

Quest #106 - Maine Woods

Countdown and Promo:

(Christine Young, Program Host) Coming up on Quest ... Maine forests are thriving, despite warnings that logging is ruining our woods. We'll see how easily trees grown in Maine and how easily forests can restore themselves. Yet, there are problems in our woods that we haven't figured out. Like the best way to deal with pests and forest fires. We'll see if nature does know best in these circumstances. And, we'll hear why more and more scientists say clear-cutting can actually improve the diversity of plant and animal life in our forests. That's what this Quest is all about.

(Narrator) Maine Public Television's production of Quest, Investigating the World We Call Maine is funded through a television demonstration grant from Rural Economic and Community Development, part of the USDA.

Opening Music

(Christine Young, Program Host) No matter where you are in Maine, you are never far from a forest. Even here, along the coast, at Bowdoin College's Thalheimer property. Maine has more forest than any state in the nation. One reason trees are so plentiful here is that both northern and southern species can grow. There was a time when we took our forests for granted, and nearly logged trees to extinction. But our north woods have a good track record for rebounding. Dana Hutchins explains.

Music

(Dana Hutchins, Segment Host) From this perspective, all of Maine looks like forest. Essentially, that is true. Ninety percent of the state of Maine is forest. Despite all the cutting of the last 350 years, the north woods of Maine are thick and thriving. Jim Robbins is a fourth-generation sawmill operator and forest land.

(Jim Robbins, Robbins Lumber) "When I walk out here in the woods and I see a white pine that's grown 30 inches or maybe even four feet in one year; knowing what the tree is going to be 50 years from now, that really gets me excited, just seeing that good growth on the land."

(Dana Hutchins, Segment Host) There are several different kinds of forests in North America. Maine belongs to one called the transition forest. It's called transition because, here, the conifers of the northern woodlands blend with the hardwoods of the more temperate, southern parts of North America.

This is as far south as most spruces and firs will range and as far north as many deciduous or hardwood trees will grow. The transition forest is most apparent in the fall, when red, yellow and orange crowns of deciduous trees fuse with the dark greens of surrounding conifers.

(Maryann McGarry, Maine Forest Service) "You have the spruce, fir in the north and the east generally, and then you have the hardwoods in the southern part of the states that tend to dominate. And, then in between, it's not a definite boundary, but you have a mixture and certainly in the north, in what's often called the boreal forests, you can get ridges of the hardwoods that you tend to associate with the south. So there's a lot of mixture. It's not exactly like Neapolitan ice cream-chocolate, vanilla, and strawberry-as you go up the state, but there's the two dominant types and then the transition is really the mixture."

(Dana Hutchins, Segment Host) There is no abrupt line to delineate the change from the northern to southern forests. This curving band of mixed forest types, which is no more than 100-150 miles wide, runs from Minnesota

to New England, to the Maritimes. All of the trees of Maine are of the transition type, and Maine has many trees. It's the most heavily forested state in the country. Why do we have so many trees? Part of the answer originates with our geology.

The last ice age sent glaciers across Maine and the northern tier of states in North America. As the ice sheets melted, the surface of Maine was rearranged. Rocks and till were left in the wake of ice sheets. This glacial debris was broken down into shallow soils by the work of fungi and lichens. Since the ice sheets never reached south of the Ohio and Missouri rivers, North America's more temperate forests were left intact. Between ice ages, they served as seed sources to get the northern forests launched again.

As the ice melted, wind, birds and mammals transported the seeds of many hardwood trees to the north.

(Mike Greenwood, University of Maine Tree Physiologist) "The forest has only been here for nine thousand years since the last glacier melted. It's a new forest. We don't know how long it will be here because we don't know when the next ice age will start."

(Dana Hutchins, Segment Host) Since the soils left by glaciation are often acid and fragile, spruces and firs have done best in the colder places. A mixture of maple, beech and birch are found in slightly warmer areas, and in the sands and gravels left by the grinding of the glaciers, white pines have prospered.

Another reason Maine forest is a transition one is because of our climate. There are no mountain ranges high enough to block the flow of cold air from the north or to keep out hot, humid air from the tropics. As a result, Maine and the rest of the east coast lie directly in the path of air masses from both the north and south.

Across the transition forest, precipitation is an evenly distributed 30-40 inches a year, reaching greater amounts in northern Maine. That is not the case in south and the Pacific northwest, two other heavily forested areas.

(Bob Seymour, University of Maine Silviculturist) "There are other forests other places which have dry climates during the growing season. Maine is not like that. This year was an exception but, in general, it rains during the summer in Maine so that moisture is generally not a limiting factor like it can be in a lot of forests throughout the world."

(Dana Hutchins, Segment Host) Productivity in the transition forest is remarkable, and trees can reach immense proportions. Unlike most other forests, the transition forest can sustain itself, meaning it grows easily.

(Jim Robbins, Robbins Lumber) "I can tell that this tree has grown this much in three years. Here is a terminal leader here and this summer, starting in probably early May until about mid-July, this tree grew this much right here, and that's about 30 inches on this particular tree. Last year it grew about the same amount. This is last year's growth, and this is the year before. So, you see, in three years, this tree went from being about, what's that, about two feet high to about eight feet high."

(Dana Hutchins, Segment Host) But in all forests, there is a certain amount of tension. A constant competition among trees for available sunlight, minerals and moisture. All this makes the methods we use to care for our forests, called silviculture, a real challenge.

(Lloyd Irland, Forest Economist) "When foresters devise prescriptions for treating stands, they have to consider a large number of things, and we call the basic science and practice silviculture. Many of the things that are considered include the environmental regulations, the landowners future objectives for the stand, the current conditions on the land, and logging and operating, and marketing considerations."

(Dana Hutchins, Segment Host) Trees can pick up moisture not only from rain, snow, and the subterranean flow of ground water to the roots, but also from dew and vapor in the air. As water works its way through soil, it is absorbed and stored in considerable quantity by mosses and other plants and by leaf litter. Some water even makes its way back up through the tree and gets released to the air by transpiration.

(Bud Blumenstock, University of Maine Cooperative Extension) "Think of the tree in these general terms. The tree is a pump and the forest is like a reservoir although we don't see the water.

Much of the water that we use in New England has a source in the forest. The forest is a place that kind of recycles water. I think it is not hard to say that the water that we drink today that flows out of our faucet was recycled by a tree yesterday."

(Dana Hutchins, Segment Host) Just as intricate is how trees get their nutrients like carbon, oxygen, hydrogen, and nitrogen. Billions of microorganisms help. In the soil, these microscopic workers digest plant debris on the ground and convert it into the nutrients required for forest growth.

(Maryann McGarry, Maine Forest Service) "Microorganisms secrete enzymes that help break up the woody tissue, decomposing the material changing it to nutrients that can be readily utilized by trees and absorbed through moisture through their roots."

(Dana Hutchins, Segment Host) Even when one species dominates a forest, this will either preclude or make possible the growth of the next or successive species. In any forest, the tree with the greatest ability to withstand a wide variety of conditions is the one most likely to dominate. The sugar maple has wide tolerance for many kinds of weather. It can tolerate vigorously growing neighbors and shaded conditions. The sugar maple also can share dominance from place to place and lives long, up to 400 years. Any fir, spruce or other plant that manages to get started on open land must compete with thousands of maple seedlings and other fast growing saplings called pioneer species.

(Bob Seymour, University of Maine Silviculturist) "That pioneer vegetation stage is really just a safety valve, an ecological safety valve, which has evolved to make sure that there is always some vegetation to colonize heavily disturbed areas so that nutrients don't leak out of the ecosystem, that the forest soil is protected from erosion and these sorts of things."

(Dana Hutchins, Segment Host) White pines do better than other conifers in the Maine Forest because they grow faster and root deeper, and red spruce has become the preeminent species on mountain summits.

(Bob Seymour, University of Maine Silviculturist) "Red spruce tends to dominant not just mountain tops but also sites that are poor from a fertility or a drainage standpoint where hardwood species and potential competitors of them just can't exist."

(Dana Hutchins, Segment Host) Scientists used to think forest reached a certain equilibrium where the species most able to adapt flourished. Scientists are now much more cognizant of the natural cycles of the forest, growth, maturity, death, followed by new growth.

(Dana Hutchins, Segment Host) These natural cycles have been interrupted by humans. Native Americans often rearranged the landscape to suit their needs. They cleared land for agriculture and burned some forests once or twice a year to keep them open, more parklike and to fertilize the soil. The native efforts to control the forest were on a much smaller scale and what came later with European settlement. White pine was the most important tree to early settlers in New England. It has been called the most useful wood our country has ever possessed.

(Bob Seymour, University of Maine Silviculturist) "White pine is a wonderful wood. Any woodworker knows how wonderful white pine is. It has wonderful properties in terms of being useful for all kinds of building materials."

(Dana Hutchins, Segment Host) The first commercial use of Maine trees was as firewood. Not long after that, the British saw to it that large quantities of tall and straight pines and spruce in Maine were saved for the British Navy for masts. This practice of taking the best pines for the King was certainly not popular among settlers. There were other wood products Maine supplied the British. Hemlock bark for tanning, oak for barrels and casks, and fine quality hardwoods for potash. Later, Maine lumber for railroad ties was in high demand. The most treasured wood was the so-called pumpkin pine which was not only light and strong but pumpkin gold inside. It also was so soft and smooth; it could be easily worked by craftsmen, and it was used widely in making houses, furniture, moldings, fan lights and even figureheads for merchants and whaler ships. Maine became a ship building giant before long and, by the time of the Civil War, Bangor was the lumber capital of the world.

(Bud Blumenstock, University of Maine Cooperative Extension) "Logging has been a major industry in Maine for all the time that people have been here. One of the things invented in Maine was the lumber log hauler. If you'll picture a train going through the woods without rails, this particular train operated on a continuous track, and these eventually became what we see as bulldozer tractors today and tanks, and that was the Hoag tractor and later on the caterpillar tractor."

(Dana Hutchins, Segment Host) At the beginning of this century, large mature white pines had been nearly eliminated from northern forests, but today white pines are slowly returning. Jim Robbins is doing all he can to speed up the return of the valuable white pine for his lumber operation, but he has encountered some surprising problems.

(Jim Robbins, Robbins Lumber) "The biggest problem that we have with reproduction in the forest is usually too much reproduction. You know, like I came into this area here and we planted this area but then the over story also reseeded it and many times, you know, we will have thousands of seedlings per acre, and what we need to do is get in there and thin out those young trees so they can grow more vigorously."

(Dana Hutchins, Segment Host) What used to be the less desirable species, spruce and fir, now have preferred status in the Maine woods. Spruce and fir fuel the state's huge pulp and paper industry which makes up two thirds of the state's forest industry. Spruce in particular is easily bleached and has strong fibers, both very important in making paper.

(Bob Seymour, University of Maine Silviculturist) "Spruce has very long fibers which gives strength to the paper. It does not have a lot of pitch in the wood, so it does not gum up the paper machines. It can be ground through a mechanical process into pulp without using chemicals. All these things were a special asset when the paper industry first began making paper out of trees which was back in the late 1800's."

(Dana Hutchins, Segment Host) This is a seven billion dollar industry. Maine is the only state in the northeast where employment in forest-based manufacturing exceeds that of recreation. That's because most of our forests are privately owned.

(Joanne Tynon, University of Maine Forestry Management) "The reason we have a greater economic impact from forest products than in tourism in the state of Maine is because we have more trees and more forests in Maine than the other New England states."

(Dana Hutchins, Segment Host) Of all of the areas in Maine the trees have been growing on since the last ice age, just 5% remains undisturbed. Only in higher, hard-to-get-to places and in specially protected reserves can

remnants of the original forest be seen. Yet forests in Maine and the rest of the northeast are still expanding, and Maine is now a wilder place than it was 100 years ago.

(Bud Blumenstock, University of Maine Silviculturist) "You cannot keep trees from growing in Maine. The question is the quality of that forest. Will it be the forest that we experienced or our kind of predecessors experienced? Will it contain a diversity of species? We don't know the answers to these questions, but there certainly will be trees. Yeah, that's for sure."

(Christine Young, Program Host) But even healthy and expanding forests have checks and balances. Insects and forest fires sometimes get the upper hand. How do we handle these natural disturbances that can lay waste to portions of our healthy forest? Do we ignore these occasional disasters or do we try to prevent them? These are Questions that scientists have long debated, but they may have some answers now. Kate Arno has the story.

(Kate Arno, Segment Host) Despite the enormity of Maine forests, we are finding that they have a very vulnerable side. Natural catastrophes can happen, and one of the most dramatic is forest fires. This raging forest fire was caused by lightning.

(Thomas Parent, Maine Forest Fire Control) "Well, the fact is that Maine does have large fires that the west has. The difference is the frequency in which they occur. In the western part of the country, it seems to happen as an annual or semi-annual event whereas in Maine or the northeast area, it happens more in large intervals of time. It might be 10, 20, or 30 years between large fires."

(Kate Arno, Segment Host) Over the years a series of natural calamities have claimed huge hunks of our forests. Not long ago, scientists decided there might be a reason for those calamities and a new theory called "Nature Knows Best" was launched. Forests need to be thinned out now and then, so scientists began thinking mother nature had ways of doing that, by knocking trees down, infesting an area with pests or burning them. Although forests of the Eastern United States usually receive more than adequate rain and snow fall, once in a while they suffer droughts like in 1995. Electrical storms also can set off fires. One single lightning strike can ignite scores of fires. It is not believed that fires have played a major role in the development of forests for millions of years. After a forest fire, pioneer species like birch and aspen will spring up before any other trees. But before long hardwoods will take root and compete with the other trees hampering their growth and crowding them out. As new trees begin to grow in a burned area, new types of habitats are created for animals. Fires stimulate the important cycle of death and regrowth. They also release more nutrients into the soil for future growth, but there can be some real downsides to forest fires.

(Thomas Parent, Maine Forest Fire Control) "If a fire burned very intensely where it removed the organic layers from the soil and you are down to mineral soil it would be a very, very long time before you have what we call trees coming back to the site."

(Kate Arno, Segment Host) The forest floor can be made sterile by fire eliminating nutrients. Runoff and erosion can follow. The ashes from forest fires can leach into waterways and be fatal to fish. Also, wildlife can be killed in fires. The Maine Forest Service was created more than 100 years ago largely because of citizens concerns regarding forest fires. At one time, there were 103 fire towers in the state. Of the 28 towers that are left, the state no longer staffs any of them. It relies on fly-overs instead. In some Maine towns, volunteers from local fire departments still man the towers in dry weather.

(Keith Goodrich, Mt. Hope Tower Volunteer Observer) "Ninety percent of Maine is woods, and it is a pretty important resource and it means a lot of money to the people of Maine and to individuals and a lot of jobs."

(Kate Arno, Segment Host) Windstorms also are effective at thinning trees out for new growth. What is called

wind throw is common in Maine because there is so much shallow glacial soil. Hurricanes and ocean gales also level trees, but the "Nature Knows Best" theory has come under fire in recent years and forest fires in particular play right into that current debate. Scientists know that much like the human body, forests are always adapting to constantly changing conditions. Forests find ways to grow back even after devastating fires or to regroup after debilitating diseases. What this means is that the "Nature knows Best" concept may have limitations because the geologically young woods of Maine are a work in progress. Not to mention all the major alterations man has caused in the last 300 years that forests have had to adjust to.

(Bill Livingston, University of Maine Forest Plant Pathologist) "Some of our most severe problems have been in the forest as a result of introduction of foreign pests. Unintentional, but people bringing in trees, usually from Europe, and the pests were on the trees and then spread to our natural forests."

(Kate Arno, Segment Host) The forest products industry has had its doubts about the Nature Knows Best theory all along, and that is why some of our most dreaded pests and diseases also have a role in this ongoing controversy. Like all eastern forests, Maine has inherited a native natural scourge, the spruce budworm. The worst pest in Maine history didn't come from away. It was right here and the spruce budworm does its work on our most economically important forest. The budworm is no bigger than a quarter of an inch, but it has specialized mouth parts for chewing needles.

(Dave Struble, Maine State Entomologist) "Very early in the post glacial period when spruce and fir became established, budworm was part of the system. It has adapted with the system. You get these periodic buildups and a harvest of the fir primarily fir and spruce, a new forest regenerates, and they harvest again. So, you've got a self-regulating system."

(Kate Arno, Segment Host) The budworm will go into outbreak mode every 30 to 50 years killing millions of spruce and fir trees. The spruce budworm is not only native to the Maine woods, it seems to dictate the cycles of the spruce and fir forests. The spruce budworm essentially harvests its own crop of trees. Large areas of mature or over-mature spruce and fir are the target.

(Dave Struble, Maine State Entomologist) "As the buds develop, I mean, you've got high sugar content, you got high oxins, you got all kinds of things that are available. Oh yeah, we're talking about the breakfast of champions here, and they feed and develop very rapidly."

(Kate Arno, Segment Host) The first notorious Maine outbreak of the budworm this century was in 1910. Another more devastating outbreak began in the late 1970s when 26 million cords of wood died.

(Dave Struble, Maine State Entomologist) "I remember going to drive-in movies with my wife. It was in the mid '70s, and they shut the movie down. It looked just like a snowstorm. You couldn't see the screen because of all the moths attracted to the light on the screen and to the projector."

(Kate Arno, Segment Host) Most of the wood was salvaged by widespread clearcutting. It translated into nearly 2000 square miles being clearcut because of the budworm. That's an area the size of Delaware.

(Dave Struble, Maine State Entomologist) "There was a tremendous amount of salvage work that went on. There was pre-salvage that went on. Don't wait for it to be damaged. There was a school of thought that said we can manage this silviculturally if we can get the proportion of fir down in the stands."

(Kate Arno, Segment Host) Even before that disaster, the state had begun aerial spraying of insecticides in the 1950s. At first, the chemical DDT was used. Once DDT was banned, pesticides such as organophosphates have been used. Millions of dollars and much effort has been spent on getting rid of pests, but most often without any

success. Now, scientists are convinced we should not even try to eradicate the budworm or other pests.

(Stephen Woods, University of Maine forest entomologist) "Most insects we cannot control to the point where we can actually eradicate them. It is just not possible. It has been tried. It doesn't work. So, the alternative is to try to manage the population so that we can keep them below certain thresholds where they do significant damage."

(Kate Arno, Segment Host) Woods believes to control pests there must be a diversity of insects in the forests. If there is diversity, there are fewer outbreaks.

(Stephen Woods, University of Maine Entomologist) "The idea here is that the more complex the environment the more stable it will be, the more easily it will adapt to disturbances such as a pest outbreak."

(Kate Arno, Segment Host) Insects can have long range value to forests. This is one of many food chains in nature that we don't often see. Through improvements in mapping and computer data storage, those in the forest products business can now more easily find and get rid of susceptible species. But they have not fully bought off on the notion of natural cycles being the best for the forests.

(Carl Haag, S.D. Warren Forest Research) "Mother Nature sets up an environment of feast or famine. There will be a tremendous supply, and then there will be none. What our forest management practices are attempting to do is to increase the total supply and to make it much more predictable as to how much we are going to be able to harvest per unit time."

(Kate Arno, Segment Host) Segments of the forest industry think science can help it limit pest outbreaks and tree mortality by coming up with genetically superior trees.

(Katherine Carter, University of Maine Forest Resources) "One example of the kinds of increases that you can get would be with white spruce. You can get improvements of 10-15% in height, and you can get also improvements in resistance to common insects such as spruce gall aphid."

(Carl Haag, S.D. Warren Forest Research) "If you compare our planted acres with what would have taken place on those acres had they regenerated naturally, we will realize a 220% increase in volume production and a 41% decrease in the length of time it takes to get that wood."

(Kate Arno, Segment Host) But paper companies rarely replant more than 5% of the areas they cut because trees grow so rapidly here. Several paper companies have seed orchards in Maine. Seeds are collected and grown in greenhouses and later planted in the field.

(Katherine Carter, University of Maine Forest Resources) "A company would decide to create its own seed orchard based on the genetic information that we found in our research, and then they would use the seed from that seed orchard to put into their planting program thereby increasing the yield from their managed forests."

(Kate Arno, Segment Host) On a much smaller scale, more localized infestations of the gypsy moth and the hemlock looper and diseases such as the white pine blister rust also have afflicted Maine forests. The forest industry considers many of these pests and diseases to be threats to their livelihood of growing marketable trees. That is why the industry still uses some insecticides in the woods, but much more widespread is the use of herbicides. Herbicides are used to suppress the growth of competing species.

(Maxwell McCormack, University of Maine Forest Resources) "Species composition is more desirable. The trees are growing faster, and the forest manager has options whereby he or she can carry out further management

and make the stand productive.”

(Kate Arno, Segment Host) Lower quality hardwoods such as white and grey birch, red maple, and pen cherry have sprung up in areas where spruce and fir have been heavily cut. When applied properly, McCormack says herbicides can triple the growth rate of young spruce and fir.

(Maxwell McCormack, University of Maine Forest Resources) “This is a tree that comes from an untreated portion. That is a cross section of a tree in a treated area with thinning. If anything, this tree was larger, taller at the time of the treatment than this tree was, so what you see here is the result of first herbicides, then precommercial thinning. Without silviculture, with silviculture. Hey, if you are going to bet money on one of these trees, go with this one. Don't waste your time with this.”

(Kate Arno, Segment Host) Environmentalists have long argued these chemicals harm the forest ecosystem.

(Jonathan Carter, Maine Green Party) “So, we are talking about toxic chemicals sprayed in order to kill those hardwoods so that their softwoods can come up, and they are doing that on about 55,000 acres a year.”

(Kate Arno, Segment Host) But there is a growing body of scientific data to suggest that herbicides do not have lasting effects on the forest's environment and more spraying could be done safely in Maine.

(Maxwell McCormack, University of Maine Forest Resources) “Studies from many years have shown that if there is a change, there is an increase in the numbers of species present, not elimination or decrease. Proportions change, but never have I seen in over 30 years of working with this technology elimination of a plant species on any study site.”

(Kate Arno, Segment Host) Besides economic concerns, there are other complicating factors for today's forest. Scientists now believe they have proof that natural and man made forces in the forest sometimes gang up to thin out trees. Red spruce used to be among the healthiest trees in higher elevations of the north east but in the last 10 years, red spruce has turned into a real mystery after numerous trees stopped growing and died.

(Dick Jaegels, University of Maine Forest Biologist) “There have been reports of red spruce dying at high elevations in the Adirondacs and in the Green Mountains of Vermont. The only thing that was correlating with them was exposure to cloud fog that was very acid. We began a project on the coast of Maine so we could look at trees that were also bathed in fog but which would be relatively pristine fog.”

(Kate Arno, Segment Host) In the midst of all the study for causes, the problem of red spruce showed up along the Maine coast as well, and that led scientists to begin analyzing coastal fog. Jaegels has found the coastal fog is probably more damaging than the acids carried by clouds at higher elevations.

(Dick Jaegels, University of Maine Forest Biologist) “I would have been surprised also before research began to show that because you think of clouds as being pure distilled water that has evaporated and condensed, but it's really the fact that this water is recondensing around some kind of nuclei, and in an area where there is no pollution that might just be inert dust particles but in an area where there is pollution then those pollutants become part of that fog.”

(Kate Arno, Segment Host) Scientists have found pollutants affect tree species differently. Pine is more sensitive to ozone, and red spruce is more sensitive to acid fog.

(Dick Jaegels, University of Maine Forest Biologist) “Some of the things we know that polluted fog does is that when it deposits on the leaf's surface it can affect the waxes that are on that surface and the waxes on a leaf

surface are very important in protecting leaves from desiccation, from infection by fungi, from damage by ultraviolet light; for a number of reasons these surface waxes are very important on leaves.”

(Kate Arno, Segment Host) This is leading some scientists to conclude trees can be weakened by pollution and then other stresses can come in and damage them further, like cold weather, global warming or insects. These are called multiple stresses.

(Bill Livingston, University of Maine Plant Pathologist) “We are dealing with multiple stresses. The stresses that are there continuously, that each growing season or even on a daily basis that these are stresses that cause the tree not to grow as well but the tree has to persist with. These are always there. They set up the forest that we have today. Then we have the stresses that occur very rarely or might be unusual. Pollution is an aspect that trees have not had to deal with. Now, they have with it. Also, with potential climate changing. Now we are introducing climatic stresses that had not been there before. So now we are dealing with stresses that can cause the tree to go from a healthy condition into a diseased condition, and these are the ones we are focusing on, and then after that, after a tree gets into this sick condition, then we have additional stresses that can come in and actually kill the tree.”

(Kate Arno, Segment Host) The best thing about Maine forests is that our trees recover quickly from any set back. Even with the most destructive tree kills, it is not long before pines and other saplings begin the regrowth process.

(Christine Young, Program Host) But the biggest test for “Nature Knows Best” thinking could be if we undergo significant world climate change, whether it is global warming from pollution or a cool down from a pending ice age. That is a huge wild card now among scientists and those in the forest industry and has caused much dispute. Another protracted controversy over our forest could be called, “Do people know best?” The issue of clear-cutting has deeply divided Mainers for more than ten years and shows no signs of letting up. But as we hear in this report by Diana George Chapin science has new information on clear-cutting.

(Diana George Chapin, Segment Host) To some, the work of today's woodcutting technology can look as disastrous as a fire, insect outbreak or even an invasion from Mars. Ever since the 1950s logging has become increasingly mechanized. Gone is the romantic cry of “timber” as sawed trees crash to the ground. Also gone are many dangerous, backbreaking, and low-wage jobs. The equipment used today to cut trees and move them from the woods to the mills are loud and robotic. What used to take a team of loggers is now done by the single grip harvester with one person at the controls. The arm of the new harvester grabs the tree by the trunk, saws it off near the ground. It sucks the tree through its rotors, delimits, measures, and cuts the log to length and then piles it onto a nearby stack.

(John Cashwell, Seven Islands Land Company) “Historically in Maine the wood was harvested by men and bucksaws, transported by horses and the amount of wood that they could produce in weeks are perhaps is capable of being done by this machine in a day's work. I would say that two men on the end of a bucksaw would have given a great deal to be able to operate a piece of machinery like this.”

(Diana George Chapin, Segment Host) And hundreds more miles of logging roads in unpopulated, remote areas have been cut in the forests to move the equipment and wood around since the log drives down our rivers were stopped in the late 1970's.

(Jonathan Carter, Maine Green Party) Historically, around the world paper industries have looked at the short term. They have cut and run, and that is what is basically happening here today.

(Diana George Chapin, Segment Host) As unnatural as some of this appears to be, scientists think some har-

vesting methods can mimic natural disturbances.

(Mike Greenwood, University of Maine Tree Physiologist) "Man caused disturbances like clear-cuts or partial harvests are very similar to a spruce budworm outbreak which can completely take out a whole stand of balsam fir and red spruce or a blow down from wind which can also take out a stand or a forest fire which can destroy a large area as happened in 1947 in the great Bar Harbor fire."

(Diana George Chapin, Segment Host) But most clear-cuts are not partial disturbances. Partial disturbances caused by nature in Maine rarely are more than 100 acres large. Before the state began regulating clear-cuts in 1989, their size could and did range in the thousands of acres.

(Jonathan Carter, Maine Green Party) "You see what is happening now with the clear-cutting and all the road building that is going on. It has fragmented the forest tremendously and what we are finding in biological diversity and conservation biology is that fragmentation is extremely damaging in that it disrupts the continuity of genetic flow through an ecosystem."

(Diana George Chapin, Segment Host) Clear-cutting is an issue that cuts to the quick of emotions more than any other other issue in Maine but it is an issue full of complexities. The ecological concerns from large clear-cutting are well known. Since much of the lands logged in Maine are located in our watershed, large clear-cuts have caused erosion problems. Rain or snow melt can carry considerable amounts of soil into nearby rivers and streams which can ruin spawning grounds for fish. Silt build up caused by erosion also can reduce food production in inland waters by blocking sunlight needed for photosynthesis. But these days, logging roads are responsible for most of the erosion in the woods, and in some clear-cuts, the natural nutrient-rich litter created by a continuous supply of leaves, needles and branches falling from trees is eliminated. For years environmentalists have been advocating either no clear-cuts or at most small strips, hatches, or blocks of clear-cutting to minimize these impacts, but surprisingly a growing number of scientists believe clear-cuts serve a useful purpose.

(Bob Seymour, University of Maine Silviculturist) "Clear-cutting is probably the most loaded issue that we have in forestry, and there isn't any such thing as a good or a bad clear-cut. My own view is that clear-cutting plays a small but important role in managing Maine's forests."

(Diana George Chapin, Segment Host) The key to maintaining healthy forests in Maine seems to be to keep them diverse, but that is a term that means different things to different people.

(Marcia McKeague, Great Northern Paper) "It's a pretty complicated concept, and nobody can really get to the point where they can go right on the ground and say, is this biodiversity or not."

(Mac Hunter, University of Maine Wildlife Ecologist) "It depends upon what you are choosing to measure. If all you care about is-if you think about it as a black box, and this is my ecosystem, and I care about what goes in and what comes out, then maybe it doesn't much matter what happens within that black box, but if you are concerned about biodiversity, it matters a great deal what's happening within that black box."

(Diana George Chapin, Segment Host) A popular idea these days is to set aside more ecological reserves that would be left undisturbed such as the proposed three million acre North Woods National Park, and an even newer version on that theme is for ecological reserves to be left by large landowners for scientific study. That way, we may be able to bring back some of the plant and animal species that have gone extinct in Maine forests. But locking up large chunks of forests could be one of the worst things to do to enhance biodiversity. Biodiversity is improved if there is a variety of tree types and ages, but that won't happen unless trees like this are thinned out. Here in Maine where the growth of trees is so rapid, there usually aren't enough natural disturbances to adequately thin out our forests. That is why some in the scientific community argue clear-cutting can

actually improve biodiversity.

(Mike Coffman, Forest Ecologist) It is almost a certainty now the outcoming research over the last couple of years that clear-cutting adds a very valuable component of diversity into the forest system.

(Diana George Chapin, Segment Host) So what do we do with the idea ingrained in us that if clear-cutting looks bad it must be bad?

(Jonathan Carter, Maine Green Party) "In the very gross sense, people don't like to look at them. That makes it bad. The public does not like clear-cuts. Every single study and poll that has been done shows that the people of the state of Maine do not like clear-cuts."

(Diana George Chapin, Segment Host) Despite this, our forests prove time after time they're resilient. In Maine our forests made a full recovery from the wholesale plundering of the woods in the 1800s when there was little thought given to sustainability. Out of the Maine woods come huge quantities of raw logs for pulp and other wood products. Today, trees are skinnier than what used to be hauled out because they are not allowed to grow as old and big as in the early days of logging. Log trucks now carry 80 to 100 trunks in one load where before only 20 or so would fit. The overall health of the Maine forest is considered good and improving all the time. In some cases wildlife also is doing better. Most of the wildlife in Maine is dependent on our forests and in the past some species were completely eliminated such as wolves, caribou, cougar, and lynx.

Howling

(Diana George Chapin, Segment Host) Recently, there have been some success stories. There are now more moose and beaver in the woods than we know what to do with.

(Mac Hunter, University of Maine Wildlife Ecologist) "If I think about the timber harvesting that has characterized much of at least northern Maine over the last few years, some populations like moose benefit because they like relatively large openings, and other populations like white tailed deer have not done as well because the large openings do not create the kind of habitat they need and the kind of winter cover they need of continuous forests."

(Diana George Chapin, Segment Host) But it can be argued the well-being of Maine forests has improved more by accident than design.

(Mac Hunter, University of Maine Wildlife Ecologist) "It is obviously just the byproduct of the forest management that has gone on here. For the large industrial land base understandably they have mills to feed. Their interests are driven first by producing timber and secondarily they think about the consequences of that for other attributes like wildlife, aesthetics, recreation, water."

(Diana George Chapin, Segment Host) Scientists have decided the trick of silviculture is to mix clear-cutting with other harvesting methods. What that mix should be is the source of much debate.

(Mac Hunter, University of Maine Wildlife Ecologist) "A diverse forest is going to be economically more stable through time. It is very difficult to predict exactly what sort of products we want to derive from our forests very long into the future, and by having a diverse forest we keep all of our options open."

(Diana George Chapin, Segment Host) Clear-cutting still is one of the preferred methods of harvesting trees for the forest products industry. Where it used to insist on clear-cuts as large as 500 to 1,000 acres, it now sees the value of scaling back.

(Jim Robbins, Robbins Lumber) "There is no doubt about it. There have been some abuses in the past, but you know we just started the sustainable forestry initiative, and we guarantee sustainability and renewability, and I think that is why our forests are doing so well because we are committed. I mean, we have been in business here since 1881. That's 114 years I believe, and I intend to be here, my brother and I are the fourth generation in our family and hopefully we will in it for several more generations to come. So, these trees that I am planting today. You know, I won't be harvesting them and maybe even my children won't be but hopefully my grand-children will be, and that's a long term commitment."

(Diana George Chapin, Segment Host) Selective or partial harvesting has been in vogue for a few years now. One reason being the forest products industries found it cost effective. It is not preservation but a lighter touch for managing woods. This new kind of silviculture goes by the generic term New Forestry.

(Ted Shina, James River Timber) "In very simple terms, the forest is an organism in itself if you will. It is made up of plants and animals from microbes and invertebrates all the way up to moose that interact to make this forest ecosystem. You have to understand the pieces, inventory the habitats as well as the timber that you have and then provide all of the components that are necessary so that you maintain those habitats over time."

(Diana George Chapin, Segment Host) 96% of the Maine woods are privately owned. Half of the total acreage of private forest is owned by industry. Some of them multi-national corporations. The other half is made up of small and large woodlot owners.

(Diana George Chapin, Segment Host) Judith Berg heads up the Small Woodland Owners Association of Maine. She has owns 240 acres herself in Buckfield.

(Judith Berg, Small Woodland Owners Association) "To me, my wood lot represents my recreation, my exercise, my fresh air, my investment, my beQuest to the future and my meditation. I really enjoy the woodland."

(Diana George Chapin, Segment Host) New forestry has really taken hold among large noncorporate land owners like the Pingree family that owns about a million acres of forest near Ranglely Lakes and north of Baxter State Park. These holdings are the largest certified well managed forest in the world. They are managed by the Seven Islands Corporation based in Bangor.

(John Cashwell, Seven Island Land Company) "What we do best is we harvest for the trees we leave and not necessarily the trees we take because it is important for us to develop value and quality in the woods."

(Diana George Chapin, Segment Host) Here in the Ranglely area Seven Islands harvests and thins with very little impact to the forest site. None of the logs are skidded, they are all carried out. Seven Islands has recruited the help of University of Maine Foresters to make a futuristic model of the holdings for 200 years out.

(John Cashwell, Seven Island Land Company) "Without this model we wouldn't really have a path into the future whereby we could ascertain for sure that we are managing sustainably. With this model we can do that."

(Diana George Chapin, Segment Host) The James River Timber Company also is at the cutting edge of forest management. James River states it works with nature where it looks at wildlife habitats first, then decides where to cut, all the while it is still getting a solid financial return for its saw logs.

(Ted Shina, James River Timber) "The art and science of silviculture is channeling that site's growth capacity on the trees that are going to meet the landowner's objectives. That may be a saw log tree like a white pine for a saw log sawmill. It may be pulp wood tree, or it may also include trees like this wildlife tree which is a part of

that holistic approach to managing the whole ecosystem.”

(Diana George Chapin, Segment Host) Many timber companies have a very intensive hands on approach to harvesting and managing forest lands. A healthy forest must include the entire landscape, all of the forest, and it needs to be tended to.

(Jim Robbins, Robbins Lumber) “If you look at a piece of land, like we have owned this land for so many years, I can look at a piece of land that is clear-cut one year, and I can come back 20 years later and see what that land has done and when I see it now, white pine trees are 30 feet tall and very, very vigorous, it makes me feel really good what we have done with the land. It is a real challenge being a forester to get the land to do that and see what has happened.”

(Diana George Chapin, Segment Host) The forest products industry has many tools for managing its lands. One of the most important tools the industry relies on is maps, lots of maps. Because the Maine forest is dynamic and changes so rapidly, companies have to constantly update their maps. For years the best way to inventory their forest lands has been with high altitude infrared photos. These are the best kind of pictures for foresters. It is even better than commercially available satellite imagery which is not detailed enough.

(Dan Boss, Great Northern Paper) “We need to be able to maintain a sustained yield and in order to do that we need to compute an allowable cut, and that is the job that we have here basically. Inventory and fiber supply management. We manage a lot of other things besides timber supply here in terms of information. We keep track of all the deer wintering areas, the special areas that are designed for particular things, and we keep track of the regulations that affect the land, and those are all mapped as well.”

(Diana George Chapin, Segment Host) From these photos, vast data banks are compiled. All this data and computers can help companies decide where to harvest and figure out how fast their trees are growing. Bowater is gearing up for a new inventory, a complete reclassification of its two million acres.

(Dave Edson, Sewel Co. forester) “The high tech is going to become a convention. There is always going to be something better, and I use an analogy earlier of moving to the right of the decimal point. We are able now to identify finer and finer levels of detail, and that information if it is delivered in a timely fashion helps people make critical decisions in an easier fashion.”

(Diana George Chapin, Segment Host) Some companies like Bowater will use the global positioning system satellites for specific jobs like locating precise positions on their lands or for measuring areas. A forester on the ground in the woods gets satellite data on his GPS receiver. The transition forest in Maine by nature includes many hardwoods which for the most part are not economically viable for timber companies to market. Yet, there are a growing number of other traditional uses of our woods, uses that will continue to play a role in the future. Sugar maples are frequently a dominant species in Maine, so a handful of enterprising Mainers have cut deals with paper companies to lease their lands for maple sugaring. There are maple syrup producers spread throughout the state, but the big bulk operations are up north where sugar maples are more plentiful and where they have been sugaring for more than 100 years.

Another emerging industry in the Maine woods is the production of Christmas wreaths and trees. Downeast and central Maine are the heart of the Christmas wreath industry. Traditionally, many wreath makers work out of their homes, even on kitchen tables. They too use trees or parts of trees on private and corporate land owners forest lands. They get permission from the land owners to get clippings for their wreaths. Most Christmas tree growers are north of Houlton or in the Dover Foxcroft area. Balsam fir is the most popular species, and it does well state wide, but growers also sell Scotch pine, Fraser fir and white pine as Christmas trees. It is a costly business to get started since it takes about 10 years for growers to get a return. Seedlings take that long to reach

the desired six to eight feet height, and it is hard to be successful without using herbicides.

(Dugald Kell, Kelco Industries) "We only use herbicides about once every four years on our greens trees just to keep the briars and one thing and another out of the way so that we can farm them properly."

(Diana George Chapin, Segment Host) We are geologically young, yet our forests have been heavily exploited and what is best for our forests may be a combination of intensive hands on and hands off management policies.

(Mike Greenwood, University of Maine Tree Physiologist) "Some would maintain that we are very egotistical in over estimating our impact on the natural world, that the natural world has been dealing with catastrophic change long before we came along and that I am confident that the natural world will be here long after we have either become extinct or evolved into something better."

(Christine Young, Program Host) To illustrate how far we have come in managing our forests in Maine, compare the choices we have made for our woods to those made for our now beleaguered ground fish industry. Granted, those managing our forests have some advantages over those managing our fisheries. Trees are much easier to count than fish under water. Yet, the intricacies of our forest ecosystems have been debated for years, probably much longer than discussions about marine ecosystems. Fishermen don't like to hear talk about cutting back on their catches even when some fish stocks seem on the verge of collapse. Yet, we may be just lucky that our Maine north woods look as healthy as they do. Just because we have a lot of trees growing doesn't necessarily mean they are high quality trees.

Next time on Quest, what we are learning about sustaining farming and other rural ways of life in Maine. Until then, thanks for joining us. I'm Christine Young.

Maine Public Television's production of Quest, investigating the world we call Maine is funded through a television demonstration grant from Rural Economic and Community Development, part of the USDA.