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Native Plant to Know

Ostrich Fern

Matteuccia struthiopteris

by Irene Fedun

Fiddleheads are the coiled leaves of ferns, but in common parlance the term is used to denote the tasty, wild, early spring treats that ostrich ferns (and ferns from the bracken genus [*Pteridium*] and cinnamon ferns, *Osmunda cinnamomea*) offer up to the discerning gourmet. Luckily, these majestic ferns are common in eastern North America and picking a few of the fronds (no more than 10% though!) will not adversely affect the populations.

Ostrich ferns (*Matteuccia struthiopteris*), to my mind, are a delightful addition to a native plant garden, especially one that is partially shaded. The plants reproduce rapidly, sending their creeping underground runners from the rhizomes in all directions. They are ridiculously easy to transplant though, if they creep into areas where you'd rather not have them. Once established, they form large, flowing colonies of green, although they're perfectly happy to make room for taller flowering plants among them.

Their preferred habitats are low, wet woods or the banks of streams and rivers, in sun or partial shade, but ostrich ferns are extremely adaptable, taking on any challenging conditions in gardens. I've had them growing in

sandy soil where it's been quite dry. Sad to say, they did look a bit bedraggled by mid-season.

The fronds can reach over 150 centimetres (five feet) in length, arching across to their neighbours. The sterile fronds (the green ones produced in spring, so-called because they produce no spores, the fern equivalent of seeds) can be up to 30 centimetres (one foot) wide and shaped like a plume that's broadest above the middle.

The fertile fronds are less than half the length of sterile fronds, emerging mid-summer stiff as soldiers, bronzy-green at first, changing to brown when they become tough and woody in the fall. The pinnae, or leaflets, are tightly curled to protect the clusters of sori

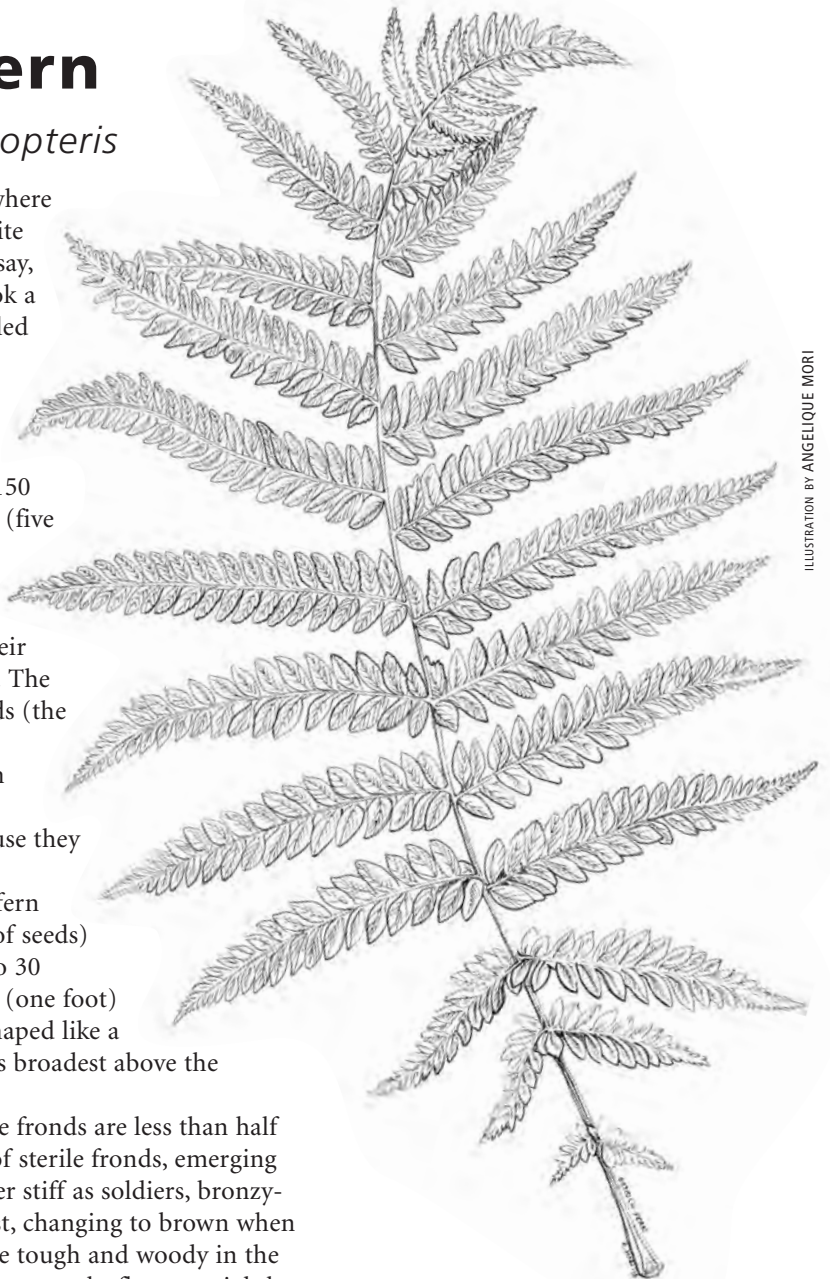


ILLUSTRATION BY ANGELIQUE MORI

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The *Blazing Star* is . . .

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In Remembrance: James French 1933 - 2016

The year was 1984. Gardens in North America depended for much of their existence on the products and advertising of the petro-chemical industry, e.g. pesticides, fungicides, weed killers and gasoline-driven lawn mowers. As well, corporate horticulture was pushing its products of sod, fertilizers and genetically selected plant freaks with double-petalled flowers, trees with mottled yellow and red leaves and non-native plants.

From within this environmentally unconscious culture, very few voices challenged the absence of Nature in the garden.

One of these voices was Jim French, a.k.a. Wildflower Willy (his self-coined moniker), of Markham, Ontario. Jim had worked his way up the corporate ladder of Prudential Insurance Co. of America in downtown Toronto to become VP of Administration. To unwind from the pressure of corporate life, he would drive many a Friday night to his cottage on the eastern side of Stoney Lake. Here, he would quickly soak up the restorative sounds, sights and the fresh air of nature. To expand the populations of wildflower species on his property he loved the most, Jim began gardening. He soon became proficient in plant propagation by seed and division.

At some point in his visits, the wildflowers, birds, trees and sunsets, with an occasional glass of vintage Scotch whiskey, monopolized his being.

A subsequent exchange of letters in the *Globe & Mail's* gardening column put Wildflower Willy in touch with native plant gardeners wanting to share experiences, ideas and questions. It was then that Jim decided to form a fraternity of like-minded persons to meet at regular intervals, swap information, stories and camaraderie.

The rest is history to readers of *The Blazing*

Star. Jim would return to the office Monday morning, restored in mind, body and spirit *and* impassioned in his mission to promote native plant gardening Canada-wide. By 1985, the Canadian Wildflower Society had a quarterly magazine, *Wildflower*, with members in all provinces and states, as well as Europe.

Wildflower Willy also had a romantic side to his passion for wildflowers. Witness these lines from one of his *Wildflower* essays:

How can words describe the loveliness of the brilliant white blooms of the bloodroot, the tiny golden anthers glowing in the spring sunshine and the large green leaves wrapped protectively around the stem. I gaze with love and awe at this exquisite creation, treasuring it while I may, for I know that a spring rainfall or gusty breeze will scatter its petals in an instant.

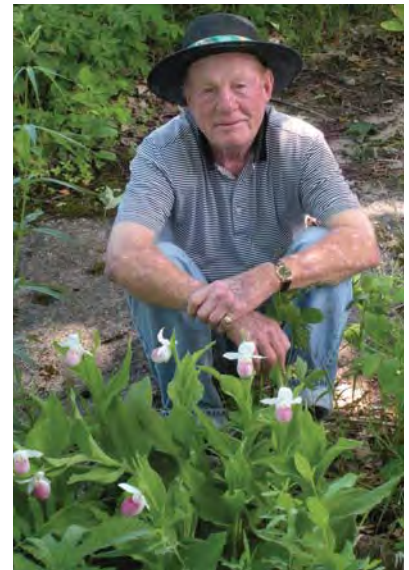
Jim has now left us, but his legacy is fulfilling its mission. Native plant gardening is now mainstream and growing by leaps and bounds.

To Natalie, Jim's wife, to Jane, Jim's daughter, to Cameron, Ian and Sandy, Jim's sons, and to his three grandchildren, we thank you profoundly from our hearts for sharing this very special man with us.

The French family has asked that memorial donations be given to the North American Native Plant Society.

Jim Hodgins

Jim was the co-founder of the Canadian Wildflower Society and editor of Wildflower magazine.



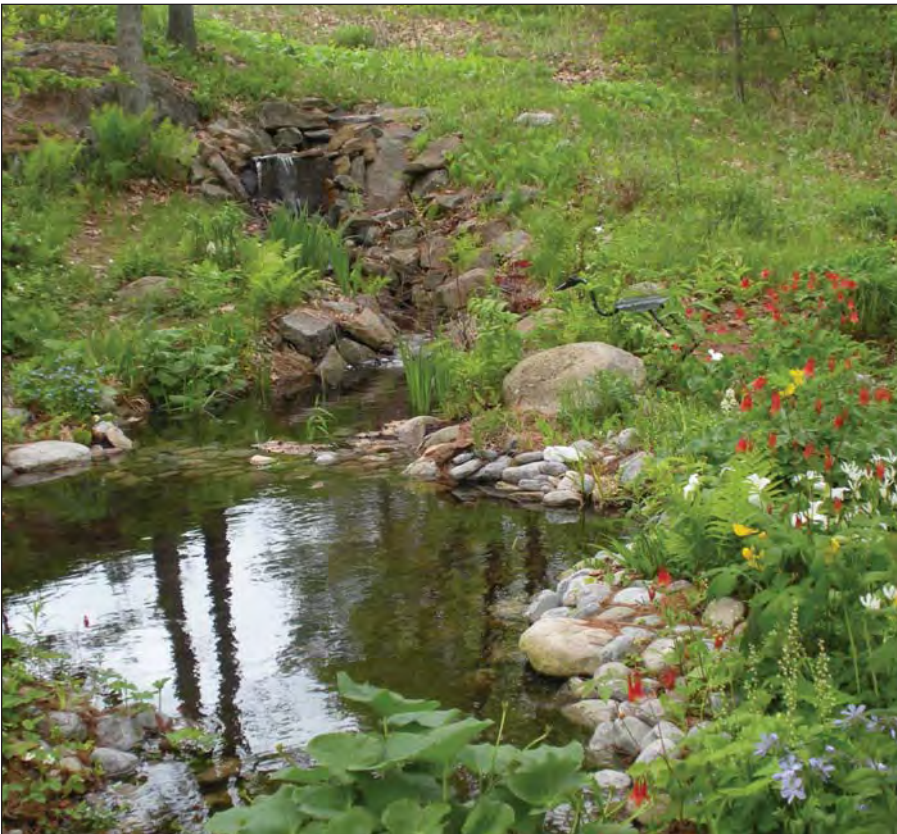
LETTER TO THE EDITOR

Dear Editor,

I noticed in the summer 2016 edition of *The Blazing Star* that you referenced Carol Pasternak's latest book on raising monarchs in captivity and I wanted to bring to your attention some recent literature I've read on the subject of gardening for butterflies that discusses the risk of butterflies raised in captivity getting diseases and spreading them to those in the wild. The latest book by the Xerces Foundation (xerces.org), *Gardening for Butterflies*, discusses it at length. It may be helpful to inform your readers that it is a safer practice to plant butterfly host plants such as milkweed (*Asclepias* spp.) in their yards and to let nature happen naturally without disrupting natural life cycles by leaving caterpillars where they're found.

*Paul Nichols,
Oakville, Ontario*

Carol Pasternak responds: I encourage everyone to plant milkweed and native nectar plants on their properties. Did you know that in the wild (or your yard) only one in 100 eggs will become butterflies? On my dining room table, at least 90% survive to be adults. That's why I feel I'm rescuing an egg or caterpillar when I bring it inside. The raising of caterpillars is a wonderful hobby for the whole family. Once someone experiences the transformation, he or she often becomes hooked on nature for life, ready to give up the computer for a walk in the ravine. There are simple ways to control disease for those of us who are raising small numbers of monarchs. For information on how to deal with parasites, visit monarchparasites.org.



PHOTOGRAPHS BY JIM FRENCH

Two lovely views of Jim French's Stoney Lake garden

Ask An Expert

I want to propagate seeds I collected from my bottlebrush buckeyes (*Aesculus parviflora*).

Do you split open the buckeyes and remove seeds or plant the whole thing that looks like a nut?

Bill Kaufman, Deerfield, Illinois

NANPS woody plant expert responds:

My advice: Think like a squirrel.

Start with a buckeye or nut that is out of the husk and not shrivelled. Big seeds such as this have transient viability, so they need to be planted as soon as possible; they must not dry out.

What a squirrel will do is to eventually find a place in the garden or grass to place the buckeye. He (or she) will dig a depression in the soil, so that when the buckeye is placed into the depression and tamped down, only the very top of the nut will be visible. Leaf drop will then cover the exposed part of the buckeye so that desiccation cannot take place. Then the squirrel forgets about the nut and, come spring, germination takes place.

I have found that mimicking what happens in nature is the best way to start seeds and nuts. You can do it in two ways:

Potted:

- Use potting soil, as it will be sterilized
- Moisten it. It should not be dry or soaking wet
- Fill a 20-centimetre (eight-inch) diameter pot with this soil
- Carve out a depression big enough to hold a buckeye and place a nut in the cavity
- Cover the nut with some potting soil so that none of the nut shows
- Wrap with a freezer bag, seal with a twist-tie, and mark what's inside: what, how many, when planted and source of nut(s)
- Place in an unheated location, out of direct sunlight, and wait for spring germination

Garden:

- Dig a shallow trough in a straight line, so that one or more buckeyes can be placed in it
- Cover all the nuts with garden soil
- Place a row of bricks in parallel-to-the-trough rows, on either side of the trough with the nuts
- The two rows of bricks should be separated by 1.5 centimetres (half an inch). This stops squirrel predation, but gives the shoots a place to grow in the spring
- Cover the whole thing with some leaves
- Wait for spring germination.

Tom Atkinson

Help! I lost numerous ash trees to the Emerald Ash Borer. Most were in the flood plain behind my house. Up on the higher banks I have hickory, oaks and some type of maple. I wanted to find a fast-growing tree that I can plant in the flood plain so that I don't see the apartments across the river. Can you advise which trees to choose? Should I grow them from seedlings or purchase 15-foot starter trees? My wife says the starter trees take a long time to take off whereas the seedlings grow fast. The trees really need to be around 30 feet tall before they provide the cover I'm looking for. The soil in the flood plain is not the best for growing stuff. I tried growing silver maple seeds, but that didn't work out because of a terrible drought we had. I'm willing to fertilize the trees and try to keep them watered.

Gary Pringle, Troy, Michigan

Our expert responds:

Cottonwood (*Populus deltoides*), sycamore (*Platanus occidentalis*), even the much maligned Manitoba maple (*Acer negundo*) grow on flood plains. Silver maples (*Acer saccharinum*) would be another good choice.

I have no idea if the trees that you plant will get sun or how much. If they get considerable sun, then growth will be faster than if they have to start with considerable shade.

If you can find a reputable nursery with 4.5-metre (15-foot) trees that have a good root system, it will give you a leg up. As a rule, and for most amateurs, starting with either seed or very small trees is best. They adapt, settle in and start rapid growth quickly. Bigger trees take longer to adapt and start the rapid growth.

Everyone had that 'summer from Hades' this year with attendant drought. Let's hope this is not the start of a pattern, as all bets are off then. If the ash trees were on a floodplain, is there a river or a creek running through the area? If that's the case then the moisture content in the soil will be sufficient in all but the worst drought years.

If we have started into a very dry cycle, trees which can handle wet and dry would be good: northern white cedar (*Thuja occidentalis*), chinquapin oak (*Quercus muehlenbergii*) and swamp white oak (*Quercus bicolor*) to some degree.

Tom Atkinson



Sycamore

PHOTOGRAPH BY BILL MOSES

Lake Erie Farms Ecological Restoration

by Mary Gartshore

Not everything goes according to plan. It was June 2009, the third growing season at the Nature Conservancy of Canada's Lake Erie Farms ecological restoration property in Norfolk County, Ontario. I was the ecological restoration expert on site and I was puzzled that nothing was growing in the sunny areas. There were broad brown stripes extending from east to west across the fields. Worse still, as the days grew longer, the shaded areas shrank and the brown sections increased. A closer look revealed millions of little grasshoppers eating everything including last year's litter. Each day little bluestem (*Schizachyrium scoparium*) would grow an inch and then lose that inch as the grasshoppers nipped it down. This was only happening in the sunny areas because the grasshoppers could only warm up and feed when the sun hit the vegetation. Suddenly, one day in early July they metamorphosed into small dark adults with wings and flew away to greener pastures.

At this point I met with Nature Conservancy (NCC) staff to discuss the brown fields. They were thinking grim thoughts. I explained the grasshopper theory and after some debate everyone shrugged and agreed this was a plausible explanation. Restoration projects should exhibit resilience and this one certainly did. Within three weeks, all the plants had regrown and were flowering, and the

little trees had leafed out again.

This year marks the 11th growing season for the northern section and the 10th growing season for the central and southern sections of the Lake Erie Farms project. NCC purchased the 160-hectare (400-acre) property in December 2003. It acts as

went into the project. NCC staff and volunteers from the Long Point Basin Land Trust (LPBLT) worked together in the planning phase. Together we identified biodiversity targets: bringing back the eastern hognose snake, whip-poor-will, grasshopper sparrow and antenna-waving wasp. We



PHOTOGRAPH BY MARY GARTSHORE

A modified two-row plug planter was used to sow 11 species of tree nuts at Lake Erie Farms in November 2006.

a significant corridor between South Walsingham Rolling Sand Ridges Area of Natural and Scientific Interest (ANSI) and the Venison Creek Valley ANSI. The Lake Erie Farms property is part of NCC's Norfolk Forests and Long Point Wetlands project which aims to create an assemblage of private and public conservation lands in the heart of Carolinian Canada through securement and restoration.

The property was comprised of 73.6 hectares (184 acres) of agricultural fields and 86.4 hectares (216 acres) of forest upon purchase. Two years of biological inventory and planning

constructed a successional trajectory of species occupancy for the restoration. For example, in the first year grasshopper and vesper sparrows would arrive. At year five, we expected an abundance of indigo buntings and eastern towhees, by year 13, American redstarts and veeries, and so on. As it turned out, during the eighth year both veeries and grasshopper sparrows were using the middle of the largest field, each choosing their favourite bit of habitat. Now in the 10th year, buntings and towhees are still abundant.

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We visited nearby forest edges, openings and restorations to see what was working and what species could be seeded in our parcel. My partner Peter Carson and I had 14 years of experience with native plants to help us understand life history traits and which species would work well together. Nevertheless, we knew that the science of ecological restoration is still young; building a natural ecosystem that is resilient, goes through successional changes fairly rapidly and supports biodiversity and ecological function could be a tall order. Luckily, native plants know what to do when given the chance.

We considered five types of restoration: controls where nothing was planted, sand barrens, oak savanna, oak woodlands and mesic forest. The areas were measured out and seeded using variations on a 100-species mix of trees, shrubs, wildflowers and grasses in the spring and fall of 2006. Two people on a mechanized plug planter seeded acorns, hazels, plums and hickory nuts on 53.6 hectares (132 acres). After the nut planting, medium-sized fruit and wildflower seeds were thinly hand-scattered. Then we used a Truax Wildflower Seeder with a sprocket packer to spread the hard and fluffy seeds of grasses and wildflowers.

The first growing season is perhaps the hardest to live with. Fields are full of giant weedy annuals that hide the future restoration. However, this is short-lived. These weeds provide shade, a windbreak and water (from



PHOTOGRAPH BY MARY GARTSHORE

A Truax wildflower seeder with a sprocket packer is used to sow hard and fluffy herbaceous seeds on a firm surface in December 2006.

dew) to the emerging ecosystem. By the second growing season, weeds are just dead skeletons and the native plants begin to grow. By mid-July the flower show is spectacular.

After the first five years, trees and shrubs begin to gain ground. American hazel (*Corylus americana*) and dwarf chinquapin oak (*Quercus prinoides*) produce lots of nuts. American plum (*Prunus americana*) and chokecherry (*Prunus virginiana*) flower and produce abundant fruit. The herbaceous layer becomes diverse as more conservative species mature and spread such as wild lupine

(*Lupinus perennis*), New Jersey tea, butterfly weed (*Asclepias tuberosa*) and Virginia mountain mint (*Pycnanthemum virginianum*). This combination of trees and wildflowers supports many insects and birds. The oaks rank high as food for lepidoptera larvae that in turn feed most of the neotropical migratory birds and their young.

Species play different roles in restoration. Ecological placeholders such as the biennial evening primrose (*Oenothera biennis*) and wormwood (*Artemisia campestris*) discourage serious biennial, exotic weeds such as



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wild carrot (*Daucus carota*) and white sweet clover (*Melilotus alba*). Evening primrose may only dominate the site

for a year or so, then disappear for a while until the site is disturbed by drought, fire or insect outbreaks.



PHOTOGRAPH BY MARY GARTSHORE

View north of south-central Lake Erie Farms in July 2008 in the second growing season dominated by brown-eyed Susan (*Rudbeckia hirta*) and wild bergamot (*Monarda fistulosa*).



PHOTOGRAPH BY MARY GARTSHORE

The same view as in the previous photo but eight years later in September 2016. Note that oaks and little bluestem (*Schizachyrium scoparium*) now dominate the site.

Native nitrogen fixers such as showy tick-trefoil (*Desmodium canadense*) and New Jersey tea (*Ceanothus americanus*) are important sources of nectar and seeds for insects and small mammals. Grasses such as slender wheatgrass (*Elymus trachycaulus*) become the matrix between other species, help exclude non-natives, but give way to tree seedlings. With complex seed mixes species can choose optimal conditions and co-exist in their historic plant communities.

We set up three control plots where nothing was seeded, in order to compare natural regeneration in unseeded areas with intentionally seeded ones. These sites were rapidly colonized by Eurasian cool season grasses, quack grass (*Agropyron repens*) and annual blue grass (*Poa annua*). Biennial weeds, such as hawk's-beard (*Crepis tectorum*), persisted as well. By July, non-native annuals had died back leaving nothing to support native biodiversity. It was surprisingly difficult for native wildflowers to seed into the control plots from the neighbouring seeded plots. Exotic plants colonized first and held their ground. In 2016, LPBLT and NCC worked together to eradicate exotic cool-season grasses and other invasives around edges and in the control plots of Lake Erie Farms. Recently published research supports the idea that native herbaceous plants suppress weeds and facilitate establishment of tree cover.

As part of the restoration project, a densely-planted, one metre by one metre (three feet by three feet) mixed conifer hedge three rows wide was established to prevent invasion of exotics from road edges. This has worked well. The deep shade, dense year-round foliage and needle duff layer prevent most weeds from colonizing from a major road. Edges of forests can be a useful source of local plants. Planning exotic invasive control requires careful timing and a good understanding of plant life

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history traits. Many native species are frost-sensitive and do not appear until May, whereas the most damaging exotics tend to leaf out in April and can be treated with herbicides prior to green-up of the natives.

After 10 growing seasons there is much to celebrate. Dry, sandy agricultural fields have been transformed into young oak savanna. Abundant wild lupines grace the open spaces in early June. Whip-poor-wills sing and counter-singing on moonlit nights. A very lucky eastern fox snake discovers a robin's nest in a black oak sapling. A rare katydid sings on cool September nights from tussocks of little bluestem. These are the unexpected delights of ecological function.

The Lake Erie Farms project provides a great opportunity for education as well. Shortly after the land was purchased, students from University of Toronto Masters in Forest Conservation, Niagara College Ecosystem Restoration and other programs in Ontario's colleges and universities have visited and learned about modern ecological restoration methods. Some have returned to carry out more research. Conservation groups, various levels of government (Ontario Ministry of Transportation, Ministry of Natural Resources and Forestry, Credit Valley Conservation Authority and others) and consultants come to experience the results of ecological restoration. The Norfolk Field Naturalists enjoy field trips to listen to the night sounds of coyotes, bats and whip-poor-wills, see expanses of wildflowers or marvel at the number of hazelnuts American hazels can produce.

At the International Union for Conservation of Nature Congress in Hawai'i this September, German Parliamentary State Secretary Rita Schwarzeluhr-Sutter put it bluntly, "We need to launch a century of forest restoration and conservation." Aldo Leopold, in 1949 in *A Sand County*



PHOTOGRAPH BY MARY GARTSHORE

Wild lupine (Lupinus perennis) among black oak (Quercus velutina) in the 11th growing season in the north field of Lake Erie Farms in May 2016.

Almanac, encouraged us to "save all the pieces." The Lake Erie Farms restoration is a significant step in the right direction.

Mary Gartshore is an ecological restoration expert with the Long Point Basin Land Trust. LPBLT raised about 16% of the purchase price of Lake Erie Farms with generous donations coming from individuals, naturalist clubs and other conservation groups.

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Prickly Pears

by Kaesha Neil

October is the start of a busy time in my desert southwest garden in central Arizona. Though daytime temperatures are still in the 90s (over 30 C), the hottest part of the year is finally past. It is time to plant fall/winter vegetables, sow winter pasture seeds and begin harvesting the fruits and nuts that survived the summer heat—including cactus fruit! Early in the morning, our hands and arms sheathed in leather gauntlet gloves, carrying buckets and long, metal tongs, we head out to collect the sweet, juicy, magenta-coloured fruit from the prickly pear cactus patch in the driest corner of the garden. We clamp the tongs onto the ripe fruit which breaks free from the pads with a twist of the wrist.

When people think of cactus plants, they often envision unwelcoming dusty green totems or bushes covered in lethal-looking spines and surrounded by wide expanses of sand and rocks. Maybe a dried tumbleweed plant rolls by in the image. There does not seem to be anything useful or beautiful about cacti. But a closer inspection reveals much more. True cacti are native to the Americas, but they have spread worldwide thanks to European colonization. There are many different species and subspecies of *Opuntia*, commonly known as prickly pears, but the taxonomy is rife with complexity and confusion, so we will look at the group as a whole.

Opuntia species are characterized by jointed segments for stems (also called clades or pads) that exhibit determinate growth. Individual pads only grow for a season and may vary in size from about six inches (15 centimetres) in diameter to two feet (two-thirds of a metre) long. New pads grow from the areoles on the edges of the older pads, forming a new joint and branching in multiple directions. Another physical characteristic specific to prickly pears is the presence of tiny, hair-like, easily

detached spines called glochids. They are present whether the larger needles are there or not. Moreover, while spines are modified leaves, small leaves will temporarily appear with the growth of new pads, and then dry and fall off. Finally, each seed is covered with an aril (a specialized outgrowth from a seed that partially or completely covers it.)

Surprisingly, prickly pears can be found far beyond the arid regions of the southwestern U.S., from coast to

store water for the plant to use during drier times. The thick cuticle, a waxy covering on the epidermis that is present in all plants but extra thick on cacti, reduces evaporation of water. Prickly pear plants that have had plenty of water have plump pads. We do not normally water the prickly pears in our garden, except to give a little bit when the pads are looking really thin, particularly before fruit or pad harvesting occurs.

Another adaptation for reducing



PHOTOGRAPH BY KAESHA NEIL

The magenta-coloured fruit of Opuntia engelmannii. Notice the long spines of this species.

coast, as far north as Canada and south to Chile. While prickly pears do best in sunny locations with well-draining sandy soil and protection from cold winds, they tend to be tolerant of a wide variety of growing conditions.

Prickly pears have several adaptations to arid living. They have a very shallow, wide-spreading and fibrous root system. Little precipitation falls at any one time in arid regions so shallow roots make it possible for the plant to quickly absorb what little rain infiltrates into the soil. The non-woody green stems not only photosynthesize, but also

loss of precious water in environments where scarcity is the norm, is a modified photosynthesis metabolism. In most plants, openings on the leaf surface, called stomata, open during the day for gas exchange—kind of like the plant version of lungs. Carbon dioxide enters the plant; water vapour and excess oxygen produced during photosynthesis leave the plant. However, during excessively hot and dry days, the plant will close its stomata to conserve water. Unfortunately, this also prevents oxygen from escaping the leaf tissue and carbon dioxide from entering. As

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a result, instead of making food, the plant uses its stored food. This is fine for a short drought or a heat wave, it is not good however, for a plant living in an environment that is hot and dry most of the time. *Opuntia* spp., like other succulents, add an extra step to photosynthesis to avoid using their stored food. The stomata on the fleshy, green stems stay closed during the day when warmer temperatures would increase water evaporation from the open stomata and open at night instead. All the carbon dioxide the plant needs is absorbed at night and concentrated around the chloroplasts. So, when the sun comes up, the plant can still synthesize food using water and the stored carbon dioxide instead of using its food stores.

As mentioned, instead of big fleshy leaves that would be difficult to maintain in a dry, hot environment, the leaves of cacti like prickly pears have been modified into spines. They reduce water loss (no stomata) and discourage most animals from eating the plant. The glochids also discourage snacking by many animals. Except tortoises—desert tortoises love prickly pear fruit, pads, and flowers! When the tiny spines imbed themselves in the skin, they are difficult to remove. Both



PHOTOGRAPH BY KAESHA NEIL

A squished cochineal insect. It produces carminic acid from which a red dye is produced.

livestock and humans have died from eating prickly pear pads and fruit without first removing the glochids because they imbed themselves in the tissue of the mouth and throat, causing severe irritation and swelling to the point of asphyxiation.

Springtime and late summer/early autumn in the desert southwestern U.S. is when you see the striking colors of *Opuntia* spp. From March through May, the plants produce new pads and

numerous flowers on the edges of the older pads. The flowers are yellow or bright pink and last about a day. They attract many insects that collect pollen. Some prickly pears have thigmonastic anthers (meaning they respond to touch or

vibration by moving), which, among other hypothesized functions, assist pollination by bending down to deposit pollen on the visiting pollinator. The tepels dry and fall off, leaving a cone-shaped green fruit (with glochids) that will swell to an egg shape as it ripens to a yellow, red or magenta colour (the most common colours) in late summer/early autumn.

Historically, many Native American and Hispanic cultures of the Americas, including the Tohono O'odham, Tipai and Aztecs, made use of the pads and the sweet fruit. Evidence supports use of the plant not as a starvation food, but as a relished plant cultivated for over 8,000 years. Particularly bountiful patches of *Opuntia* spp. became the basis of settlement sites. The fruit, with a berry-like flavour, was eaten raw or dried for later use. Historically, the fruit was either rubbed on the ground or with vegetation to remove the glochids before scooping out the juicy pulp from the inedible skin. When we harvest prickly pears from our garden, we swirl the wetted fruit in a colander to remove the bothersome spines. The fruit are then rinsed of any stray glochids. Alternatively, we burn off the glochids with a weed torch—just a few seconds



PHOTOGRAPH BY KAESHA NEIL

O. engelmannii fruit cut in half with the arils visible around the seeds. The flesh is scooped out and eaten fresh or juiced.

are needed to singe them into smoke and ash. We make the young pads safe by cutting off the areoles, which are laden with spines.

Today, the fruit is eaten raw or made into syrup, fruit leather, candy, jelly or wine. The very hard stone-like seeds are often discarded (we feed them to our chickens who eagerly gobble them up.) Historically, some tribes roasted and ground the seeds, using them in porridges. The young pads (nopales in Spanish) are sliced, diced

or left whole. They are then boiled, baked, sautéed or grilled (whole) and mixed with eggs or served in dishes such as tacos. Some people eat the pads raw. They produce a mucilage, like okra, and have a tangy, green-bean like flavour. The mucilage, interestingly, has been used in mortar mixes and is being investigated for soil stabilization applications. The pads are also used as an important forage plant for livestock, primarily cattle.

All prickly pears are edible. Some species were especially prized for their sweet and juicy fruit, such as *O. engelmannii* and its varieties in the Sonoran Desert, and domesticated varieties such as *O. ficus-indicus*. The pads and fruit are high in vitamin C, soluble fibre, magnesium and polyphenols. They're also high in calcium, but most of it is in the non-usable form of calcium oxalate. They contain compounds that have been scientifically demonstrated to lower blood cholesterol and blood glucose levels.

Few animals, especially those with concentrated urine, can safely process the calcium oxalates in the pads. Tortoises, small mammals such as javelins and rabbits, and insects such as the giant cactus beetles, will eat the young pads and fruit. Given the



The spineless Opuntia ficus-indicus still has glochids.

prodigious production of fruit (much of which can still be found on the plants into winter—especially in the unreachable centre of large patches) and rock-like seeds, it has been hypothesized that *Opuntia* spp. evolved with large, now extinct, mammals that would disperse its seeds (maybe mammoths or giant sloths) and broken-off pads.

Opuntia spp. provide nesting habitat for many birds such as roadrunners and mourning doves, small mammals (e.g., packrats) and insects. The most important inhabitant (for humans) is the cochineal (*Dactylopius coccus*), a scale insect that produces the chemical carmic acid in its body tissues, which is used to produce a brilliant red dye. The dye was coveted in Europe (among other uses, it produced the red coats of the British army) and became the second most important export of Mexico, after silver. Once the secret source of the red dye became known, pads of *Opuntia* spp. were shipped worldwide to

establish commercial farms, some of which became quite successful. But the development of synthetic aniline red dyes caused the cochineal market to crash in the late 1800s.

Prickly pears reproduce asexually (pads that break off and fall to the ground can take root, forming large, dense clonal thickets) and those that were planted in ideal conditions continued to thrive without human help, often becoming aggressive weeds and even forcing some people to abandon their farms and homes. Some of these heavily colonized

areas are becoming economically important again as interest in the plant for food and forage grows. There has also been a resurgence in interest in cochineal as some synthetic red dyes used in cosmetics and food have been linked to safety concerns, such as cancer.

Our patch of prickly pear, which includes both native and cultivated varieties, is still small because it is just a few years old. Fortunately, we are fond of using its pads and fruit, so the threat of our own personal “green hell” is not great.

Kaesha Neil and her family live as sustainably as possible in Arizona, supplementing their diet with as much bounty as the land will provide.

PHOTOGRAPH BY KAESHA NEIL



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A Necessary Meadow

by Nicky Staunton

Last summer, winds descending upon my backyard meadow grasses created rhythmic waves. Birds lingered to forage, then sought shelter later in the year under old leaves bending beneath the fallen snow. Goldfinches found milkweeds and native thistles rich in potential nesting material. The mountain mints were visited for their nectar by wasps, bees and butterflies. I found myself singing the praises of my lively meadow planted in 2006 to fulfill a rather unglamorous role.

In the 1990s, I learned that small communities in Monterey, Virginia were using cattails (*Typha* spp.) to treat wastewater. If they could do it, maybe I could create a native meadow to cover my septic tank's drain/leach field on my 10-acre (four-hectare) property in the rural Piedmont Hills of Virginia.

My woodland sacrificed one acre (two-fifths of a hectare) of its 40-year old hardwoods to become the site of the house and "yard" on a slope of Parish Mountain. The septic tank/field covered approximately half an acre

(one-fifth of a hectare). I could have planted a lawn over it which would handle the surface task of controlling soil erosion. But the roots of native plants would reach deeply enough to interact with household wastewater. They would be helped in their job by non-compacted porous soil, microbes, air, full sunlight and time. This natural system would return clean water to my property's water table.

My meadow site was graded and drainage tiles were installed to a depth of two-three feet (two-fifths of a metre to one metre). No other preparation was necessary. The seeds were sown in August and covered with straw for the winter. The herbaceous and annual grass seeds germinated in spring 2007.

Little bluestem (*Schizachyrium scoparium*) was meant to be the primary plant in the meadow but the seed company accidentally put in big bluestem (*Andropogon gerardii*). I didn't realize this until the first growing season. After three years big bluestem had become the meadow's monoculture grass. Little bluestem, a prairie bunchgrass with fine-textured foliage that forms dense mounds 18-

24 inches (45-60 centimetres) high, sends its roots three feet (one metre) down. Big bluestem, as the name suggests, is a much larger clumping warm-season forage plant, four-eight feet (1.2 – 2.4 metres) in height. Would its six-foot (two-metre) deep roots destroy the septic field by clogging the systems' ditches? I was concerned.

I contacted the seed company, nurseries, natural resource managers and home extension agents, but none had a clear answer at the time. This year, they were unified in their response: the deep fibrous roots of big bluestem will not damage a drain field system. But I had pretty well figured that out after 10 years. Still, little bluestem is probably the most compatible of native grasses with the scale of a septic field meadow. It allows sunlight to penetrate to flowering plants since it is no taller than most neighbouring plants of the meadow.

The perennial big bluestem sprouted, but did not grow much above ground the first year, while its root system matured and became established. Warm season grasses require two-three years to mature and bloom. Waiting for them demands patience. I've heard stories of people becoming impatient or anxious and replanting/re-seeding prematurely thinking the perennial grasses had failed the first time around. Instead, I suggest repeat-sowing annual rye seeds over bare areas. The perennial grasses are worth the wait.

My 2007 meadow was full of black-eyed Susans (*Rudbeckia hirta*). The following year there were very few. Beebalm, or wild bergamot (*Monarda fistulosa*), is the single pollinator species that survived from the initial seed mix. Butterflies cover the flowers from June through July. Deadheading would extend flowering, but it's extremely impractical. It's better to sow other species to cover the seasons with flowers.

Broom sedge (*Andropogon*



PHOTOGRAPH BY NICKY STAUNTON

In its first year Nicky's meadow attracted these fawns, among other wildlife.

virginicus) is a good choice as cover for a septic bed. Two to four feet in height, its fibrous root system is made up of short rhizomes. It is considered a weed in the agricultural world, but gardeners use individual specimens as ornamentals. Broom sedge seeds were sown in the immediate area around the house as a lawn, but this was a major mistake. The builder had already sown a fine leaf fescue which would have been perfect by itself as a no-mow lawn. A broom sedge lawn is impractical. Before totally removing it, I collected seeds for a few years and donated them to another meadow.

Virginia wild rye (*Elymus virginicus*) and bottlebrush grass (*Hystrix patula*) were also part of the original seed mix from Ernst Conservation Seed Company in Pennsylvania but they have given way to the more aggressive big bluestem. That said, I'm slowly adjusting the meadow to incorporate little bluestem and more flowering plants. Individual plants of mountain mint (*Pycnanthemum muticum* and *P. tenuifolium*), blue giant hyssop (*Agastache foeniculum*) and sunflowers (*Helianthus* spp.) have been casually added. Dozens of butterfly weed (*Asclepias tuberosa*) were planted in the early meadows, only to die, likely due to drought and shade from the established big bluestem grasses. Common milkweed (*Asclepias syriaca*) was sown in the spring meadow two years ago, but has not yet appeared. Only transplanted volunteers of common milkweeds have survived. The species seems to have germination issues here. It spreads with shallow roving roots that can be transplanted easily. Perhaps best before or during a rainy spell.

Meadow advocates recommend using regional native plant seeds to support regional insect and bird genotypes. For instance, seeds introduced into a site incompatible with its evolution might simply expire or they might proliferate and become invasive. Learn what is growing naturally in your area from the Digital



PHOTOGRAPH BY NICKY STAUNTON

Nicky's meadow in October with big bluestem dominating.

Atlas of Flora. You can find out whether a species is documented in your hardiness region from the maps. For Virginia go to <http://www.vaplantatlas.org>. Described below are two other septic meadows planted within the last decade.

Lou Staunton's meadow

Lou (my daughter) created a new septic field on land previously used for an orchard, next to a wildlife management area and close to Shenandoah National Park. She

cleared and graded the land for the septic field and three other meadows without using herbicides.

The meadow was slow to establish and then only with sparse flowering plants. Cold snaps nipped the initial sprouts and the field was overrun by beefsteak plant (*Perilla frutescens*), stilt grass (*Microstegium vimineum*) and other common weeds in the first year. Native plants are gaining on the invasives through abundant seeding. Lou incorporated more flowering plants, predominantly common milkweed, butterfly weed and whorled



PHOTOGRAPH BY NICKY STAUNTON

Lou's septic meadow with forest in the background

Continued on page 14

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milkweed (*Asclepias verticillata*), in her meadow than I did in mine. As a result, far more insects have visited, especially monarch butterflies. Lou's goal was to create an insect garden to enrich her passion for macrophotography, wanting to be "eye to eye" with her subjects.

The meadow is mowed annually in March. Further mowing happens early in the growing season to control the incursion of invasive plants.

This site used a quartz gravel mix along the pathways around the house and upper area of one of the meadows, offering walking paths, a firebreak and the opportunity to see wildlife visiting from the nearby wildlife management area and national park.

Ron and Carol Nelson's meadow

My neighbours created a native plant pollinator meadow over an established lawn-covered septic field site. They spent some time studying the site and the options, then settled on a kidney-shaped area over a 25-year-old septic field of lawn grass, white clover and wiregrass.

The surface was mowed, raked and then surface-scraped several times with a tractor's blade.

Herbicides were applied twice. Using a propane flame-thrower, they singed unwanted emerging plants – a two-person task. They kept a water hose at the ready, in case needed. They purchased flower and grass seed mixes from several companies and collected seeds on their walks. The project began slowly, and limped along during the second year. By the third year they had many flowering plants with perennial grasses beginning to make an

Big bluestem



PHOTOGRAPH BY NICKY STAUNTON

The Nelsons' meadow in July

appearance. By 2016 (the fourth year), grasses were well established and the flowers attracted a multitude of pollinators.

The site is mowed annually. Herbicides are applied as needed. In the future, they plan to control the large grasses such as big bluestem, Indian grass (*Sorghastrum nutans*) and switch grass (*Panicum virgatum*) and sow selected species, namely little bluestem, sunflowers (*Helianthus helianthoides*) and black-eyed Susans.

Advice for creating a septic bed meadow

The septic drain area is dedicated as a leach field for household wastewater management and its use must remain focused on that task.

- Allow no trees and shrubs with woody root systems and/or water-seeking roots into the meadow.
- Monitor the aging septic tank and field. It is less expensive to have the system checked periodically than incur the expense of having to replace it.
- Use no perennial herbaceous plants that demand regular thinning which disturbs the surface and subsoil.
- Always wear gloves if working with the soil of the drain field.
- Do not water or fertilize the drain field. Avoid shading the field with construction.
- Do not grow vegetables over the septic field.
- Prevent vehicle traffic and the creation of heavy footpaths which

might compact the soil.

- Our forestry department suggests doing a prescribed burn under their supervision instead of yearly mowing.

The growing cycle is over now and my big bluestem meadow is preparing for winter. In a few months, the spring grasses will be racing to produce pale green sprouts after the ground-clearing mow. Rains will fall, urging plants to reach for the warmth of the emerging sun's rays. The bare soil of the meadow will benefit from a short-lived interaction with daylight before being shaded by dense native bunchgrasses. When summer arrives, a dense, deep green crowd of "turkey foot" grasses will dance in the wind. The lavender flowers of *Monarda fistulosa* will join in welcoming great spangled fritillaries, other butterflies and pollinators. In October, the meadow's grasses will be sculpted into russet teepees scattered throughout. Perhaps mice or rabbits will shelter there over the next winter. And over the course of the entire year, the meadow will be quietly performing its valuable function of treating the wastewater from my house and returning it clean and pure to the landscape.

Nicky Staunton is a past president of the Virginia Native Plant Society. She has spent four decades learning about the flora of Virginia which she continues to study, illustrate, photograph and promote.

Calendar of Events

FEBRUARY 22-24, 2017
2017 Land And Water Summit
Albuquerque, New Mexico

Presented by the Xeriscape Council of
New Mexico and Arid LID. For information email
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If you would like to join us to help sort the seeds, please contact volunteer@nanps.org.

Thank you!

Continued from page 1 – **Ostrich Fern**

(spore dots) on the underside of the fronds. According to *A Guide to the Ferns of Grey and Bruce Counties, Ontario* produced by the Owen Sound Field Naturalists, “The dustlike spores [of most ferns] are produced by the sporophytes in tiny structures called sporangia. These are designed to open in dry weather and close under wet conditions, thus facilitating spore dispersal on air currents.” An ostrich fern’s fertile fronds will persist through winter. Use them to add charm to a winter bouquet.

Both forms of fronds emerge “in a dense, circular cluster from a stout erect branch of a scaly, dark brown rhizome.” Early in the spring, before anything has leafed out, you’ll discover a little nub above the ground, from which the fronds will eventually emerge. If you want to find out if the plant is still alive – and worth transplanting – just scrape a bit of the brown off the top. If it shows green, you’re in luck!

Ostrich ferns were used by the Cree in a decoction of the sterile leaf stalk base for the expulsion of afterbirth and for back pain. The Menominee used it as a poultice and infusion for whitish urine. This fern seems to have an affinity for the reproductive and urinary systems. As a springtime food it is both nourishing and cleansing.

Note: fiddleheads may cause food poisoning if not stored, prepared or cooked properly. (Look on the internet under www.todayparent.com for instructions on how to cook ferns safely.) Apparently, some people also apply the green fronds directly to the skin to heal wounds and boils.

The North American Native Plant Society’s late fern expert, Richard Woolger, did not list ostrich ferns among his favourites. He said, “They often look ragged and windblown by mid to late summer.” But he readily agreed that they are easy to grow and a good choice for the novice gardener. I would add that they delight many an experienced gardener with their simple, elegant spring form and easygoing attitude – rather like a lot of native plants.

Irene Fedun is the editor of The Blazing Star.

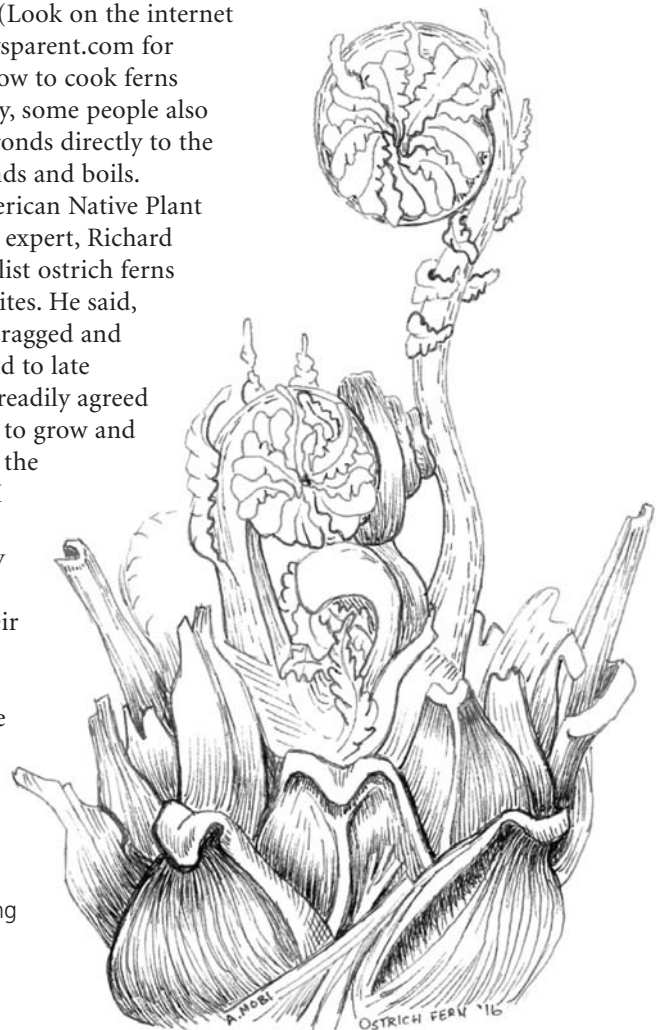


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