Monday

Holiday—10:30 a.m.

Fledglings

June 27—10:30 a.m.-noon

July 25—10:30 a.m.-noon

August 29—10:30 a.m.-noon

BOSTON NATURE CENTER

Mattapan, 617-983-8500

Jolly Ol' Jack-o'-Lanterns

October 26—2 p.m.-4 p.m.

BROAD MEADOW BROOK

Worcester, 508-753-6087

Caterpillars of Lake Wampanoag

August 4—10 a.m.-2 p.m.

6th Annual Barbara Walker

Butterfly Festival

August 10—10 a.m.-4 p.m.

Rain date: August 11

BROADMOOR

South Natick, 508-655-2296

Wild about Turtles

September 14—1-2:30 p.m.

CONNECTICUT RIVER VALLEY

Easthampton, 413-584-3009

Insects in the Fields

August 17—10-11:30 a.m.

FELIX NECK

Edgartown, 508-627-4850

Marine Discovery Tour

June 25-August 7—5:30-7:30 p.m.

HABITAT

Belmont, 617-489-5050

A Night at the Pond

August 7, 6:30-8 p.m.

WACHUSETT MEADOW

Princeton, 978-464-2712

Massachusetts' Reptiles

August 17—1-3 p.m.

WELLFLEET BAY

South Wellfleet, 508-349-2615

Seashore Rambles

Monday through Friday during

the summer months

Marine Life Cruises

Twice a week on summer evenings

Call the individual sanctuaries for more information, fees, and to register.

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Belize: February 1-10, 2014

Jamaica: February 23-March 4, 2014

Colombia Birding: January 29-February 7, 2014

Kenya and Tanzania: February 26-March 12, 2014

Honduras: March 9-15, 2014

Crete, Greece: April 2014

The Republic of Georgia & the Caucasus Mountains: May 2014

Iceland: June 2014

US TOURS

Monhegan Island Weekend: September 20-22

For more information, contact Ipswich River, 978-887-9264

Block Island Birding Weekend: September 27-29

Cosponsored by South Shore Sanctuaries and Ipswich River

For more information, contact South Shore Sanctuaries, 781-837-9400, or Ipswich River, 978-887-9264

Summer Owl Prowl Campout: August 10-11—6 p.m.-9 a.m.

For more information, contact Ipswich River, 978-887-9264

River Camping: September 14-15—6 p.m.-9 a.m.

For more information, contact Ipswich River, 978-887-9264

Wildlife of Acadia National Park: October 4-6

For more information, contact Stony Brook, 508-528-3140

Discover the Nature of Martha's Vineyard: October 18-20

Cosponsored by Broadmoor, Habitat, and Felix Neck

For more information, contact Broadmoor, 508-655-2296, Habitat, 617-489-5050, or Felix Neck, 508-627-4850

Fall Family Campout: October 21-22

For more information, contact Moose Hill, 781-784-5691

Birding the Mid-Atlantic Coast:

October 22-27, with René Laubach

For more information, contact Berkshire Sanctuaries, 413-637-0320



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Atlantic puffins

Cajun Country and Yellow Rails in Louisiana:

October 29-November 4, 2013, with David Larson and Susan Hardy

For more information, contact Joppa Flats, 978-462-9998

Waterfowl, Waterfalls, & Wineries

of the Finger Lakes Region: October 31-November 3

Cosponsored by South Shore Sanctuaries and Ipswich River

For more information, contact South Shore Sanctuaries, 781-837-9400, or Ipswich River, 978-887-9264

Bosque del Apache and the Rio Grande Corridor in New

Mexico: January 7-13, 2014, with Bill Gette and Alison O'Hare

For more information, contact Joppa Flats, 978-462-9998

Arizona: January 25-February 2, 2014

For more information, contact Mass Audubon Tours.

Southern California: March 4-12, 2014, with René Laubach

and Doug Williams

For more information, contact Berkshire Sanctuaries, 413-637-0320

New Mexico-Rio Grande Lowlands to Rocky Mountain

Highlands: April 22-30, 2014, with René Laubach and Bob Speare

For more information, contact Berkshire Sanctuaries, 413-637-0320



Mass Audubon Tours
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FALL CELEBRATIONS



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Daniel Webster Farm Day, Marshfield

BLUE HILLS

Milton, 617-333-0690

Fall Festival

October 12, 13, 14—10 a.m.-4 p.m.

BOSTON NATURE CENTER

Mattapan, 617-983-8500

Rockin' With Raptors

September 28—1-4 p.m.

IPSWICH RIVER

Topsfield, 978-887-9264

Halloween Happenings

October 25 and 26

LONG PASTURE

Cummaquid, 508-362-7475

Cape Cod Wildlife Festival

September 15

MOOSE HILL

Sharon, 781-784-5691

Halloween Prowl

October 25, 26 and 27

OAK KNOLL

Attleboro, 508-223-3060

Spooktacular

October 19—5:30-8:30 p.m.

SOUTH SHORE

Marshfield, 781-837-9400

Farm Day

October 20—10 a.m.-4 p.m.

Rain date: October 2—

10 a.m.-4 p.m.

STONY BROOK

Norfolk, 508-528-3140

Spooktacular

October 19—5:30-8:30 p.m.

Stony Brook Fall Fair

September 28—10 a.m.-4 p.m.

WACHUSETT MEADOW

Princeton, 978-464-2712

Hey Day

October 5—10 a.m.-4 p.m.

WELLFLEET BAY

South Wellfleet, 508-349-2615

Haunted Forest

October 25—6-8 p.m.

Call the individual sanctuaries for more information, fees, and to register.

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Pond Life

Illustrated by Gordon Morrison

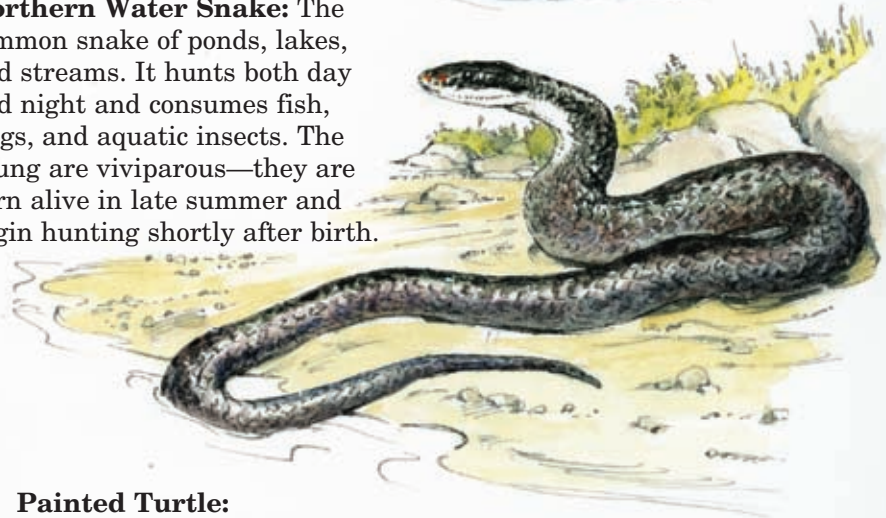
Small freshwater bodies of water, for all their size, host a wide variety of plants and animals encompassed in a dynamic complex ecosystem. Below are a few of the most common and most obvious species. Summer is the best season of the year to look for them.

White Waterlily: White waterlilies, which are native plants, tend to spread over shallow coves. The flowers open in full sun and exude a sweet, almost cloying, fragrance. The presence of pond lilies is usually a sign of a healthy pond. Pollution tends to limit their growth.



Green Heron: Look for these small herons among reeds and rushes at the pond edge, or perched on low shrub branches, peering down into the water. They are well camouflaged and less noticeable than their cousins, the great blues, but common.

Northern Water Snake: The common snake of ponds, lakes, and streams. It hunts both day and night and consumes fish, frogs, and aquatic insects. The young are viviparous—they are born alive in late summer and begin hunting shortly after birth.




Green Frog: The green frog, along with the larger bullfrog, is probably the most common frog nowadays (frog populations are dropping worldwide). Females lay up to 4,000 eggs, which hatch three to five days later into tadpoles. At the end of the first year, the tadpoles begin to grow legs and leave the pond, although many winter over as tadpoles.

Painted Turtle: Tiny one-inch baby painted turtles are born in summer and may double their size before hibernating with the onset of winter. These are the turtles you so often see crowding onto logs and exposed rocks, sunning themselves. They dash off en masse if you approach them.



Outdoor Almanac Summer 2013

July 2013




July 25 Shorebirds begin migrating. Watch for flocks along the coast.



July 27 Look for Indian pipes and beechdrops in forested areas.

August 2013




August 3 Yellow warblers and northern waterthrushes begin moving south.

August 9 Black fruits appear on the curving stems of Solomon's seal.

August 14 Goldfinches are nesting at this time. Watch for them in gardens and field edges.

August 16 Sweet pepperbush blooms near lakes and ponds about this time; sniff the air for its spicy odor.



August 18 Woodland asters begin blooming.

August 20 Full moon. The Sturgeon Moon.

August 23 Cardinal flower blooms along clean freshwater streams.




August 26 Watch for migrating nighthawks overhead at dusk.

August 29 Fall webworms begin to appear; look for their nests at the tips of tree branches.

August 31 Watch for spotted sandpipers at pond edges.

September 2013




September 6 This is the peak of the fall warbler migration; watch for them in backyard shrubbery and treetops.

September 10 Broad-winged and sharp-shinned hawks migrate about this time of year.




September 19 Full moon. The Corn Moon.

September 22 Autumnal equinox; days and nights are of equal length.



September 26 Look for ripening wild grapes along old stone walls. Wild cherries, elderberries, and dogwood berries are ripe. Watch the thickets for feeding migratory birds.

October 2013



October 2 Green darner dragonflies migrate about this time. See them over sunny meadows.

October 5 First juncos arrive from the north.

October 6 Phoebe are still around.

October 9 Watch for squirrel middens on stumps and rocks.



October 12 Watch for large flocks of blackbirds.

October 14 Yellow crab spiders may be seen inside goldenrod flowers.



October 16 Look for daddy longlegs in meadows.

October 18 Full moon. The Harvest Moon.

October 21 Yellow-rumped warblers migrate. Listen for their *check* call as they perch in small trees and shrubs.

October 23 Oaks are still holding their leaves.

October 26 Once the leaves are off the trees, look for oriole nests at the ends of willow and elm branches.

November 2013

November 4 Mushrooms are still coming up; look for the bright caps of yellow *Pholiota* growing on logs and vase-shaped clusters of oyster mushrooms on tree trunks.

November 12 Peak migration date for snow buntings.



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