

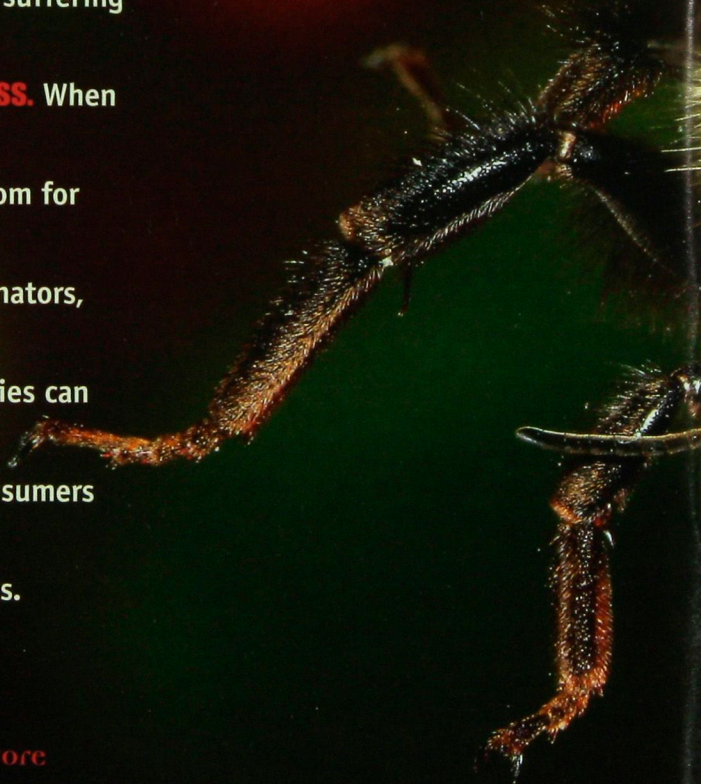
[ A Sticky Situation for ]

# pollinators

Native bees are suffering  
from **habitat loss**. When  
people make room for  
these wild pollinators,  
plant communities can  
flourish and consumers  
reap the benefits.

BY BRIAN DEVORE

PHOTO BY PHIL DEGGINGER, DEMBINSKY PHOTO ASSOCIATES





**A bumblebee** buzzes from one flower to the next, typically collecting pollen from the same species on a single foraging trip. This habit, known as *flower constancy*, helps ensure that the pollen inadvertently left behind by the bee lands on female flowers of the same species.



It's a crisp October morning at a café in St. Paul's Swede Hollow neighborhood, and the insects are here for the lunch special: all the nectar they can eat. Entomologist John Luhman scans a flower and vegetable garden adjacent to the café patio as bees, wasps, and hover flies pay their bill by transporting a few grains of pollen from plant to plant.

At one point, a common eastern bumblebee (*Bombus impatiens*) plunges into the depths of a snapdragon. And then, like a car backing out of a leafy garage, it slowly withdraws, its hairy legs dusty with protein gold. The bee will carry some of the pollen back to its nest—a hole in the ground, such as an abandoned rodent den. As the bee continues to collect pollen along the way, some of the pollen will rub off on the next snapdragon it visits. Thus, by being forced to do some tricky navigation, the bee pollinates the flowers, forging a key link in the plant's chain of reproduction.

Plants play such tricks in the pollination game for good reason: It's the basis of their survival. Pollinators—wild insects and domesticated honeybees—help 70 percent of the world's wild and cultivated flowering plants reproduce. Every third bite of our food is a result, directly or indirectly, of an insect transporting pollen. Without pollinators we would have to say goodbye to (or do with a lot less of) an array of fruits, vegetables, legumes, and alfalfa, as well as many wildflowers.

Bees purposefully collect pollen to feed on its rich protein, but a variety of creatures participate in the pollination

parade. Butterflies, moths, wasps, flies, ants, bats, hummingbirds, and yes, mosquitoes, play a role in plant pollination, though they do not feed on pollen.

"Pollinators are really a keystone group that other organisms rely on," says Eric Mader, assistant extension professor at the University of Minnesota and the national pollinator outreach coordinator at the Xerces Society for Invertebrate Conservation. "Pollination is almost as essential to life as water and oxygen."

Some pollinators are gasping. Scientists, farmers, beekeepers, and conservationists are alarmed at recent pollinator declines around the world, including Minnesota. The National Academy of Sciences reported in 2007 that long-term population trends for North American wild pollinators are "demonstrably downward." At least four dozen species of wild bees in this country are on the Xerces Society's "red list" of at-risk pollinators. Though multiple causes could lead to population declines, many wild bees are suffering from the loss of natural habitat.

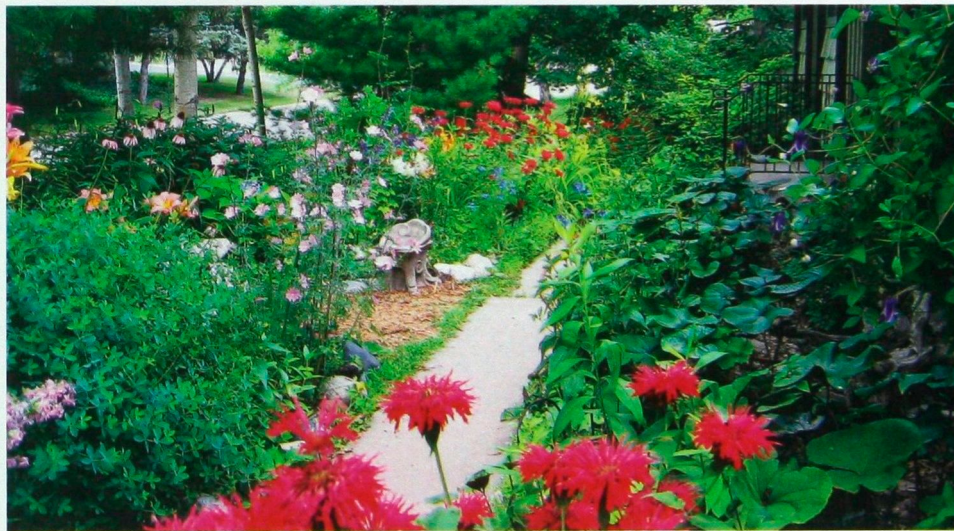
Because wild bees are integral to a healthy ecosystem, any conservation initiatives that help them could have a positive effect on other parts of the environment.

And because these denizens of field and forest play such a crucial role in food production, people have compelling reasons to conserve and propagate wild pollinator habitat not only in natural areas but also on farms, along roads, even in back yards.

**Real Apian Workhorses.** Bumblebees are among the most efficient pollinators present in Minnesota, and three species appear to be declining. The yellow-banded bumblebee (*Bombus terricola*) and the rusty-patched bumblebee (*Bombus affinis*) haven't been officially sighted here since 1999 and 2003, respectively, according to the Xerces Society. The American bumble-

these species could adversely affect crops of cranberries, alfalfa seed, blueberries, apples, melons, tomatoes, and wildflowers, among other plants.

The decline of wild bees comes at a time when their domestic cousins are also struggling. Domesticated honeybees, imported from Europe in the 1600s, provide the majority of managed pollination to cultivated crops in this country. A few years ago, beekeepers began losing honeybees to a condition called Colony Collapse Disorder, or CCD. Nationwide, they lost a third of their honeybees between 2007 and 2008, with many of these losses due to CCD. Fortunately beekeepers were able to



This pollinator friendly garden in Golden Valley includes native flowering plants. Bright white, yellow, and blue flowers with a pleasant fragrance are particularly attractive to bees.

bee (*Bombus pensylvanicus*) may also be in trouble. "When you think about three bumblebees declining in a state where you have 12 to 13 bumblebee species overall, that's major," says Mader. The waning of

make up most of these losses, but the threat of CCD persists. University of Minnesota entomologist Marla Spivak says CCD is likely brought on by numerous factors—disease, parasites, pesticides, lack of good

**Bombini is the tribe** that includes Minnesota bumblebees (*Bombus* spp.) These social bees form small colonies, most often underground. Six of Minnesota's 12 pollinating bumblebee species are shown here. With their insulating pile of long, soft hairs, these sturdy bees can forage for nectar and pollen in the chill of early morning and evening.



***Bombus bimaculatus***

Two yellow spots on the abdomen are the most striking identification marks of this species.



***Bombus impatiens***

Some surveys show this species appears to have increased in abundance in recent years.



***Bombus griseocollis***

As its Latin name suggests, this species has a dark band between thorax and abdomen.



***Bombus auricomus***

Wing color and venation distinguish species. Black wings are characteristic of this one.



***Bombus fervidus***

The abdomen, as well as the thorax, of this species is almost entirely yellow.



***Bombus ternarius***

Two distinctive red-orange spots on the abdomen make this species easy to identify.

**Solitary bees** make individual nests, sometimes near one another. The sampling of Minnesota native species shown here represents five families. The images are enlarged and not indicative of actual size. These bees feed on nectar easily accessible in shallow, flat-top flowers such as goldenrod, purple coneflowers, and asters.



***Anthedonia* spp.**

A female digger bee looks for uncovered soil to dig a burrow with brood cells for each of her eggs.



***Megachile* spp.**

Leafcutter bees prefer nesting in dead trees and branches, but they also nest underground.



***Dialictus* spp.**

Commonly called sweat bees, Halictidae species can tunnel underground for nesting.



***Augochlora* spp.**

Also in the family Halictidae, this gold-green sweat bee usually nests in dead wood.



***Andrena* spp.**

This species specializes in nectaring from particular plant species such as aster.



***Ceratina* spp.**

Boring into plant stems or wood for nesting, members of this species are known as carpenter bees.

foraging areas leading to poor nutrition, and increased workload—which all add up and stress out these apian workhorses.

One way to reduce stress on honeybees is to tap into help from the wild, says Spivak. Of the estimated \$20 billion in services pollinators provide U.S. crops annually, around 15 percent comes from wild insects. In the upper Midwest, the potential for native species to transport pollen is huge. Together, Minnesota, Wisconsin, and Michigan have more than 500 species of native bees.

In many ways, native bees are superior pollinators to domesticated honeybees. Bumblebees will fly in bad weather when their domestic cousins are holed up. As

apples, a job that could require 40,000 honeybees. A bumblebee can cling to inverted flowers such as blueberries and efficiently buzz pollinate—shake pollen off by vibrating its wings. On vegetable farms in New Jersey and Pennsylvania, wild bees visited flowers more frequently than did honeybees in three out of four crops studied, according to the *Journal of Applied Ecology*.

**No Substitute for Natural.** Though native bees can help pollinate cultivated crops, they need regular access to natural foraging and nesting areas. In southern and western Minnesota, they need prairies, wildflower meadows, and brushy fencerows. Brushlands and shrubby areas harbor pollinators in the northern region. Manicured lawns and pine plantations may be green, but without blooming plants they might as well be concrete as far as pollinators are concerned.

As diverse natural habitats have declined, so have pollinators, say entomologists. “Rather than look at individual insects that are threatened, just look at their habitat,” says Luhman, a biological control expert with the Minnesota Department of Agriculture. “If the habitat is in trouble, chances are the insects that like that habitat are in trouble.”

The synergistic relationships between pollinators and natural habitat are becoming increasingly clear, says Minnesota Department of Natural Resources botanist Welby Smith. In the United Kingdom, a decline in bee diversity has resulted in the diminished distribution of 75 species of wild plants that require insects for pollination, according to the journal *Science*.

“Native pollinators pretty much evolved in association with these diverse wild plant communities, and so their pres-



PHOTO BY JOHN MIELCAREK, DEMBINSKY PHOTO ASSOCIATES

Nonnative honeybees, prodigious pollinators of agricultural food crops, will also feed on nectar from native plants.

few as 250 orchard mason bees (*Osmia lignaria*)—native metallic-tinted bees present throughout the country, including Minnesota—can pollinate an acre of

ence can tell us a lot about a habitat's overall health," says Smith. "In order to protect the habitat of the wild plants, we need to protect the wild pollinators."

All pollinators, wild and domesticated alike, require a seasonal succession of blooming plants to get through spring, summer, and fall—and prepare for winter. Colonies of wild pollinators such as bumblebees are annual, meaning they are formed when a solitary queen emerges in May or June. Throughout the season, colonies must collect large amounts of pollen (a source of protein) and nectar (carbohydrates) to produce new queens. Bumblebees can be seen as late as October clinging to sunflowers, attempting to glean the last bit of sustenance from the plants before the season shuts down. Plants that bloom early in spring and late in fall are critical to pollinator populations.

Pollinators also need a habitat free of chemicals. Pesticides can be particularly dangerous to bees as they forage in sprayed areas, collecting and storing chemical-saturated pollen. A Penn State University study released in August 2008 showed honeybee

## Add flower power

To help pollinators, experts say: Plant flowers. But a monoculture of mums won't fly. Bees need a succession of plants blooming from April until frost. Goldenrod and asters blooming in September are gold mines for pollinators looking for high-energy food before winter.

- Landscape with native species, [www.mndnr.gov/gardens/nativeplants](http://www.mndnr.gov/gardens/nativeplants) or 888-646-6367
- Find native plants by ecoregion, [www.pollinator.org](http://www.pollinator.org)
- Build bee homes, [www.fs.fed.us/wildflowers/pollinators/beebox](http://www.fs.fed.us/wildflowers/pollinators/beebox)
- Make farmland bee friendly, 503-232-6639 or [www.xerces.org](http://www.xerces.org) or local Natural Resources Conservation Service.



### Spring Blooming Plants:

Pussy willow (*Salix discolor*)  
Juneberry (*Amelanchier* spp.)  
Spiderwort (*Tradescantia* spp.)  
Plums and cherries (*Prunus* spp.)  
Wild roses (*Rosa* spp.)

### Summer Blooming Plants:

Prairie clover (*Dalea* spp.)  
Bee balm (*Monarda* spp.)  
Lavender hyssop (*Agastache foeniculum*)  
Beardtongue (*Penstemon* spp.)  
Blazing star (*Liatris* spp.)

### Autumn Blooming Plants:

Aster (*Symphyotrichum* spp.)  
Sneezeweed (*Helenium autumnale*)  
Goldenrod (*Solidago* spp.)  
Sunflower (*Helianthus* spp.)

MIKE HALVERSON, DNR

hives across the country had low levels of over 70 pesticides.

**Pollinator-Friendly Farms.** Minnesota farms have the potential to provide more pollinator habitat. The Natural Resources Conservation Service has started training

crops such as apples, blueberries, pumpkins, canola, or sunflowers, there's an added bonus: "Growers will have a way of creating a healthy population of their own pollinators, reducing dependency on rented hives," says Mader.

Current NRCS guidelines in many states



GARY ALAN NELSON

A western Minnesota prairie harbors a suite of flowering native plants, which attract nearly all of Minnesota's more than 120 species of native bees.

staff to help farmers establish and maintain pollinator-friendly habitats. Native wildflowers can provide excellent foraging for pollinators. So can cover crops that are allowed to flower. Reducing tillage causes less disruption of nesting habitat, because two-thirds of bees nest underground. Leaving logs, stumps, snags, and clumps of grass will provide nesting sites for the rest. Fencerows with willow, dogwood, or other flowering plants provide foraging habitat on working farmland without disrupting the agronomic productivity. For producers raising pollinator-dependent


recommend at least one to two acres of pollinator habitat for every 25 acres of pollination-dependent cropland. And it needs to be relatively close: Bumblebees will range up to a mile from their nest to forage, while for tiny solitary bees (some species are small enough to ride on a bumblebee's antenna), a flight of 200 yards would be a major undertaking.

**Refuges for Bees.** Roadsides, ditches, and buffer strips can also serve as wild pollinator habitat. Over twice as many total number of wild bees and almost 50 percent more bee species were found along highways planted

to native prairie when compared with weedy byways, according to a 2008 University of Kansas study.

During the past two decades the DNR Roadside for Wildlife program has promoted the establishment and protection of natural vegetation along roads. "Even the narrowest strip of wildflowers will help bees, especially if you have native wildflowers blooming throughout the growing season," says Carmelita Nelson, DNR Roadside for Wildlife coordinator. Nelson estimates that the southern two-thirds of Minnesota has 525,000 roadside acres that could be planted with native wildflowers to provide prime pollinator habitat.

Botanists and entomologists say even a few square yards of native flowering plants in a yard, garden, or vacant lot can make a difference. This kind of ecological restoration can truly be a win-win, says Spivak of the University of Minnesota.

"It would give the wild pollinators nesting and feeding sites. It would help the domestic bees. It would help everything," Spivak says, hesitating for a moment before adding one more benefit: "Isn't there a theory that when you plant flowers, there's less crime?" 

LAYNE KENNEDY



A bumblebee nectaring on blazing star (*Liatris* spp.) collects pollen under her hairy abdomen and on her leg hairs.



# Into the **Inhospitable** Peatland

By **Gustave Axelson**

The Sand Lake peatlands harbor a community of bizarre plants—but it's no place for people.

## **We are lost.**

After bushwhacking through hazel brush for two hours behind Department of Natural Resources plant ecologist Bruce Carlson, my eyes are blinded by sweat on this boiling July day, my ears ring with the machinelike whirring of deerflies and whine of mosquitoes. We stop for a water break. Carlson studies his topo map, then gauges our surroundings. "This doesn't look right," he says coldly. My backpack suddenly, seemingly, weighs 50 pounds heavier.

It's easy to get lost back here, in a vast waterlogged 38,000-acre complex of peatlands and conifer forests that forms the headwaters of four rivers, including the St. Louis River. These peatlands lie within the single largest U.S. watershed that contributes to Lake Superior. The remote region straddles St. Louis and Lake counties and is so ecologically prized that parts of it are protected in two preserves—the DNR's Sand Lake Peatland Scientific and Natural Area and The Nature Conservancy's Sand Lake/Seven Beavers Preserve.

Carlson is surveying state and federal forest land in the northwestern corner of the Sand Lake peatlands because the DNR Min-

nesota County Biological Survey has no plant records here. Our plan is to camp on federal land, since camping isn't allowed in the SNA. I wanted to tag along for the adventure of going where no botanist has gone before. But now, as my knees sink in muck and we bushwhack through alder brush, I appreciate why nobody goes here.

"This is good news!" Carlson chirps. I stop bushwhacking to stare at him in disbelief. "This is the alder moat that rings the peatlands. We're almost there."

After five more hours of meandering through the muck, it becomes clear that we will not reach the esker that Carlson promised me—the breezy, bug-free ridge of glacially deposited gravel and sand where we'd camp on dry ground with a view of the sunset. So instead we make camp among the brushy understory of an upland red pine stand. Field biologists always have a Plan B, Carlson tells me.

Exhausted by the daylong slog, we forgo dinner for a prisoner's meal of bread and cheese. We sip water conservatively since only two of our six Nalgene bottles are still full and neither of us has the energy to strain and boil the brackish bog water, which resembles French onion soup.

Naturalist and author Paul Gruchow referred to peatlands as a "waterlogged desert" because everything is soggy but fresh water is scarce. He was right. This is no place for people. And like a desert, the Sand Lake peatlands are home to strange plants with ingenious adaptations—Labrador tea shrubs with waxy leaves that minimize evapotranspiration (and preserve hydration) and sundew plants that eat insects instead of trying to eke their nutrition out of these highly acidic environs.

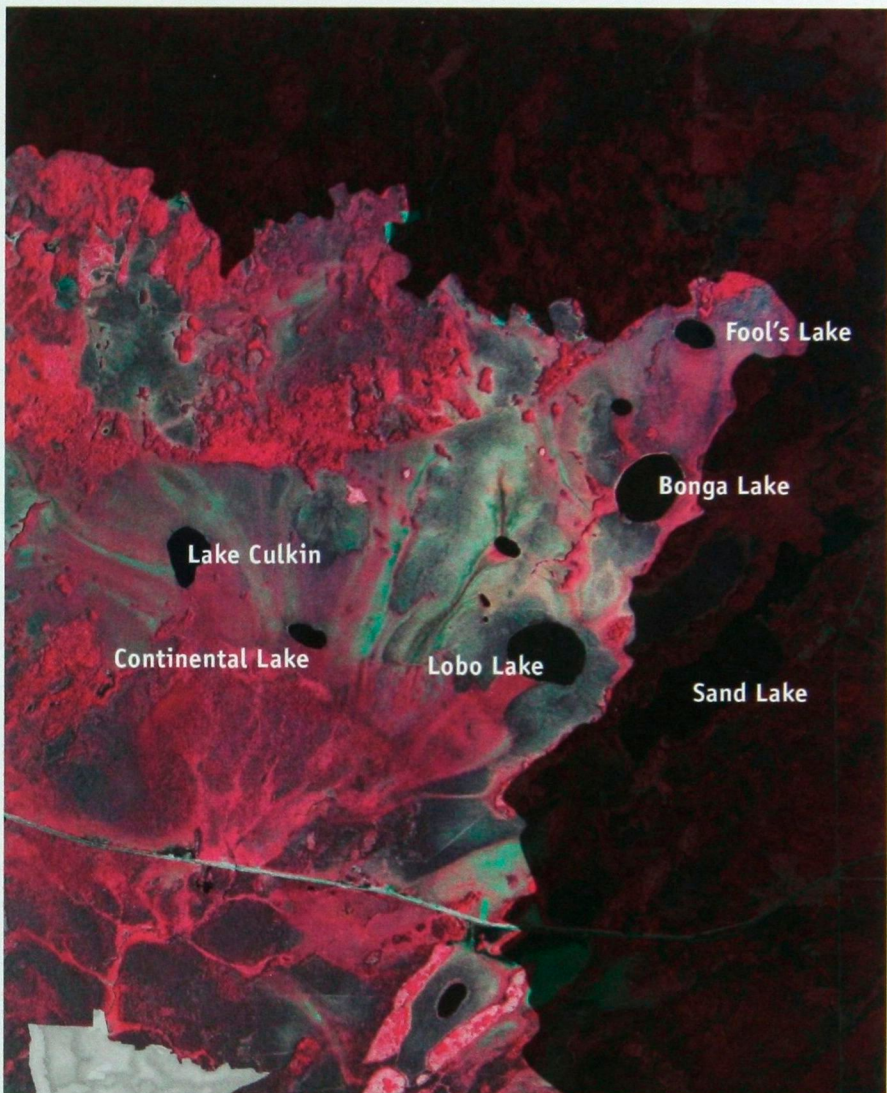
Carlson has hopes of finding plants even stranger or rarer, plants maybe never before found in Minnesota. I'm just hoping he finds a way out of the alder moat tomorrow.

**Ants on a Rembrandt.** "Let's ditch the map today," Carlson says as he nudges out of the tent the next morning, soaks a white rag in bug dope, and tucks the rag under his baseball hat so it flows down over his neck and shoulders. "We'll navigate the water tracks instead."

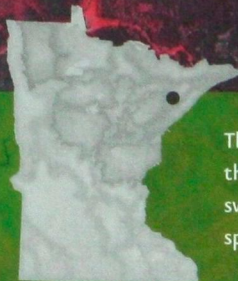
He means to follow the flowing water through the peatlands to the plant communities he seeks in the fens. Peatlands are basically comprised of bogs and fens, two ecological communities differentiated by their source of water: bogs hold stagnant waters fed only by the sky (snow and rain), while fens are also fed by the upwelling and flow of mineral-rich ground water.

The Sand Lake peatlands feature ribbed fens. The distinction *ribbed* describes the patterns of vegetation (sedges, shrubs, and forbs), which sometimes form in the water tracks. The whole mosaic is called a patterned peatland, because aerial images depict an artistic composition of blue-green fens swirling through ribbons of stunted tamaracks and around dark bogs of black spruce on mounded peat. The striking patterns of this vast complex only become visible from an aerial view.

"You're like an ant walking on a Rembrandt," DNR plant ecologist Norm Aaseng once told me. Aaseng is one of the state's premier experts on peatlands (he is a co-author of the book *The Patterned Peatlands of Minnesota*). "From the ground, you simply can't comprehend the broad brush strokes of beauty you're trudging across."



INFRARED PHOTOGRAPH GENERATED BY NORM AASENC, DNR



This infrared aerial photograph of the Sand Lake peatlands highlights the artistic beauty of a patterned peatland. The light blue-green swirls are fens with flowing water; the dark green areas are black spruce bogs; and the red patches are upland forest or swamp.

As I tentatively follow Carlson out onto the bouncy trampoline terrain of a floating bog mat (out of the alder moat at last!), I perceive this peatland to be not so much a Rembrandt as the neo-impressionist variegations of painter Georges Seurat—macrobeauty created by millions of tiny pinpoints of brilliance. I kneel to inspect what comprises this bog mat and discover an intricate design, woven by diminutive sundews, cranberry plants with miniature pink flowers, and spongy sphagnum moss. The sphagnum is the connective tissue holding this bog mat together.

Sphagnum can hold up to 20 times its weight in water, which accounts for the bog's sponginess. Scientists concerned about climate change and carbon loading in the atmosphere are heralding sphagnum's ability to soak up carbon as well.

Carbon is continually fixed by the mosses and vascular plants and trees in sphagnum bogs. When those plants die, their sequestered carbon remains stored for hundreds of years in the bog because the cold, wet conditions inhibit decomposition.

In the Sand Lake peatlands, the buildup of dead organic matter has been measured as deep as 53 inches. The carbon sinks of sphagnum bogs explain why the world's boreal forests store twice as much carbon as tropical forests, even though tropical forests cover slightly more of the globe.

**Old but Growing.** Peatlands are not rare in Minnesota; we have 6 million acres of peatlands, more than any other state except Alaska. But the Sand Lake peatlands are unique in a paradoxical way. At 8,000 years of age, these peatlands are older than peatlands elsewhere

## Plans for Peatland SNAs

In 1991 the Minnesota Legislature designated 18 ecologically significant peatlands as scientific and natural areas. The DNR recently received federal funds to develop management plans for some peatland SNAs. DNR regional nongame specialist Katie Haws has written the first two management plans.

"These management plans will allow us to assess the resources present within each SNA, including wildlife, native plant communities, rare plants, unique geomorphic features, and corridors of disturbance," says Haws.

The plans will extend beyond SNA boundaries to the surrounding watershed. They will benefit wildlife in wetlands and lowland conifer forests, two key habitats identified in the state wildlife action plan, *Tomorrow's Habitat for the Wild and Rare*. Peatlands harbor 45 species of greatest conservation need, including northern bog lemming, boreal owl, American bittern, and spruce grouse.

With proper protection, these peatlands can continue to store vast amounts of carbon within organic matter, an important function for reducing atmospheric



BOREAL OWL BY BILL MARCHEL

carbon dioxide, a greenhouse gas.

To learn more about peatland SNAs, contact Peter Buesseler at [peter.buesseler@dnr.state.mn.us](mailto:peter.buesseler@dnr.state.mn.us) or 218-308-2641.

in the state, such as northwestern Minnesota's Red Lake peatlands, which are 2,000 to 4,000 years old. But the Red Lake peatlands are stabilized—their sphagnum mats have run out of stagnant, cold, wet lowlands to colonize. The sphagnum mat in the Sand Lake peatlands, which squishes like a wet sponge with every step I take, is still expanding outward. The sphagnum will grow until it reaches the flowing water of a fen or an upland boundary, where it can grow no more.

How could it be that the Sand Lake peatlands, with a 4,000-year head start on their Red Lake counterparts, still haven't found equilibrium? Maybe because everything, including bogs, grows slower in the Arrowhead, where winters are long lasting. But nobody knows for sure, according to Aaseng.

I've reached the end of this particular bog mat, where I stand on the edge of Lake Culkin, one of several lakes that speckle these peatlands. It's obvious I've reached a fresh water oasis: There's a beaver dam on the lake. A loon with trailing chicks floats by. I spy the flash of a deer's white rump among an encampment of blue flag irises (*Iris versicolor*) by the water's edge. A breeze blows, and for the first time today, the mosquitoes are mercifully at bay. I want to stay here among my warm-blooded brethren. But the plants that grow here, by Carlson's standards, are pedestrian.

"Let's go this way," Carlson leads, following a water flowage away from the lake. I take a deep breath, zip up the mesh hood on my bug shirt, and walk back into the bog.

**Alien Planet.** Our walking gets easier when we encounter an abandoned logging trail, probably a remnant from timber cutting in the 1930s and '40s. We enter a dwarf forest,

populated by 4-foot-tall tamarack trees and black spruces that look like Charlie Brown Christmas trees—spindly, scraggy, and wan. Carlson tells me I might be towering above an old-growth forest. He says black spruces in bogs like this one have been aged at 300 years. The loggers passed by these so-called "stagnant spruces" on their way to bigger trees on eskers and upland islands.

Next we pass into a standing dead forest of gray, weatherworn, brittle tree skeletons. It looks like the life was sucked out of these trees from the bog below. I feel like I'm on an alien planet. Anything familiar is dead. Everything living looks foreign, like the pitcher plants with flowers that rise out of the sphagnum moss like periscopes with cabbage heads. An old woodsman once warned me windigos, the devilish spirits of Ojibwe lore, take the form of pitcher plants, so I shouldn't turn my back on them in the bog.

They are indeed mysterious plants, with folded leaves that appear to cradle a puddle of dew (only too late does the insect victim realize it's bathing in digestive juices). Nine of the 10 species of pitcher plants found in the United States grow in the South. The northern pitcher plant (*Sarracenia purpurea*) ranges from Minnesota all the way up to Canada's Northwest Territories. As a boreal adaptation, the northern pitcher plant's seeds only germinate if exposed to cold temperatures.

Carlson spies a yellow flower floating in the murky bog water; the flower is attached to a plant that looks like a strand of seaweed. He plucks the plant from the water and introduces me to another of the peatlands' carnivorous plants—one that eats like a whale. This is intermediate bladderwort (*Utricularia intermedia*). Its stem is speckled

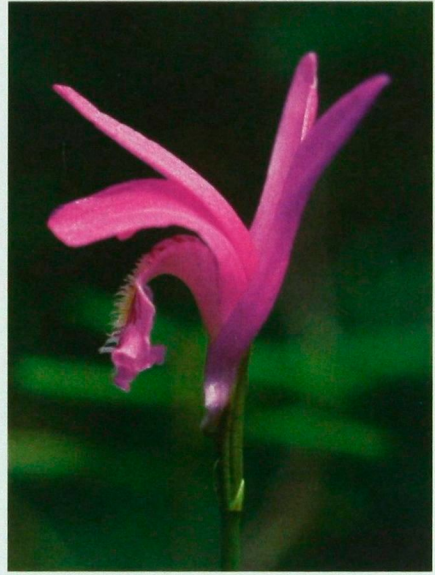


**Bladderwort** (*Utricularia* spp.) This tiny carnivorous plant sucks in water and filters out zooplankton through membrane sacs on its stem.

with tiny sacs. The membrane sacs are its namesake bladders, which suck in ambient water and filter out zooplankton, like a great blue whale discharges seawater through its baleen to filter out krill.

For the next hour, Carlson slowly steps through the bog with his head craned downward, like a man searching for a lost wallet, until he exclaims, “Ah! Here’s something interesting.”

Poking up from the ankle-high sedges is a purple flash of color, a flower with two pointy petals sticking up like the ears of a German shepherd and a delicate protruding lip painted with splashes of deep indigo. It is a dragon’s-mouth orchid (*Arethusa bulbosa*), a plant notable for its abundance in this spot. I can count 10 dragon’s-mouth orchids within a few yards of where I’m standing. Carl-



**Dragon’s-mouth orchid** (*Arethusa bulbosa*) This midsummer flowering orchid is pollinated by queen bumblebees attracted to the flower’s yellow, bristled lip.

son tells me the Sand Lake peatlands harbor one of our state’s largest populations of this plant. This is good news because Minnesota is one of the few places west of the Canadian maritime provinces where dragon’s-mouth orchids are holding their own, according to the book *Orchids of Minnesota* by DNR plant ecologist Welby Smith.

Other orchids such as the club-spur orchid (*Platanthera clavellata*) and northern bog-orchid (*Platanthera obtusata*) bloom in the peatlands in summer. The flashiest orchids like rose pogonia (*Pogonia ophioglossoides*) and fairy slipper (*Calypto bulbosa*) try to be more brilliant than the others in the bog, like neon signs in Times Square, vying for the attention of passing bees or mosquitoes that might alight to get some sugar from the nectar. The mosquitoes sus-



**Northern pitcher plant** (*Sarracenia purpurea*) The iconic carnivore plant of the bogs, the pitcher plant consumes insects, mites, spiders, and even small frogs.

pended in a cloud around my head are intent on protein at the moment—my blood.

“Let’s get out of here,” Carlson says, after jotting notes on his clipboard. I’m only too happy to comply.


**More Than Pretty.** After hastily packing up our camp, we begin the slog out of the Sand Lake peatlands, again climbing out of the alder moat to tangle with hazel brush. We leave knowing the fruits of our two days in the bog will be represented on a native plant community survey map with a few dots indicating an unusually high concentration of dragon’s-mouth orchids. Carlson had hoped for more, perhaps the elusive linear-leaved sundew (*Drosera linearis*) or a cloudberry plant (*Rubus chamaemorus*), or the rare moose dung moss (*Splachnum* spp.).




**Cloudberry** (*Rubus chamaemorus*) A Scandinavian delicacy, the cloudberry has been found in northern Minnesota, though not yet in the Sand Lake peatlands.

But the only guarantees in this kind of botanical survey are hours of bushwhacking, hordes of bloodthirsty bugs, and the treachery of going into bogs where a misstep could mean self-extrication from hip-deep, peaty muck. As he scrapes through the thicket, Carlson pauses and looks back at me, his cheek striped bloody red from the claw marks of hazel brush.

“You know, sometimes folks look at these native plant inventories, and they say all I do is wander around looking for pretty flowers,” he says.

Then we press on into the brush, still hours away from Carlson’s truck. 

 [www.mndnr.gov/magazine](http://www.mndnr.gov/magazine) Watch a multimedia show about the author’s trek into the Sand Lake peatlands in July, and a return trip in the fall.

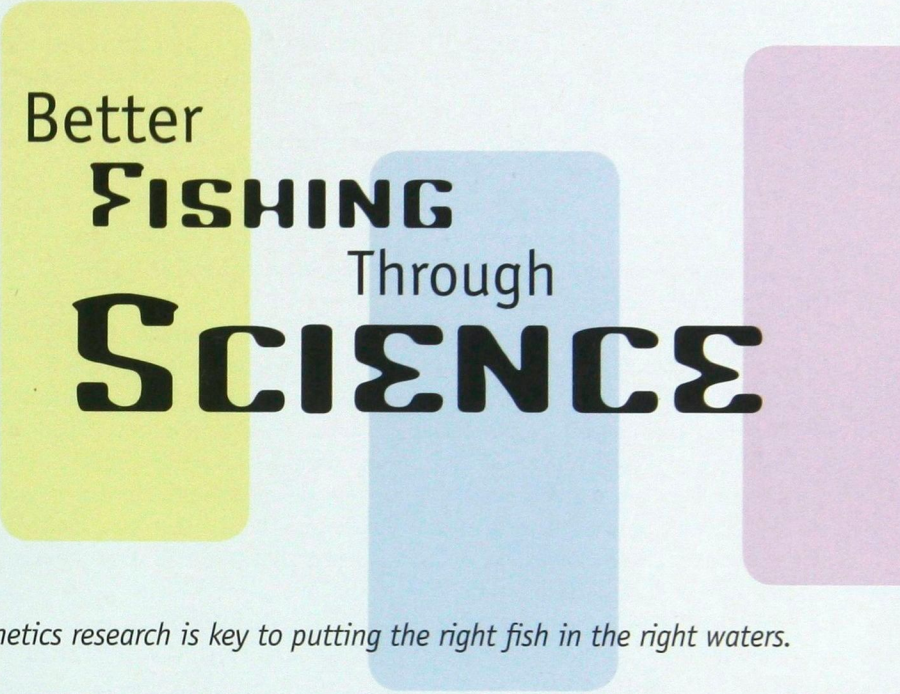
**Detection of Crappie Hybrids** Analysis of DNA fingerprints enables scientists to distinguish crappie hybrids from white crappies and black crappies. Each vertical column shows a DNA marker for a single fish. DNA from black crappies and white crappies produce single bands. Hybrids have DNA bands from both species, as well as a third band found only in hybrids.

Hybrid Crappie

White Crappie

Black Crappie





# Better FISHING Through SCIENCE

*Genetics research is key to putting the right fish in the right waters.*

*By Chris Niskanen*

**IT WAS A SIMPLE QUESTION:** Why do some Lake Minnetonka crappies get exceptionally large?

Curious if there was a biological or fish management issue at play, Minnesota Department of Natural Resources biologist Mike McInerny decided to investigate with a bit of high-tech sleuthing. He asked fish geneticist Loren Miller, in the Department of Fisheries, Wildlife and Conservation Biology at the University of Minnesota, to study the genetic makeup of the largest crappies entered in the Crappie Contest, held each April at Lake Minnetonka. DNR biologists hoped the results might aid them in managing for big crappies in other lakes.