



Native Plant to Know

Zigzag Goldenrod

Solidago flexicaulis

by Katie MacDonald

August has always been my favourite month. At my grandmother's cottage on the shores of Lake Huron, we would spend our days building castles in the sand and playing in the crashing waves. At the end of the day, we would collect flowers for the dinner table. Growing wild along the sandy trails were non-native Queen Anne's lace (*Daucus carota*) and cornflowers (*Centaurea* spp.), but the star was always the goldenrod (*Solidago* spp.), the bursts of bright yellow flowers mirroring the sunshine that filled our days.

There are thought to be more than 150 species of goldenrod across North America, growing in almost every habitat type, including woodlands, swamps, mountainsides and meadows. The plants can be tall or short, bushy or narrow, with smaller or larger clusters of flowers, and grow in sunny or shady, rainy or dry conditions, and any soil type.

One sweet little goldenrod, strikingly different from the ones we see regularly in the landscape, is zigzag goldenrod (*Solidago flexicaulis*), so named for the crooked, bent pattern of the plant's stem. By goldenrod standards, this plant tends to be on the smaller side, rarely growing higher than a metre (three feet) tall, and

spreading even less with a width of 60 centimetres (24 inches). It is an accommodating little plant, content in dry conditions in clay, loam or sandy soils and, most surprisingly, adapted to full shade – a rarity for a flowering woodland plant – although it is happiest with at least three hours of sunlight.

Zigzag goldenrod, considered hardy in zones 2-9, is common in central and eastern North America, ranging from the eastern prairies to the Atlantic coast and from southern Quebec and Ontario as far south as the mid-southern states of South Carolina and Louisiana, with pockets further south. The plant can be found in rich, deciduous woods and is often seen along east- and north-facing slopes, in rocky woods, on the edges of floodplain forests, on wooded stream banks, along cliffs and in undisturbed

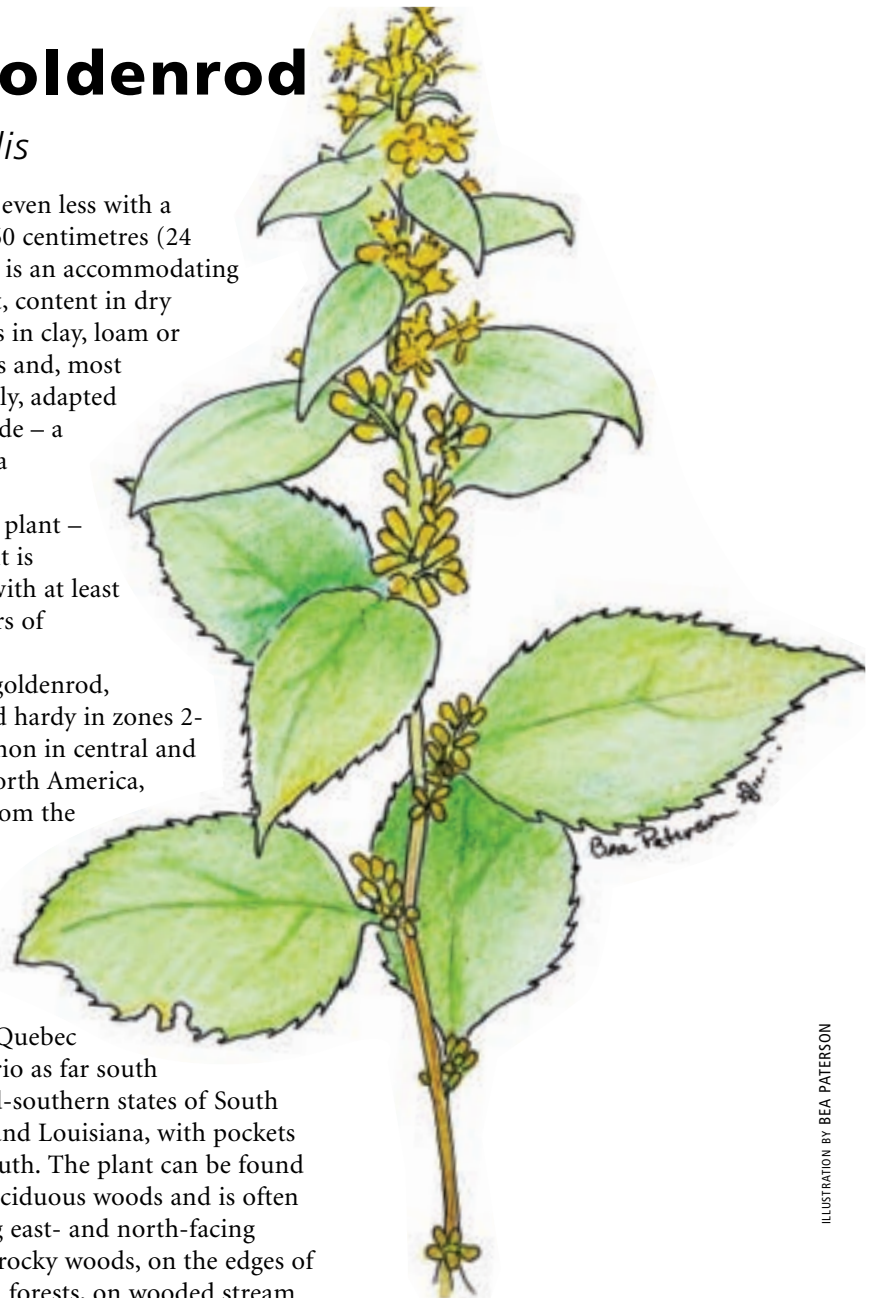


ILLUSTRATION BY BEA PATERSON

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***The Blazing Star* is . . .**

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NANPS Events

The Role of Non-native Plants in Butterfly Communities

Tuesday, September 19, 2023

7 p.m. – 8:30 p.m.

This webinar features Heather Kharouba, associate professor of biology at the University of Ottawa, who specializes in global change ecology and insect conservation. Sustaining native pollinator populations and reversing declines in threatened pollinators requires enhancing and maintaining habitats across many land use types. There is increasing evidence that non-native species can play a positive role in the persistence of native species and can contribute to the achievement of conservation goals. In her research, Dr. Kharouba looks specifically at how much butterflies currently use non-native plants as nectar sources and if non-native plants provide a nectar benefit similar to that of native wildflowers. To register visit: <https://heatherkharoubawebinar.eventbrite.ca>.

NANPS 2023 Annual General Meeting

Saturday, October 28, 2023

1 p.m. – 3 p.m.

Online. To register visit nanps.org.



PHOTOGRAPH BY DON SCALLEN

A round-leaved sundew, a carnivorous plant growing in an alvar on Ontario's Bruce Peninsula

Sycamore

by *Fatima Mohammed*

My leaves are furry
They fall in a hurry

My spotted bark is as white as dusty
snow
My branches dip high and
they dip low
In a riparian ecosystem I
like to grow

Wildfires hollow out my
inside
I become a perfect place for
animals to hide

Woodpeckers in my soft bark
drill away
I withstand their maniacal pecking
all day

My five-pointed leaves are covered in fuzz
The woodpecker pecks, but that's not all it
does

It shoves its acorns into me
Which makes me a granary
I'm a pantry, the thought makes me a
seething tree

Hummingbirds use my fuzz to line their nests
I think they're unbearable pests

I'm the wise, exasperated Sycamore
I never get a peaceful moment to snore

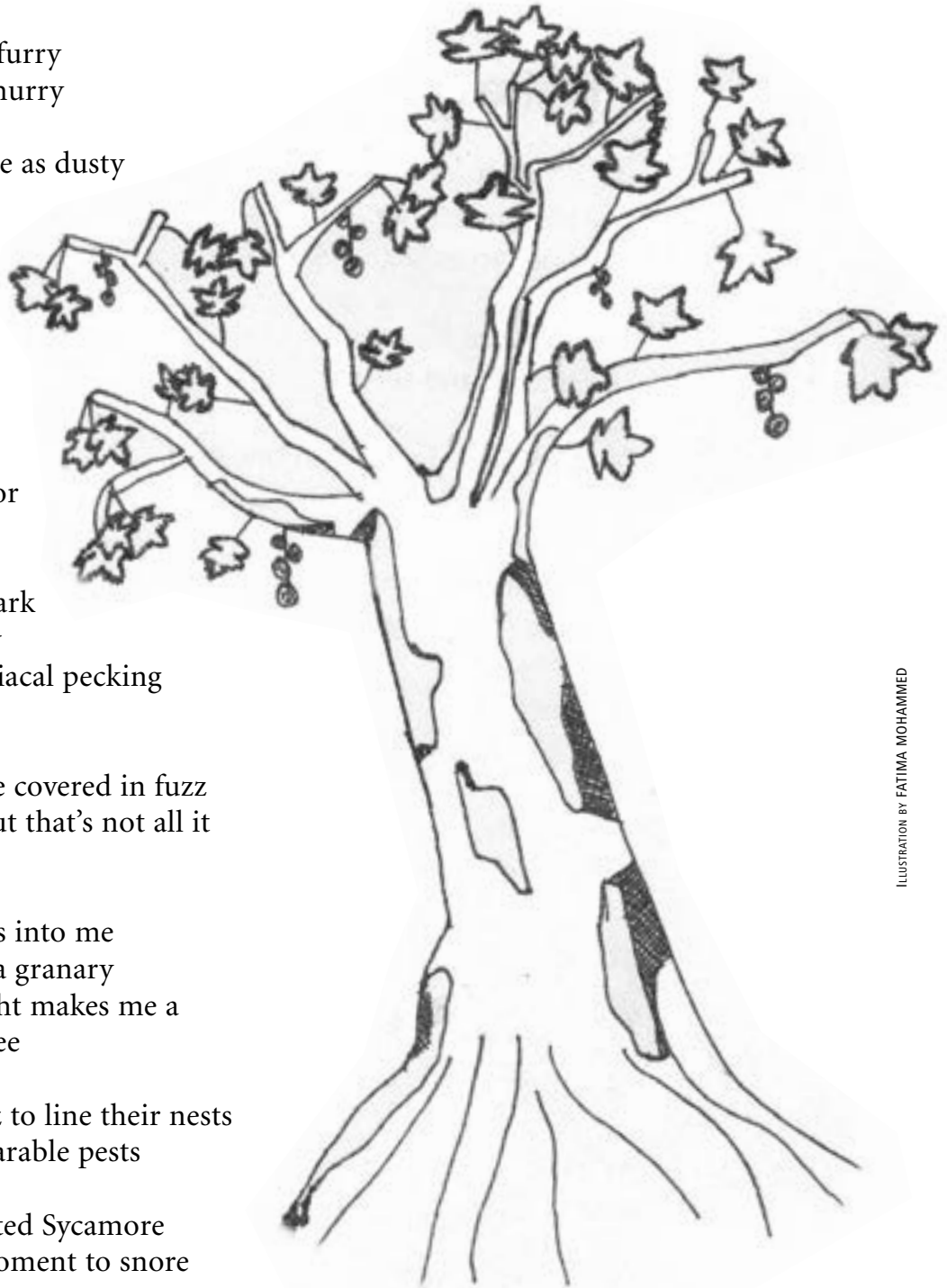


ILLUSTRATION BY FATIMA MOHAMMED

Fatima Mohammed is a budding young artist, writer and naturalist. Her work stems from a love of the wilderness and all things natural. She has lived the greater part of her life in the wild, beautiful lands of California, but now resides in Texas, where she continues to pursue her interests. She is the author of four books:

Time to Rhyme with CA Native Plants & Animals, Comical Cat Poems, Midnight's Legacy and Blaze Your Own Path. Her passion for poetry and writing in general is coupled with her love for art. She hopes to continue providing books for all to enjoy!

Carnivorous Plants

by Don Scallen

Carnivorous plants are simply spectacular. Not convinced? Charles Darwin dedicated years to their study, culminating with the publication of *Insectivorous Plants* in 1872. During research into his favourite genus, the *Drosera* or sundews, he wrote, “at this present moment I care more about *Drosera* than the origin of all the species in the world.”

One of the abiding attractions of carnivorous plants is the astonishingly different ways they’ve evolved to capture insects. A timeworn, but apt, phrase is useful here: necessity is the mother of invention. These plants need to find enough nitrogen and phosphorus in their low-nutrient habitats to fuel their growth. The solution, common to all, is to get those essential chemicals from small animals – mostly insects. Ah, but the methods are wildly diverse. Perhaps the most awe-inspiring example of inventive vegetable carnivory can be found in the Carolinas – the well-known Venus fly trap (*Dionaea muscipula*). Its leaves have evolved into traps that snap shut in the blink of an eye to capture insects.

Though the limelight might shine brightest on Venus fly traps, other species also delight with their evolutionary creativity. In the north, where I live, various species of sundews (*Drosera*), bladderworts (*Utricularia*), butterworts (*Pinguicula*) and pitcher plants (*Sarracenia*) also offer wonder and carnivorous intrigue, using water-filled pitchers, sticky leaves and minute traps to catch the prey they need.

On a recent, early-summer botanizing trip to Ontario’s fabled floral wonderland, the Bruce Peninsula, which extends deep into Lake Huron, I was mesmerized once again by these fascinating plants. The site I visited along the Lake Huron coast wasn’t acidic bog – the habitat commonly associated with carnivorous plants. The immediate shoreline habitat was alvar, consisting of limestone or dolomite pavement with shallow soil or none at all. The moisture of alvars varies dramatically through the year, often inundated in the spring and then parched later in the summer. These extremes and the lack of deep soil keep most trees at bay, or at least limit their growth, allowing a suite of alvar-adapted shrubs and herbaceous plants to thrive.

Carnivorous plants, needful of reliable moisture, aren’t generally found on these alvars, but along Lake Huron they grow at the interface between the shoreline alvar habitat and the adjacent wooded habitat above the high-water mark. For these carnivorous plants, this narrow transition habitat between the shade of the trees and the punishing extremes of the alvars is the Goldilocks zone. Here purple pitcher plant (*Sarracenia purpurea*), slender-leaved sundew (*Drosera linearis*), horned bladderwort (*Utricularia cornuta*) and common butterwort (*Pinguicula vulgaris*) flourish.

The abundant sunlight and generally moist conditions of this transition zone are key to their survival, but the underlying limestone is also vitally important. This alkaline



Horned bladderwort growing in sand

PHOTOGRAPH BY DON SCALLEN



Common butterwort with fly prey

PHOTOGRAPH BY DON SCALLEN

rock has been pocked by natural acidic rain that has fallen over millennia. Then, gradually, organic matter has accumulated in the depressions, creating soil that is eventually colonized by the vegetable carnivores. Their storied carnivory compensates for the nutrient deficiency of the thin soil.

The purple pitcher plants boast lovely urn-shaped leaves partially filled with water that drowns insects and other prey that fall in. Adding to their macabre appeal are blood-red “veins” networking the “pitchers.” The quirky beauty of this species has elevated it to the rarefied status of provincial flower in Newfoundland and Labrador, where bog habitat dominates much of the landscape.

Not long ago, researchers in Algonquin Park in Ontario rocked the botanical world by revealing that pitcher plants included vertebrates in their diets. They discovered that 20% of the pitcher plants in an Algonquin bog had “swallowed” juvenile spotted salamanders!

Where pitcher plants grow, sundews are often found. The species I encountered on the Lake Huron shoreline was the slender-leaved sundew, also known as linear-leaved sundew. Like pitcher plants, sundews are suitably named. These tiny carnivores have leaves festooned with droplet-tipped filaments that sparkle in sunlight like morning dew. This allure portends danger, however. Tiny creatures keen on supping that dew tempt fate – if they touch the sticky dew-capped threads they risk becoming ensnared.

Slender-leaved sundew has leaves that are indeed slender and linear. They extend outward from the hub of the plant like the questing tentacles of an octopus. This species is something of a floral oddity because most of its global range is in Canada. It is found from the Canadian Maritimes through to eastern British Columbia, with cross-border outposts in Minnesota, Wisconsin and Michigan.

A relative commonly found in bogs and fens, round-leaved sundew has by contrast an enormous range in the northern hemisphere. It grows from the British Isles to Japan and from the Pacific to the Atlantic in North America.

These temperate sundews are small plants, and careful scrutiny of their habitats is often necessary to find them. Many of the round-leaved sundews are rosettes no larger than a Canadian two-dollar coin. But searching for these beguiling plants is well worth the effort.

Growing among the sundews and pitcher plants near the Lake Huron shoreline was common butterwort. This species, like round-leaved sundew, can be found over a vast range including much of Canada and Europe and parts of the northern United States and northern Asia. It is a calciphile, favouring alkaline habitats. The pocked limestone shoreline of the Bruce Peninsula satisfies its needs.

Where numerous, common butterwort is easy to find, despite its small size. The bright yellow-green leaves punctuate the dark rock that it grows on. It seems to need only a tiny amount of soil. The leaves are sticky, with



PHOTOGRAPH BY DON SCALLEN

Horned bladderwort, slender-leaved sundew and common butterwort on pocked limestone pavement



PHOTOGRAPH BY DON SCALLEN

A purple pitcher plant showing off its pitcher!

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enough adhesive power to hold small flies and other insects. Enzymes gradually digest the prey, allowing the leaves to absorb nutrients.

According to a research paper from Michigan State University, butterworts survive the winter as rootless “buds” known as hibernacula. It is thought that these tiny buds, untethered to soil, allow butterworts to disperse via the action of wind and water.

The fourth carnivorous species I found in the transition zone between alvar and trees along the Lake Huron shoreline was horned bladderwort. This species grows in damp sand covering the pocked limestone. Its prolific early-July flowers daub the sand yellow. Its bladders are chambers with little doors that open suddenly to invite insects in, and then, like a horror movie trope, close quickly. Trapped inside, the prey dies, and the nutrients are gradually absorbed. Observing this carnivory isn’t possible, however. The bladders are tiny, and they operate underground and out of sight – in contrast to the bladders of aquatic members of this genus, like common bladderwort (*Utricularia vulgaris*), that are attached to floating roots and easily visible.

In recent years research has suggested that the bladders of bladderworts are much more than simple trapping devices.

The liquid inside the bladders teems with microbes including bacteria, fungi, protozoans and algae. This diverse microbiome has spurred speculation that there is more going on in bladderwort bladders than simply the digestion of small animals.

Matt Candeias, in one of his *Defense of Plants* podcasts, offers this: “The traps of these plants harbor extremely rich microbial communities, far richer than the microbial diversity of other carnivorous plant traps. In fact, the richness of these microbial communities [is] more akin to the richness seen in the rooting zone of terrestrial plants or in the *gut of a cow*.” (The italics are mine.)

The implication? Bladderworts may consume more than tiny animals. The microfauna (gut fauna?) living in their bladders also appears to break down plant material – algae. Thus, bladderworts may be more accurately defined as omnivores, not carnivores.

More revelations about our fascinating carnivorous plants will undoubtedly come to light in future years. They will continue to captivate 21st century botanists and naturalists just as they did the great Charles Darwin in the 19th century.

Don Scallen is the author of Nature Where We Live.



PHOTOGRAPH BY DON SCALLEN

A slender-leaved sundew with a captured fly

Cup plant

This exquisite painting of a cup plant (Silphium perfoliatum) was rendered by Geraldine Sadoway. She writes, "I have been fascinated by this plant since I discovered it on Toronto Island, near Gibraltar Point, 10 years ago and I have done a couple of cup plant portraits that were entered in a juried show held by the Botanical Artists of Canada in 2017."



ILLUSTRATION BY GERALDINE SADOWAY

West Woodbine Beach Dune and Meadow Habitat

by Vicki Low

Binoculars clapped to our eyes, we follow the flight of the bird to where it lands in a shoulder-high clump of eastern cottonwood (*Populus deltoides*). “A bobolink!” Noam Markus exclaims, beaming as he lowers his glasses. I spy a handsome, mostly black bird with a striking cream-yellow nape—it is my first ever sighting of this once common but now increasingly rare bird.

Noam and Clyde Robinson are giving me and my friend Heather Hilliard a tour of the West Woodbine Beach Dune and Meadow Habitat. I have come expecting a botanical show-and-tell, but to my surprise it turns into an impromptu birding session as well as a primer on the highs and lows of urban nature activism.

In the spring of 2017, and again in 2019, record levels of precipitation caused Lake Ontario to flood, affecting shoreline communities, among them Canada’s largest city. In the Toronto Islands, ferry service to the city was cancelled as fish swam around in sports fields and residents desperately heaped sandbags to protect their homes. Further east, a large area of Woodbine Beach was inundated for months, leaving colourful Muskoka chairs—placed for the enjoyment of visitors to the area—half-submerged in a wide expanse of knee-deep water.

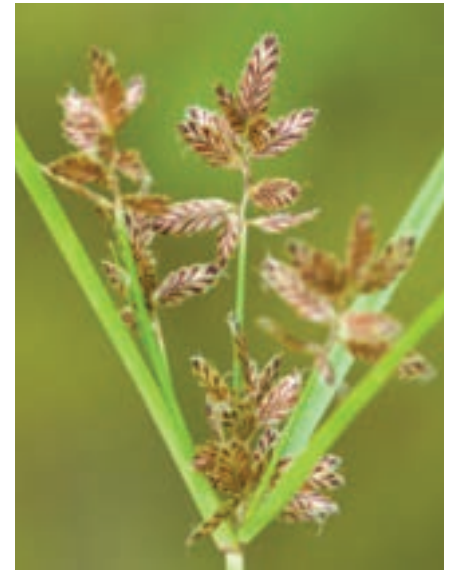
Faced with the flooding, the city suspended its practice of grooming the beach several times a week. As the water receded, though, a complex ecosystem seemed to emerge whole out of the sand. Within a couple of seasons, ground-nesting birds began raising young at the site, while rare sedges made their first appearance in the Toronto area in as long as a century, growing within a matrix of willows, cottonwood, forbs and rushes.

Measuring some 300 metres (328 yards) long north to south and 150 to 200 metres (164 to 219 yards) east-west across its widest point, the

teardrop-shaped site covers an area equivalent to about four soccer fields (3.2 hectares or 7.9 acres). But sports and nature are not generally compatible—in late 2021, the existing Beaches Disc Golf Course was expanded onto the naturalized area without public consultation. Realizing the increased foot traffic would be harmful, Noam and Clyde quickly came together to campaign for the removal of the disc golf holes and for the newly emergent habitat to be protected. The additional disc golf holes were finally removed in October 2022 as a result of their advocacy and activism; now the focus is on making sure the habitat—unique in the city—is accorded appropriate protection.

The dangers to birds are obvious. The area is popular with beachgoers and it hosts, at the peak of nesting season, the city’s Victoria Day and Canada Day fireworks displays, the noise from which must be extremely stressful on breeding birds. Even as we walk around the area, a woman has let her dog run loose, despite the fact that from April to October no dogs are allowed on the beach, whether leashed or unleashed. Noam calls out, “Excuse

me!” and starts toward her, but as she moves off, he turns to me with an anguished look. “It takes so much out of me to confront people about their dogs,” he laments. “I want to enjoy this place without getting into stressful situations, so often I just call 311 [the city services hotline] to report them.”



PHOTOGRAPH BY OWEN STRICKLAND

Umbrella flatsedge (Cyperus diandrus), classified by the Toronto Region Conservation Authority (TRCA) as L2, “regional conservation concern...at risk of decline/disappearance from the region”



PHOTOGRAPH BY VICKI LOW

A path through the dune and meadow habitat submerged in water after a heavy rain



Common boneset (*Eupatorium perfoliatum*), classified by the TRCA as L4, "of conservation concern in the urban matrix"



A young killdeer, hatched this spring in the dune and meadow habitat

"The trouble is," Clyde chimes in, "when the by-law enforcement officers arrive, they don't actually have the power to do anything but issue a verbal warning. They don't even have the authority to take down a person's name."

Sadly, a few days after our meeting, Noam sees a dog running out of the habitat with a fledgling red-winged blackbird in its mouth. It is deposited dead on the boardwalk while the dog's owner puts a leash on, all too belatedly.

The city's land-use plan zones this stretch of shoreline as "Parks"—indicating that the beach is meant for public and recreational use. But, as Clyde and Noam argue, the new emergence of this rich ecosystem warrants particular attention. The Toronto and Region Conservation Authority (TRCA) owns the land, but it is managed by the City of Toronto, in particular the Parks, Forestry and Recreation (PFR) department. Although the TRCA has acted to remove invasive phragmites (*Phragmites australis*) and made a few plantings in the area, it has so far declined to grant protected status to the site or even to enforce existing regulations, for instance on the protection of pollinators, nesting and migratory birds, and plant species of conservation concern. Noam and Clyde's bafflement and frustration with the seeming lack of coherent action and clear communication are palpable, although Clyde allows that public budgets are limited and staff overstretched.

It's not as though they're asking for the moon—just a sign to notify the public that the habitat is a "naturalized area." To bolster the case, Noam has begun an inventory of the flora and fauna at the site. By profession a teacher and performer of mime and physical theatre, Noam is an avid birder and nature photographer in his spare time, handy skills for building the inventory. But a

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task of this magnitude couldn't be performed by one person. "I got a bunch of my friends to help with the inventory on iNaturalist [the wildlife observation app]," he explains. Under the project name "West Woodbine Beach Habitat," he and 58 other observers have logged roughly 2,500 observations. As of late June 2023, 162 plant species and nearly 600 species of fauna have been recorded. It is a striking illustration of the power of crowdsourced citizen science



PHOTOGRAPH BY VICKI LOW

Noam Markus (left) and Clyde Robinson (right)



PHOTOGRAPH BY VICKI LOW

A path through the dune and meadow habitat on a dry day

(<https://www.inaturalist.org/projects/west-woodbine-beach-habitat>).

Some of the findings are remarkable. By the TRCA's own reckoning, the umbrella flatsedge (*Cyperus diandrus*) was last recorded in the greater Toronto region in 1913, on the Toronto Islands. Now classified as L2 ("regional conservation concern ... at risk of decline/disappearance from the region") in the TRCA's system of ranking flora and fauna, it was observed growing at West Woodbine Beach in 2020. Also ranked L2 is Schweinitz's umbrella-sedge (*Cyperus schweinitzii*), first observed here in 2022. Ten plant species ranked L3 ("regional conservation concern; restricted in occurrence and/or requires specific site conditions") have been recorded, including fen orchid (*Liparis loeselii*), sphinx lady's-tresses (*Spiranthes incurva*), slenderleaf false foxglove (*Agalinis tenuifolia*) and hardstem bulrush (*Schoenoplectus acutus*). Fifteen plant species have been recorded in the L4 category ("of conservation concern in the urban matrix"), including riverbank wild-rye (*Elymus riparius*), common boneset

(*Eupatorium perfoliatum*), variegated horsetail (*Equisetum variegatum*) and Allegheny monkey-flower (*Mimulus ringens*).

Naturally, this wealth of native vegetation has been a boon for insect life. To look through the roughly 450 insect species collected on iNaturalist for West Woodbine Beach is to lose oneself in a world of winged beauties such as the saltmarsh moth, the uncommonly lovely common blue and the *Chrysopa oculata* (a green lacewing). The names are by themselves delightful – once-married underwing, twice-stabbed lady beetle, lilypad clubtail, olive-shaded bird-dropping moth.

Noam is fascinated by the sand wasps at the site, though he wryly admits that most people are more excited to hear about the orchids he's found. Surely high on anyone's list of charismatic fauna, though, monarch caterpillars are already present, munching on milkweed – the three species established here are the common (*Asclepias syriaca*), swamp (*A. incarnata*) and butterfly (*A. tuberosa*) milkweeds. Larvae of the mourning cloak butterfly have been seen in numbers – the eastern cottonwood that is abundant here is larval host not only to the mourning cloak, but also to the viceroy and eastern tiger swallowtail. Also host to the mourning cloak and other lepidoptera are the native willows, of which there are four species growing throughout the site—the sandbar (*Salix interior*), heartleaved or stiff (*S. eriocephala*), shining (*S. lucida*) and peachleaf (*S. amygdaloides*) willows. As we know from the work of Douglas Tallamy, native willows are second only to oaks in the range of moth and butterfly species they host, which in turn generates the caterpillar biomass necessary for feeding fledgling birds.

And speaking of fledglings, five bird species are known to be nesting at West Woodbine Beach – killdeer, yellow warbler, song sparrow, savannah sparrow and red-winged

blackbird. Some 120 more species have been spotted, including several listed by the provincial and/or federal governments as threatened, vulnerable or of special concern. The bobolink we saw is on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species, as is the eastern meadowlark, seen here a handful of times during migration season. The dune and meadow habitat is clearly becoming an important stopover site for migratory birds, especially shorebirds, which as a class are under threat worldwide. The list of

shorebirds seen here would make any birder's heart beat fast – red knot, Wilson's phalarope, red-necked phalarope, lesser yellowlegs, greater yellowlegs, semi-palmated plover, short-billed dowitcher, whimbrel, willet, spotted sandpiper, white-rumped sandpiper, least sandpiper ... the list goes on.

All this biodiversity has not gone unnoticed. Clyde and Noam have been joined in their campaign by several groups, among them the Ontario Field Ornithologists, the Toronto Field Naturalists, the Toronto Ornithological Club, Birds Canada and the Toronto Entomologists' Association. Clyde, a retired carpenter and contractor, is also founder and lead steward of the Ashbridge's Bay chapter of the Toronto Nature Stewards, an all-volunteer group that removes from public lands invasive plant species such as common burdock (*Arctium minus*), garlic mustard (*Alliaria petiolata*) and dog-strangling vine (*Cynanchum rossicum*), with the city's blessing. In a recent victory, Clyde and his team were given the go-ahead to work on the dune and meadow habitat in addition to the adjacent, more manicured Ashbridge's

Bay Park. They have begun the important work of controlling the spread of phragmites in the area and are monitoring the purple loosestrife (*Lythrum salicaria*) that has gained a toehold.

Looking at all the life around me, it's quite stunning to think that, a mere seven years ago, there was nothing at this site but sand. Gesturing towards the beach volleyball courts a short walk to the west of us, Clyde asks, "There's space set aside for volleyball and disc golf, so why can't this be a space for nature lovers, too?" Noam chimes in, "And this is exactly what city officials are always saying we should have more of! They're always talking about the importance of green space in the city, and this" – he turns and spreads his arms wide as if to embrace the whole of the West Woodbine Beach Dune and Meadow Habitat – "This just *fell into our laps!*"

For now, it is unclear if the authorities can see this. But Clyde, Noam and an ever-growing number of nature lovers are working to make sure that they do.

Vicki Low is copy editor of The Blazing Star. She lives near Woodbine Beach.



PHOTOGRAPH BY NOAM MARKUS

Sphinx lady's tresses (Spiranthes incurva), classified by the TRCA as L3, "regional conservation concern; restricted in occurrence and/or requires specific site conditions"

Sanaz Mazinani: An Impossible Perspective

Sanaz Mazinani is an artist and NANPS member who has been photographing plants in four different biomes: the Pacific coniferous forests of California, the Willamette Valley of Oregon, the Yucatan Peninsula of Mexico and the deciduous forests of Southern Ontario. Her images are then processed and combined with artificial intelligence. The exhibition of her work, entitled *An Impossible Perspective*, will open at the Stephen Bulger Gallery in Toronto on September 9 (reception from 2 p.m. to 5 p.m.) and run until November 4, 2023.



Little Disturbances

by Larry Weaner

In general usage, the word *disturbance* has a negative connotation. When it comes to gardening, however, is it a good thing or a bad thing? Regardless of the answer, gardeners “disturb” with virtually every action they take. Whether they are considering the vegetative effects of those actions, however, is another story. Before we delve into those effects, let’s define disturbance as it is used in the ecological sciences.

As defined by *Encyclopedia Britannica*, ecological disturbance on plants is “an event or force, of nonbiological or biological origin, that brings about changes in their spatial patterning in the ecosystems they inhabit. Disturbance plays a significant role in shaping the structure of individual populations and the character of whole ecosystems.” The frequency and duration of the disturbance as well as the size of the affected area are collectively referred to as the disturbance regime.

Disturbance and Seed Germination

As it relates to seeds, disturbance does two things. The first is that it reduces competition among plants. Vegetative competition inhibits the germination of seeds. The more dense, intermingled and multilayered that vegetation is, particularly on the ground layer, the less seed germination will occur. The second condition created by disturbance is a loosening of the soil. As all gardeners know, this also increases the germination rate of the seeds that are present. So, each of these effects generates an increase in seed germination, and an increase in the number of new individuals entering the system. Consequently, whether disturbance is “good” or “bad” depends on the soil seed bank. More times than not, in our world of invasive species and general landscape degradation, it is bad.

Armed with this information, we

can conclude that there is an inverse proportion between vegetative density and seed germination, and that a highly competitive vegetative composition, particularly on the ground layer, will reduce the number of weeds entering the system. In the ecological sciences this condition is called *relative ecological stability*. In garden terms it is called *low maintenance*.

Suggested exercise: During a weeding session, place a flag wherever weeds are removed. You will likely find that most

of them occurred where the planted vegetation was thin or nonexistent.

Disturbance and Weeding

While a competitive ground layer will certainly reduce weeding requirements, it will never eliminate it. Some weeds are bound to push through; there is no such thing as a maintenance-free garden. An understanding of disturbance, however, can affect how we treat those weeds. Pulling a weed by the roots causes a disturbance. Disturbance



PHOTOGRAPH BY LARRY WEANER

These cardinal flowers (Lobelia cardinalis) were not planted. They are the result of intentionally applied disturbance – the released, suppressed seeds already present in the soil.



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causes increased seed germination. Increased seed germination causes more weeds. In effect, we are trading one weed for many and initiating a never-ending cycle of weeding. What if, instead, we reach through the native vegetation and cut the weed at the base? Any gardener knows that most weeds will re-emerge after being cut in a traditional garden where significant open space exists between the garden plants. In this scenario, however, the weed must husband the resources to re-emerge through the dense ground layer vegetation that remains standing. It may do so once, or maybe more, but eventually the competitive disadvantage will cause it to give up the ghost. Informal research that I have performed determined that a gardener can cut four weeds at the base in the same time it takes to pull one by the roots (not peer reviewed). Even if the weed returns after four cutting sessions, the time expended by both methods is equal. Disturbance will be avoided however, as will the never-ending weeding cycle that it can engender.

Caveat: This method is not recommended for the most noxious of weeds, particularly those with highly aggressive, expanding root systems such as Japanese knotweed (Reynoutria japonica) or black swallowwort, also known as dog-strangling vine (Cynanchum rossicum).

Disturbance and Ecological Succession

In practical terms, disturbance reverses the process of ecological succession, the process by which the



*A planting with a diversity of sexual (wild geranium, *Geranium maculatum*) and asexual (golden groundsel, *Packera aurea*) proliferation strategies*

PHOTOGRAPH BY LARRY WEANER

species composition in a given area changes over time. In most cases this plays out in a forward motion where fast-growing, short-lived, ruderal (growing on waste ground) species dominate initially, then pass the torch to the slow-growing, long-lived species over time. A meadow transitions from a biennial-dominated composition, with species like black-eyed susan (*Rudbeckia hirta*) or blue vervain (*Verbena hastata*), to a more stable population, with plants like wild blue indigo (*Baptisia australis*) or culver's root (*Veronicastrum virginicum*). The ruderal species that dominated initially no longer have a significant presence, but their seeds do. A future disturbance will create openings for their germination and re-emergence, essentially taking the planting back in time from a species standpoint. The successional process then repeats. This scenario illustrates that it's important to include short-lived, ruderal species in the plant palette. Even though the planted individuals won't have a

lasting presence, the seeds they distribute will provide an initial, native response to disturbance, wherever it may occur.

The Ideal Disturbance Regime

According to ecologists, wild native landscapes that experience small and scattered disturbances are often the healthiest. In this scenario, annual species are always present, since openings for the germination of their seeds always exist. Openings for perennial seed germination are also present, allowing young plants to continually enter the system to replace older individuals as they senesce. Consequently, annual species are abundant and the perennial component is continually being renewed. The result is high levels of species diversity.

Early in this article I intimated that disturbances are generally undesirable

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in the landscape garden. By providing openings for the germination of weed seeds, they result in a significant increase in maintenance requirements. I used the “cut, don’t pull” weeding recommendation as an example of avoiding disturbance to reduce the time spent weeding. But what if, after years of growing native species and suppressing the weedy ones, the seeds in the soil are now dominated by the natives? Now they, not the weeds, would likely dominate the vegetative response to disturbance, and garden maintenance just got a whole lot easier.

Disturbance and Traditional Landscape Practice

Here’s where we really go off the map of contemporary landscape practice. In earlier eras of restoration ecology, it was assumed that in most cases the environmental effects of human activity were bad or, at best, inconsequential. Yet, the more we examine the traditional practices of Indigenous peoples on the land, the more we realize that people can have a positive effect on the ecological health of the lands where they operate. At Kaz Mountain National Park in Turkey, the Yurok people have gathered and grown plants, harvested wood and maintained sacred sites since the 1400s. The ecological diversity here is astronomical. The forest on these mountains contains 32 species that are found nowhere else in the world. Since Kaz Mountain was made a national park the Yurok have been prohibited from continuing their traditional activities, which ironically were part and parcel of the system that made this place so ecologically rich.

Ecology-based landscape practice rightfully uses plants that are native to the region where they are being planted. But, throughout the world, plants have been impacted by the activities of humans. While the affected plants are regionally specific, traditional practices have remarkable similarities throughout the world. Grazing, burning and other forms of

intentional disturbance have been part and parcel of ecologically rich landscapes from the American Great Plains to the Australian Outback. Looking at these historic practices and considering their incorporation into contemporary North American practice can only enrich the effectiveness of our environmental efforts.

Seeds are the engine of landscape change. The soil seed bank contains

the map of that change. So is disturbance a good thing or a bad thing? I guess it depends.

Larry Weaner is the principal of Larry Weaner Landscape Associates and the founder of New Directions in the American Landscape (NDAL), an educational organization dedicated to the art, culture and science of ecology-based landscape design.



*Few became many as plants like columbine (*Aquilegia canadensis*), coral bells (*Heuchera sanguinea*) and wild geranium (*Geranium maculatum*) proliferate beyond the numbers that were originally planted.*

PHOTOGRAPH BY LARRY WEANER

Continued from page 1 – **Zigzag Goldenrod**

natural areas.

Even before the flowers appear, the foliage of zigzag goldenrod brings beauty to the garden, with broad,

softly hairy, dark-green leaves, often described as toothed. When the blossoms emerge in starry, bright yellow clusters, the unexpected burst

of colour in a shady spot brings light to the late-summer landscape.

In autumn, the seeds are equipped with a tiny tuft of light brown fluff to carry them away in the wind, but they are easy enough to collect before they disappear. Propagation is simple, requiring only a 60-day period of cold/moist stratification to mimic the winter conditions they experience in the wild. Zigzag goldenrod will also spread by underground rhizomes, but not aggressively.

A vitally important late-season pollen and nectar source for pollinators, *Solidago flexicaulis*

hosts the caterpillars of several moth species. Our native bees, migrating butterflies, wasps, pollinating flies and especially queen bumblebees preparing for winter all depend on the flowers for their last energy source of the summer. Companion planting with zigzag goldenrod enhances pollinator habitat, providing additional homes and food. In particular, the rich purple of New England asters (*Symphyotrichum novae-angliae*) mingle with the bright yellow of goldenrod in what is known scientifically as “reciprocal tones,” the beauty of one illuminated by the radiance of the other. Grown together, these flowers attract a greater number of pollinator visits than either would alone. This leads to greater plant and pollinator success.

Once the flowers have faded, and the bees and the butterflies have either migrated or begun their hibernation, the seeds attract songbirds and upland game birds, including swamp sparrows and pine siskins. White-tailed deer graze on the remaining foliage.

With its deep roots, zigzag goldenrod acts as a soil stabilizer and is beneficial in restoration projects and water-wise landscaping.

With my grandmother's passing, I lost my cottage summers. But I never forgot the way August engaged with all my senses, from the wind on my skin to the beauty of the glittering lake at sunset and the distinctive scents of summer, in part perfumed by the goldenrod we gathered along the sandy trails. Eventually, I found my way back to the lake, and my own summer place. And tucked away under a birch grove in my garden, I planted zigzag goldenrod, whose shy blossoms emerge in stark contrast to its dark green leaves and the dappled shade, reminding me that the best part of summer is just arriving.

Katie MacDonald loves being outside and spends her summers demonstrating the importance of native plant ecology in a primarily agricultural area.

PHOTOGRAPH BY MICHAEL OLDHAM



Solidago flexicaulis photographed in Peterborough, Ontario in early November.

PHOTOGRAPH BY KATIE MACDONALD



Zigzag goldenrod in Katie MacDonald's garden



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