

NEW YORK STATE

Conservationist

for Kids!

HIGH TECH NATURE



**Technology helps us
understand nature**

Welcome
to

NEW YORK STATE

Conservationist

In This Issue

Scientists use technology

to answer many of the questions that they have about fish, wildlife, and nature. Some of the ways that technology is used are explored throughout this issue.



Getting outdoors to observe nature is lots of fun!

And, it doesn't mean you need to leave all of your technology inside! The same technology you use for fun indoors is used by scientists every day to answer questions about nature, so that we can conserve our natural resources.

Digital Cameras

Tablets

Laptops

Smart Phones

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Conservationist for Kids, 625 Broadway, 4th Floor
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What's out there?

How do scientists use technology to help them discover what lives where?

To better manage habitats and the animals that live in them, scientists use many kinds of technology. They learn which animals live in an area and where they move around, both within their preferred habitats and to other places.



Fishers

are large members of the weasel family that nearly disappeared from New York State in the 1930s, due mostly to habitat loss and unregulated trapping. Now fishers are making a comeback, returning to many of the areas where they used to live. Scientists used camera traps to help determine the spread of fishers in the state. Around 600 camera traps were set up during the winters of 2013 and 2014. These camera traps are motion-activated trail cameras baited with large pieces of beaver meat (a delicacy to fishers). The meat is hung on a tree about four feet off the ground, and when the fisher moves towards the bait, the camera takes a photo. In addition, wire brushes placed around the bait collect hair samples, allowing scientists to identify individual fishers (using DNA), track their movement, and find out how many fishers are in the area. Surveys will continue in winter 2015, and the public can also submit their observations. To learn more, see the December 2014 *Conservationist*.



taking the bait

Atlantic Coast leopard frog

Scientists used technology to help confirm the identity of New York State's newly identified frog, the Atlantic Coast leopard frog. One difference it has from other leopard frogs is its call, and scientists used special sound equipment (acoustic monitoring) to demonstrate this. After recording the calls and then turning the data into sonograms (pictures of sound), scientists could use the sonograms to help formally describe the new species.



Scientists who study bats are interested in knowing which species live where.

One way this can be done is by listening to them—each species makes unique sounds during echolocation, which can be used to tell them apart. Echolocation is a type of sonar that bats use to help them navigate and locate their prey. Using special microphones and computer software, much like in the leopard frog study, scientists create pictures of the sounds bats make and use these pictures to help determine which bats are present at different locations. By knowing this, scientists can take steps to better protect bats that need help, such as the endangered Indiana bat.





Where Do

How do scientists use technology to study where animals go when they move around?

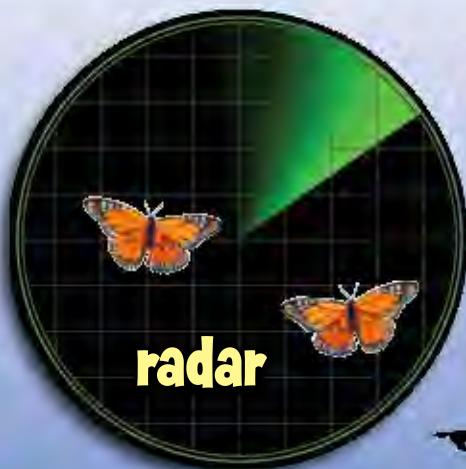


Many new technologies allow scientists to study animals from a distance. Advances in technology have also allowed scientists to answer questions not easily answered in the past.

Scientists use many kinds of technology to monitor animals as they move, either locally or seasonally (such as during migration). Some of the technologies they use include: GPS (Global Positioning System)/satellite tracking, radar, gliders/drones and acoustic (sound) tagging.



When studying migratory animals, scientists often use technology to track animals' movements as they travel between their breeding habitats and their wintering (or non-breeding) habitats. By monitoring how and when these animals move, scientists can better understand how animals use different habitats, so we can better protect the areas the animals depend on. In addition to habitats for breeding and wintering, animals often make stops along the way to eat and rest. Knowing where they stop is also an important part of managing their habitats and helping to protect animals like this golden eagle.



Birds & butterflies can both be tracked locally using radar

Radar is the same technology used for monitoring weather. Flocks of birds and swarms of butterflies appear on radar screens in much the same way that storms do, allowing scientists to monitor when and where animals are moving and track their daily behavior.



Things Go?



DRONES and gliders can be used in several ways to help scientists study where animals go. Some gliders are used underwater to track signals emitted by special transmitters worn by the animals being studied. The gliders can collect information about where the animals move, how deep or shallow they swim, and even information about the water through which they are moving, such as temperature and chemical properties. Drones can be used to monitor animals visually as they move, often taking photos or videos of groups of animals from the air. They also can be used to take photographs of changes in habitat vegetation, allowing scientists to study these changes over time and better manage habitat for wildlife. Gliders and drones can get to places people can't and can cover more ground more quickly.



the American Eel

You may not find American eels very cute and cuddly, but you'll be amazed at where they go and how they live! American eels all migrate to the Sargasso Sea near Bermuda to reproduce. Young American eels (larvae) drift northward in the ocean, and when they become small, transparent "glass" eels, they enter into freshwater habitats where they spend most of their life. For American eels that migrate up the St. Lawrence River and into Lake Ontario, that's a journey of over seven years and 3,800 miles! Only female American eels live in Lake Ontario, and when they are about 20 years old, they migrate back to the Sargasso Sea where they spawn and then die. Their long and very complex life cycle is filled with many dangers, and scientists need to



glass eels



learn more about those perils to help reverse declines in the American eel population. To follow American eels on their journey back to the Sargasso Sea, scientists attach tags to the eels that collect important information, such as their location and the water temperature, and then relay that information to satellites orbiting Earth. While reviewing tag information collected by satellites, scientists noticed some eels migrating in cold water appeared to suddenly enter much warmer water. It turned out that the migrating eels didn't abruptly swim into very warm water; they were eaten by sharks that have warm stomachs!



transmitter on eel

Who am I and how am I doing?

How do scientists use technology to identify animals and monitor the health of their populations?

When scientists are managing animal populations, they need to keep track of the animals and how they are doing. As part of their work, scientists use many different methods to monitor the health and survival of animal populations.



Each year, NYS Department of Environmental Conservation (DEC) stocks more than 3.5 million fish into Lake Ontario for people to catch, as well as to help rebuild fish populations affected by poor habitat conditions and invasive species. Biologists sometimes need to know more about what happens to fish after they are stocked, such as whether the fish survived, how well they survived, which “families” from the hatchery survived best, and where the fish were caught. A new tool, the AutoFish system, allows DEC scientists to identify each stocked fish and monitor how they are doing. The AutoFish system is controlled by complex machines and computers that measure every fish and insert a tiny coded wire tag, or CWT, into the snout (nose) of each fish. Each CWT has tiny numbers on it that can be read only under a microscope.



CWT tag

When a fish is caught, the snout (or sometimes the entire head) is removed and sent to the scientists to analyze. When a CWT is removed from the snout and read, it tells which hatchery the fish came from (and even which tank in that hatchery); where, when and how the fish was released; who its parents were; and how old it was when it was caught. This helps DEC managers learn which fish and stocking methods did best and helps them do a better job of making fishing great in New York State.



Auto Fish System

Another tool scientists use to monitor animals is called a PIT-tag

(Passive Integrated Transponder tag) These tiny tags are attached to the animals being studied and are used to identify individual animals and monitor their movement. Scientists are using PIT-tags to study bats, which are declining due to a disease called white-nose syndrome. Some bats spend the winter hibernating in caves. Unfortunately, caves are also ideal habitat for a fungus that causes white-nose syndrome. This disease has killed a lot of bats, and scientists are trying to determine the status of the remaining bat population. PIT-tags are glued to the backs of bats before they go into caves to hibernate, and a series of antennas is placed near the entrances of the caves. When bats fly past the antennas, a device records a unique signal from each tag. This works in much the same way as the EZ-Pass® toll system and allows scientists to identify individuals based on the tag they are wearing. By keeping track of which bats fly out of the cave after hibernation is over, scientists can get a better idea of how many bats survived the winter and why some did better than others.



Hellbenders are the largest salamander in New York State and live their entire lives underwater in rivers and streams. They are protected, and one of the threats they face is being caught and sold illegally as pets. As part of the efforts to recover hellbender populations in western New York, many hellbenders are hatched and raised in captivity, then released into their native habitat. Prior to release, the hellbenders have PIT-tags injected under their skin, allowing biologists to track their movements and survival. In another use of PIT-tags, scientists were able to identify a hellbender that was being illegally sold in Ohio as having come from New York. The PIT-tag also allowed biologists to return the captured hell bender back to its native habitat because they knew exactly where it had been released in the first place. For more information about the program, see the December 2014 issue of *Conservationist* magazine.



How do we keep track of all the data?

How does technology make it easier for scientists to gather, store, share and analyze data? Although biologists still use pencil and paper at times, many field scientists use tablets, smartphones and other portable computers to record information. These types of devices have lots of advantages over traditional methods, including easy storage and uploading of data (even from remote field locations) to satellites in space or computers back in the office. Devices can even be made rugged enough to withstand being dropped in a wetland or bounced down a rocky hillside!



How does GPS/Satellite Tracking work?

A special transmitter that emits an electronic signal is attached to an animal by biologists.

1



2

Satellites in space pick up signals containing data about the animal.

Scientists download the data to their computer and analyze the information; they can better manage the animals.

3



For more information about the following topics, visit the Conservationist for Kids website at www.dec.ny.gov/education/40248.html:

- DEC Citizen Science
- DEC Fish & Wildlife Projects
- DEC Rare Species - Contribute Data
- NY Fishing, Hunting & Wildlife App
- NY Natural Heritage Program

- NY Watchable Wildlife
- Conservation Drones
- NASA - Birds and Radar
- Science NetLinks - Science Apps
- U.S. Fish & Wildlife Service - Let's Go Outside!



The OUTSIDE Page



Exploring Your Own Environment

With advances in technology, it is easier than ever to identify the plants and animals you see while exploring outdoors. In the past, this often involved carrying around field guides or perhaps taking photos to view indoors. Now, thanks to smartphones and other portable technology, many apps exist that will help you identify everything from birds to leaves to plants and stars. The links below will take you to descriptions of many of these apps. Some are free, but others cost money, so always check with your parents before downloading or installing them. You can also use technology to help you keep a nature journal. There are journaling apps and websites that you can use, and you can also use your smartphone to take photos to add to your journal. DEC has an app that can help you find places in nature to explore and identify animal species. You can download it from www.dec.ny.gov/outdoor/96470.html



Mother Nature Network—19 apps that will turn you into a wilderness expert <http://bit.ly/ZI8QGF>

National Wildlife Federation—25+ Nature and Wildlife Mobile Apps <http://bit.ly/1cTomhu>

Gizmodo—The Best Nature Apps for Springtime Adventures Outdoors <http://bit.ly/1fZ9gJ9>

Word Search!

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- CAMERA
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Reporting what you see

Now that you are better at identifying different plants and animals, what should you do with the observations you have made? Many scientists use information from everyday people as part of their research. By sharing what you see, you can be a citizen scientist! This helps expand the knowledge about where animals and plants occur and contributes to scientific research. In some cases, citizen scientists have even helped identify new species or rediscovered species that people thought were extinct. You can share your observations on these websites: *eBird* (<http://ebird.org>), *iNaturalist* (www.inaturalist.org) and others. For more information about citizen science, see the spring 2014 issue of *Conservationist for Kids*.



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 Andrew M. Cuomo, Governor



Department of Environmental Conservation

Joe Martens, Commissioner
 Dianne L. Patterson, Director of Communications

OFFICE OF COMMUNICATION SERVICES
 Harold Evans, Director
 Jeremy Taylor, Editor
 Jennifer Peyser, Artist/Designer



Conservationist for Kids

Supplement for Classroom Teachers – High Tech Nature

Using Technology to Understand Nature

Advances in technology have made it easier than ever to answer many of the questions that scientists have about nature. Gone are the days when they had to rely on pencil and paper, film cameras, and large, unwieldy tracking equipment. Today, scientists and researchers can use improved technology and smaller equipment to help them learn more about nature and better manage our natural resources.

Using everything from GPS and satellite tracking to drones and trail cameras, scientists can learn even more about where animals live, what they do, and where they go. In some cases, animals have been discovered in areas where they were not previously known to occur. For example, fishers are being found where they used to occur before being extirpated from those locations. Scientists use technology to track animals, both locally and during migration, unlocking mysteries of the animal world in the process. This enables them to better manage the animals themselves and the habitat on which they rely.

Children today are more connected to technology than ever before. Currently, there is an effort to get kids to put down their electronic devices and go outside. However, the two do not have to be mutually exclusive. This issue of *Conservationist for Kids* explores ways that technology can be used outdoors, and how it can help kids learn more about nature while they are playing and exploring.

This Issue’s “Outside Page”

The “Outside Page” in this issue of *Conservationist for Kids* talks about apps that students (and their parents!) can use to identify plants and animals and to find places to explore nature. Journaling is also discussed, as is using smartphones and other technology to capture images to add to online journals (or to print and use for regular journals, projects and more). For fun, there is a word search that students can either work on as a class activity or take home to work on with their parents. Finally, there are opportunities for students to report what they see when using their devices and information about how they can become citizen scientists. You might even participate in a citizen science project as a class. Learn more about citizen science in the spring 2014 issue of *Conservationist for Kids*.

Teacher Workshops

For teachers who have participated in an Aquatic WILD, Flying WILD, or Project Learning Tree (PLT) workshop, the activities listed below complement this issue of *Conservationist for Kids*. Visit www.dec.ny.gov/education/1913.html for information about workshops and about how to obtain curriculum and activity guides.

Aquatic WILD: Designing a Habitat
Riparian Retreat
Sea Turtles International

Flying WILD: Count Your Birds
Feeder Frenzy
Home, Sweet Home

PLT: School Yard Safari
Are Vacant Lots Vacant?
Name That Tree

***Conservationist for Kids* and an accompanying teacher supplement are distributed to public school fourth-grade classes in New York State three times each school year (fall, winter and spring).** If you would like to be added to or removed from the distribution list, if your contact information should be changed, or if you have questions or comments, please e-mail the editor at KidsConservationist@dec.ny.gov or call 518-402-8047.

Supplemental Activities for the Classroom

Cat Tracker

Cats are mysterious animals, often spending countless hours nowhere to be seen. This can be especially true of cats allowed to go outside. We often have no idea where they are! Cats that are allowed to go outdoors are also a danger to wildlife, killing millions of small animals and birds every year. One way to learn more about the behavior of cats is through the Cat Tracker activity found at <http://cats.yourwildlife.org>. For this activity, a GPS harness is put on a cat, the cat is released, and its movements are tracked. The data is downloaded from the GPS unit, showing where the cat has been spending time. This activity could easily be modified to track students in the schoolyard to demonstrate the technology and motivate them to go outside.

Online Photo Album

Most students have some form of mobile technology today, whether it is a smartphone, a tablet, or something similar. Assign students different themes (leaves, flowers, insects, colors, etc.) involving nature, and have them take photos. Create an online photo album for the classroom, and encourage students to share their photos. You could hold periodic photo contests and have other classes in the school vote for their favorites. Winning photos could be used to create a calendar or greeting cards, which students could sell to raise funds for a field trip or for supplemental classroom equipment to enhance their nature exploration activities.

Do you have an interactive white board in your classroom?

If you use a SMART Board or similar interactive white board or projection system in your classroom, consider downloading a PDF of *Conservationist for Kids* and using it along with the printed copies enclosed in this mailing. This issue and *all of our back issues* are available at: www.dec.ny.gov/education/40248.html.

Online Resources

DEC Citizen Science: Wildlife Observation Data Collection www.dec.ny.gov/animals/1155.html

DEC Fish & Wildlife Research Projects www.dec.ny.gov/animals/80726.html

DEC Fish & Wildlife Monitoring and Surveillance Projects www.dec.ny.gov/animals/80721.html

DEC Rare Species – Contribute Data www.dec.ny.gov/animals/91024.html

NY Fishing, Hunting & Wildlife App www.dec.ny.gov/outdoor/96470.html

NY Natural Heritage Program www.dec.ny.gov/animals/29338.html

NY Watchable Wildlife www.dec.ny.gov/outdoor/55423.html

Conservation Drones <http://conservationdrones.org/>

NASA - Birds and Radar <http://spaceplace.nasa.gov/birds/en/>

National Wildlife Federation – Green STEM Initiative

www.nwf.org/Eco-Schools-USA/About-Eco-Schools-USA/STEM.aspx

Project WILD K-12 Technology Connections

www.projectwild.org/documents/WILDTechConnections_000.pdf [PDF, 78 KB]

Project WILD Aquatic Technology Connections

www.projectwild.org/documents/AquaticTechConnections_000.pdf [PDF, 81 KB]

Science NetLinks – Science Apps <http://sciencenetlinks.com/collections/science-apps/>

STEM Blog – 5 Ways to Take Technology Outdoors

<http://blog.stemconnector.org/ee-week-5-ways-take-technology-outdoors>

U.S. Fish & Wildlife Service – Let’s Go Outside! www.fws.gov/letsgooutside/educators.html

Limited quantities of *Conservationist for Kids* magazine back issues are available upon request. Go to www.dec.ny.gov/education/40248.html to preview back issues online before requesting printed copies. From each issue’s lead page, use the link “read the entire issue, cover to cover” to access an eight-page PDF of the print version. To request printed copies (individual or bulk), e-mail the editor at KidsConservationist@dec.ny.gov or call 518-402-8047.