

QUEST: Investigating Our World

#504 Spring

Maine PBS

(Narrator)

Even though global warming and climate change may be leading to earlier ice outs and ahead-of-schedule lilac blooms, it still seems Spring comes and goes in a matter of weeks in northern New England.

Yet a lot of things have to happen in our shortest of seasons.

Take our migratory songbirds. We can't wait for them to return. But in a flash, they're gone again.

(Bryan Pfeiffer)

Some birds come up here and...they're nothing more than ruthless opportunists. I mean they come up here and they exploit our insects, and they raise their young and then they get the heck out of here.

Narrator

Even more transient is some of our short-lived wildlife that you never get to experience any other time of the year.

(Susan Sawyer)

Here's the water tiger with the jaws. They're so cool. They dog paddle so they're completely silly when they're swimming. But they can nab things and just suck the insides out of them. See that? That one has striped legs.

And here's...hello, it's a peeper.

(Narrator)

Then there are the flowers. Glorious to look at, but there's a whole lot more going on here than meets the eye.

(Judith Sumner)

The flower is of course nothing more than a sexual advertisement for the plant.

(Narrator)

Northern New England springs back to life, next on QUEST.

(Narrator)

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(Narrator)

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(Music)

(Linda Greenlaw)

Hi, I'm Linda Greenlaw.

Spring fever, spring fling, spring chicken.

There's something about this time of year that makes us feel like trying something new.

Like this flower garden here. I'm determined to get more color in it this year.

It seems it takes forever for Spring to take hold here in northern New England, but once it does, there's no stopping it.

And it's remarkable how different one day can be from the next.
I've often wondered why things have to be so fleeting in spring.
Why can't this wonderful season last longer?

(Narrator)

There are a number of places in northern New England where it seems Spring will never arrive.
So why does Spring come so slowly to our region?
There must be a meteorological explanation as to why we have to wait so long?

(Bryan Yeaton)

They call it climate migration and depending on whose statistics you look at, Spring actually moves northward anywhere from 14 to 17 miles a day. So...if you get spring in Washington D.C. at a certain date...a couple days later it'll hit Baltimore, and two weeks later New York City. And another couple of weeks after that, it'll hit Boston. And eventually we get it up here in northern New England. Sometimes, some people say we might never get it.

...So when it arrives can vary greatly from February 1 from the southern United States to well into May up here in the northern U.S.

(Narrator)

Mixed in with that deliberate northward advance is a series of false starts – that can fool the most seasoned New Englander.

The sun may be shining brighter and stronger on us after the vernal equinox, the first day of Spring, but it still takes a series of pulses of warm air to push all the cold off to the north.

(Bryan Yeaton)

Spring is a really transitional time of the year...it doesn't all happen once in a very uniform manner. Because that's not the way the atmosphere works. So we may get big blasts of hot air. Like yesterday it was 80 degrees here. Today it's supposed to hit 60. And then by Friday we could have snow and freezing rain.

(Narrator)

Yeaton surely knows about short Springs.

He not only hosts a national radio show about the history and science of weather, called The Weather Notebook, he works for the Mount Washington Observatory.

(Bryan Yeaton)

The climate migration works similarly from the valleys to the summits as it does from the south to the north... It'll start in the valleys and then it will progress upward about a hundred feet every day until finally it reaches the summit. Although a summit like Mount Washington may never really get a spring or summer because the conditions are just so severe up there.

(Chris Lewey)

This is an exciting place. Highest point in the northeastern United States, 6288 feet. You're kind of looking out over all of New England here.

The seasons are shortened; the spring and summer seasons are shortened here.

That's why extremes I think are great places to see the workings of nature. They're great windows to look out of...

(Narrator)

Chris Lewey is a New Hampshire naturalist who leads field trips all over northern New England.

Springtime is one of his busiest times of year because of all the people desperately looking for signs that winter

is over.

(Chris Lewey)

Go right along the trunk of the tree. It's about four inches to the left of the trunk in some branches. Yeah. Pisch. Pisch. Hear that whistle sound of the oriole? Handsome bird. Wow! Look at that.

They're obvious changes in every morning if you listen; if you open your door and you go out and listen, you can hear a whole chorus of new birds that might have come in the night before and we can also get a glimpse of how the plants work. To go out and have no greenery within our sight, and one day we just have one little blade of some organism that has stored up enough food last summer, to put out some solar collector, so it can capture some energy from the sun and start storing up more food.

(Chris Lewey)

There's really not a whole lot of time. So you can see that in the shaping of the strategies of our birds and our mammals. The insects and our amphibians. You can see that all start to come into play; they're all part of that same orchestra.

(Narrator)

No matter where you are in northern New England, if winter has dragged on too long, there are natural splashes of color to be seen even before the snow melts.

They're lichens, and they grow all over our rocks and trees.

(Katrina Maloney)

For me, they're always noticeable. But I think for average people, once they realize what they're looking at, they're easier to see in the spring. Also they sort of warm your soul after a long cold winter if you see those bright green, apple green caperatas up on the trees. You realize there really is life in the winter. And they don't hibernate and they don't really go into dormancy the way other plants do.

(Narrator)

Maloney is one of a handful of people in the world that can be called a lichen expert.

(Katrina Maloney)

Now this is the sort of thing where if I won the lottery and didn't have to make a living, I would study this. This particular lichen, this blue-green one, is over-growing this moss. Now, who's going to win this little successional battle? That's the sort of thing I'm really interested in.

(Narrator)

Lichen is often mistaken for moss. But unlike moss, it's not a plant.

It doesn't need soil and it doesn't have leaves.

(Katrina Maloney)

This species grows fairly slowly. Maybe a centimeter in a 100 years in circumference. So these guys have been here awhile.

Whenever's there been an event, a fire in a forest or glaciers coming through, one of the first things to colonize are lichens, because they are wind-blown. Even on a very smooth rock, they can come and find tiny tiny cracks and establish themselves. Actually you can kind of see that whole event happening. You've got bare rock. And then you've got these other species of lichen coming in here. And right at this edge, you've got a little mat of mosses. And then you move on up to the grasses, the vascular plants. And you get more of a cushion here of this little wildflower.

(Narrator)

Lichen is two organisms in one - fungi and algae - and they cannot live without each other. The fungi provide the structure and shares nutrients and water with the algae. The algae have the difficult job of photosynthesizing for both organisms. There is a no other relationship like this in the biological world.

(Katrina Maloney)

...Lichens actually create a third thing from that communion and that is something that has just fascinated me. And I like to use that analogy when I'm teaching biology, that things from entirely different kingdoms can get along.

(Narrator)

This composite organism has diversified into nearly 14,000 species of lichens with great diversity in size, form and color.

(Katrina Maloney)

...There was this one special lichen I wanted to show you. Maybe it was over here...Uh-ohh. These are really nice. These are great. You can see...you got a mat started here. Oh yeah, and here's a bunch of these nice little pixie cup cladonias that are so, they're beautiful. And another thing I love about them is that once you start to get up close and personal with them, the forms are just magnificent. We've got little pixie cups in here and a dark cladonia with black spots on it. We saw some red-topped ones, the British soldiers...There can't be less than ten species in there.

(Narrator)

Usnea or old man's beard is also gaining favor here in this country. An extract of this lichen is added to the natural deodorants by Tom's of Maine to kill bacteria.

(Katrina Maloney)

You know, here we are with this incredible diversity that is just mind blowing. I could spend all day out here collecting them and trying to figure out what their secrets are. And then part of me realizes too it doesn't really matter what they're called; they're just beautiful anyway.

(Narrator)

Although lichens can grow year round, plants cannot. They have to pull back and go dormant in order to survive our winters. Come Spring, they have to start all over. So how do they make the most of a short growing season? One of the first signs that the ground has warmed up enough for another growing season, is when ferns, coiled up tight like a fist, punch their way through the soil. Spring is fiddlehead season in northern New England. Of the 58 species of ferns here, only three are considered edible. The ostrich fern is probably the tastiest and most highly sought after as a tonic this time of year. While no ferns are poisonous in the fiddlehead stage, some can be quite toxic after they have unfurled.

(Narrator)

It's not just fiddleheads getting a head start on the growing season. Early spring is when you see the first wildflowers of the season too. In a sense, there's a race underway on the forest floor with the spring ephemerals. For these short-lived flowers, getting an early start makes all the difference. Bob Popp, a botanist with the state of Vermont, can't wait for these early bloomers.

(Bob Popp)

The spring ephemerals have adapted to living on the forest floor under a closed canopy for a good chunk of the year. So what their strategy is to just leaf out real early as soon as the ground thaws; essentially come up and then flower very, very quickly and produce their seeds. All within a matter of weeks in some cases.

(Narrator)

Very soon they're about to lose their main source of energy – the sun.

Warmer weather is causing the sap to rise in the trunks of trees.

The trees' canopies will be soaking up the sunlight and shading the forest floor and these ground plants will become dormant once again.

But don't look for anything real showy. Most ephemerals are very understated.

(Bob Popp)

I like them all. It's just so neat to see them and in the spring after a long winter, especially like the one we've had when the snow goes away and you know the trilliums come up and the trout lilies and the bloodroot like we've seen around here a bit.

(Bob Popp)

Spring's my favorite season. I just love to go out and listen to the birds, and see what wildflowers are up, just see what's happening. It just changes constantly. Day to day, it changes. It's a field of early saxifrage. This is a little unusual. This plant usually grows in the woods in the shade. But what it really likes is outcrops. And if you look real close here, we're essentially right on bedrock with some turf on top of it. I mean, the summer's great and the weather's warm, but things are kind of the same. You're out and you're out a week later, and there's not much progression. But in the spring it's like every day is different.

(Narrator)

Even our trees and shrubs have to come up with strategies to make the most of a short growing season.

Having made it through winter with just the barest of essentials, each Spring trees appear to have to start from scratch.

But are they really bare? Let's take a closer look.

Before trees become part of the Spring show, a lot of preparation has gone on behind the scenes.

In fact, trees started getting ready last summer and fall.

(Judith Sumner)

Well buds are generally formed in the fall. ...buds are actually pre-packaged and everything that you would expect to see coming out in the spring is already there, in a miniaturized form, in the fall, covered with leathery bud scales, which are not really there to keep the bud from freezing, but really to keep the bud from mechanical harm; flying ice crystal and physical damage.

(Narrator)

The shape and size of these buds is unique to each tree species.

Judith Sumner specializes in flowering plants.

She's a popular instructor who's been passionate about plants here entire life.

A skilled botanist like Sumner can identify plants by their buds alone.

All winter long, these trees have been running off energy reserves.

Come spring, they need plenty of new foliage and blossoms for reproduction to ensure their survival.

(Judith Sumner)

Warmth, light, internal plant hormones, and a combination of these factors that give the plant sort of the on switch and then the buds begin to swell. Sugars that are moving up from the roots that are actually chemically

very close to the table sugar you put in your coffee or tea, these are now moving up from the roots, through the stem, and arriving at the level of the buds, beginning to nourish and feed those cells. There's now liquid water available. The individual cells are beginning to enlarge. Vacuoles in the cells are swelling. And this is what makes a bud literally begin to just pop open, swell open, the bud scales begin to fold back, the bud scales fall off, and the bud is on spring growth.

(Narrator)

Some of the buds open up to become leaves. Others become the tree's flowers; they burst open first.

(Judith Sumner)

I think somehow we think of trees as separate from flowering plants. And when we in fact talk about hardwood trees; oaks and elms and maples, these in fact are every bit as much a flowering plant as a geranium or a rose or a trillium.

(Narrator)

The red maple got its name not for its fall foliage, but for its intense red spring flowers.

(Judith Sumner)

We're certainly aware, if we park our car under a hardwood tree in the spring, of all this small material, these little catkins and things that fall on the car. And we might dust them off and be annoyed with them, but in fact when one of those falls on your car it's actually a cluster of flowers. And these are reproductive every bit as much as a big showy rose or a magnolia is...The flower is of course nothing more than a sexual advertisement for the plant.

(Narrator)

Wait. These beautiful flowers, that give us so much pleasure, are sexual advertisements?

(Judith Sumner)

I've had a number of students who've been surprised to find out that plants have sexual reproduction. Of course, I teach college students and college students think of sex in terms of fast cars and pretty girls, and go to a bar. And they don't realize that the biological definition of sex is that it's the fusion of cells from two genetically distinct parents... You have a pollen grain produced by one tree or one flower and sperm cells are fusing with egg cells. And that's every bit as much sexual reproduction as two animals reproducing and having babies.

(Narrator)

Even the male and female sexual organs on plants are somewhat similar to ours.

The male parts, called stamens, are exposed. They often look like a bunch of little stalks.

At the top is a purse-like sac called an anther that holds the male sperm - pollen.

The female parts are in the center of the flower.

The stem of the flower leads directly to the ovary and the eggs inside and then runs up to the sticky pollen-receiving parts – the stigmas.

Stigmas come in all kinds of shapes depending on the flower species.

What's more, flowers can have both male and female parts...or they can be one or the other.

Take red maple flowers. They can be male, female or bisexual.

And all three types of flowers can occur on the same tree!

Although all plants have the same basic equipment, there's an incredible diversity in how they go about reproducing.

That's where the birds and the bees, the insects, and what some think of as "magical pixie dust" come in.

(Narrator)

Reproduction must start with pollen.

Individual grains of pollen are tiny.

They usually look like yellow or orange dust.

A single birch catkin contains five and-a-half million pollen grains.

Of course you'd need a microscope to begin to count the grains and to see just how distinct they can be.

(Judith Sumner)

Pollen comes in different shapes. Some pollen is what botanists call boat-shaped. It has a long, central groove, and it's sort of the shape of an elongated jellybean. Other pollen grains are sort of shaped like little triangular pillows. Some of spherical. Some are sort of flattened and round and have a central band and sort of look like a hamburger...

(Narrator)

This evolutionary design comes in handy in getting pollen delivered to the right female flower.

(Judith Sumner)

When a pollen grain lands on the stigma, the stigma is usually a very receptive surface. It's often sticky, it's often a little bit hairy, and the pollen grain can nestle right on the stigma, and actually is nourished to some extent, by the stigma. Gets some food, some sugars, and some proteins, and some hormones, that promote growth of a little tube. The tube pushes out through the pollen wall...and will begin to grow down, toward the earth...And when it reaches the area of the ovule, and the ovule is the immature seed, it will then push in to the wall of the ovule, again through a little opening. And at that point, there's actually an explosive event that occurs in the pollen grain, where through this pollen tube are forcefully shot two sperm cells...into the middle of the ovule. And one of those sperm cells fuses with the egg.

(Narrator)

Once the eggs in the ovary are fertilized, the male parts of the flower are no longer needed; they wither and fall off.

The petals no longer have jobs either; their colors fade and they too drop.

(Narrator)

But getting pollen from one plant to another can be tricky.

Most of our trees rely on air currents to do the delivering.

(Judith Sumner)

Wind pollination is a tremendous event that occurs in the spring. The wind carries huge amounts of pollen.

Just imagine if you were trying to get something, like a letter in a mailbox. How many letters would you have to release into the wind to get one to fly, by accident, into a mailbox. And that's the best analogy I can give.

XXX The vast majority of pollen grains end up on the ground, in other places, on water, lost, and do not in fact engage in the pollination/ fertilization process.

(Narrator)

All that tree pollen is responsible for many of our springtime allergies.

But with all the pollen that's produced, some must land on the wrong plant.

What happens then?

(Judith Sumner)

And if it is the incorrect pollen grain, the stigma can actually chemically dissolve the pollen tube. As the pollen tube begins to germinate and penetrate down the stigma of the flower, it will be attacked by enzymes that actually can break it down...It will break down pollen tubes from the wrong species, so they cannot attempt to deliver sperm to the egg, deep down inside the ovule, in the bottom of the pistil.

(Narrator)

Scientists believe wind pollination is a hold-over from the last ice age.
When plants first attempted to recolonize glaciated areas, it was still too cold for insects.
But there were winds to carry pollen around.
Now most northern New England plants are pollinated by either wind or insects.

(Judith Sumner)

A wind-pollinated plant has essentially the same reproductive parts as a big showy insect-pollinated plant...
What it doesn't have are fancy petals. It doesn't have bright, huge, pigmented petals.

(Judith Sumner)

In insect-pollinated species, pollen is usually delivered to exactly the right place. A bee comes in, gets brushed by pollen from the anther, visits the flower, because a bee will visit just flowers of one type on any given day; carries that pollen to the next plant which will be of the same species because the flower will have the same color and shape.

(Narrator)

It's early spring when insects begin pollinating. Ephemeral wild flowers are their first targets.
But none of these plants just wait around for insects. They actively court them.
Oftentimes there's a sweet reward awaiting the insects for their troubles.
Nectaries deep within the flowers produce a sugary liquid.
Flowers will even provide helpful directions.

(Judith Sumner)

Many flowers have ultraviolet reflective pigments. And so to a bee, the flower is perhaps also going to have perhaps pink or hot purple colors that are off the human visible spectrum. For instance, something like a violet or a pansy, those dark lines that point towards the middle of the flower, to us aren't terribly exciting, but to a bee those are outlined in these ultraviolet pigments, so they look rather pulsating and bright. Those are nectar guides. And those are literally pointing to an insect exactly where those nectar deposits are. The insect then goes directly to those nectar deposits, and as the insect is drinking, gets brushed by pollen, and then when the insect visits the next flower, that pollen is brushed right onto the stigma, right onto the correct female part of the next flower.

(Narrator)

Up close, it's easy to see flowers are at the heart of much activity.
In northern New England, Spring is the time to savor flowers of all kinds.
They come in waves this time of year... from the first hardy ephemerals to the more vibrant blooms that see us into summer.

(Narrator)

Spring is also the time for many birds and animals to mate and give birth.
It would seem easier for wildlife than plants.
At least animals can move. But does that necessarily make it easier?
Wildlife tracker Diane Boretos is out looking for the first signs of animal movements in the Spring.

(Diane Boretos)

See the track? See three toes here? Fourth toe is out here. There's a front paw, there's a hind paw. There's a front paw. In all my years of tracking, I've only gotten two casts of beaver. But this animal is definitely working here.

Living here.

(Diane Boretos)

Wetlands are significant to a number of species in New England in terms of nutritional value for the emergent vegetation that first comes up in wetland areas. For example, the black bear oftentimes makes a beeline toward the wetlands...near its hibernation areas to feed on things like cattail and the sedges for nutrition. It's come out of a long winter of hibernation and its body has been depleted and it's looking to get some kind of rejuvenation to start up with mating.

(Diane Boretos)

It's one of the first places that greens up in the springtime. Animals know that.

(Diane Boretos)

Animals are coming off a hard winter, they're needing nutritional value right now, big time. Animals eat in different ways. Their teeth are structured differently, their mouths, their eating habits. This is a 45-degree angle. This tells me this is rabbit sign.

There's some fresh sign. This has been worked. You can see burrows up there. That cavity up there. Looks to be, given the sizes of the pieces of wood, a pileated woodpecker. And sometimes, if you look closely, you can see the size of the beak on the wood. Now that cavity up there is big enough for a saw whet owl to use. Whereas last year, there was a flying squirrel in there.

There's more life associated with dead wood than there is with living wood, starting with insects and animals that come feed on the insects including the insectivore birds. Then you get the small mammals like rodents, white-footed mice, deer mice. A cavity like this, it's called a base cavity like this, this would be particularly useful during the winter for shelter. And in the springtime for nesting.

This kind of log will be used in the springtime for drumming by the male grouse, ruffed grouse. They'll sit on the log and open up their wings. And they move their wings up and down so rapidly that they produce this drumming sound that can be heard for long distances. And they'll use the log for year and years and years; they'll come back to the same log in that landscape. And it has to have a certain amount of cover to it to make it attractive for the male.

Spring and the wildlife associated with spring epitomizes hope for me...

Looking at wildlife coming, looking forward to finding mates, looking to reproduce, enjoying life, and they do. This is a wonderful, well I shouldn't say spring is easy, because for a lot of species, it's not. But they are hopeful about the easier season coming in the summer. And I think animals understand that intuitively.

(Narrator)

For some animals to breed, they must first make a long and dangerous migration.

Peepers are part of a remarkable movement each spring of amphibians seeking out water for breeding, then a few weeks later, returning to the woods.

These tiny frogs – often no larger than a penny - are much easier to hear than to see.

Special night vision lenses allow us to see them in action.

For many of us, it's not Spring until we can hear the trilling of peepers.

Sawyer I love this part. When after sugaring ends it's just about the beginning of vernal pool season. And as soon as it starts raining, and the pool starts melting, I start going around and seeing how much water there is and when I can see certain things.

(Susan Sawyer)

Especially wood frogs around here because they're so noisy. So people know where it sounds like ducks in the woods. Really, that's how I often find them, is in the evening if I have my windows rolled down in the car, I can

hear the wood frogs quacking. And they're particularly found in vernal pools and other waters that don't have fish. The peepers could be in every pond or many ponds if it has vegetation.

(Narrator)

Spring peepers. Wood frogs. They're known as calling amphibians. The males get to the pools first. What we hear are the males urging the females to join them.

(Susan Sawyer)

I think that most people get interested in vernal pools because the frogs...the wood frogs are making a racket in them. And they hear that and they start going to them just to see the amphibians. But once you get into the pools you discover all the other things that are happening. Although you could stay with the amphibians because they're kind of, they're fascinating. But there's so much more in here too.

(Narrator)

Sawyer first became interested in vernal pools about 10 years ago when she was asked to write a middle school curriculum about them. The pools are now a spring obsession of hers.

(Susan Sawyer)

Vernal pools don't have fish. And so the animals that are very successful in here that you won't find in permanent water. Those get cleaned out in water where there's fish. There's also a lot of food in here. It's a detritus food chain here. The food comes from the leaves that fell off the trees last fall. And so this water that fills up makes tea. So basically it's tea or soup; it's very nutritious. So lots of different life forms have adapted to that.

(Narrator)

These vernal pools are like island ecosystems because they often dry up by summertime. And the species that come here to breed...must either be able to go dormant or migrate back out of the pool.

(Susan Sawyer)

This one is a heartbreaker. It's on top of ledge and there's no spring to feed it. It's got plenty of water now, but if the spring turns out to be dry, the pool will dry up before any of the amphibians get out. One of the things about vernal pools is you can safely walk around in them. Because they dry up, they get a nice and hard, like the forest floor bottom with water on top of it. It's one of the ways I tell if a pool has more permanent water in it, if I get my boots stuck (laughs)...I'll try to take as few steps as possible because every step you take disturbs something and kicks up a bunch of mud. And the pool is so clear you don't want to disturb it too much. Here are salamander eggs right here on these little, teeny sticks. And these are Jefferson blue-spotted-hybrid eggs, which I can tell because the jelly is very loose.

(Susan Sawyer)

And there's fairy shrimp in here. One of the things I wanted to do today is look for the fairy shrimp. Now, here's a patch of sunlight and I can really see in. Lots of fairy shrimp everywhere there's a patch of sun. There's lots of fairy shrimp. You don't see them at first because they're not on the top and they're not on the bottom. They swim in the water column. They're orange. You always want a white dishpan for aquatic works so you can see what you got. Scoop up some of these guys. They swim on their backs, and they have eleven pairs of legs, which they move in a sort of wave action. They're filter feeders. They're only found in temporary waters you know. The water is just temporary and the fairy shrimp are temporary. And you could come back to this pool, if it still has water in late June, you could come back and you'd never know the fairy shrimp had been there.

(Narrator)

A month later...Sawyer is headed to another vernal pool. This time with some apprentices.

(Susan Sawyer)

What we're seeing today is like the end of spring. Then fairy shrimp are gone. The salamander eggs have pretty much hatched. The wood frog egg masses are long gone. And the tadpoles are big and they'll start growing legs soon. There's lots of predatory insects out now; the damselflies and water tigers are out snagging things. What you watch in a vernal pool when you visit over and over, is waves of populations that grow and then breed and then disappear. And then other populations take their place. Either because their food is different or their habitat.

Who wants to be eaten by a water tiger? Here's the water tiger with the jaws. They're so cool. They dog paddle so they're completely silly when they're swimming, but they can nab things and just suck the insides out of them. See that? That one has striped legs.

(Narrator)

How the amphibians get to the vernal pool each spring is a story in itself.

Biology professor Aram Calhoun and some of her students are there when the wood frogs and spotted salamanders head to the pools, when it's still much more like winter than spring.

(Aram Calhoun)

Mark on the top. It's beautiful.

(Narrator)

They set up traps all around the pools so they collect as many of the amphibians coming and going as possible.

(Aram Calhoun)

Keeping track by year now so even if they're already marked, we're doing multiple years now, then a different color for a different year. I guess everybody is getting a mark now as they go out. Yeah.

(Student)

It's very quick. Small needle and you just inject under the skin very shallow, so it doesn't hurt the frog and get into the leg tissue. Just underneath the skin very gently.

(Narrator)

After several years of counting, they've come up with some remarkable data on the migrators.

(Student)

Well we've never had any salamanders switch breeding pools. Ninety-five percent of the wood frogs come back.

(Aram Calhoun)

There's a lot of debate about how they know which pool. Because as you know they tend to go back to the same breeding pool from which they were hatched. And the question is how do they know where that is? Some people say, they know their tracks, they have olfactory scents, or they can sense the algae in their given pool. Some people say they are using some sort of celestial clues. But I don't think anybody really knows the answer to that question yet.

Oh my goodness, beautiful markings and it's in the right pool.

We're finding, at least on this island, that the wood frogs are moving even if it's dry – in 34 degrees. If it's time to go, the males go and they start chorusing and it attracts all the others. Whereas, we never see the salamanders move without a warm rain event. So the salamanders seem to be much more keyed to specifics of climate than the wood frogs do.

(Narrator)

Biologists refer to this mass migration as Big Night.

(Aram Calhoun)

Big night is if we're lucky, and the conditions are just right, and we have a nice warm spring rains, and big night refers to that en masse migrations we get of wood frogs and spotted salamanders sometimes at the same time. We've all driven out on country roads on a warm spring night and seen lots of things jumping in front of the headlights; that's kind of a big night.

(Reporter)

Even with all the technology in the world, the highway can be a dangerous place if you're a salamander.

(Burbank-Hammarlund)

We better be careful where we step.

(Reporter)

Because when nature calls, even a backroad like this one on Grimes Hill can be a death trap. Every spring, Hollis Burbank-Hammarlund sits by the phone waiting for the rescue call to come, usually on the first rainy wet night in April.

(Burbank-Hammarlund)

Watch this car coming up here. OK.

(Reporter)

She and dozens of her neighbors put on reflective orange vests, grab their flashlights, and held out hundreds of those yellow-spotted salamanders crawling out of hibernation and right into the path of doom.

(Burbank-Hammarlund)

Oh, he just ran over one.

(Reporter)

Hollis and her neighbors are trying to get to them, before the cars do.

(Burbank-Hammarlund)

It's sort of a race. I feel like we have to find them, ahh, before they drive over them. A lot of people drive and they don't know that they're in the road. They see something in the road and it looks like sticks. How are you doing?

(Reporter)

These salamanders spend most of their lives hidden out of sight. Except for this one night every year, they venture out. Their instincts take over. They have one thing on their minds.

(Burbank-Hammarlund)

To mate. Yep. To breed in the vernal pools. They males arrive first. He's cruising. Here we go over here on the right.

(Reporter)

And in a way, Hollis, and Fred, and the other neighbors, are matchmakers. Who try to make sure these guys make it to their pool party. So now, every spring, neighbors have a phone tree, and when the big night arrives, the crossing brigade answers the call.

(Burbank-Hammarlund)

It's sort of a salamander hotline list that we call.

(Reporter)

Bringing out volunteers like Wendy Johnson and her family.

(Burbank-Hammarlund)

Big time crossing here.

(Reporter)

In Williamsville, Tom Hallock, News Channel 31.

(Aram Calhoun)

Pretty spectacular. A black animal with bright yellow spots... And we don't see them. Which is part of the reason I think that folks don't really understand the importance of vernal pools or what they have to do with anything. Because we're talking about a bunch of animals that people never see. If they were more visible, it might be better for them.

(Narrator)

When migratory birds return to northern New England to breed we all take notice.

For their songs can instantly lift our spirits and let us forget all about the void they left last summer and fall.

As conservation biologist for Vermont Audubon, one of Mark LaBarr's jobs is to keep track of the number of migrating birds.

A great place to do that is at Herrick's Cove on the Connecticut River.

(Mark LaBarr)

A place like Herrick's Cove provides a great wealth of food for them to recharge; both from the emerging insects that are coming out right now to you know the marsh ecosystem out there which provides a lot of food for waterfowl. And for a lot of birds, it's a very key part because they need to recharge after a, especially with our small songbirds that migrate at night, these have to find a place that they can recharge, take a little bit of rest, but also eat and get ready for that next night's push. And so there is obviously by the number of species that are here, there is a wealth of food available to them.

So everything and anything, from the small songbirds, the yellow warblers that breed here, but also move through here. Bay-breasted warblers which a much more northern species, different habitat but use it as a migratory route. And of course with the abundance of water you have a host of waterfowl that also move through this spot. And as far as raptors, you're going to catch your... Sharp-shinned hawks as well as osprey that would be using... you know osprey is a good example of a raptor that would use that water and take advantage of that for its migration north.

(Narrator)

At night, individual species of migratory birds will fly in waves.

But if something goes wrong, a lot of birds can be affected at one time.

(Mark LaBarr)

You know a bad storm, bad weather pattern that sets up wrong that may blow birds off the coast, can be very detrimental to species as they move. And oftentimes they use now a lot of Doppler radar to follow these birds. You can actually follow them, there's enough birds migrating in, that move through. You can see how a big wind shift or a weather pattern or a hurricane or something like that, would blow birds off course. Now for birders that can be a great thing, because all of a sudden you're gonna see birds that you never, have ever seen

before in your neck of the woods are all of a sudden going to be there because nature shifted their route. So it can be both positive from the birding perspective but it can be a very big negative for the birds as well.

(Narrator)

For the migratory birds that do make it back here, the adults are “programmed” to either go back to last year’s breeding areas, while younger birds are more likely to stake out new territories.

(LaBarr)

One of the ways you can bring them in is through what’s called pischhing. Pisch. Pisch. There’s a common yellow throat right there. Pischhing for whatever reason draws the attention of the birds and so you can bring them in usually a little closer.

(Narrator)

Dawn is the best time to hear the songbirds. As more migrants return, the chorus intensifies and diversifies each morning.

(Mark LaBarr)

A lot of the birds you’re hearing here, yellow warblers and such, they’re males that are back. They’re kind of establishing their territories as well as advertising to the females, to let them know that they are, they’re here and ready to. To pair up and...you know nest. So the bird song has dual purpose in many respects.

(Bryan Pfeiffer)

The spring migration tends to be more concentrated; it actually starts in February...things start to happen to February. And it progresses and it rises to this wonderful crescendo in May.

(Narrator)

Bryan Pfeiffer knows birds. And he loves to share what he knows with birders on his tours.

(Bryan Pfeiffer)

He’s in this scope now.

Sometimes you’ll see early red-winged blackbirds, sort of what most folks think of as the real harbinger of spring. You’ll even see breeding activity. Owls breed quite early, ravens; so things even start then. And those are the things when you’re in the depth of winter, you’re wondering if are you ever going to remove your long johns. You know you start seeing these little signs of spring that show up and you know that there’s hope.

(Narrator)

As welcome a sight as these migrants are, Pfeiffer’s well aware of the real reason why they’re back. It has everything to do with the biological need to reproduce.

(Bryan Pfeiffer)

Some birds come up here and actually come up here and they’re nothing more than ruthless opportunists. I mean they come up here and they exploit our insects, and they raise their young and then they get the heck out of there. I mean some birds are actually thinking about going south by July.

(Bryan Pfeiffer)

You’ll see male birds in many cases it’s only the males that will sing. Males will sing not only to broadcast their presence to females, but also to broadcast their presence to other males. Because what matters most if you’re a male songbird is if you’ve got turf on which to raise young. And birds sort of defend territories with their song very often. You’ll see them moving around the perimeters of their territories and singing and often you’ll see

birds counter-singing; one male here, one male there counter-singing. In a sense it's kind of a duel. They're sort of competing for territory. So song is not only this sort of wonderful, loving event that we tend to associate with it. In some ways, it's an aggressive gesture on the part of birds.

(Narrator)

Although a bird will be strongly territorial against others of its own species, it will typically not chase away other species.

No two bird species have the exact same needs - so they're not direct competitors.

(Bryan Pfeiffer)

The red-winged blackbird is a great example. Males will start to show up in March in good numbers. No females, only males. Males will arrive first, they will sing and flash those red epaulets and do this sort of big bravado macho thing really to establish territory. They are only singing to other males there. And the females arrive later; you know three weeks later, so you'll start to see female showing up. And by that time, males have staked out their territory. So the males are, females are choosing males not only based on the flashiness of their red epaulets or the vitality of their song, but also the size of their turf...because what matters to a female blackbird is that there is enough territory there for her to raise her young; to find food to raise her young.

Spring is an amorous time. And these birds for the most part are thinking about three or four things. They're thinking about getting to good breeding areas, if they're in migration. They're thinking about finding food. They're thinking about avoiding predators. And they're thinking, probably above all, about making more birds. That's really what the migrants are coming here for, to make more birds. To reproduce.

Lots of folks tend to associate spring with birds. Lots of folks tend to appreciate nature through birds; they're so animated; they're so lively; they're so colorful. Birds are this wonderful sort of gateway to the outdoors. And when you're out looking...you just suddenly become aware of all the other great things that are in their good company.

Once we learn birds, we start to look at other things like butterflies and dragonflies and flowers and lichens. And you realize that they're just an obvious but sort of just one component of all this wonderful life outside. Wonderful, wonderful treats that are just so close to us, right near us.

(Linda Greenlaw)

Spring is one of the few times of the year to see the American Kestrel which is returning to our region to breed. This falcon is one of over 20 species of birds of prey at the Vermont Institute of Natural Science, New England's leading raptor care and educational center.

It's a great place to learn more about the spring activities of our larger birds.

I'm Linda Greenlaw. Thanks for watching. See you next time.

Mike. What do I do now?

(Music)