

PURPLE INVADER

*Purple loosestrife is taking over our wetlands, rendering them useless for wildlife.
Can anything stop its spread?*

BY JACK HANNA

On a humid day last July, biologist Don Cuddy lifted off from an airstrip near Ottawa in a light Cessna. The plane climbed above the heat haze and headed west over the woodlands toward Muskoka.

Almost as soon as they had gained altitude, he and the pilot were struck by a peculiarity in the haze-softened scene below. The carpet of lime-green deciduous forest was broken by a patchwork of splotches of lovely purple. In every direction, wherever there were breaks in the forest, they were coloured a soft, fluffy mauve.

The patches of colour that caught Cuddy's eye were stands of purple loosestrife (*Lythrum salicaria*) in full bloom. However, botanists and naturalists in Ontario are finding loosestrife impressive for more than just its stunning flowers. It is a dangerous beauty.

Cuddy could easily see large patches of loosestrife from the air because the plant is a sort of super-weed, taking over many of Ontario's marshes. As it carpets the wetlands, it overwhelms the native plants that grow there and is believed to drive away the animals, especially birds and waterfowl, that depend upon them. Purple loosestrife is almost useless to wildlife.

The weed is rampant in the eastern United States, where an estimated 190,000 hectares of wetlands are overrun each year by the purple onslaught. "It is destroying our wetlands," says Ellen Fuge, purple loosestrife coordinator for Minnesota, "and in the east [of the U.S.] it is out of control." As for Ontario, Don Cuddy, who is the Ministry of Natural Resources' regional ecologist in the east, says "There is an awful lot of it out there. It is definitely taking over large areas of wetlands."



*Above: Mountsberg Conservation Area in Halton Region, west of Toronto, has been invaded by purple loosestrife in recent years.
Below: The weed grows too densely to allow ducks to nest. It also displaces the marsh plants on which many wildlife species feed*



Thus far, efforts to halt the advance of purple loosestrife have failed. The plant is astonishingly indestructible. It easily survives cutting, burning, drowning, even uprooting. In the U.S., officials have turned to massive chemical spraying and are still losing the battle to contain the weed.

Loosestrife spreads its swath of purple through marshes and pastures and along lake shores and stream banks. From July until the first frost, motorists see stands of the flowers in roadside ditches. The tall stalks, up to 2 metres high, are topped by spikes of bright flowers, mauve wands rising elegantly above the greenery. An-

other identifying characteristic: the leaves are paired along the stem opposite each other.

Purple loosestrife is a beautiful but unwelcome invader from Europe, having first arrived in the early 1800s. It could have come by a variety of means. At that time, ships carried gravel and moist sand from exposed tidal flats as ballast, and naturalists who observed the ballast dumping grounds noted that European plants frequently had been stowaways. The ships also carried sheep and raw wool, as well as straw and hay for bedding and fodder, and any of these could have carried seeds. Immigrants may have purposefully brought loosestrife with them, since it was a medicinal herb. Ground into a powder and ingested, it was a treatment for diarrhea and dysentery. The leaves, dried or green, were applied to cuts and sores. Or settlers may have brought it with them simply to give flower plots a touch of beauty from back home.

Gardeners have treasured purple loosestrife for centuries. In recent years, they have been accused of unwittingly spreading it, as cultivating wildflowers has become more popular. In 1985 an American researcher surveyed 50 different retail packets of mixed wildflower seeds and found that one-tenth of them contained the wild variety of purple loosestrife. In addition, hybrid varieties have been sold in garden shops. Botanists are not sure, however, whether these hybrids are as insidious as wild purple loosestrife if they break out of the garden. Research on that question is being conducted at the University of Manitoba. In some American states, it is illegal to own, plant or sell purple loosestrife, including the horticultural hybrids. For example, in Minnesota 16 horticultural varieties are prohibited.

Robert McCaw

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Don Cuddy remembers getting a call two years ago from a woman who wanted advice about transplanting purple loosestrife from her city flower-bed to her lake-country cottage. He gave the reply he thought appropriate: "Are you crazy?"

When purple loosestrife crossed the Atlantic, it left behind the insects that seem to control it in Europe. In North America, this adaptable plant found no natural enemies and has proliferated unchecked.

The beautiful weed is a daunting breeder. A single mature plant can produce up to 2.7 million seeds a year. The seeds float and are usually transported by water. But they could be mixed into mud that sticks to ducks, muskrats or the tires of automobiles. No one is sure how long the seeds remain viable. An experiment to try to answer that question was concluded when the seeds showed no ill effects after three years in dry storage.

Although loosestrife prefers damp soil in the open sun, it can stand a bit of shade and can get by in 50% sunlight. Once it has sprouted, it can even tolerate deep water.

Given a beach-head in a compatible wetland, loosestrife can spread quickly. Its speedy invasion of Montezuma National Wildlife Refuge in New York State is a classic example. Loosestrife was first spotted in 1966, growing on the dikes around the marshes, which were prime habitat for wetlands plants. By 1978, the weed made up 90% of the vegetation on the dikes in a large study area. Don Cuddy says that in some Ontario marshes a similar takeover has occurred, with loosestrife displacing 80% of the native vegetation.

Marsh managers are beginning to live in fear of loosestrife. Not only is it populating their wetlands, but it is restricting their ability to manage them. Typically, managers drain marshlands every five to seven years to allow oxygen into the soil and to rejuvenate grasses. However, exposing damp, open soil to sun creates the best possible growing conditions for purple loosestrife.

Gary McCullough, a regional habitat biologist with the Canadian Wildlife Service (CWS) in London, Ontario, says loosestrife is making marsh managers reluctant to drain their swamps. CWS staff have been battling the weed in one federally owned marsh, pulling up plants by hand. "There is no way we would consider [draining] that marsh because of the extreme likelihood of loosestrife really getting started," he says. "Everybody is hesitant to [drain marshlands] now because of the loosestrife management problem."

Loosestrife overwhelms the marsh

plants on which many species of wildlife depend for both food and shelter. The tubers of bulrushes, cattails and sedges provide food for muskrats and some diving ducks, and bulrush and cattail seeds are eaten by waterfowl. But there is almost no food value in loosestrife for the common marsh dwellers. The stem and roots are woody, and seeds are too small to be caught as waterfowl sift water to catch grains and small invertebrates. Seeking shelter amid the reeds and grasses, many species of ducks nest over the water. But loosestrife grows too densely to provide a home for most ducks. According to a 1987 report by the U.S. Fish and Wildlife Service, the red fox, a major predator of goslings, can more



Hand-pulling will not get rid of older plants: the roots are hefty and pieces are easily left behind, which sprout anew

easily sneak up on its prey through dense growths of loosestrife. Although there have been reports of red-winged blackbirds nesting in loosestrife and of deer browsing on it, they are the few known fans of the weed, among the legion of animals that shun it.

Loosestrife also collects tussocks of dirt around its tightly packed roots, thus hastening the encroachment of firm land into marshes. In addition, the dense growth keeps winds off the water, preventing fresh oxygen from mixing with the water. With the loss of oxygen, invertebrates cannot survive, and laying ducks and newly hatched goslings, which depend upon the invertebrates to supply them with abundant protein, are deprived of essential food.

"Not a whole lot of good comes out of this plant, other than that it is pretty," says Darryl Kroeker, a research biologist in Winnipeg with Ducks Unlimited Canada.

Marshland managers trying to control

loosestrife face frustration. This incredibly prolific weed is almost indestructible by any of the ordinary control methods. "It is frightening when you think about it," says Minnesota loosestrife coordinator Ellen Fuge. "It is like something in a science fiction movie."

Young plants can be pulled out by hand, but if a plant that is two or three years old is pulled up, fragments of the root remain behind and sprout anew. Burning off the weed doesn't work for the same reason—the roots survive. Needless to say, cutting down the plant also leaves the roots in place. If clippings of the plant are left behind on the ground, those can root and sprout.

Ducks Unlimited has experimented with various methods of controlling loosestrife. In the summer of 1987, near Smiths Falls in eastern Ontario, researchers armed with pruning shears clipped experimental patches of loosestrife below the surface of shallow water. It was to no avail. Two years later, says Kroeker, the loosestrife in the mowed plots had recovered and was flourishing just as well as the untouched patches.

In another experiment Kroeker shipped seed-laden buckets of soil from the Smiths Falls area to his organization's Delta Waterfowl and Wetlands Research Station, near Portage la Prairie, Manitoba. In 1987 and 1988, he germinated loosestrife in a greenhouse and then experimented with flooding young plants of varying heights with various depths of water. Although mature plants didn't much mind the water, Kroeker did somewhat slow the growth of the very young plants by flooding them with plenty of water, 20–30 centimetres of it. In the end, however, that only triggered a startling reaction from the plants. It was like the climactic horror scene in a science fiction movie. Just when the hero thinks he has finally gotten the upper hand on the aliens...

At the tips of the flooded loosestrife, clusters of small leaves sprouted. Then, about the width of a thumbnail below the tips, rootlets appeared. Eventually, the tiny tips, with the newly sprouted rootlets, broke free from the plants and floated to the surface of the water. These little floating satellites could drift to soil, root and grow. The old stalks, which the little satellites had abandoned, withered and fell over. However, Kroeker is not certain the plants are dead. He is waiting to see whether the roots of these withered plants resprout this spring.

In the U.S., authorities are spraying chemical herbicides to attempt to control loosestrife. Small patches of the weed are sprayed by personnel wading through wetlands with backpack sprayers. They use

a commercial herbicide, Rodeo, which currently is not licensed in Canada. Larger areas are attacked by trucks and boats equipped with hoses and sprayers mounted on booms, or by airplanes. The chemicals commonly used are 2,4-D and SEE 2,4-D. However, Fuge says these have the disadvantage of drifting easily in the wind. Experiments are being performed with a new pesticide from Dow Chemical, Garlon, which does not as readily float on the air. Some forms of 2,4-D are licensed in Canada; Garlon is not.

In Canada, governments have been casual in their reaction to loosestrife. Joe Carreiro, chief of wildlife conservation for the federal government's Canadian Wildlife Service, says, "At this stage of the game, no, I don't see it as a big problem yet." He takes a wait-and-see attitude. Loosestrife, he says, "came in very fast. It may continue to grow very fast or it may disappear. Who knows?" Carreiro says the only existing, effective means of extensively combatting loosestrife is itself a curse. "Herbicides," he says, "will affect everything in a marsh."

In Ontario, Ministry of Natural Resources (MNR) officials are just beginning to turn a nervous eye upon loosestrife. Tom Beechey, a life sciences specialist with the parks branch of MNR, says there is little reliable research detailing how large a problem loosestrife is here. How extensive is it in Ontario? Exactly how does it disrupt a marsh? Which plants does it displace and how important are those plants within the marsh ecology?

Cathy Keddy, a consulting biologist in Ottawa, laments what she sees as foot-dragging by governments. After what has happened in the U.S., she says, if loosestrife is not combatted "it is quite clear what the outcome will be."

Keddy has applied for funding to study loosestrife in Presqu'île Provincial Park, on Lake Ontario, and Westmeath Provincial Park, on the Ottawa River. She proposes to establish study plots and then recommend a control method for each, depending on the density of the loosestrife and the presence of other species such as rare plants. She also hopes to develop a monitoring system that will track the rate of loosestrife's increase—or decrease—in any wetland.

Since this proposal is still on the table, Keddy is not yet sure what control methods she would try. It's questionable whether the MNR would approve the use of herbicides in provincial parks. For that matter, the ministry is hesitant to use herbicides in any wetland because of the difficulty of targeting them. "If you're spraying for

loosestrife," asks Tom Beechey, "what else is going to get it?"

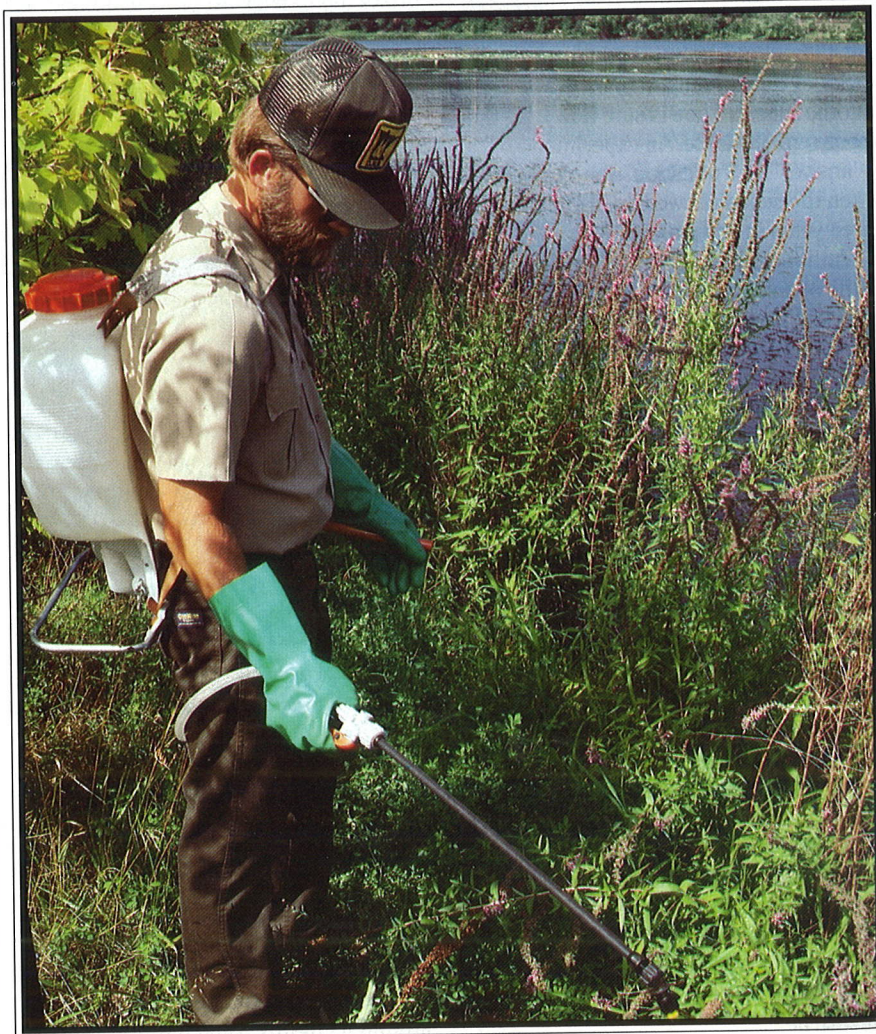
Nancy Patterson, wetlands specialist with the Federation of Ontario Naturalists, also objects to the spraying of herbicides in wetlands. She acknowledges there is no easy solution in controlling loosestrife: "We can hardly handpull all the large infestations in Ontario, nor can we undertake a mass spraying program." But Patterson is getting impatient with the province's lack of action.

She points to a resolution that came out

problem in a number of wetlands. How long do we have to wait?"

While the controversy continues over the safety and effectiveness of herbicides, a new weapon is being developed in a laboratory in Switzerland. There are insects that keep loosestrife under control in Europe, and the U.S. government is exploring the possibility of introducing them to North America.

Stephen Hight is a research entomologist with the U.S. Department of Agriculture's Beneficial Insects Laboratory in



In the U.S., small patches are spot-treated with herbicides from a backpack sprayer

of a conference on Ontario wetlands, co-sponsored by the FON last fall. The 300 delegates recommended that Ontario launch a province-wide program to manage loosestrife. Natural Resources Minister Vincent Kerrio's only response was to state that provincial officials were monitoring U.S. control efforts and would take action if loosestrife becomes a major problem here.

Patterson says that's not good enough. "We already know loosestrife is a major

Beltsville, Maryland. He says that in the early 1980s researchers found several bugs in Europe that appear to gobble up loosestrife and nothing but loosestrife. Three insects have been selected as potential transplants to North America: a weevil that lays its eggs in loosestrife's roots and two beetles that eat its leaves.

The risk with any biological method of control is that the insects that are introduced to attack a particular plant may

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unexpectedly begin devouring something they are not supposed to. Hight has shipped samples of 50 North American plants to a Swiss research firm. These plants are being offered to the chosen insects to see if they find them appetizing.

The Beneficial Insects Laboratory has applied for a government permit to bring the insects to the U.S. The bugs would remain in quarantine on this side of the Atlantic for one or two years while the experimentation with plants is repeated to double-check the Swiss research. Hight says the Canadian government is closely consulted about American biological control innovations, since newly introduced insects are unlikely to be deterred from crossing the U.S./Canadian border. But there are no guarantees that an insect will be approved as a biological control for loosestrife, and even if such a control were approved, it would not be licensed for two or three years, at the earliest.

Meanwhile, loosestrife is spreading. Some biologists worry that it is gaining footholds in the prairie sloughs, those crucial way stations for the vast flocks of migrating waterfowl. Ducks Unlimited's Kroeker says loosestrife is now common in Manitoba and has been spotted in Saskatchewan and Alberta.

The weed has not yet done much visible damage in southwestern Ontario. Mike Oldham, MNR's regional ecologist there, says that although a few rivers in Essex County have high populations of loosestrife, major wetlands such as Hillman Marsh and Long Point are still relatively free of it. But the question is, for how long?

In southeastern and southcentral Ontario, loosestrife has transformed wetlands beyond recognition in a very short time. "There's a great place for migrating waterfowl on the Ottawa River called Ottawa Beach," says Dan Brunton, a past president of the Ottawa Field-Naturalists' Club. "When I started birding there in the mid-1960s, loosestrife was just one of the plants on the beach. Now it forms a band 5-20 metres wide along the whole shoreline. What used to be bulrushes, cattails and marsh grasses is now 95% loosestrife."

What's scary, Brunton suggests, is the quickness and insidiousness of the takeover. "In 10-15 years, it went from being simply present to being dominant on this beach. The increase was phenomenal."

Jack Hanna is a freelance writer living in Ottawa.

CANOEING WITH KIDS: MORE TIPS

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Bedding: Infants can sleep in papooses. One or two small children can fit in with their parents if two adult bags are zipped together. Or two small children can fit end to end in one adult bag if the zipper is modified.

Food: Remember that regular snacks, consisting of high-energy foods, are as important as the three main meals. Never threaten children with loss of snacks to force them to do something.

Clothes: On long trips take at least four changes of clothing (to a parent's one) for each child, with one pair of gum boots and one pair of runners.

Unfortunately there is no perfect method for disposing of diapers. Even the biodegradable ones are only 85% biodegradable. Diapers can be packed out, buried or burned. Packing them out can be unpleasant on any canoe trip, for obvious reasons. Burying them well away from water is a possibility, but since they won't decompose for years, you're leaving a legacy for future campers, who may well dig them up again while digging their own latrine. (The chances that this could happen will increase as more and more people use a diminishing wilderness.) Animals will also dig them up. Most campers solve the problem by removing and packing out the plastic backing and then burning the diapers. We once tried the diaper moss used by native peoples in days past. It must be

sun-dried until brittle and then packed in cloth. But you still face the same problem associated with cloth diapers—you have to wash the cloth in water hauled up from the lake (and you need lots) and then dispose of the water so it won't drain back into the lake.

Equipment: Insect net, bug box, magnifying glass. Don't bother taking toys.

Bugs: With proper clothing, this problem can be reduced to a minimum. Children and adults should wear light-coloured clothing (bugs seem to like dark things) with a T-shirt underneath a long-sleeved button-down shirt—this prevents the bug from getting at the stomach, especially blackflies. Bandanas around the neck and a hat or bandana tied around the head and ears can keep the bugs off. (The Ojibwa of northern Ontario make bug bonnets for their children. These are bonnets with a skirt that falls down past their shoulder and covers the top, back and sides of the head and the neck.) Pantlegs should be tucked into socks, even on hot days. The only parts left exposed should be the face and hands, where bug dope can be used. The nice thing about canoeing is that once you are out on the lake or river you generally leave most, if not all, of the bugs behind. If the bugs are so thick that you're breathing them in, bug hats sometimes work, but most young children tend to fling them off. If your children really can't handle the bugs, try to go when the bugs are not too bad.



MORE INVASIVE ALIENS

For better or for worse, many non-native plant species have settled comfortably into our landscape, particularly in southern Ontario. Some are well behaved, but some are vicious. The more aggressive species, like purple loosestrife, may alter our forests and wetlands forever.

Wilf Botham, a botanist living in Essex County, remembers when garlic mustard showed up for the first time in the 1960s at Point Pelee. This aggressive herb now dominates much of the ground flora at the tip. Many of the forests of the Niagara Gorge and along the Niagara Escarpment in the Niagara Peninsula are also carpeted with garlic mustard. It is doubtful that the delicate, showy spring flora will long survive this invasion, nor will the less robust forest species later in the year. How is garlic mustard handled elsewhere? Illinois uses herbicides, at very specific times of the year, in very specific low doses. Are we willing to use herbicides here in our few remain-



Garlic mustard is an aggressive herb

ing natural areas? Generally, we have avoided dealing with that question.

The dog-strangling vine has not been here long, but many residents of the Golden Horseshoe area now contend with it in their gardens. This vine is a member of the milkweed family and its seeds, with their ultralight appendages, fly far and wide. People who drive up and down the Don Valley in Toronto may wonder about the identity of this plant that covers hectare after

hectare of valleyland, the individual stems climbing on each other for mutual support. Even the common grasses don't survive under the heavy cover of the dog-strangling vine.

Other communities can learn a lot from what has happened in Toronto's valleylands. A good example is the use of Norway maple. This species has long been favoured by urban landscapers because it thrives almost anywhere, casts deep shade and grows very quickly. Of course, these are also the characteristics of a species that destroys native habitats. Even by the early 1970s, small Toronto ravines such as the Vale of Avoca were dominated by Norway maple. On ravine slopes, this tree casts such heavy shade that few if any native understory species survive. Will this lack of understory aggravate erosion on those slopes? What will these valleys look like in the future? We have started these experiments with our well-meaning introductions, and we should monitor them to see where they lead us.

The Wainfleet Bog in the Niagara Peninsula is our southernmost acid peatland of any size. Recently acquired by the Ministry of Natural Resources, Wainfleet is an open, unforested native bog. However, from the western portion of the wetland, a birch forest is advancing. Dr. Tony Reznicek of the University of Michigan Herbarium has identified the culprit as the European white birch, a native species of bogs and swamps in northern Europe. At Wainfleet, however, it is aggressively taking over large areas of the once unforested bog. Its heavy leaf litter is throttling the ground cover of sphagnum mosses, leatherleaf, sheep laurel and high bush blueberry, resulting in a monoculture of white birch, without much understory at all. Should managers try to fend off the birch, so that the site that was purchased as a bog stays a bog? At what cost? How?

My own list of offensive non-native plant species is headed by Scots pine—perhaps because I know from experience the kind of hours required to make even a modest dent in an invading stand. In some parts of the province, abandoned Christmas tree plantations have become stunted forests of bent old trees. Scots pines produce seed cones by the time they are five or six years old. This species' march across the southern Ontario landscape is relentless.

Imagine the shock on finding Scots pine in the middle of the Farlain Bog in Awenda Provincial Park, and in the middle of the

large bog south of Luther Marsh, far away from any surrounding upland areas. But, of course, Scots pine is also a bog and swamp species in northern Europe, so it was to be expected. At Luther Bog, the species is a particularly undesirable alien. It occurs as a stand of dead mature trees, surrounded by an expanding ring of younger, seed-producing trees. The trees seed on to the sphagnum hummocks of the



Scots pine has invaded Luther Bog

bog, where it is a little drier, but by the time the young trees mature, their weight has forced the peat mat down toward the water table. This drowns the roots and kills the trees, which persist like scar tissue on the native bog.

Although there are many such invaders of natural habitats, in Ontario they are largely ignored in the management of natural areas. South of the border, where their history of alien invaders is longer and where the effects have become more dramatic, there is also a much longer history of manipulation to combat the problem. The use of herbicides, mowing, fire and the removal of alien species by hand, by professionals, is now accepted practice in the U.S. northeast and midwest. It may only be wishful thinking to believe that our natural areas managers can avoid the same costly activities in the future.

Whether we like it or not, we have become the "managers" of our natural areas, either through intervention, isolation, protection or just benign neglect. However, while we weren't watching, the aliens landed, so our neglect may not be so benign anymore.

—John L. Riley

Mr. Riley is the regional ecologist in the Ministry of Natural Resources' central region.

John Riley

Betty Greenacre