

# URBANFOREST CONNECTIONS

webinar series

## Wildlife Conservation in Cities and Suburbs: Research, programs, and tools

Wednesday, March 11, 2015 | 1:00 – 2:00pm ET

### TRANSCRIPT

*Margie Costa:* Now onto today's topic: *Wildlife Conversation in Cities and Suburbs: Research, programs, and tools*. We'll hear from two speakers today, Susannah Lerman, Research Ecologist with the U.S. Forest Service and the University of Massachusetts, and David Mizejewski, Naturalist: Media/TV Expert with the National Wildlife Federation. Naomi Edelson, Director of State and Federal Wildlife Partnerships with the National Wildlife Federation, originally was going to be one of the presenters. She will not be here today, but has – she and David worked on the presentation.

Our first speaker is Susannah Lerman. She earned her Ph.D. in ecology from the University of Massachusetts in 2011. She was awarded a Switzer Environmental Fellowship in 2010, a Switzer Environmental Leadership Grant in 2011 and in 2012. Susannah was awarded the National Science Foundation's Sustainability Fellowship and is partnering with the U.S. Forest Service and the University of Massachusetts. She explores the links between human management of urban green spaces and the health and success of native wildlife populations, and how these impacts influence people due to the role of biodiversity and delivering ecosystem services. In the mid- to late-90s, Susannah established a bird migratory research program at a major stopover site in Southern Israel and promoted ecotourism through birding tours. Her research has been published in high-impact ecology journals such as *Ecological Applications* and *Bioscience*, as well as featured in *Audubon Magazine*, *The Guardian*, NPR, and the *American Gardener*. Susannah is a keen birder, enjoys running, desert hiking, and epic sledding hills. So, take it away, Susannah.

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*Susannah Lerman:* Okay, thank you so much for inviting me to share my research with everybody and thanks, everybody, for joining us on this webinar. I want to start by talking a little bit about the birds and the bees. This is the classic talk about the birds and the bees, the flowers and the trees, and I will mention some of those, as well, but I'm going to give this a slightly different twist. So the two animals I want to focus on

today, the birds, they both provide some very incredible provisioning services to really try to really increase the ecosystem services where we live. So for example, Doug Tallamy from the University of Delaware painstakingly documented the number of insects it takes to raise one clutch, one family of chickadees. He estimated it between 7,000 to 9,000 insects for just one single family. And this is pretty incredible when we think about how many caterpillars – we see this one picture on the left side of this Carolina Chickadee – how many caterpillars it takes just to raise that one family. And this is not an isolated case. When we think about the number of birds that we can see just outside of our backyard, the number of insects that it's going to take to raise their families, it really adds up to a lot. So they really provide this tremendous resource for us and this tremendous service by really keeping our insect populations in check.

Then when we think about the insects and particularly the bees, they also perform these really extraordinary services for us, primarily in the form of pollination. Scientists have been able to quantify the pollination service that bees provide – and this includes native bees, but primarily honeybees – and it's estimated to be around \$56 billion per year. They provide this vital component to our agricultural systems and without bees, our whole foods system would pretty much collapse. But in addition to these provisioning services, these birds and bees also provide these cultural services, as well. So birders are a fanatic group of people. We spend millions of dollars travelling around the world trying to see that one specific species, or just going out into our local patch and we gain so much enjoyment just from being outside and enjoying our feathered friends. Bees also provide ways for us to reconnect with nature, in one form of beekeeping. And again, this is an activity that people will spend a lot of money to go out and raise bees to try to provide some honey, and this can be either on a professional or an amateur basis. But there's also what I'm calling these “bee-ers,” these people that go out and identify bees just for fun and can spend hours upon hours just trying to identify one individual bee. We do this because it makes us happy and this is something that's really difficult to quantify, but I'm sure everybody on this call can really appreciate how much these animals can really add to our well-being.

So one of the biggest threats to our wildlife populations is urbanization and just the basic form of development. The way that scientists are really trying to quantify how animals are responding to land-use change is by looking at animal populations and communities along an urban to rural gradient. As a wildlife biologist who studies urban animals, one of the things that's really nice about using this approach is that we do get to go out into these wild places. When we think about it, these are forests, our pristine forests and grasslands and deserts. And then as we get a little developed, we see some of these more rural or exurban areas. In New England, we would call these “the sticks.” And then as areas get a little bit more developed, we see this drastic change in the amount and type of green space to our suburbs and suburban areas, residential areas, until we get our most urbanized places, our cities, our downtown areas. And these are really exemplified by the amount of impervious surface; however, you can still see these little patches of green space throughout. So by looking at how animals have responded to different degrees of urbanization, what we have found is that these really striking patterns – that as we become a more urbanized area, we see this drastic

decline in biodiversity and species richness. So we have fewer species that are able to persist in our urban areas. The primary reason because of this is the loss of habitat and the alteration of habitat. So many conservation organizations have really targeted the rural end of the gradient to be able to get more bang for your conservation buck. And many wildlife populations have responded to this and have rebounded because of these efforts. However, when we think about the statistic that this is the place where the majority of Americans are having their primary interaction with the natural world, it really becomes imperative that we create these wildlife habitats that can support wildlife, so that we have the opportunity to enhance and strengthen the ecosystem services that our birds and our bees can provide for people.

So the urban forest – and this is something that's pretty familiar to most everybody on this webinar – is not all doom and gloom. There's actually a tremendous amount of variation within our cities with regards to green spaces. Here's an example of a couple of different types of green spaces or parts of the urban forest that we can find, ranging from rooftop gardens to pocket parks to office parks, as well. Another classic area of green spaces are these residential landscapes. This is a very typical scene in a New England town in the fall, not so much right now. We're just about to start getting rid of most of our two to three feet of snow, so hopefully soon we will start seeing some greenery. But this is a very serene image. When I look at these street trees and these different residential areas, I see all this potential wildlife habitat. For example, when we look a little bit closer at these trees, there's these opportunities for nesting. We have deadwood that's present in our street trees, and these can be great resources for cavity nesting species like woodpeckers, and also for owls. There's nests that we might be able to find up in the higher areas up here in the higher areas of the canopy for some of our species that like to nest higher up. Then there's also opportunities for ground nesting animals, as well. In addition to these nesting opportunities, there's other types of resources that wildlife require to persist in these different types of environments. We can see things like nectar from these plants that people might be having in their gardens. We also might see some water, and here the only example I can find is the water hydrant. But there're earthworms that are scuttling around underneath our lawns that are really great resources for a lot of different animals. And again, some cover for other activities for birds and other types of wildlife to hide. This might be an example of how some of these species, some of these birds and bees might fall out within these residential landscapes.

So one of the things that we're really trying to figure out, though, is what are these optimal conditions? So our research with U.S. Forest Service and University of Massachusetts is investigating three lines of inquiry. First, we are assessing habitat potential using the urban forest assessment tool *i-Tree*. Second, we're expanding our conservation partners with the *Neighborhood Nestwatch* program. And third, we're creating habitat in our *Sustainability Begins at Home* project, and I'm going to describe these three different projects in detail now.

First, I'm going to talk little bit about this new module called *i-Tree Wildlife* and I'm not going to go into too much detail about *i-Tree*, but I would be more than happy to

answer questions after the presentations. The main goal of this module to the urban forest assessment tool is to develop a way to do a rapid assessment of the habitat quality and the habitat availability within our urban forest. The way we are doing this is we're building habitat models based on the literature of what different types of species – and at this stage we are working with birds – what types of habitat features these birds require. And we are putting that into these *i-Tree* models that are part of Dave Nowak's team in Syracuse and some of his other partners. We're able to use this information to start assessing what quality and potential habitat exist in these urban forest, and then we can use this information to try to improve these habitat management plans. And then we have this ultimate goal of increasing urban bird diversity, so going back to that trend I showed in terms of that urban-rural gradient and how wildlife is responding.

So I'll use the red-bellied woodpecker as an example to show you how the project works and how *i-Tree Wildlife* can be applied. For most species there're a few key habitat features that they're going to be responding to. We can model the variation within this particular habitat feature with how likely a species will use the habitat. Here we have the percent canopy on the x-axis here and we have the suitability index over here on this y-axis. So if suitability is 0.0, we're not going to see these birds at all, to 1.0 being very optimal habitat. What this is showing is roughly at around 36-37% canopy cover, this is where we are actually going to start seeing really optimal conditions for the species. But another thing to note is it's not necessarily more is better. We reach a certain threshold that once we get above 60% of canopy cover, all of a sudden the conditions are not as optimal for this particular species.

So we use this information. We create these habitat models and for most of the species we have been modeling so far – and we are up to about nine different species that are found in, predominately in the northeastern part of the country – and for each species, we have between three to five different habitat features that these birds are responding to. With a red-bellied woodpecker, in addition to percent canopy cover, these birds also need large trees that are larger than about 23 centimeters in diameter, a pretty dense basal area within a hectare, and also they need to have some dead and decaying wood because these are primary cavity nesting species. I have the different habitat variables up here in the top part of this table here, and then to show you how this works I'm going to give examples from the city of Philadelphia and New York City and then also two different land-use types, we have our high-density residential on the top and then forest fragments on the bottom. These yellow circles represent these *i-Tree* plots, these .04 hectare plots where we're actually going out and collecting the real-time data. Based on our habitat models, what we know in terms of the optimal conditions are just listed below. So we know, as I mentioned with the canopy percent, between 35% and 62% represents the suitability of around 1.0.

So what we found in terms of what actually exists within these different cities and in these different land-use types are the numbers I just put up now. There're a few interesting things that I want to go over in a little bit of detail. First, these numbers here represent the total suitability for each of the cities and for each of these different land-

use types. Remember a 1.0 is most suitable. So based on using the *i-Tree Wildlife* module, what we can see is that in these forest fragments in Philadelphia, these provide some really decent wildlife habitat for red-bellied woodpeckers. In New York City – not so much. Then we see a decline in habitat suitability in both Philadelphia and New York City in these more residential areas. When we look at some of the different numbers, we can see here, at least with regard to canopy percent, it falls pretty far below our threshold of 35% to 62%. I circled a few other examples, as well – where basal area for Philadelphia falls very nicely within the optimality, whereas in New York City it does not. The same with the amount of deadwood present. Some of the reasonings behind these differences could be due to some of these management choices that urban foresters might be making in these different cities.

So in sum, what we've been able to see with the *i-Tree Wildlife* module, and what we're hoping for it to really be able to do, is provide a rapid assessment of the habitat quality and the habitat potential within the urban forest. We're also able to provide some detailed information about what habitat features are required to support these animals. So rather than having a blanket statement of just plant more trees, we can go back into the models to see with the optimality is and we can notice that, okay, well maybe the city has 20% canopy cover and the red-bellied woodpecker needs 35%, so therefore, we can start designing our management goals accordingly.

Moving from modeling to actively assessing the urban birds, I want to talk a little bit about our *Neighborhood Nestwatch* project and citizen science. The *Neighborhood Nestwatch* project is a program that was started by Dr. Peter Marra from the Smithsonian Migratory Bird Center back in the year 2000. And this was a citizen science project based in Washington, D.C., where he was actively assessing the health of these backyard bird populations. In the year 2012 and since then, we've added on four additional cities to really start assessing these patterns along a north to south gradient along the East Coast, but also along this urban to rural gradient. Now we are able to start quantifying the health and productivity of some of these backyard birds. When we think about birds in general, they are probably one of the species, one of the groups of animals that we know the most about. They are so well studied; however, most of the information that we know about birds is from more natural, wild systems. So we don't know whether these patterns are the same and we also don't know some of the stressors that some of these birds are facing, which is really integral to understand how to better improve habitat management plans for the benefit of these species.

So the project has two main components. We have the science component, and within the science we are looking at two major questions with regards to these vital rates of these animal populations. First, we are looking at year-to-year survival, so how long do these birds live. One of the things that people will say, especially with backyard birds, is that people have a stronger, more intimate connection with these birds. They might say, "Oh, my robin is back again this year!" However, we don't necessarily know if it's the same robin that's returning to your backyard every single year. But with our research program, what we're able to do is to catch these birds and put these unique

color-bands on these birds and then they start having these individual ways that we can identify. Here in this picture, we have a picture of a gray catbird and we can now say, "Oh, well, this is yellow over silver and red and he's back for the third year in a row." So now we know this bird is at least three years old and we can start making some inferences about what types of stressors it might or might not be facing, depending on some other different types of issues that it might be facing along an urban to rural gradient. The second component that we're really interested in is nest success. We're able to find and monitor nests so this way we can start really getting at a sense of how productive some of these urban to rural birds are, whether or not they differ again along this gradient, and again linking this to different habitat features of management programs so that we can hopefully start improving some of these conditions for urban wildlife.

The second main component of the research is the outreach and the citizen science, the engagement part project. This is a vital component to the success of the research. In order for us to gain access to thousands of acres of private property, we form these partnerships with householders. They invite us into their backyards and we're able to transform their yards into these mini field stations just for a day so we can start investigating how their backyard birds are doing. We are able to collect our data, and furthermore, the other main point of the project is that we train the householders on how to track their colored birds, how to monitor the fates of their nests in their backyards. So in essence, they become the eyes and ears of their backyards. They become our field assistants. They watch these birds and enter their data and they become part of the whole scientific process and they also learn about science from the comforts of their own home. I think they also are able to gain a deeper appreciation for their role in the ecosystem. So not only do we uncover some really cool science, but everyone has fun. I think these three images really capture the spirit of the project. That "feel good" factor, the happiness, is something that we cannot necessarily quantify, but I think we all understand the importance of this.

Finally, I want to talk, to shift the focus on our bees. We talked about the birds and trees and now we're onto the flowers and the bees. So there's been a lot of buzz about bees these days, especially when we think about, especially with honeybees. And one of the main drivers – well, there's been a number of different reasons for their decline, but one of the main drivers is the loss of wildlife habitat. That's a primary concern because of their ecosystem service that they provide. Organizations like the National Wildlife Federation and Audubon have developed programs on how to improve yards for wildlife habitats. One of the requests that some of these programs provide is to try to remove or take away some of the lawns that people have, to transform some parts of the lawn or all of the lawn into wildlife habitat, into better habitat. I fully support that. However, when I think about the expense of these lawns, I realize that this is a huge, huge challenge. Lawns are the greatest irrigated, the largest irrigated crop in the United States and their pervasiveness is not going away. I started to think about, given the fact that these lawns are so pervasive throughout these urban areas, urban and suburban areas, how can we better manage them so they're less bad for wildlife? One of the things I started to think about was the types of resources that could be present

within these lawns, especially when we don't fertilize these yards and try to kill everything except for the grass species.

Our current research is looking at how lawn mowing frequency might be either enhancing or inhibiting floral resources for bees. It is also really time to look at these lawns as potential habitat. The first part of our research is really looking at how lawn mowing frequency – either mowing every week, every two weeks, or every three weeks – might be affecting the number of lawn flowers that we might see in our areas. So it's thinking of long flowers as an important resource for native bees. What our research is showing so far is that there really is a significant difference in terms of lawn mowing frequency and the number of flowers. So even mowing every two weeks we have 70% more flowers in these less mowed, less frequently mowed lawns.

The next question that we are working on is how this might affect the bees. Do the bees respond to these different landscape changes? We have been working for the past two years in Springfield, Massachusetts, in lawns in Springfield, Massachusetts to really start addressing these questions and really linking these human behaviors with these ecological processes and biological outcomes. The way that we're able to get at this question is, again, partnering with the public and we have been offering free lawn mowing service in exchange for the use of people's private yards. Although we are still crunching numbers, the preliminary results are suggesting that bees really are in fact responding to some of these different behavioral changes that we could make in our yards. For example – again, preliminary results, we're still working on our second year of data, trying to figure out some of these patterns – but what we see here is that when we mow our lawns every two weeks, we see a significant jump in the number of bees that these lawns could support. We are still uncertain about what's going on in every three weeks and why we see this decline, but from an aesthetic point of view, this might make sense in terms of trying to convince people to mow their yards every two weeks rather than every three weeks. It might be a better sell. From what we were gathering from our research, people just didn't seem ready to let their lawns go that much.

The other thing that we were able to look at was the compaction, the soil compaction from our lawnmower. I just want to remind you, if you remember the photograph I posted before of the person mowing the lawn, these are small push lawnmowers, about 70 pound machines. And even with something so small, we are starting to see it really significant signature in terms of the compaction that these machines are making on these lawns. This has some really great implications for ground nesting bees, especially in light of the fact that for most of the programs out there, mostly it's for providing floral resources and not really trying to provide for nesting resources, which could be a really integral part of their life stage. But the other thing this has some implications for is perhaps stormwater management implications, and we are still trying to figure out how this research might fit within that realm. In sum, what I think the research is really trying to get at is that it gives you a license to mow less and sitting back and just watching the grass grow because, in fact, you are doing something beneficial for wildlife.

In summing up, I believe that working in the urban forests and engaging the public in research really demonstrates the important role that our urban forests play in sustaining our cities and suburbs. We can provide opportunities for the public to be a part of the scientific process and increase their understanding of the processes driving their urban ecosystems.

Finally, we have many opportunities to change the course of our cities. To date, of the land area projected to be developed by the year 2030, 40% has already been developed. So that means there is 60% of land that has yet to be developed. So hopefully we can use science and the public support to better design our future cities and redesign some of the areas that have already been developed, so that we can ensure their sustainability for both people and wildlife. With that, I would just like to thank my funding sources and the many colleagues who have helped me with this research.

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*Margie Costa:* Thank you so much, Susannah, for a very, very informative and interesting presentation. Our next speaker will be David Mizejewski. He's a naturalist, author, blogger, and national media personality with the National Wildlife Federation. He interprets the natural world and teaches Americans about wildlife, how to keep it, and how to connect with nature. David hosted and coproduced the Animal Planet TV series, *Backyard Habitat*, and regularly appears on the *TODAY* show, *Conan*, *National Geographic Wildlife*, CNN and many other shows and networks. He is author of the award-winning book, *Attracting Birds, Butterflies and Other Backyard Wildlife* and has a passion for restoring wildlife habitat in our towns and neighborhoods. So I will turn it over to you, David.

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*David Mizejewski:* Thanks, Margie. And thanks, Susannah, that was a really great presentation. Folks, you're going to hear a lot of overlap in what I'm going to talk about and what Susannah talked about and to me that is such a great thing that there is so much interest and effort being put into the urban landscape in terms of wildlife and its habitat.

I want to start by thanking the Forest Service. The National Wildlife Federation is partnering with the Forest Service on this program, on this issue of creating habitat for wildlife in our cities and towns. I'm going to touch on that a little bit later on, one specific project that we are working on with the Forest Service. Also I wanted to thank my colleague, Naomi Edelson, who, unfortunately, was not able to be here today, but she help me put together this presentation. Given that we have a fairly short amount of time and I have a lot to get through, I just wanted to say at the top, if anybody has questions that we don't get to, you can always feel free to reach out and we can make our contact info available. With that said, let's dive right in.

As I mentioned, I'm with the National Wildlife Federation. We're one of the oldest and largest conservation education groups in the U.S. We've been around since 1936. Next year will be our 80th anniversary. We focus our work on protecting wildlife and its habitat in a whole variety of ways, at the large landscape level down to the species level. But equally important to our mission is getting people connected to nature. These efforts that we're talking about today – about creating wildlife habitat where people live, learn, work, play, and worship – is really the greatest blend of both of these parts of the National Wildlife Federation's mission.

We've actually had a program called – it's really all about gardening for wildlife. It used to be called the Backyard Habitat Program. Nowadays we're calling it, again, Garden for Wildlife. Since 1973. Many of you guys might be familiar with this program since it has been around for a long time. And what I'm going to do in this presentation is, this is essentially the talk I give when I go out and speak to the public and try to teach them a little bit about the value that our landscapes can have for wildlife if we just make some simple changes on our part. So I'm hoping for two things: (1) that you guys will be reinforced on the information that you are delivering already to the public, and maybe you will pick up new information as well. We've been doing the program since 1973 and there're really two main goals. It is about helping wildlife in a world where we continue to essentially remove habitat and push species out into ever shrinking wilderness areas. So it is about helping them, inviting them back in – the species that are appropriate to share the landscape with us. At the same time, it's about giving people that daily [indiscernible] nature that we know is so necessary to create a populace that cares about wildlife and cares about a future where we have clean air and clean water and abundant wildlife species.

So, it's helpful, I think, to start putting this into context. Why gardening? What does gardening have to do with wildlife? Why do we call it that? Really, what it boils down to is that plants are the foundation of the food system in *any* ecosystem, whether that's out in the wilderness or that's in our backyard. The fact is also that 90% of the insects that rely on plants as a food source can only eat the native plants that they coevolved with. So plants form that foundation of the food chain. And then insects themselves are that next step in the food chain for many other species. Essentially, what we're talking about is taking this, where there's almost no plant material, and certainly no native plant material, and converting that into a landscape that actually has the food value, that has an ecosystem built on it for the native wildlife species. That very act of planting, which is what we are asking people to do in this program – to deliberately plant something for goal – is by definition gardening. So this is a special kind of gardening. It's wildlife habitat gardening. It's native plant gardening. But it is gardening nonetheless.

So what kinds of wildlife can you expect to attract when you create a garden for wildlife? Well, everybody loves garden butterflies, and frankly that's the hook that we use at the National Wildlife Federation to engage the public in this whole idea because they're colorful, they're beautiful, and in most cases people don't perceive them as pests. But our program really wants to help people design functioning ecosystems, so

what we try to do is remind people that beyond birds and butterflies, there're lots of other species that are important and need our help. Butterflies are not the only insects out there that are interesting and beautiful and completely nonthreatening to people. Dragonflies are a great example. Amphibians are on the decline worldwide and if we create better habitat for them within our cities and towns, we might be able to help with their future survival.

We try to teach people about the role of predators. Just because there are animals out there that might scare us, that might show up in our yard, doesn't mean that's not a reason to create wildlife garden. So we talk about the value of snakes – the fact that the chances of a dangerous snake (to a human) showing up in your yard is really minimal, and that snakes are critically important predators. We try to teach people about things like wasps and the fact that they're different than bees. Bees are essentially “vegetarians” while wasps are actually predatory. They're out tirelessly patrolling your garden and eating the actual pests. So we try to teach a message of tolerance, that yes, if you have yellow jacket next to your kid's swingset or by your front door, yeah, maybe that's when you want to remove it. But if it's in the back of your property, where you're not running around, you should be trying to keep these animals because they play an important role in your backyard ecosystem.

Same goes for animals that might be perceived as nuisances. So our program at National Wildlife Federation is about attracting wildlife, but it's also about teaching people how to live without conflict with wildlife. Let's face it, animals like raccoons are here. They're not going anywhere. Coyotes are another example. We tried to wipe them out for centuries. It's not going to work. We try to teach people how to make simple behavioral changes on their part that will minimize any conflict that they might have with some of these urban wildlife species. Put your trash cans out the morning of trash collection, not at night when the wildlife can get to them. Make sure they have tightfitting lids. Critter-proof your attic. Things like that are a big, important part of teaching tolerance for wildlife and how to, again, avoid conflict with them. And that's all part of what we want people to know when they go out, set out to create a wildlife-friendly garden space.

Similarly, predators, again, play an important role in the urban ecosystem. Predators, historically, are very maligned, obviously, so this is a really great way and place to teach people about the critical roles that predators play in ecosystems. We're not talking about mountain lions or wolves in people's backyards, but gray foxes and sharp-shinned hawks certainly are appropriate predators to be in your yard. And they can be there and not pose any danger to people or pets or things like that, and that's okay. That's a big part of our message. And lastly, again, these gardens for wildlife are about helping people connect with nature, as well.

All wildlife need four things to survive. This is the crux of how we teach people about this whole idea of urban habitat. And this is true for wildlife in, for African lions on the savannah to orcas to the chipmunk you see here. Everything needs these four things in order to survive. This is basic Biology 101. Food, water, cover or shelter, and then

places to raise young or resources that allow them to reproduce. I'm going to go through each one of these.

When we talk about food, the first thing most people think about is feeding, putting out a birdfeeder. And there's nothing wrong with that. Feeders – you know, birds will use them as a supplement to the natural foods that they find in the landscape, which is important because (1) you don't need to worry about your birds starving to death if you go on vacation and cannot fill up your birdfeeder, but more importantly, it underscores the importance of plants. If you want to see the birds or other wildlife, you need to focus on your plants because that's how Mother Nature feeds them. That's the way that birds are naturally finding food in the landscape. And plants provide food in a whole variety of ways, whether it's berries that allow, fruit-eating birds will feed upon, or seeds, like the goldfinch down here that's feeding on seeds from a wildflower. It's not just birds, too, that rely on fruits and berries from plants, it's mammals, as well. Nuts are a critically important food resource that we can be providing to wildlife in our backyards in the urban forest. Nectar is critically important for butterflies, for bees, for hummingbirds, and a whole host of other insects that feed on nectar as a primary food source. And we can be very easily adding food sources in the form of blooming plants in our gardens for wildlife.

Plants provide food in a bunch of different ways. There's sap. Sapsuckers drill holes, and other woodpeckers, to eat the sap. Hummingbirds sometimes rely on that as a food source before the flowers are blooming. Insects actually go and feed on that sap, as well, and they in turn become food for other wildlife. That bee in this photo here is drinking nectar, but also collecting pollen which it's going to use to provision its young, so that's an important food source for wildlife. And it is a little bit of a tough sell sometimes to tell people that pollen is important food source, but remind people that animal-pollinated plants generally are not responsible for their allergies because the animals are moving the pollen, not the wind, and it's generally not going to end up up your nose. Then the last point about plants for being the major food source for wildlife is the fact that yes, some of your foliage and some of your plants are going to actually get eaten by wildlife. But if you design your garden in a way that mimics the design of Mother Nature, you're really not going to notice the animals browsing. And if you create a diverse ecosystem in your backyard, then you're going to have lots of predators and parasites that are going to take care of a lot of the plant-damaging animals. So it really balances out.

Now, this is critically important, this idea that plants are the foundation of the food chain, and again, the next step up are insects. When you talk to people, especially the layperson who just wants to see pretty birds and butterflies in their garden and they're not necessarily thinking in the bigger ecological picture, you need to point out to them that 96% of terrestrial birds – these are the birds, songbirds, that people want to attract – rely on invertebrates to feed their young. And largely, those invertebrates come in the form of caterpillars. Put simply, if you don't have bugs, you don't have birds. And so, this is a really important way of driving home the message to the typical suburbanite that you don't need to be out there spraying pesticides like crazy because

if you do, you're going to eliminate a critical food source for the birds that you are trying to attract. And of course, these caterpillars will grow into butterflies (and moths), so that's another way that we can get people to stop for a second and think about some of the impacts that we're having in the urban and suburban landscape.

I want to give a shout out to Dr. Doug Tallamy, as well. The National Wildlife Federation and the Forest Service are working with Doug to develop some resources that will really help people understand this whole idea of creating habitat through native plants in our gardens. I'm going to talk about the study that Susannah referenced in her presentation, too, because it's pretty phenomenally amazing when you hear some of these numbers. So here's a chickadee. They basically specialize in caterpillars when it comes to feeding their young. They can bring back a caterpillar to the nest once every three minutes. Both the male and female are out foraging literally from sunrise until sunset over the breeding season, so anywhere from 6:00 AM to 8:00 PM. That's essentially, on average, about 350 to 570 caterpillars a day, and it's through them, as I pointed out. That ends up being about 6,000 to 9,000 caterpillars over the course of a 16 day nesting event. And that's happening largely within about 5 meters of the nest space. Just to emphasize the volume of insects that we need in the landscape in order to feed the birds that we're trying to attract. It's kind of mind blowing and I think that having numbers and research like what Dr. Doug Tallamy has done really helps us communicate this to the public.

And, again, it's not just chickadees. All sorts of different birds are feeding on insects either themselves or as a primary food source for their young. To put that in perspective, you know, chickadees weigh .3 ounces. A red-bellied woodpecker weighs eight times that much. If you do some quick math, you can, again, see how much insect mass we need out there in the urban and suburban landscape in order to support the birds that people want to attract, and also are critically important for the ecosystem in general. And again, it's not just birds that need to eat insects. These are all examples of different wildlife species that rely on insects as part of their diets, whether it's other insects or invertebrates like spiders. Amphibians, reptiles, bats, even foxes eat a large amount of insects in their diet. As we try to educate people about how to make a better, more sustainable urban forest, urban landscape, and it is easy to hook them on birds and even some of these other animals, but we've got to have a healthy insect population if we're going to have the rest of the wildlife.

Everybody's interested in bird feeding, so, again, even though the focus of our program is the plant material, we do try to teach people there're different kinds of feeders. The main point here is it is okay to feed. Do it in moderation. Keep your feeders clean and feeders are more for people than they are for birds. And generally speaking, they allow you to see wildlife, see these animals up close at a regular spot. So we do a little bit of education on that and teach people if you want to put out a platform feeder like this, you will invite different kinds of birds. You might even get squirrels. And even if you put out a squirrel-proof birdfeeder, there's really no such thing. Where there's a will, there's a way. But again, we try to deemphasize the idea of feeding even for birds and focus on the idea of restoring native plant communities to

provide all those great food sources that plants themselves provide, as well as to create healthy insect populations that will feed everybody else up the food chain. We talk about the fact that predators, if you put out a feeder for birds that eat seeds, you're also putting out a feeder for animals that eat birds. That's okay, too, especially if you have a lot of natural cover that the smaller birds can get away.

This is not what we are talking about when we talk about feeding wildlife. In fact, everybody oo's and ahh's when I show this slide and then I have to question their spirit and say, "Really what you're looking at are dead baby raccoons" because if you artificially feed animals, particularly mammals, they usually don't survive very long because they lose their fear of people. They become habituated, so we do a lot of education on this. Again, feed the wildlife naturally by restoring the food chain, by restoring the ecosystem and you won't run into trouble like this, like this mother raccoon teaching her babies to approach people for food.

Like food, water is next. All animals need water to drink or in the case of birds, to bathe and keep their feathers healthy. You don't have to put in a big fancy water garden if you don't have the time or budget. A birdbath is just fine. It will meet the requirements of birds and other small wildlife. If you do have the space for a larger water garden, you might actually attract some of these kinds of species – amphibians, aquatic reptiles, wading birds – but, again, a birdbath is totally fine. If you do create a pond, we try to teach people not to have steep sides. Make a shallow area where a bird can come in and out or other animals can come in and out without drowning. We try to teach people to plant your water garden. It helps compete with algae and also provides cover and food for the wildlife. But, again, a birdbath will just be fine in terms of providing that resource of water for wildlife.

Be sure to check your birdbaths at night because you never know who might be showing up. It's not just birds that use birdbaths. Amphibians might be using them, as well, as is the case with this gray tree frog and spring peeper. Beyond ponds and bird baths, we try to teach people, too, about the value of just even mud puddles. Butterflies engage in a behavior called puddling, where they drink up the water and the minerals. Birds will bathe in it. Insects like these will be drinking water from places like that. So mud, muddy areas, and this idea that sometimes just going with the flow of what Mother Nature provides on your property instead of spending a lot of time and effort trying to fill it in or create retaining walls, and so on and so forth, trying to get grass to grow where it won't. We try to get people to think naturally and, again, follow Mother Nature's lead.

Again, different animal species might show up. When I give this presentation in the west, I remind people not to go out and buy tadpoles because you could be introducing an invasive species like we had with the bullfrog out west, which is literally eating other amphibian species into extinction. And, again, you never know who is going to show up, even if you just put out a birdbath. That's a little baby bobcat.

Alright, so we talked about food, we talked about cover – I'm sorry, we talked about water, and now let's talk about cover. Animals need cover or shelter either because they're a prey species trying to hide from predators or they're a predator trying to get a meal and be camouflaged so that they can spring upon their prey.

Animals also need cover to get out of the elements. They're like us, they don't want to be out in a blizzard or rainstorm. And, again, your plant material is really how you're going to provide this component in your yard in the urban scenario. Dense plantings of native plants provide excellent cover for all sorts of animals, even animals as big as foxes like in the photo on the right. You might be able to see the gray fox hanging out right there. You don't have to really do much extra than plant your plants in a way that mimics Mother Nature and create natural plant communities and they will pretty much create this whole element of cover for wildlife.

You want to think seasonally. Evergreens make great cover for wildlife, especially in winter months or bad weather. Some animals create their own cover, and that's okay. They dig burrows and if they do that, we want to, we try to encourage people to leave them. Don't try to fill them in.

You can create brush piles or rock piles, or even put out something cute like a toad abode. These are all ways of providing habitats, cover habitat for wildlife. Obviously, with a brush pile, it's not something you can do in every place. In a very suburban area or an area that, where there's fire concern, you don't want to do that. But this whole idea of creating a wildlife garden with these elements can be really implemented in so many different ways. So you don't have to do a brush pile, but if you want to, it is a great form of cover. And then sometimes you put out nesting boxes and other animals use them as cover, but that's okay, as well.

Lastly, we want to talk about the fourth component: places to raise young. This really encompasses the idea that we want to make sure that not only we're feeding animals, giving them water, and making sure they have cover, but they are actually reproducing and sustaining their populations. So, look to your plants. Dead and dying trees are critically important, as Susannah pointed out in her presentation, for nesting for birds and other animals. Cavity-nesting birds are, again, going to nest inside tree cavities. Other bird species will nest right on the branches. You can put out nesting boxes to mimic the natural cavities that are found out there. We try to teach people about poor nesting box design. I'm not going to get into that right now, but you don't want to encourage invasive birds like English sparrows. So it's important you put up a quality nesting box if you're going to do that.

And some species have completely different habitats requirements in different phases of their lifecycle, whether it's caterpillars that need host plants to grow before they turn into adult butterflies or moths, or tadpoles or amphibians that need an aquatic environment. They breathe through gills before they complete metamorphosis. We're doing a lot of work right now on monarchs. Their population has plummeted by 90% for

the eastern population, so we are really trying to encourage people to plant milkweed and, of course, nectar plants for them.

And then if you provide those four elements, you also need to be gardening in a sustainable way. And I've said it a bunch of times already. If you mimic the natural plant communities for whatever region you're in, in your garden – both in the species makeup, as well as the design – you're going to take a big step toward sustainable gardening. We try to teach water conservation. We all live in a watershed, so what you do in your yard or in the urban environment is going to impact animals right where you live, as well as downstream. We try to teach people about controlling our pets. Birds – domestic cats can kill up to 3.7 billion birds and other small animals, so we want to keep them indoors. We want to rely on natural pests or natural predators and parasites to keep pests under control. Again, we teach people not to artificially feed wildlife. And that includes birdfeeders – if bears are coming to your bird feeders, you have to take them down. Again, the predator message is there. These predators are there. They're going to show up and we have to live with them. It is up to us to keep our pets safe.

And then, as I start to wind down here, a huge part of the message of our program at National Wildlife Federation is the importance of native plants. They're both adapted to the local regions, or local conditions, the soils, the weather, the climate. They're also the plants that animals coevolved with and they're the ones that are in sync with the habitat needs. These happen to be two Pacific Northwest plants. The last time I gave this presentation, I was up in Seattle, so I left those in there. But going back to Dr. Doug Tallamy's research, not all plants are equal when it comes to creating habitat for wildlife. Oaks, for example, according to his research, support over 500 species of caterpillars, whereas a non-native species, such as the ginkgo, only supports 4. When you go back to that map I shared – and the numbers about chickadees is one example – you can see the huge difference in habitat for wildlife that can be created simply by plant choice. So it is really important.

This is a slide that shows the difference between a landscape that's uninvaded by invasive species, or exotic species, and one that is, in terms of the number of wildlife species that it will support, as well as the abundance of those species. Just some more examples of some of the numbers that really illustrate how native plants support way more caterpillar species and how that can translate into better, more quality habitat for wildlife all over, up and down the food chain, especially when compared to commonly planted exotic plants that are already out there in the urban landscape.

Again, our native plants are much better at providing the habitat needs of our native wildlife and exotic plants tend to not do as good of a job because, again, they haven't coevolved. Some more stats, or data, from Dr. Doug Tallamy and the difference between nutritional value of some of our native plants versus exotics in terms of the habitat values that they can be providing to wildlife. So, really what we want to do is take us from this place, where we are choosing plants in our landscape in the urban forest for just strict survivability and functional value and decorative value to one where

we're actually incorporating the ecosystem services that they're going to provide in addition to those other things.

So, we need to create corridors. We need to reduce the amount of lawn area that we have. And we need to begin to help people in urban and suburban areas transition away from exotic ornamentals to native – and frankly, any natives are ornamental in and of themselves. So if we can make that change, we can go a long way in providing habitat for wildlife. And of course we want to remove invasive exotics. These are some Pacific Northwest exotics that I was talking about in Seattle. We have invasive exotics everywhere, so the more we can remove them and replace them with natives, the better.

Of course, as I wind down here because we are pretty much out of time, the last several slides here are talking about National Wildlife Federation Garden for Wildlife certification. So our message is that you can do this anywhere. You can do it at home. You can do in your workplace, schools. You can do in urban areas, on balconies. If you do, we'll recognize those efforts through our Certified Wildlife Habitat program. You can get a sign that really helps spread the word to other people throughout the community that this is a good thing and others should be doing it. In fact, we have a community level certification, where entire communities create concentrations of these wildlife-friendly places. We'll recognize that, as well. If you have questions about this, please reach out and I can give you more detailed information.

And then lastly, just some resources. This is my book *Attracting Birds, Butterflies and Other Backyard Wildlife*. I hosted an Animal Planet series based on the book. We have a *Best of DVD* with 12 episodes. I write for the magazine, so check those out. In every issue, there should be an article about creating wildlife-friendly gardens. It's really, again, geared towards the layperson, the public. Some great books you can check out: *Noah's Garden* by Sara Stein, *Bringing Nature Home* by Dr. Doug Tallamy, who I've talked a lot about here. Really great reading and reference material both for the professional and for the layperson.

Some regional resources. You might have state wildlife agencies that have published material on their website, so that obviously varies from place to place but you can poke around online and you might be able to uncover some really great resources that are specific to your area. I'm on Facebook. That's another great way to connect with me: Naturalist David Mizejewski. National Wildlife Federation has a page. We also have a Certified Wildlife Habitat community on Facebook. We've got a great website filled with information, again, that even professionals, I think, will find useful.

And then, this is a screen grab of a project that we are working on with the Forest Service and Dr. Doug Tallamy. Essentially, what we're doing is taking the research that he did that identifies the top plants for butterflies and moths, and therefore the birds that eat them, which he's done for the Mid-Atlantic. We're replicating that for the entire country and making a really user-friendly website with a mobile app that will allow people with a few clicks to type in their zip code and get the best plants to support

these wildlife species that are based in data, based in the science. So this is going to be coming next year. We just want to give it a little bit of a tease today.

We also have a program called American Beauties Native Plants you can find in your local nurseries. It's a retail program. And if you want to get more involved and follow-up, I definitely recommend checking out our website, [www.nwf.org/garden](http://www.nwf.org/garden). And if you go there, you can sign up for our newsletter. I'm the editor. We put together really practical information for folks to be able to create wildlife-friendly gardens in the urban landscape. With that, thank you for inviting me here and, again, if you have any further questions (because, again, we are pretty much a little bit over time now), feel free to reach out and give us a call, give us an e-mail, follow us on Facebook, and we'll do our best to give you answers. Thanks.

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*Margie Costa:* Thank you, David, for an excellent and inspiring presentation. As he said, we are running a little shy on time, but we do have one question, which we can answer while you are all looking at the screen for the ISA code. For those who are looking for ISA continuing education credits, you can write the code that you see here and then add that to their form. You can download the form from the pod here also. If you are interested in receiving a Certificate of Participation to submit to other continuing education program, you type your full name and e-mail address in the group chat, and we'll keep the room open a few minutes to do that.

So one of the questions is: In light of climate change, are there any other – besides native or natural – recommendations on having to plant native, what other recommendations can we do besides planting native in light of climate change? That's for either one of you, David or Susannah.

*David Mizejewski:* Susannah, do you have anything to say on that?

*Susannah Lerman:* In terms of general, one of the challenges of planting in these urban areas is trying to first of all figure out which plants can actually survive in some of these really poor soils. And I think, compounded with that, the fact that climate change is really coming in and really changing the species, I think that's probably a really important line of research that we're starting to think about, so we can address that. But I think in terms of trying to really focus on native plants and then maybe the next step is noninvasive plants.

*David Mizejewski:* I would echo that. And what I was going to say is I think this is an area we need a lot more research in. The National Wildlife Federation is doing a lot of work on climate change adaptation, but it really is focused more on wilderness areas and not in the urban sense, and certainly not in the urban forest sense. So I would say that it is a great question and we need more study and research to be able to provide those recommendations.

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*Margie Costa:* Okay, thank you. There's a question: What is a good way to help homeowners and city managers in urban areas to keep dead and dying trees? Sometimes they are viewed as hazardous and people want to cut them down right away.

*David Mizejewski:* Our suggestion at NWF is always to say this – we teach people about the really important value of dead and dying trees for wildlife and that if we can keep those things in the landscape, we're going to be doing a good service to the wildlife. But with the caveat, the very big caveat, that it needs to be a dead or dying tree that is not posing any danger to person or property. We do recommend calling in a certified arborist or other tree care professionals and communicating that you want to keep these things for the wildlife, but that you want to do it in the way that is going to minimize any potential dangers. Just like the wasps nest, there are times when you just have to take them out. And that's okay. We also try to teach people, don't beat yourself up over that. But maybe if you do have to cut down a dying tree, maybe you can keep the trunk of it and create a brush pile or fallen, woody debris instead of having it standing up and that's also going to be great wildlife habitat, as well.

*Susannah Lerman:* I will echo with David just said. And I think some of the work we're also doing up at UMass is working with an arborist in trying to link these cavities for wildlife with a hazard grading. A lot of times, a lot of the trees that are dead and dying are removed even though they don't necessarily pose a really strong risk to either human health or property. So I think, again, working with an arborist and really trying to assess the actual hazard of that particular dead and dying tree can really help with your management decisions.

*David Mizejewski:* I would add, too, that opportunities like this where we have a dialogue with you guys – I saw a lot of you were urban foresters and maybe even arborist in the poll in the beginning – to be able to have the opportunity to talk and share some of the data from the wildlife perspective so that you guys can be better informed and armed with knowledge when you go out and get some of these questions. So like I was showing in that slide comparison about how we make decisions about the urban landscape, I think we need to – I think we're all trying to diversify how we think about how we manage the landscape so it's not just about Right Tree, Right Place, regardless of whether it's native or not, or the wildlife species, or whether it has a dead branch or not, but it's sort of all of these things. And I think we are still working on that. I think we collectively need to come up with better models that address all these things so that we can all use them as tools for making these kinds of decisions.

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*Margie Costa:* All right. Well, we need to wrap it up here, but thank you so much for staying on longer to ask some questions and I'll encourage those participating to go on

our website and post any additional questions you may have and we can follow up on those. And also to please be sure to join us next month on April 8 for our webinar on *Emerald Ash Borer: Status, management options, and cost calculators* with Professor Deborah McCullough from Michigan State, Professor Cliff Sadof from Purdue, and Professor Richard Hauer from University of Wisconsin. Once again, I want to thank Susannah and David for an amazing and wonderful presentation and for taking time to be with us today.

Thank you.

[Event concluded]

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