

Quest #204: Maine Fauna

Coming up. Can people and wildlife coexist in Maine? Biologists have reason to wonder. Huge animals called megafauna lived in Maine during the last ice age but some like the woolly mammoth and mastodon suddenly became extinct. Prehistoric hunters may be partially to blame. Maine has lost more than the megafauna. In the last 100 years alone, ten species of animals have become extinct due to over-hunting. How to reverse the damage to our wildlife, what we know and don't know. That is next on Quest.

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Christine Young, Program Host: Hi, I am Christine Young. In a scenic, rural place like Maine, wildlife plays a vital part in many of our lives. We scare them out of our gardens, feed them in our back yards, hunt them in the woods, and save them if we think they are threatened. We have an affinity for our fauna. The trouble is, we have an effect on them as well and not always for the best. Our impact on animals can be traced back to the very earliest people in Maine. Dana Hutchins tells us about some of the latest theories on the ice age animals who disappeared.

Music

Dana Hutchins, Segment Host: Thousands of years ago, enormous creatures with huge tusks, hairy bodies, and stiff legs trudged around the receding glaciers of Maine. These ice age animals, the woolly mammoth and the mastodon, may have been big and fuzzy, but they certainly weren't warm and cuddly.

Harold Borns, Glacial Geologist, University of Maine: Both the mastodon and a mammoth are off-shoots of the elephant line and there are varieties of the mammoth that are designed bodily not only to live in the tundra where there are no trees, and they eat low vegetation, and the mastodons live in the woody area and browse on trees and higher bushes.

Dana Hutchins, Segment Host: During the ice ages there were other megafauna in Maine. In addition to these early elephants there were also huge horses, camels, ground sloths, bison, even a giant beaver. There were smaller mammals living during glacial times too, the caribou and musk ox of today lived much like then did 11,000 years ago when they roamed the tundra of Maine.

These animals have since migrated to colder northern climes. How do we know so much about a time so long ago? We've found the evidence buried in the ground.

Gary Hoyle, Curator, Maine State Museum: I was putting together an exhibit of ice-age material, and I had heard about this mammoth tusk, or at that time it was a tusk.

Harold Borns, Glacial Geologist, University of Maine: Yeah, it was first found by a farmer digging a hole and some amateur scientists got involved in it, and they dug it up and ... they had dug it up by accident actually, and they looked at it and thought that maybe this was an elephant, a circus elephant, that was brought into Maine back in the early 1800's named Old Beth, the first elephant who came into this state, and someone shot it in the backyard. It got loose in the town of Sanford. They thought, well this is adjacent to Sanford, maybe these are the remains of that Old Beth elephant, and that's where it ended.

Gary Hoyle, Curator, Maine State Museum: So, I became curious to find out if it really was an ice age specimen.

Harold Borns, Glacial Geologist, University of Maine: So, we started to run that down through the newspapers to the Maine ... to the Portland Society of Natural History which had been dismembered and removed from the landscape down there and all the pieces went to different places, and part of this elephant, the tusk, ended up at the University of Maine at Presque Isle in a box.

Gary Hoyle, Curator, Maine State Museum: We eventually got the tusk and we took a sample and sent it away for radio-carbon dating. It ended up being in excess of 10,000 years old, so we knew that we had something ancient.

Harold Borns, Glacial Ecologist, University of Maine: I was really surprised. And, of course one date doesn't do it. So, ultimately we got about four dates and it turns out the elephant is really about 12,000 years old.

Gary Hoyle, Curator, Maine State Museum: Then I got permission from the landowners to go to the site and we were going to do an initial survey. We were going to dig along the perimeter of the pond first to allow the geologists to study diverse stratigraphy in the area. While that was being done, there were spoils or back dirt that had been dug up in '59 that lay up on the bank of the pond and it was getting to be a bit dangerous. I said, well, why don't we move the back dirt to the other side of the pond and then we will sift that out later on. In the process of moving that back dirt all of a sudden bones started tumbling out.

Bruce Bourque, Chief Archaeologist, Maine State Museum: The odds that that the animal could be some nicely preserved in sediment here is what's unusual. That's the most spectacular Pleistocene megafauna find in Maine. We have had hints of others, but they always turn out to be false leads.

Gary Hoyle, Curator, Maine State Museum: Okay, this is the mammoth tusk that came out of Scarborough. As you can see, it has actually been cut in half, and this has been done for analytical purposes.

Harold Borns, Glacial Ecologist, University of Maine: I perspired a lot when we started cutting that tusk. I remember my hands were kind of wet and clammy. I was very nervous when we were cutting that particular tusk, because it is the only one we have. The only one from Maine. Screw that up and there were no seconds. There are no seconds if you mess it up.

Gary Hoyle, Curator, Maine State Museum: In effect we have the entire life history of the animal in the tusk. By looking at the ivory bands, depending on the size of the ivory bands, we can determine what sea-season of the year it is. We can also determine the number of pregnancies that she had. We can analyze carbon ratios, and we can find out what type of vegetation she was feeding on and we now know that towards the last four and a half years of the animal's life, and this has only the region that has been analyzed thus far, she was feeding on mostly browse, that is she was not feeding on much grass at all, which is unusual for a mammoth. Our nitrogen studies that have been done now confirm that she was under nutritional stress, that this animal was actually in declining health due to the fact that she was not finding the proper source of nutrition.

Music

Dana Hutchins, Segment Host: Just why did nearly 100 species of megafauna suddenly become extinct? There are few fossils left such as those found at Chicago's Field Museum for scientists to analyze. Yet, despite their size, large animals are not as indestructible as they appear. Because they were so very huge, they consumed massive amounts of food, and there never were massive herds of mammoth or mastodon roaming the North American landscape. Instead, these animals were thinly dispersed which provided vast areas to roam for food. But since they were so few in number they were especially sensitive to any change in their environment.

George Jacobson, Paleo-ecologist, University of Maine: The problem is that if the number of breeding individuals is small enough, and in this case probably pretty widely dispersed over the landscape, then even random events of climate or random processes that are going on that bother the individual animals can suddenly make the population even less likely to reproduce next year and all of a sudden the downward spiral can't be stopped.

Dana Hutchins, Segment Host: Yet there are some species of megafauna that did not die off. Some have survived into modern day. Some animals appear to migrate in random patterns such as the bison and caribou which of course have survived.

There are two main theories behind the demise of megafauna. One is that rapid catastrophic climate changes could have killed them off. The other theory, and this is probably the more controversial one, is that humans were responsible: early people--or Paleo-Indians--who over-hunted the large beasts.

Yet with precious few fossil records to go by, how are we ever going to know what really happened to the megafauna. Scientists believe they are getting closer to an answer.

Paul Mayewski of the University of New Hampshire is a glaciologist. He has one of the best computer-generated records of how climates have changed over the past 100,000 years.

Paul Mayewski, Glaciologist, University of Maine: We have record from the thickest part of the Greenland ice sheet that comes from a core that is about 10,000 feet long, covers as much as 250,000 years of earth history, and thus far the first 10,000 years of that earth history we can actually count down annual layers just like tree rings and pull out samples from each of those annual layers and describe what the atmosphere looked like.

Dana Hutchins, Segment Host: Using ice core samples taken from the Arctic regions, Mayewski has detected extreme shifts in climates, from one typical of Northern New England today to one where winters are twice as long, and these shifts occur in just a few years' time.

Paul Mayewski, Glaciologist, University of Maine: It happens literally in our record in the year 14,720. In one year. In our record it appears to literally happen in one or two years. Now that is not because the ice sheets just suddenly melted. This is a record of atmospheric circulation and what it saying is that literally 14,720 years ago the atmospheric circulation patterns just suddenly shrunk back and went into conditions in here which lasted for about 2000 years which looked a lot like the conditions which we experience today.

Dana Hutchins, Segment Host: Scientists at the University of Maine Patersky Institute can track major climate changes like Mayewski describes by analyzing pollen in soil samples.

George Jacobson, Paleo-Ecologist, University of Maine: Now these are maps that show the changing distribution and abundance of various plant groups during the time from the last glacial maximum of 18,000 years ago—KA here stands for kilo anni, geologists talk that way about time—up to the present. Now from the point of view of extinction of the large mammals, this period right around here between 12,000 and 14,000 years ago was probably critical, so that about 10,000 years ago there were closed forests right up to the ice and the kind of physical and biological environment that would have been available to the mammoths and mastodons in Eastern North America was greatly changed.

Dana Hutchins, Segment Host: It is not hard to imagine how rapid severe climate changes across North America could have had a devastating effect on megafauna. Animals could have trouble adjusting to much colder or warmer temperatures, or they could starve because their food supply, forage, had been destroyed by extreme weather. But could it have just been coincidence that these large animals were dying off at precisely the same

time as historic hunters were coming on the scene? There are scientists who believe that megafauna extinction followed human footsteps just as the first people spread out from Africa and Asia out into other continents such as our own. These same scientists think animals became vulnerable as soon as they were first exposed to hunters.

Bruce Bourque, Chief Archaeologist, Maine State Museum: You can imagine the wildlife, a new kind of predator on the scene, the human, which many of these species had never seen before, which they had no natural wariness of. They would have been very easy game indeed. We know that Paleo-Indians expanded their population very rapidly. There was plenty of food and there was no opposition to them just sweeping like a wave across both continents.

Dana Hutchins, Segment Host: There is now evidence that prehistoric people were pushing into Maine even before all the ice sheets had retreated. That's much earlier than previously believed.

Harold Borns, Glacial Geologist, University of Maine: I am interested in why did they migrate? What made them move? My conclusion is that they did move, and they followed the big game animals. So with the motion of the big game animal, the people followed. Maybe that's why they crossed from Asia to the Americas in the first place.

Dana Hutchins, Segment Host: The scientific data suggests it's probably unfair to suggest that either climate or early hunters did megafauna in. It is very possible that early people and climate delivered a one/two punch to these large animals and their combined effects would have been devastating.

The earth lost some grand animals, science may one day tell us why. In the meantime we all wonder just how long creatures, those larger than elephants, could co-exist with us people.

Christine Young, Program Host: There may be even more reasons why some animals are on threatened or endangered lists, like these eagles here at the Gray Animal Farm. Wildlife biologists are learning that some animals live on the edge because Maine may or may not be an ideal place for them to live. Evolution continues to winnow out those that don't belong or cannot adapt, and this provides yet another challenge for scientists.

As we hear this report by Bob Demers, evolution is often too slow to notice, and when we can see it happening, it can be impossible to tell whether it is natural or another instance of human interference.

Wolf howling

John Chase, Co-Chair, Maine Wolf Coalition: Okay. The reason we're out here is we are going to be doing some wolf howling trying to determine the presence or absence of some wolves that might be possibly in the area. I will be doing first a set of soft howls and again they are done pretty just in case there are any wolves or canids in the area.

Bob Demers, Segment Host: John and Sue Chase are hoping their howls sound real enough to make wolves feel welcome again in Maine.

Howling

Bob Demers, Segment Host: Several times a year they go out in the wild to attract an animal that has been gone from the Maine woods for 100 years. It is not just megafauna which has been lost in Maine over the years. Since the 1800's many species of animals have become imperiled. Four different animals are no longer found here as well as three kinds of birds, two types of butterflies and one reptile. And many species of the animals

have dwindled down to numbers which are in danger of extermination.

For the humpback--as well as the fin back, sperm, sei, and right--whales, it was over-hunting in the 1800's that nearly made them extinct in Maine waters. For other fauna, poisons in agricultural pesticides or industrial wastes are to blame. Many of the species that we have lost altogether, like the Caribou, were what scientists refer to as habitat specialists.

Mark McCollough, Wildlife Biologist, Maine Department of Inland Fisheries & Wildlife: These are animals that require a very specific kind of habitat. That predisposes them many times to being rare because that habitat is very limited and sometimes those habitat patches are separated widely from each other, and by our activities, building roads that intersect between these patches prevent populations from intermixing, and over time cause populations to decline in those small patches, so that is one of the concerns we have for habitat specialists.

Bob Demers, Segment Host: Yet about a dozen species have gone extinct in the past 100 years. Now, that sounds much less ominous when we compare to the total number of species still on the earth. Conservatively, estimates run as high as tens of millions of separate animal species existing in the world and some species are what scientists call extirpated. That is to say they are gone from Maine but may be found elsewhere on the planet.

It appears that we could lose a few species and hardly notice they are gone. One problem is that we rarely meet a species we don't like and want to get rid of.

Music

Jody Jones, Wildlife Biologist, Maine Audubon Society: All these species play a key role in how they affect each other. For example, deer and moose have a very particular relationship. The deer have a meningeal worm that they carry and it doesn't bother them whatsoever, but in areas when they occur with moose, that meningeal worm affects moose, it actually kills them so that when they do occur together, the moose is at risk.

Bob Demers, Segment Host: Eighty-three species of Maine wildlife are classified endangered, threatened, or of special concern because their numbers are low. Twenty new species are being considered for addition to this list. Many of them are insects. The Maine Legislature will soon rule on these possible additions.

Mark McCollough, Wildlife Biologist, Maine Department of Inland Fisheries & Wildlife: Endangered species are very rare species in Maine like the piping plover, least tern, the roseate tern that number each less than 100 pairs in our state, so they are critically right there on the edge. If we are not managing them very intensely, they will likely go extinct in Maine in the foreseeable future.

The wood turtle is an example of a species of special concern. We believe there may be over several thousand individuals in the state that could be threatened or endangered in the future if current trends continue.

Music/voices

Mark McCollough, Wildlife Biologist, Maine Department of Inland Fisheries & Wildlife: The radio telemetry that we are doing with the wood turtle is helping us understand how these animals lose their environment, how they interact with their habitat and in turn we are studying the environment as well. This is Jeb who is a male as you can see from the concave plastron. There has been a lot of interest in wood turtles in the last two years. There was a petition to list them on the Federal Endangered Species list. That's been denied, but still we have a lot of conservation concerns for the wood turtle. Many of them are being taken out of the wild for the pet trade. In some instances habitat is being lost, so we need to find out more information about their populations, the kind

of habitats they use so that we can do better planning in the future for their conservation and conservation of their habitats.

Bob Demers, Segment Host: The State of Maine oversees a number of projects that keep a watchful eye on species that are or may be in danger. Charley Todd keeps tabs on Maine raptors.

Charley Todd, Wildlife Biologist, Maine Department of Inland Fisheries & Wildlife: Maine's eagles started in a rough spot in the 1960's. There were amongst the most imperiled eagle populations in the country. We were down to around a population of 30 nesting pairs producing very few eaglets. Some constraints on the application of insecticides and controls on environment contaminants combined with a very aggressive program to locate and manage eagle nest sites within the state of Maine, working cooperatively with landowners to provide a secure niche for them has enabled a long and steady recovery. Their comeback has been ongoing for perhaps 20 years or more now to get us to this level. We have come from a point where that 30 pairs has blossomed into 200 nesting pairs statewide, broadening their range here in the state of Maine.

Bob Demers, Segment Host: DDT and pesticides nearly did in the equally impressive golden eagle. Those particular golden eagles live in the western mountains of Maine.

Charley Todd, Wildlife Biologist, Maine Department of Inland Fisheries & Wildlife: Golden eagles have always been relative in the East but they were once widespread into the Southern Appalachians, and that population has been lost. We are left with a single breeding pair here in the state of Maine. Ironically, that site is probably the oldest golden eagle aerie in North America. Abinaki Indians named the mountain after the presence of golden eagles, and it has had a steady presence, albeit the last one, available for the species in this region. Chemical contaminants have again set the birds back very hard. This pair has produced only one eaglet in the last 14 years which is a level that is certainly signifying that we are at great risk of losing them altogether.

Bob Demers, Segment Host: But the restocking of another bird on the endangered species list is making great strides. The peregrine falcon in Maine was near extinction. That is until birds from the West were relocated in Maine's mountains, as well as the downeast coast.

Music

Bob Demers, Segment Host: After being gone for more than a century, Puffins and other threatened sea birds can once again be seen on some islands off the coast of Maine. The National Audubon Society has been working in Maine since 1973 using some pioneering methods.

Stephen Kress, Director of Seabird Restoration, National Audubon Society: I started this project 22 years ago, and before that no one had restored a puffin or tern colony before, so we pioneered all the techniques right here on Eastern Egg Rock. People come from all over the world to see what we are doing and to learn about it. This time of year we try to put bands on puffins. If we can reach the puffin chicks underground we will pull them out . . .

Bob Demers, Segment Host: The Audubon Society was the first to take a more active role in attracting birds. They are restoring puffins on three Maine islands: Metinicus, Seal Island in Penobscot Bay, and--the grand-daddy of them all--Eastern Egg Rock.

Stephen Kress, Director of Seabird Restoration, National Audubon Society: I am very pleased with the way the level of progress has gone. We had four pairs nest here in 1981. That was 100 years since puffins has nested here previously, and the colony has grown up to about 17 or 18 pairs, and this year we have 18 confirmed active nests on the island. So, we are very pleased with that. It's a small colony, but yet it's the southern limit of their

range, and it's at a place where many people can come and see them.

Bob Demers, Segment Host: Puffins as well as razor bill hawks and murrelets were decimated along the Maine coast in the late 1800's. These sea birds were heavily hunted. Even their eggs were used by islanders for food. Fishermen also used the birds for bait. Huge numbers of terns were also devastated along the Maine Coast because their feathers were in vogue for the hats of the fashion conscious.

Turns, razor bills, and murrelets are now on the come back, and that is thanks to the same methods Kress began using with puffins to get them to nest here again. The successful restoration of puffins on Maine islands provides a model for future generations to follow.

Stephen Kress, Director of Seabird Restoration, National Audubon Society: I think this kind of work is very important because people have a responsibility to be stewards for wildlife. Too many human actions lead to extinction and extirpations of wildlife. We live in a period when there is more wildlife going extinct now than any recorded time in history. But I also believe that people have an opportunity to restore wildlife and to make sure that we don't lose species. I think the work here on Egg Rock shows that people can not only work to extirpate animals but we can also work to restore them.

Bob Demers, Segment Host: Mammals, because they have either been over-hunted or considered a nuisance, have been hardest hit in Maine's animal kingdom. Now during the past 100 years we have lost the wolf, the cougar, the sea mink, and the caribou. We don't know how the sea mink became extinct. The wolf, on the other hand, was pushed northward into Canada.

There is a group of dedicated wolf aficionados in Maine that would like to see the wolf return here.

John Glowa, President, Maine Wolf Coalition: The Maine Wolf Coalition supports natural recolonization as opposed to reintroduction for several reasons. First of all, there is growing evidence that wolves are coming into Maine now. We have a wolf sighting hotline; we have re-corded about 60 sightings of wolf-like animals in Maine. We have one verified wolf killed here in 1993. Maine has an abundance of habitat and an abundance of prey. Wolves in Maine would feed primarily on moose, white-tail deer, and beaver. We would like to see wolves be allowed to come into Maine to play that role in the ecosystem that they were meant to play.

Bob Demers, Segment Host: Because there are occasional sightings of wolves in Maine, biologists here and in Quebec Province are beginning to keep an eye out for them. All of the research to date indicates there are no wolf packs here. The closest packs are in Quebec's Lorentard Reserve, and there is no evidence that these animals are extending their range southward into Maine--or is there?

Craig McLaughlin, Wildlife Biologist, Maine Department of Inland Fisheries & Wildlife: About the last day of October, a trapper in Northern Hancock County, just east of Aurora, reported that he had captured a very large coyote to one of our district wardens. The warden met him and looked at the animal and realized immediately that this animal was much larger than any coyote that we have here in the east. It was 81_ pounds, and it was 65 inches from nose to tip of tail. It stood about 26 inches high. A very large canid. She informed him it was probably a wolf-dog hybrid and may indeed be a wild wolf that may have dispersed here from Canada.

Bob Demers, Segment Host: Scientists refer to genetic markers which are individual attributes that help distinguish one species from another. Thus far, we know that one animal killed in 1996 contains markers that are distinctive of the coyote. This does not rule out the possibility that the mystery canid is a wolf. The presence of coyote markers could indicate a wolf/coyote cross. However, side-by-side photographic comparisons with a coyote gives further credence to the theory that it is indeed a wolf.

Howling

Bob Demers, Segment Host: As researchers eagerly assemble the pieces of this genetic jigsaw puzzle, the animal could finally prove what many people suspect. Namely, the wolf is on its way back to Maine.

Craig McLaughlin, Wildlife Biologist, Maine Department of Inland Fisheries & Wildlife: The chief limiting factor on wolves historically has been human tolerance of them. Most of the reduction in wolf range historically has occurred because of the killing of wolves by people.

Bob Demers, Segment Host: Since losing four species about 100 years ago, Maine's native mammals are holding their own. Most of them appear resilient to the presence of humans, but some animals are still making adjustments because of us. The black bear and martin used to be found anywhere in Maine. Now they are virtually gone from southern portions of the state, probably because of development encroaching on their habitat. On the other hand, deer which at one time were only found in southern Maine can now be seen all over the state.

Jody Jones, Wildlife Biologist, Maine Audubon Society: The advent of people here in Maine has caused changes both in the forestry practices and the population of wildlife. When people first came to Maine, they hunted moose almost to extinction. At that time the forestry practices caused relatively small cuts to be used in the forests of Maine. The advent of mechanization and huge machines caused large cuts able to be here in Maine and that allowed the moose which can travel through those clear cuts easily and are not shy like the deer to increase now to the point where we can hunt them again.

Bob Demers, Segment Host: The quick strike--set the hook. The fisherman climbs out of the water and up on the bank. He wants plenty of firm footing to play this fellow. Another bass happily delivered. He has lots of spunk life, but they so does our fisherman. For freshwater fish in Maine, it is not so much that we have lost species as it is trying to hang on to the diversity we already have. Androgenous fish such as Atlantic salmon and shad have clearly been devastated by not being allowed to swim up river to spawn because of all the dams on Maine rivers.

Alan Hutchinson, Wildlife Biologist, Maine Department of Inland Fisheries & Wildlife: As a group, aquatic species are considered one of the most threatened groups of wildlife in the whole U.S. One of the big problems is the loss of their habitat; water quality issues, declines in water quality. A lot of our aquatic species are in some pretty serious trouble.

Bob Demers, Segment Host: Maine rivers are much cleaner than there were 25 years ago and more suitable for freshwater fish, but pollution has not been eliminated from our rivers and watersheds. In fact, dioxin and mercury levels are still high in freshwater fish. Past problems with the DDT in fish taught us how certain poisons can move through these populations and then into their predators. Birds, mammals and finally humans. The long-term effects of pollution are still unknown to us. Strange as it sounds, in some ways there is more diversity now among fish.

Alan Hutchinson, Wildlife Biologist, Maine Department of Inland Fisheries & Wildlife: I think the bottom line of what we are trying to accomplish is to maintain the diversity of wildlife here in the state of Maine and also the genetic mix, the diversity of what we do have. We are looking at some of our native species and we want to maintain that, and we are concerned about the effects that introductions of even closely-related species may have on that.

Bob Demers, Segment Host: But what about the reintroduced fish like farm-raised salmon and trout that seem to do poorly in the wild. Why does that happen? After years of trying to get farm-raised fish to replenish some of those killed by dams and pollution, wildlife scientists were baffled.

Irv Kornfield, Population Biologist, University of Maine: Are there any unique alleles here or any extremely rare alleles in this group of individuals that you are looking at.

Student: Well, here, actually you can see most of the alleles are pretty much concentrated in this area.

Irv Kornfield, Population Biologist, University of Maine: The new technologies provide us with exquisite acuity in being able to discriminate, to identify individuals from particular stocks, particular rivers, or particular culture situations. Because of that acuity, because we can effectively see their genetic signatures, we can get an idea whether there is a mixture going on between different river systems or if per chance fish from cage culture happen to enter rivers, what proportion of those fish represented in the native runs.

Bob Demers, Segment Host: There are just about a dozen lakes across Maine where we can see land-locked arctic char spawning each fall. Maine is as far south as we find these fish which were left by the last glaciers. The char is found mostly in Alaska, Quebec, and Northern Europe. Fred Kirchies is using genetics to find how the char are managing at the far southern edge of their range.

Fred Kirchies, Research Biologist, Maine Department of Inland Fisheries & Wildlife: We started out with doing electrophoresis and then we did some mitochondrial DNA and then we moved on to some nuclear DNA analysis to try to find out how these fish compared genetically to other populations of char. And what we learned is that these fish in the northeastern United States and southeastern Canada are all extremely similar to each other, but they are different from those populations in Scandinavia or Northwestern North America.

Bob Demers, Segment Host: By studying spawning habits, reproductive abilities and genetic patterns, Kirchies has learned much about the char. But human populations have put this species at risk in Floods Pond. This body of water is Bangor's sole source of drinking water and has been, at times, drawn down below the natural spawning sites of the fish.

Fred Kirchies, Research Biologist, Maine Department of Inland Fisheries & Wildlife: These fish over the 12,000 to 15,000 years they have been here, they have evolved with the habitat to be able to be ideally suited to survive here and that means that they have some degree of adaptation that is different from fish that live in other habitats, so that if we lost this Floods Pond population of char, we would lose a certain degree of genetic adaptation ability that can't be found just like this somewhere else.

Bob Demers, Segment Host: A more widespread use of genetics among wildlife scientists could provide a whole new way to help them assess what should be done when animals become threatened. We are no longer just keeping count of how many plants or animals we have, we are also keeping track of genetic changes to tell us how well our animal kingdom is doing. Now since biological diversity is a controversial subject in and of itself, adding genetics to the equation is bound to liven up the debate.

Jody Jones, Wildlife Biologist, Maine Audubon Society: I think it is a fair question asking why should we care about diversity here in Maine or anywhere. If you take all of the animals in the world and you put them in a dictionary and those words represent the gene pool for all the species here in earth, and you open that dictionary randomly and just tear out a page, those words on that page represent the genetic diversity of those animals and they are gone forever and we may not know what their value is. I think the people that come after us will not forgive us for throwing those species away.

Christine Young, Program Host: If the early man could influence the viability of mega fauna, what about all the smaller animals that would come later. Without a doubt our presence is felt by the wildlife kingdom. Yet animals respond to us differently. Some can live with us, some cannot. As Kate Arno explains, this has forced us to come

up with a number of very resourceful ways to save those animals we do threaten.

Music

Kate Arno, Segment Host: The summit of Mt. Katahdin is about a mile higher than most of the rest of the state of Maine. One can get a sense of its looming presence just by looking up from the bottom. It is even more apparent from the top. This exquisite monolith is a special and isolated mountain that towers over everything around.

Music

Kate Arno, Segment Host: When the last set of ice sheets to cloak Maine melted and receded to the north, Mt. Katahdin was left with an environment unique in Maine. On the ridge of Katahdin is an arctic alpine climate much like the top of Mt. Washington in New Hampshire, an even higher mountain top. Here above the tree line only the hardiest of plants and animals can withstand the extreme weather. Among them are three species of arctic animals that arrived with the glaciers, yet remained on Katahdin even after the ice was gone. These glacial remnants are the northern bog lemming, a mammal; the American pipit, a bird; and the Katahdin arctic, a butterfly. All three are very elusive and, because they all live on one mountain top, their fate is precarious.

Andy Marchand, Arctic Steward, Baxter State Park: Pipits like it up here due to the relative remoteness of it. They can get back into the krummholtz and back into the plants back here and be relatively undisturbed. The bog lemming is a creature of the arctic basically. It likes it around here. There are very few predators for it to be afraid of, and there are a lot of prey that it can feed on that other animals are not after up this high.

Kate Arno, Segment Host: This is ideal habitat for the northern bog lemming. There are not many to see though because of their natural population control cycle. Last year the number of lemmings ballooned, and there was not enough food left to keep the youngest lemmings alive, so this year the few that did survive are hard to find even when looking in their favorite places at the top of the mountain, in the moss and krummholtz, which is German for crooked trees.

Andy Marchand, Arctic Steward, Baxter State Park: Many people have spent years on the mountain and they have never seen a bog lemming. And we have very little information as far as their habitat goes, their needs. We just know that they are found in upper alpine areas such as this.

Kate Arno, Segment Host: Another reminder of the ice age found on Katahdin is the American Pipit. These small brown birds with white tails flit above the treeline through dwarf plants. They winter in southern New England and go north to breed during the summer.

Andy Marchand, Arctic Steward, Baxter State Park: The breeding season is basically June. June to early July. When they are doing their breeding, the male ... the female will sit on the ground and make a chirping-like sound, and the male will do almost like a woodcock will do. It will fly up into the air and do an aerial display. And they get to be quite spectacular because you can get several males doing it at the same time.

Kate Arno, Segment Host: Unique among animals on this mountain is the Katahdin arctic butterfly. This is the only place in the world this butterfly is found.

Andy Marchand, Arctic Steward, Baxter State Park: This is our prime, prime arctic butterfly habitat. Generally you do not see the butterflies this time of year in mid-August. You'll see them June to July, a little bit in May. They are still hatching out coming out in June around some of the watery areas around here. Their habitat is these grasslands, and it is the only habitat like it in the world for them.

Kate Arno, Segment Host: It resembles a common, drab brown moth and in its lava stage, it looks like this caterpillar, which also prefers to live at the 4000-5000 foot level of the tundra.

Jean Hoekwater, Naturalist, Baxter State Park: Recently officials from Federal Fish and Wild Life Department contacted us and told us that they were doing an investigation in which several Katahdin Arctics were part of a collection they were seizing as evidence in an international butterfly poaching ring, which was a new issue for us. We were a very, very small part of that and one of the few Eastern butterfly species that had been taken were Katahdin arctic. This person didn't have permission, so that kind of put a spot light on the issue of collecting this species at Baxter State Park, but it has been against regulations to collect it for some time now.

Kate Arno, Segment Host: The Katahdin Arctic Butterfly is a prime example of how evolution reveals itself. Like the Arctic Char ever since the last glaciers, these animal have been adapting themselves to new environments. Yet scientists are not certain what's next for these species.

Alan Hutchinson, Wildlife Biologist, Maine Department of Inland Fisheries & Wildlife: What could easily take place is that it could just disappear. It's only found in one location in Maine and, in fact, world wide. It is a very, very small, restricted piece of land on the top of Mt. Katahdin and you can conceivably see where some minor climate changes could affect that habitat so that it could just disappear.

Kate Arno, Segment Host: The Katahdin Arctic Butterfly could be headed for a dead end on this mountain because the habitat may be too small. Then again it could develop into an entirely new species of butterfly.

Alan Hutchinson, Wildlife Biologist, Maine Department of Inland Fisheries & Wildlife: It has been isolated enough that it is starting to evolve and become distinct from the other species of Arctic butterflies. So there is a very good, strong likelihood that if it can persist there that in the future it may become a distinct species onto itself and, bingo, evolution right before our eyes.

Kate Arno, Segment Host: But since this barren landscape gets so many visitors during the warmer months of the year, time probably is not on the side of any of these unusual Katahdin animals.

Paul Austin, Alpine Steward, Baxter State Park: On a typical nice day, hundreds of people, mostly as you go up the trail you'll notice a handful here and there. When you get to the top 120, 150 all congregated around the top and its those crowds really make a big impact on the area.

Andy Marchand, Arctic Steward, Baxter State Park: This type of habitat right here is the habitat that is commonly found with the Katahdin Arctic butterfly. They basically lay their eggs underneath the grasses. They spend most of their time in their younger stages underneath the ground or right around the grasses. This is a very fragile ecosystem. If it gets stepped on it is basically killed. We're trying hard at the park to try to preserve it because this is the only place on earth that the Katahdin Arctic is found.

Kate Arno, Segment Host: Except for the rare arctic animals left here by the glacier, all Maine fauna had to move here. Some arrived quickly, others migrated here more slowly. And on rare occasions, some species are still showing up here.

Mac Hunter, Wildlife Ecologist, University of Maine: Species are constantly changing their geographic range. That part of the globe they occupy is always shifting, primarily in response to climate change. There also another examples of species shifting their ranges in response to what people have done to modify the environment, particularly providing food in winter for these species, providing road kills in the case of turkey vultures. There are a just number of cases of where these species, you know, nature abhors a vacuum, we create a new environment;

these species respond by moving geographic ranges.

Kate Arno, Segment Host: Many of the new animal arrivals are extending their range, usually from the south. Other animals were brought here by people sometimes inadvertently. They were exotic species, but now they are commonplace.

Mac Hunter, Wildlife Ecologist, University of Maine: The most familiar example is the common periwinkle brought here probably inadvertently just clinging to some ship's hull. Others were quite deliberate. The starling is perhaps the best example of that. The starlings were introduced into New York City by a Shakespeare Society. They decided on sort of a whim that wouldn't it be nice to have, living in North America, all of the species mentioned by Shakespeare. In one of his plays, I believe it was King Henry IV, it talks about "thou shall take all of starling to his ear, Mortimer, Mortimer", that one line in which Shakespeare mentioned the starling led these people in New York to decide, wouldn't it be nice to have starlings here, and they led to New York Starlings, or paid people to catch starlings and release them here. It took them quite a few years. They had to bring over hundreds of starlings before they were successful, but ultimately North America was overrun with starlings much to the chagrin of farmers throughout much of the country, all because of some whim on the part of these people.

Kate Arno, Segment Host: We are learning over time that evolution means that no species last forever. New species appear, and old ones become extinct. But we are still learning about how this happens. We tend to think of evolution as a slow process, too slow to see. Yet, sometimes what is called natural selection can happen faster than we think, especially when survival is at stake.

Irv Kornfield, Population Biologist, University of Maine: Natural selection is a fundamental process which, in fact, unites much of the organic world. It provides an explanation to understand why fish are of certain colors, why butterflies have wings, why earthworms hibernate, and so on. It is a relatively simple and extremely elegant process which says that certain individuals in the population will survive and pass on their genetic attributes and other individuals will not pass on those attributes.

Kate Arno, Segment Host: A good example of how animals react to natural pressures are ground fish. Over-fishing is depleting stocks of cod and flounder in the Gulf of Maine, but in an effort to survive, ground fish are maturing and spawning at earlier ages.

Irv Kornfield, Population Biologist, University of Maine: There is a real premium driven by natural selection to try and grow as rapidly as you can so you are the first one out and then can begin to reproduce. So one consequence of harvesting large numbers of fish, particularly these very big adult fishes is that you produce a population which in some sense may be stunted, that is consisting of a large number of smaller fish with less total biomass and less total evolutionary potential.

Kate Arno, Segment Host: Herring and black back gulls on the Coast of Maine, on the other hand, are an example of species thriving at the expense of other animals. Gulls are taking advantage of natural selection opportunities. Unlike other seabirds, seagulls were never hunted to extinction. And ever since puffins, terns, and other birds were nearly wiped out, the number of gulls has exploded. There are so many gulls that other seabirds had a difficult time getting reestablished when hunting stopped. That's because gulls would raid other birds' nests for their eggs. Gulls have also benefited from open landfills where they can get all the food they can eat.

Brian Benedict, Operation Specialist, Maine Wildlife Refuge: The gulls are opportunistic feeders in that they are generalists. They can feed them about anything that is available and here is this buffet. Anybody who has been to an open landfill has seen just the hundreds of seagulls around these landfills just feeding. What that has done pretty much is that there is very little if any mortality during the winter period which in a natural environment

there would be, so those numbers just skyrocketed.

Kate Arno, Segment Host: So what do we do when we have too many gulls? Wildlife scientists have tried several methods to keep gulls away from other seabird nests. They have tried scaring the gulls, and breaking up their nests, but many now believe that we should try to get rid of some of the gulls by poisoning them, and even though seagulls are not most people's favorite bird it's hard to think of any animal being intentionally killed.

Brian Benedict, Operations Specialist, Maine Wildlife Refuge: What we do is, it's a powdered formulation, it is mixed with margarine. It's spread onto bread, and it's cut into cubes, and the bread cubes are placed within the nest and the birds come to the nest, feed on the bread and then normally in about 48 hours we find them dead on the site. There is few if any management actions that have gone on for wildlife that have been as effective. And when you look at the Arctic Tern members, they have increased by 60% from 1984 to 1996. And when you look at the rosea tern and the common tern, both their populations have doubled within that same time frame, so it is definitely working.

In terms of ways of our waste and our handling of our waste, there has been a significant change, in that most of the open landfills are now closed, which was a very significant source and fishery's waste also has been cleaned up a lot in their practices.

So I think that in looking forward and we are already starting to see a leveling off in the herring gull population, and I think that once these artificial food sources are taken away from the populations they will recover or stabilize at a more normal level.

Kate Arno, Segment Host: Some people would consider a plan to kill the gulls as humans playing God, and that is one way of looking at it. But in this instance, some biologists are saying perhaps we want to nudge nature along because sometimes it takes longer than we're willing to wait for ecosystems to regain their balance.

Brian Benedict, Operations Specialist, Maine Wildlife Refuge: The comments that are often raised. There are two we are most likely to hear. One is that you are playing God. Who are you to decide who lives and who dies? And for us as a fish and wildlife service, our mission is to preserve and protect these birds. In this case we do not feel like we are playing God. In fact, we are trying to correct a wrong that man has done in terms of their mismanagement of their waste, and it is because of our mismanagement of waste that brought about the explosion in herring gull numbers. So, we feel it is really important for us to address that.

Irv Kornfield, Population Biologist, University of Maine: If we wish to maintain biodiversity then perhaps we may have to interact by harvesting certain components of the population, in this case those that may be predators on other individuals in order to increase or maintain what the biodiversity is—extremely difficult decisions that have to be made and clearly they are societal decisions in which scientists can only play one part of it and the public in general has to play a very critical role, questions that cannot be avoided in their entirety.

Christine Young, Program Host: We love our wildlife and cannot leave them alone, but that is also the problem. We humans have a long history of being reckless with animals and even when we try to be humane just our presence is enough to threaten some of them. It is a challenge for scientists to figure out what impact we do have on our wildlife, but the debate has probably just begun on how far we should go in saving individual species of animals. I'm Christine Young. Thanks for joining us.

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