

Quest #203: Maine Flora

Music

Christine Young, Program Host: For a few short months every year we get to enjoy the splendor of Maine plants in bloom. For that short burst of time flowers become an integral part of our backyards, our hikes up mountain peaks, our trips to the beach, even our commutes to work. Yet we probably assume that the flowers we so enjoy are wild and native to Maine. In reality, it's not a simple matter keeping track of Maine flora. In fact, it's a bit of a moving target, as we hear in this story by Bob Demers.

Bob Demers, Segment Host: The sweet season of the summer in Maine begins with our fragrant lilacs. As the warming breezes of summer wash over the state, it's beach roses and meadow lupines that fill our senses. For many of us, this is quintessential Maine. But these and many other beloved wild flowers and shrubs of Maine cannot all claim to be native to the state. Some of our stock-in-trade favorites are actually exotics, or aliens as some botanists call them ... and these days the skilled gardener wants to show off their exotics. A recent public television program, "The Three Thousand Mile Garden," highlighted Leslie Land's many exotics in Cushing.

Leslie Land: I've been asked if there is anything too exotic for me to grow ... and the answer is that I'm a sucker for a pretty picture, just like everybody else. When you discover this amazing flower, you don't care what it's called. You just want to enjoy it.

Bob Demers, Segment Host: Of the more than two thousand species of plants considered established in Maine, a third of them were brought here from elsewhere. There are a number of ways that seeds for these plants were able to get into Maine to take root.

Dirt falling off an interstate truck is one way non-native seeds hitch a ride to Maine. Some species escape from gardens and other landscaping and expand their territory over time. Many of the exotic, or alien, species become wildflowers and fit right in with the local scene.

Dorothy Spaulding, Josselyn Botanical Society: I'd like you to look at this because it's a plant we don't see very often in Maine. It's called *Hiddisera*. It's a member of our pea family and its species name is *Alpineum*. It has what we call jointed pods. See, these are all little particular seeds and they will break apart and each become a new plant.

Bob Demers, Segment Host: But, because our mix of plants changes all the time, how do we keep track of all of them? Well, the state does much of the sleuth work, but it can't keep up with all of it.

Francie Smith, Maine Natural Areas Program: Brian, could you come over here for a second, please? I want to ask you about some of the information on the occurrences of the plants down here. Do you know if we've gotten information from the field people yet? Have we gotten in all of the field surveys?

Brian: No, I'm not

Francie Smith, Maine Natural Areas Program: We have, right now in our data base, well over 3,000 records of plants and habitats, and information about natural features here in Maine and with our staff there is no way in the world that we can possibly monitor all of those populations, all of those what we call occurrences, and we have a whole bunch of people throughout the state that are very willing, and very qualified, to help with our work. The qualified botanists that I'm talking about aren't paid for their work. They do it because they like to.

Male: This lupine here, I was just asking, was it the parenus, or is it the polyfillus? I guess that's how it's pronounced.

Female: I believe it's the parenus.

Male: The parenus, okay. Fine, that's what I thought here.

Bob Demers, Segment Host: Amateur botanists become members of groups that make a serious hobby of learning about Maine's many plants.

Female: Right next to your little zanthora is a _____

Male: Ah, oh yeah, there it is.

Bob Demers, Segment Host: One of the most established groups is the Josselyn Botanical Society whose members have been keeping track of Maine wild flora for more than 100 years.

Female: Boy, that was a real guessing game!

Male: There's a xantalsia.

Male: Xantalsia, that's what it is. Hallelujah!

Dorothy Spaulding, Josselyn Botanical Society: Our purpose is to come out and botanize in a different county in Maine every year and so we come and we just wander around the fields and the meadows. Someone has come to the area, and who lives here, and looked it over to see where we can take this many people, and we check, and see, are there any new plants that we don't have in our plant checkbook, that we can add to the list of the flora of Maine.

Bob Demers, Segment Host: Maine's most famous amateur botanist is a very early Josselyn alumnus, Kate Furbish. Furbish not only knew flowers, she also knew how to paint them in enchanting detail.

Sue Gawler, Maine Department of Conservation: She made it her avocation to collect and paint all the native wildflowers of Maine, and traveled all over the state. She was single and, of course, this is quite a while ago, when single women weren't traveling around the state alone very much, but she was pretty dedicated, and traveled up to the St. John in 1880 and 1881, and was doing some botanizing along the bank and came across this particular species of fidicularis, that's the genus name for it and said to herself "this is not something I've seen before. This is different."

Bob Demers, Segment Host: Kate Furbish's namesake, Furbish's lousewort, is a wild snap-dragon she discovered in 1880. She found it in what was then, and still is, a sparsely settled and hard-to-get-to area of Maine along the St. John River.

Sue Gawler, Maine Department of Conservation: She collected it, sent it to Harvard, and the botanist there who was in charge decided that yes, indeed, it was a new species and named it in her honor.

What makes everyone here so excited to see Furbish's Lousewort is that the St. John River is the only place in the world where this particular species of plant grows.

Bob Demers, Segment Host: It was here between the hamlets of Allagash and St. Francis that the Dickey-Lincoln Hydroelectric Power Plant was proposed in the late 1970's. It would have flooded 88,000 acres and wiped out the one-of-a-kind lousewort which survives by clinging to river banks. It was during this controversy that Maine's first endangered species, this modest-looking little plant, became a symbol for environmentalists across the nation. Plans for the power plant were scrapped and the lousewort still flourishes in its little world in this most northern stretch of Maine. Kate Furbish died long before the bitter debates over the Dickey-Lincoln proposal got wound up, but the ensuing controversy spotlighted this remarkable botanist and painter. Her work is now being preserved by the Bowdoin College Library. Even today, because of all the detail, it's one of the best ways to familiarize ourselves with many wild flowers.

Frank Graham, Author: She did not consider herself an artist in that sense, in the high-flown sense. She considered herself a scientist and someone who was just trying to spread the word about plants to make them known to people, and so she painted them as precisely as she could so that someone coming across her painting later, and then who was seeing a plant in the field would be able to put the two of them together.

Bob Demers, Segment Host: Even though there is much to learn about Maine flora we wouldn't know nearly as much now if it weren't for Furbish and other volunteers.

Sue Gawler, Maine Department of Conservation: People have been trying to document the flora of Maine for over a hundred years and, as you said, it's a very big job. We can't just say, well I'm gonna go here and find that. You need to be out all the time, you need to have people who know what they're doing out exploring.

Bob Demers, Segment Host: It's not just in Maine, but around the world that scientists are interested in the diversities of plant life. Now, we're not even sure how many different species of plants exist on the earth. The best guess is that there is at least 10 million different species, but some estimates run as high as 30 to 50 million species.

One of the biggest challenges to botanists is, even if we knew exactly which species we have today, it would only be a snapshot. It wouldn't take into consideration all the subtle changes occurring to plant species and how they'll continue to adjust to changing conditions over the centuries and millennia. Each time glaciers extended from the north and covered Maine most of what was here for plant life was wiped out. When the ice sheets retreated we had a clean slate and plants, animals, and microorganisms moved back into Maine from the south, and from the north.

George Jacobson, University of Maine Quaternary Studies: Plants in general can re-colonize a deglaciated landscape surprisingly quickly as long as the climate allows that and in most cases along the southern margin of the ice sheets in Maine is along the southern margin of the Laurentide ice sheet that covered this region, the climate at the time of deglaciation is actually remarkably mild. One Question is how quickly do the soils have to change for plants to be able to live there but it turns out that, based on a number of modern studies of recently deglaciated areas up in Yukon, and Alaska and Norway, that the landscapes can be developed, the soils on landscapes can be developed so quickly that plants can be covering the landscape within a matter of 100 years or sometimes even more quickly than that.

Okay. Now we're ready to go down ...

Bob Demers, Segment Host: Jacobson and other scientists at the Quaternary Institute have been piecing together several snapshots of what Maine looked like since the glaciers. Their best clues are preserved in the sediments at the bottom of lakes and wetlands. It takes hundreds of core samples of sediment and painstaking lab analysis to piece together these theories.

Georg Jacobson, University of Maine Quaternary Studies Often there is a year, or more, worth of work involved with studying the core, and that involves studying the physical characteristics of the core, as well as the biological characteristics, and the amount of time it takes to look at the individual samples, spaced through time over time amounting to 15 thousand years, as you can imagine takes, it does take a lot of time and energy.

Bob Demers, Segment Host: Since the Ice Ages most of the plants to come into Maine have been species extending their natural range. Maine falls in a transition zone between the hardwood forest regions of the south and the more northern boreal space for forests.

Francie Smith, Maine Natural Areas Program: There are plants that in the northern part of the state reach their southern limit. In other words, they are much more common once you go north of Maine, into Canada for example. A lot of the plants that grow along the St. John River we consider very rare here in Maine. However, if you go across the border and up into the Maritimes Provinces you'll see these plants, you know, in a lot of different areas, and it's the same thing in southern Maine a lot of our species in southern Maine, a lot of the rarer species that we're tracking, things such as spice bush or sassafras, or even flowering dogwood, are considered rare here in Maine. However, if you go down towards Connecticut or New York, you know, you see 'em along the roadsides all over the place.

Bob Demers, Segment Host: With very few southern Maine dogwood trees, will ever look like the ones found the mid-Atlantic and southern states.

Chris Campbell, Plant Biologist, University of Maine: It's likely that this species differs genetically in Maine at the limit of this distribution because it's facing climatic conditions that are extreme for the species, so people interested in the distribution of plants are interested in this phenomenon of genetic differences at the margin of the distribution of species.

Bob Demers, Segment Host: But every now and then new plant species show up here, but most of these are not plants trying to naturally extend their range from the south or the north. They're brought here by people like ourselves.

Chris Campbell, Plant Biologist, University of Maine: And perhaps a third of the plants that grow on their own in Maine are not even natives of Maine. They've been brought here by people largely from Eurasia and we have the removal of plants, a couple of species of trees like sycamore and the slippery elm that used to grow in Maine, but probably do not grow in Maine anymore. They were very limited in their occurrence here and were cut down, or went extinct naturally.

Bob Demers, Segment Host: So which plants are natives and which plants aren't? Well, Maine only has two truly native plants and those are plants that are only found in this state and those are Furbish's lousewort and the Orono sedge. Maine is typical of other glaciated areas in having only a few unique species, but we consider all of the plants that have naturally extended into Maine as natives. Blueberries and cranberries are two such natives.

Eric Welzel, Fox Hill Nursery: This is the native American cranberry. It's a low-growing plant that sends out very long leaders. It has very nice colored foliage in the fall and the fruit on it is your traditional-looking cranberry fruit. There's a lot of hybrid blueberries now in production and a lot of hybrid cranberries in production to produce a bigger yield, but the native blueberry and the native cranberry do quite well in Maine soils.

Bob Demers, Segment Host: More than 600 plants species have been introduced to Maine that have been brought here by people either inadvertently or intentionally. Most fit in well with their surroundings. Seeds for European grasses and flowers have been here since the 1600's. The settlers would clear five acres and then grow hay from seeds they brought from home. Many of what we now consider wild-flowers along our road-

sides, daisies, asters, and buttercups are actually weeds from England. And today's farmers are glad that clover was introduced here, since all nine species of it help maintain nitrogen levels in soils and are well liked by foraging cows.

There are a number of other Maine plants so prolific that they are often mistaken for native species. The ubiquitous lilac which signals that summer is around the corner has adorned Maine homesteads for centuries.

Many of those who left the Pine Tree state to be among the first settlers in the west made sure they had lilacs flowering for them out there as well. Loaded in just about every wagon that headed west was yeast, rhubarb, and a slip of lilac. It was the Europeans who brought lilacs to the east coast, but the shrub can also trace part of its lineage to southwestern Asia. Surprisingly, the lilac is a member of the olive family.

And along the coast of Maine, even though they're fully exposed to wind, sun, and salt, the rugosa flourishes. It's hard to believe that this flower which flourishes along the coast was brought here in the late 1800's directly from the Far East.

Suzanne Verrier, Rugosa Expert: To begin with, the rugosas were introduced in Europe in 1796, but I suspect that they got here a little earlier. They were brought over by sea captains who very often found plants that they liked and brought them home and, maybe they brought over just the hips, or maybe they brought over the plants, and I think that's why in 200 years they've established so well here. You can hardly go anywhere on the coast and not find them.

Bob Demers, Segment Host: The rugosa is described as the hardiest of all roses. It can survive frigid winter temperatures of 50 below zero. Rugosa hybrids also do well in Maine and Verrier has worked for some time now to make this rose a popular item in gardens.

Suzanne Verrier, Rugosa Expert: They do appreciate fertility and they do well in a good garden soil, but on the other hand, the rugosas also tolerate a lot of different things from salt, to poor soils, to windblown sights, which is also a very useful here in Maine. A lot of our gardeners are on the coast.

Music

Bob Demers, Segment Host: Hydrangeas are another import that have become a staple in many Maine gardens.

Eric Welzel, Fox Hill Nursery: Hydrangeas are not native to Maine. They were introduced in the late 1800's in China and Japan, but they are another plant that's very adaptable to Maine soil and can handle the harsh winters that we have up here.

There are a lot of hybrids of hydrangeas, but a lot of them aren't hardy for Maine. They would be hardier in southern Maine or closer to the ocean, but inland a lot of people would like to see some of the nico blue hydrangeas, but they're just not hardy enough for Maine.

Bob Demers, Segment Host: What tends to happen with flowers is if they do well in Maine and become popular in gardens, over time they can escape and become found in the countryside.

Suzanne Verrier, Rugosa Expert: It doesn't take a whole lot, I mean, all it takes is a few seeds, or maybe even roots. This is a rugosa hip, or fruit. It's what's left after the blossom goes by and it is full of seeds. In fact, if you open it up and see, there are all the seeds and what happens is the animals eat these and then, of course, the seeds are left behind and that's what spreads the plant and, as you can see, there's quite a few little rugosas in here.

Bob Demers, Segment Host: It's little wonder we find wildflowers so alluring. Since many of these flowers are not that wild after all, that's why they can be as splendid as those found at a well-tended garden.

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Christine Young, Program Host: In late summer in estuaries like the one here in Merrymeeting Bay, where salt water meets the unsalted fresh water from rivers, there are a dozen different species of rare plants in bloom. The best time to see them is at low tide. These are affectionately referred to as the Muddy Crugglies, but the nickname doesn't do justice to the beauty of this intertidal flora like the cardinal flower, burr marigold, or arrow-head and others. At times, it's a wonder flowers would even survive these constant mud baths. Yet botanists understand how tenacious some Maine plants can be. In fact, some flora can be quite threatening. Dana Hutchins has more ...

Dana Hutchins, Segment Host: Not all newcomer plants, even those with blossoms this pleasing to the eye, are desirable in Maine. Some species just don't fit in and some try to take over and surely wear out their welcome. These are what botanists refer to as exotic, the alien invaders. We as a people have become increasingly mobile and as the world becomes a smaller place, there's more trade occurring across the globe. What's happening is more and more plant species are ending up in places far from home. Oftentimes it's inadvertent, like the plant seeds stuck on wood ballasts, or packaging crates.

Chris Campbell, Plant Biologist, University of Maine: That's bad, because the native plants that we have are being replaced, the number of plants could potentially be reduced because some would be pushed to local extinction or, at least, be very few in numbers.

Dana Hutchins, Segment Host: But sometimes we're the culprits when we innocently buy ornamentals that are not native, but would still seem to fit so well into our yards and gardens.

The Japanese bamboo plant sown in a Maine yard grows so thick that it doesn't take long to resemble the jungle plant it is in its native setting in Asia. The Norway maple often mistaken for red maple is another plant that can spread like a brush fire here in Maine.

Many of the exotics or aliens find a niche in their new settings, even the bamboo. There's a fine line at times between ornamentals or species we want, and those species that become weeds or plants that we don't want.

Then there are the plants botanists wish didn't even exist because of their propensity to displace native species. The purple loose strife looks harmless enough. Its purple flowers are a pleasant addition to the countryside in late July and August.

Linda Gregory, Botanist, Acadia National Park: There's a couple other plants that look similar to purple loose strife, but one of the ways you can tell the purple loose strife from other things is the leaves are opposite, they're alternate, that opposite on either side of the stalks. It has a long purple spike that the flowers bloom at the bottom first and then move upward. As in fact, as you're driving around, you know, anywhere really in Maine, if you look in wet areas, roadside ditches you're gonna see this.

Dana Hutchins, Segment Host: Loose strife can be bought at some nurseries in the state and highway crews still use it on occasion to stabilize soils after construction.

Linda Gregory, Botanist: Purple loose strife is highly invasive. It'll take over a wetland and form what we call a monotypic stand. Just basically one species and, things like cattails that we're all familiar with in wetlands, are

pushed out and that takes away habitat from ducks and fish, birds. It really alters the way the wetland functions.

Female: It seems around here somewhere, oh, here it is ...

Dana Hutchins, Segment Host: Acadia National Park has an aggressive program to combat the purple loose strife. Park scientists have been watching its spread since the late 1980's. Loose strife first showed up in Maine earlier this century. Park rangers are trying a variety of measures to keep it from cropping up in Acadia. All around the park visitors can see signs advising them not to disturb the soil. Sometimes a disturbed area loses vegetation because too many people have walked through it, wearing down the plants. This gives an invader like loose strife the chance to move in and beat out other vegetation.

Linda Gregory, Botanist: All right, we don't want those seeds to fall and create more.

Dana Hutchins, Segment Host: Acadia scientists also use hand-held backpack sprayers to selectively apply a common herbicide, Rodeo, on individual plants they find growing.

Linda Gregory, Botanist: Out of all the herbicides we could use, it's pretty non-toxic. It bonds very easily with the soil particles so it doesn't get into the water table. It's registered for use in wetlands.

Dana Hutchins, Segment Host: If Acadia needs another line of attack it may be biological controls, like natural predators. Weevils, beetles, and other insects may be imported from Europe or Asia, the native lands of the loose strife.

Linda Gregory, Botanist: The hope is that through introducing native predators from the plant's native range, it will keep it in check here. It will still be in the wetlands, let's say, but it won't form a mon-otypic stand. It's be "in check."

Dana Hutchins, Segment Host: Acadia scientists have good reason to be attacking the purple loose strife as soon as they notice it growing in park boundaries. The plant is despised in states south of us, and is illegal in 13 of them.

Chris Campbell, Plant Biologist, University of Maine: The pathogens that have kept them in check. Those things aren't present in their new home, and so they're free to grow with an advantage that the native vegetation does not have.

Linda Gregory, Botanist: That's great, I don't see any in here. This may be a little upland for it. Let's go check the next meters.

Dana Hutchins, Segment Host: It may be wise to heed the lessons learned from other states, because with many alien plants we can't predict all the possible interactions with other species. Loose strife is notorious for greatly reducing the variety of native plants in areas it invades. This variety is called biodiversity and it will be measured in several ways. The most obvious measure is how many species an area can support.

Chris Campbell, Plant Biologist, University of Maine: This is a concern like many exotic plants and animals, in terms of posing a threat to biodiversity, because they are so extra-competitive that they suppress the growth of native vegetation.

Dana Hutchins, Segment Host: Another kind of biodiversity is measuring the differences in the thousands of genes that are found within each individual species.

Chris Campbell, Plant Biologist, University of Maine: This biodiversity is important because all of these organisms live together in communities and are inter-dependent upon one another, and when you remove one you change the community in ways that we don't understand fully, and you may push the community in a direction that's not good for it. It's hard to know.

Dana Hutchins, Segment Host: Some alien plants tend to hybridize and essentially become more like the native plants around them. That can negatively affect the genetic integrity of certain native plant species. So far in Maine, alien plants are more likely to take over habitats than to dilute the genes of nearby plants, but what is so troublesome for botanists is discovering how easily alien and other un-wanted plants cross-pollinate with wild flora.

Linda Gregory, Botanist: Those plants bought at nurseries could cross with populations already in wetlands and, when they crossed, formed purple loose strife plants that had tremendous hybrid vigor that had more seeds than either of the parent plants and created more of a monster than either the wetland plant or the nursery plant to begin with.

Nicole Cyr, Sprague's Nursery: That wouldn't surprise me. You sterilize something and you're asking for trouble normally.

Female: Why's that ?

Nicole Cyr, Sprague's Nursery: Well, normally they find another way to reproduce, all plants are here and reproducing, and that's why an apple tree, you cut back and you'll get a lot of apples.

Dana Hutchins, Segment Host: Acadia Park recently sponsored a national summit on the hazards of purple loose strife and they spent much time talking about educating the public.

Linda Gregory, Botanist: I think the word is getting out, but we still have a little farther ways to go.

Dana Hutchins, Segment Host: Some states are even more serious about educating the public about noxious weeds.

Chris Campbell, Plant Biologist, University of Maine: If left unchecked one can predict that they'll just increase in numbers the way they have elsewhere and what's happened over and over again in many parts of the world, we don't need to experiment with this. We can predict quite clearly what's going to happen.

Dana Hutchins, Segment Host: There are also some plants that have been around for a while that are usually not categorized as noxious and invasive.

Ever had a raspberry patch that you couldn't get rid of?

Well, you're not alone. Paper companies and even farmers have the same problem.

Ken Laustsen, Great Northern Paper: It's a problem because underneath here in places are spruce fir regeneration. The two species that Great Northern needs to supply wood fiber to its pulp and paper mill and these raspberries prevent that spruce fir from developing properly and in extreme cases, such as here, they prevent spruce and fir from even germinating and occupying this site.

Dana Hutchins, Segment Host: It seems the more clear cutting the paper companies do, the more raspberries bushes they get. It becomes a problem because raspberries take over. There's a reason for that. Raspberry

seeds are among the toughest; they can last 100 years or more in the soils of the forest floor.

Ken Laustsen, Great Northern Paper: We're in an area that was harvested in 1990, using a clear cut harvest method, and what I'm standing in is a major raspberry patch which resulted from that harvest. Raspberries show up on good growing ground and they are very fertile and they know how to occupy a piece of territory once they get a toehold.

Dana Hutchins, Segment Host: Clear cutting causes them to sprout and once they start growing surrounding vegetation, including many trees, take a back seat. Raspberries will simply crowd out surrounding vegetation.

Ken Laustsen, Great Northern Paper: Raspberries spread by suckering off the roots, so if we dug them in here and exposed the roots, next year canes would come up out of here off the roots and grow and then the next year they'll come up here and on the roots they'll grow. The roots, as they develop, spread the raspberries across the site. Plus, the seeds as they fall to the ground also help to introduce new raspberries to a particular area. Animals carry raspberries away after they eat 'em and deposit it them on new sites.

Dana Hutchins, Segment Host: Some scientists believe that raspberries make themselves nearly invincible by producing a chemical that acts as a natural herbicide.

Alison Dibble, Botanist, United States Forest Service: The chemical that could be responsible for some sort of competitive advantage for red raspberries would be due to allelopathy. And this is a condition in which the plant exudes a chemical compound that is detrimental to the growth of other plants, or the germination of seedlings in the vicinity.

Dana Hutchins, Segment Host: Paper companies fend off raspberries with a synthetic herbicide. It may be the only way to get the upper hand, which is what many people with backyard raspberry problems have discovered.

Ken Laustsen, Great Northern Paper: You have to understand we use herbicides not to eradicate raspberries. We use them to control raspberries and choke cherries and pin cherries in order to give spruce fir a 3 to 4 year window to grow this high and then compete on an equal basis with this material, so herbicides aren't killers in the common sense thought of why we use them. We don't use them to kill this vegetation, we use them to retard the continued development of this vegetation over a period of time.

Dana Hutchins, Segment Host: Paper companies may have made things harder for themselves with raspberries. In recent years as a friendly gesture the paper companies allowed beekeepers and their hives on their lands. Each year beekeepers come from all over to set their bees loose to pollinate agricultural crops. In the middle of the summer there's a period when the bees aren't needed for pollination because of the cycles of crops. To keep the beekeepers in Maine for the next pollination cycle the paper companies have offered their raspberry patches. The beekeepers are happy because raspberries are popular for honey, but the paper companies' good will may have backfired on them because bees make more raspberries.

Ken Laustsen, Great Northern Paper: So, if I can avoid spraying herbicides, I save myself a lot of money that I don't have to keep in the bank for 60 years until the payback comes.

Dana Hutchins, Segment Host: Even though there is a conflict between paper companies and raspberries, the berries have important roles to play in the forest ecosystem. They're a significant source of food for wildlife. They sprout up in clear cuts and other disturbed areas for a reason, to protect forests from erosion and drying out in the sun.

Farmers can face a similar situation with unwanted plants when plowing certain fields. For them, it can be rasp-

berries and broadleaf weeds, such as mustard and kale that do the invading.

Neil Crane, Farmer: Though it is costly in terms of yield because it robs nutrients and can shade out the plants, but also, it bothers with the equipment, mechanically. It'll plug up the equipment.

Male: Are the leaves narrow or narrowly land-shaped versus broad?

Linda Gregory, Botanist: They are narrowly ?land- shaped.

Dana Hutchins, Segment Host: It's surprising how vigilant botanists need to be about invading plants. Brand new species have to be watched to see how they interact with existing species, and even plants that have been here co-existing peacefully with their habitats can suddenly turn on them and become an invader.

It's probably safe to say few of us realize what goes on behind the scenes with botanists. To us it looks like it should be a rather serene field of study, but now we know better.

Linda Gregory, Botanist: My mission here is to preserve the biological diversity I see here, and some that I can't see, dragon flies, invertebrates, insects, fish, birds, and all the plants.

Chris Campbell, Plant Biologist, University of Maine: So people should, if they are concerned about what our future environment's going to look like, they should be concerned about what they're doing in the present, exotic organisms.

Ken Laustsen, Great Northern Paper: And that what's drives me, it's not the same old thing every day. There's always something different to address. You keep sharp, trying to think of new ways to do things better, or ways to help some of the people I work with, so that they can do their job better, and that's what makes it fun for me.

Music

Christine Young, Program Host: It's vascular plants that we typically think of when discussing plants. Vascular plants are able to move sugar, water, and salts around in their stems and leaves, but Maine has many more kinds of plants, such as fungi, lichens, and mosses. Maine has up to 5,000 separate species of these kinds of flora. On average, they make up about one-third of the ground cover in our forests. Kate Arno explains why these under-rated plants are as much a part of the diversity of our plant life as the more obvious and showy species.

Music

Alison Dibble, Botanist, United States Forest Service: I think it's possible there are many plants, insects, animals that we don't understand very well. They may have been ignored because perhaps they're small or they aren't very noticeable compared to larger, showy organisms and species such as Orono sedge do have an importance in the ecosystem that we only begin to guess at.

Kate Arno, Segment Host: The Orono sedge is easily mistaken for a common weed. Many of us wouldn't even notice this rare plant when we're walking through weeds and brush, but the only place in the world where the Orono sedge grows is right here in Maine and that makes it very uncommon.

Alison Dibble, Botanist, United States Forest Service: This plant, Orono sedge, is found only in Maine and, in fact, in only part of our state and is our only species that we know of that has that particular geographic distribution.

Kate Arno, Segment Host: Dibble has found 60 sites in the state where this sedge grows. The best place to look

for it is in hayfields, but you have to look hard. It's not that obvious.

Most Orono sedge sites are small, with fewer than 20 individual plants. Some sites are much larger, with a thousand or more plants. Botanist Alison Dibble has a theory that the sedge spread up the Penobscot River earlier this century in loads of hay sent to logging operations.

Alison Dibble, Botanist, United States Forest Service: We don't have proof for this, but it makes sense that Orono sedge could have been spread when hay was transported upriver in the late autumn or early winter to supply the horses and oxen that were used for twitching logs out of the woods and its seeds may have fallen as it was being moved.

Kate Arno, Segment Host: Because it's a weedy plant it's not been a high priority for conservation. It's taken a back seat to the only other rare plant that's found in Maine, Furbish's lousewort, which has a higher profile.

Sue Gawler, Maine Department of Conservation: It blooms in August, mostly, late in July, but here's a plant that is about to flower, it will be flowering soon. You can see that it's growing in this grassy vegetation, has leaves that look a little bit like ferns, but this, of course, is not related to ferns, and it has what botanists would call it inflorescences, which is just a flower cluster, and this becomes cylindrical and has little yellow flowers sticking out of it.

Kate Arno, Segment Host: Furbish's lousewort is even more uncommon than the Orono sedge. That's one reason why the lousewort is on the federal list of threatened plant species. The only other Maine species on a federal list is the small rural begonia which is classified as endangered.

Sue Gawler, Maine Department of Conservation: We try to assess the rarity of various plant species in Maine, those that might be either endangered or threatened or simply rare, and to do that we gather information on their abundance and distribution in the state and we sit down with our botanical advisory group and collectively determine which plants should be listed as endangered, which plants should be listed as threatened.

Kate Arno, Segment Host: Maine has many rare plants that do not show up on federal lists. Two hundred fifty-four species found here are considered rare, threatened, or endangered. That's 17% of the total number of plant species.

Susan Hayward, Orchid monitor: A considerable amount of the assessment that we do is just, especially when it comes to orchids. Now with other rare plants, they've got a little bit more of a handle on it, but orchid research is, I think, in its infancy.

Kate Arno, Segment Host: The showy and ram's head lady slippers are stunning examples of several fragile species. Both the showy and ram's head are orchids similar to the more common pink, yellow, or white lady slippers. Neither the showy or ram's head lady slipper is now on the federal protection list because they have become more common in other parts of the country. But as a species in Maine they're still very much at risk.

Susan Hayward, Orchid Monitor In the '80's we've had as many as 150 plant stems that we've counted and it's been a much more robust population. As in 1996, we've had a very wet spring, and so, they could be healthy, they could be robust, they could be having plenty of wetness that they need, but a more important factor is the previous two years that it was dry.

Kate Arno, Segment Host: The state classifies the ram's head as threatened.

The showiest rank as extremely rare. Here in the sanctuary owned by the New England Wildflower Society these rare orchids are so zealously guarded we had to keep their location secret.

Susan Hayward, Orchid Monitor: That's the role that an organization like the New England Wildflower Society that can step in and acquire some of these properties and put it into private ownership and assign a steward to the property and assign somebody like me to monitor it and because the resources, the monetary resources just aren't out there to have paid Ph.D.'s in every one of these spots doing hard research on them.

Kate Arno, Segment Host: One of the reasons there are places like this bog sanctuary is because there is no law saying you can't disturb the rare plants listed by the state and legal protection for those plants listed by the federal government has some loopholes.

Federal law prohibits people from going to other people's property to disturb listed plants, but people who own land where rare plants grow can do what they please with their plants.

Alison Dibble, Botanist, United States Forest Service: One could ask if conservation laws are fair and who should pay for them. I would like to see a system that had more incentives for landowners to manage rare plant habitats so that the plant could stay there.

Kate Arno, Segment Host: Even when rare flora is protected by an environmental group serious about its future, there is no guarantee that the plant will be safe.

Take for instance the northern blazing star which blooms in August with striking purple blossoms. The blazing star is also classified as threatened in Maine. Most of the world's remaining blazing stars are found at the Kennebunk plains in an area protected by the Nature Conservancy, but there is more than tender loving care to keeping these beautiful purple flowers away from the brink of extinction.

Peter Vickery, Research Biologist: I guess I really enjoy trying to learn and understand about how a particular plant and a particular habitat works and I'm trying to get as deep as I can into what are the forces and factors that seem to really affect this landscape. This is northern blazing star, and one of the things that interests us is the fact that there are caterpillars that live in these flower heads. Each of these is called a flower head and the caterpillars like to feed on the seeds, so you can see right here that there's a hole and, really, the entire seed has been eaten internally.

Kate Arno, Segment Host: Two hundred fifty-four rare, threatened, or endangered species seems like a lot for Maine, but as a percentage of the total number of species it's not out of line with other states. Because Maine is 90% forested, it's also not unusual that most of the plants on the lists are from the forest.

There are no one-size-fits-all conclusions scientists can draw from how forest practices, like logging, affect forest flora. It seems to depend on the individual species of plants. A species that needs partial shade will not do well in a clear cut. On the other hand, a flower like the showy lady slipper declines under heavy tree canopies and appears to do best when the forest is thinned.

Sue Gawler, Maine Department of Conservation: It's difficult to generalize about forest practices. I think the people need to be careful, to look at forest practices in terms of what particular parts of the natural world they're trying to conserve.

Kate Arno, Segment Host: Scientists know for certain that Maine has lost 32 species of plants. More than half of those lost are southern Maine plants and that's because the southern part of Maine has more peripheral species, those on the edge of their natural range. Some southern Maine species are struggling because of long-term climate changes. Since the last Ice Age it seems Maine was warmer than it is now. A few reminders of those warmer times are the wild dogwood and rhododendron.

Sue Gawler, Maine Department of Conservation: Flowering dogwood. Beautiful tree. It grows in one or two locations in extreme southern Maine. As you go southward it becomes a forest understory dominant in places, so from the New England perspective it's not rare, it's all over the place. From a Maine perspective it is extremely rare, but by having the New England perspective along with that, it helps us focus a little better; it helps us understand what's of conservational importance, maybe.

Kate Arno, Segment Host: But keeping track of the number of species as a measure of the health of our plant life has its limitations. Until recently we thought the more species the better for the sake of diversity in the biological world, but by merely counting the number of species we leave out the variety of plants found within certain species.

Sue Gawler, Maine Department of Conservation: When you're dealing with biological entities, you're dealing with genetic diversity and you're dealing with evolution and those things happen at a very fine scale sometimes and by getting a fine enough resolution to look at say, a particular subspecies, or maybe a particular hybrid, you're able to get a better view of how evolution may be working.

Kate Arno, Segment Host: The size of a plant's population also can be a good indicator of its health.

Male: You can count by the clasping leaves, see how hairy the stalk is, and the ...

Kate Arno, Segment Host: There may be several sights in Maine where a rare plant is found, but how many plants grow in those sights says a lot.

Botanists are increasingly looking for a wider lens to determine plant diversity. Maine is mosaic of distinct ecosystems that if maintained as a mosaic, will continue to support a wide variety of plant species.

One way the state of Maine can be dissected is geographically, into 15 very diverse biophysical regions. On one end of the state there is the boundary plateau, which is relatively flat and featureless with the harshest winters in Maine and half as few frost-free days as southern Maine.

There is the Aroostock Hills scattered with peatlands and bogs.

The central mountains, including Mt. Katahdin, is known for Arctic alpine vegetation and the most geographical relief of anywhere in the state. And there's the east coastal region of low ridges surrounded by flat terrain, which in the summer, shrouded by fog for twice as many hours as other sections of the Maine coast.

Janet McMahon, ecologist, Nature Conservancy: The gradients are really steep for topography and climate and we've got the effect of the ocean, all those things work together and, as a result, you end up with types of wetlands and peatlands that you only get in Canada that come, creep into Maine, or you get pitch pine forests which are common in New Jersey creeping up into southern Maine. So there's just a lot of species here that, hundreds of species in the center part of the state that you don't get to the north or to the south.

Kate Arno, Segment Host: McMahon hopes that her biophysical classifications will be used in tandem with maps showing the state's diversity, such as a list of about 100 natural habitats that support interacting plants and animals that recur or cross the landscape. They're all considered biological communities.

Janet McMahon, Ecologist, Nature Conservancy: For ones called biophysical classification, and that's very regional. It goes, it divides the state into 15 different regions based on the types of landscapes you'd see, and the other is looking at the groups of plants and animals you see on the landscape, natural communities of things. It's like a

spruce fir forest or a northern hardwood forest or a poplar forest, those would be natural community-types.

Kate Arno, Segment Host: McMahon is one who thinks Maine needs to do more to focus on habitats to protect plant species. To her, the best way to do that is by setting aside areas called reserves where plants can just be. To a degree Maine has done that with public and some private land, but she advocates an even more comprehensive reserve system that scientists can study.

Janet McMahon, Ecologist, Nature Conservancy: It's sort of, like, not having a library, or a reference library. I think it's important to have one. If you didn't have one you couldn't learn, you wouldn't learn as much. If you had one you'd learn more.

Female: and look at the mosses and the liverworts growing on this.

Female: What is that one? What do you have on that tree you just touched?

Female: Bizania, chalobeda..

Kate Arno, Segment Host: To help document what has been set aside in the state an ambitious and exhaustive inventories is underway on public lands and private reserves across Maine. The search is for exemplary natural communities.

Janet McMahon, Ecologist, Nature Conservancy: I'm a science nerd so, in some measure so this project really gives us a chance to ... I like the quantitative sampling and the cataloging of what's out here, but we've had the good fortune of discovering a couple of plants that are new to Maine. No one has ever seen them here before.

I mean, it's kind of mysterious because there have been any number of places that we've looked and said "this thing ought to be here, it ought to be here" and it wasn't, and on this particular site it was there.

Jill Webber, Plant Ecologist: I feel like we're just so lucky. We've had a chance to be in front of the neatest places in Maine.

Kate Arno, Segment Host: In each study area they indicate the types of trees they encounter and their size and which types of plants and soil they find.

Sally Rooney, Plant Ecologist: We're after real hardcore data as opposed to just going in and doing an inventory without sampling. This, well you've seen, I mean, we have to do soils and tree tallies and, we're actually getting data that can be analyzed and

Jill Webber, Plant Ecologist: We getting quantitative data.

Molly Docherty, Maine Natural Areas Program: And we're working to get our entire data system into, over the Internet and so that people can get into areas and find out what species potentially could occur in their back yards or in the towns.

Kate Arno, Segment Host: There are other inventories in Maine that are teaching us more about our plant diversities. The Appalachian Trail Conference is doing an inventory of its own, collecting data from each state on rare plants near the trail so hikers can be diverted from them. And for future informational signs along the trails scientists are making a list of natural ecosystems they find. This past summer botanists took an inventory of sections on the Appalachian Trail near Greenville and along the Kennebec River near the forks.

John Lortie, Naturalist: It's great! It's great to see a rare species. I keep track of the plants I've seen and to find the species that I've never identified before. It's thrilling. Oh, it's a biological science; it's a botany science. It's a study of living things and it's more of a basic research where you're going in and identifying whether a plant occurs in an area or not, and if we do have an occurrence we try to define the micro habitat in which it occurs and then use that information for other studies.

Kate Arno, Segment Host: Most of us are aware that species of plants are being lost forever and we humans are the cause. It asks us to define terms like biodiversity or loss of habitat and most of us can't. Yet we expect, and even encourage, scientists to make the case for conservation.

Alison Dibble, Botanist, United States Forest Service: There could be something about each species or its connectiveness with other species that we don't yet appreciate and for us to ignore that makes us all poorer.

Kate Arno, Segment Host: Scientists will probably continue to come up with even more reasons to protect wild plants; that's their job and oftentimes they're the best advocates plants have, but we all recognize the sheer strength these small wonders of the wild have for lifting our spirits.

Christine Young, Program Host: Biological diversity is a term that means very little to most of us, but virtually all of us know that we're losing some plant species and we realize we're to blame, but so far most of us are not alarmed. Recent surveys suggest that we feel it's all right if some species are eliminated and that it's okay to feel that saving jobs is more important than saving habitats, but at the same time we realize that the debate about which species should be saved is far from over.

I'm Christine Young. I hope you've enjoyed our program and I hope to see you next time on Quest.