PROJECT NATURE NEWSLETTER

JANUARY, 2019 ISSUE

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Events

46th Annual Winter Hike
Blacklick Woods Metro Park - Ash Grove Picnic Area
5th January 10:00 am - 1:00 pm
Take a 2- or 4-mile walk through the woods and meadows. Hot drinks and snacks provided, while supplies last

Blacklick Woods in Winter Display
Blacklick Woods Metro Park - Nature Center
5th - 6th January 8:00 am - 6:00 pm
Discover what plants, animals and fungi can be found in the park throughout the coldest months of the year

Feed The Stream
Battelle Darby Creek Metro Park - Nature Center
5th January 2:00 pm - 2:30 pm
Give the fish worms and crickets and watch the feeding frenzy in 53-foot living indoor stream

"If Trees Could Talk" Display
Battelle Darby Creek Metro Park - Nature Center
5th - 13th January 9:00 am - 5:00 pm
Learn what trees would tell us if they could speak about their long lives

Lantern Stroll
Highbanks Metro Park - Nature Center
5th January 6:30 pm - 8:00 pm
Carry lanterns to light the way on a 1-mile hike on the Dripping Rock Trail

Common Winter Birds
Inniswood Gardens Metro Park - Gardens Entrance
5th December 10:00 am - 11:00 am
Learn about the most common winter birds on a guided walk. Afterwards, warm up inside the Innis House with warm drinks. Binoculars provided or bring your own

Weekly Bird Hike
Scioto Audobon Metro Park - Grange Insurance Audobon Center
5th, 12th, 19th, 26th January 10:00 am - 11:30 am
Hike with experienced birders to find and learn about birds (Binoculars and field guides can be provided)

Insects in Winter
Blacklick Woods Metro Park - Nature Center
12th January 2:00 pm - 3:00 pm
Learn how insects survive in winter, then dig through leaf litter, turn over logs and shake tree branches to find some

Owl Hike
Highbanks Metro Park - Oak Coves Picnic Area
12th January 6:30 pm - 7:30 pm
Hike 2-miles to search for both Great Horned and Barred owls

Wonderful Woodpeckers
Blendon Woods Metro Park - Nature Center
12th January 2:00 pm - 3:00 am
Walk the trails and find the woodpeckers in the park

Owls of Darby Creek
Battelle Darby Creek Metro Park - Indian Ridge
12th January 5:30 pm - 6:30 pm
Try to lure in these raptors for a closer view on a 2-mile hike

46th Annual Winter Hike
Sharon Woods Metro Park - Maple Grove Picnic Shelter
12th January 10:00 am - 11:00 am
Enjoy a 2- or 4-mile hike through fields and forests. Hot soup and drinks served

Central Ohio Prairies
Inniswood Gardens Metro Park - Innis House
12th January 10:00 am - 11:00 am
Rick Gardner, Ohio's Chief Botanist, discusses the natural history, plants, and animals that inhabit the prairies at Darby and Pickaway Plains. Sponsored by Columbus Wild Ones

Irruption!
Blacklick Woods Metro Park - Nature Center
13th January 3:00 pm - 4:00 pm
Learn about rare winter visitors and what brings them

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46th Annual Winter Hike
Prairie Oaks Metro Park - Darby Bend Lakes
13th January 2:00 pm - 3:00 pm
Enjoy a 1-, 3- or 5-mile hike around the lakes, through the prairie and along the banks of Big Darby Creek

Winter Twig Identification
Three Creeks Metro Park - Confluence Area
13th January 2:00 pm - 3:30 pm
Learn to identify trees by their twigs and gather some to start your own collection

EPN Breakfast - Climate Action: Our Local Response to a Global Challenge
Nationwide and Ohio Farm Bureau 4-H Center
2201 Fred Taylor Dr
15th January 7:15 am - 9:30 am
Join the conversation about local actions set towards climate change mitigation while enjoying breakfast hosted by the Environment Professionals Network
Registration - Free for students ($10 otherwise)

Owl Hike
Blacklick Woods Metro Park - Nature Center
19th January 10:00 am - 11:00 am, 1:00 pm - 2:00 pm
Take a 2-mile walk to search the trails for roosting barred owls

Ice Age Ohio Display
Blacklick Woods Metro Park - Nature Center
19th - 20th January 8:00 am - 6:00 pm
Learn about life in Ohio during the Ice Age

Ohio Geology Display
Battelle Darby Creek Metro Park - Nature Center
19th - 27th January 9:00 am - 5:00 pm
Learn about the Geology of Ohio

46th Annual Winter Hike
Scioto Audobon Metro Park - Climbing Wall
19th January 10:00 am - 1:00 pm
Enjoy a 1- or 2-mile hike along the Greenway and park trails. Food and drink after

Project Feederwatch Openhouse
Highbanks Metro Park - Nature Center
19th January 10:00 am - 12:00 pm
Learn identifying winter feeder birds and how you can get involved and contribute to the citizen science program

Owls of Harry Potter
Blacklick Woods Metro Park - Beach Maple Lodge
20th January 2:00 pm - 3:00 pm
Learn about owls in Ohio and in the Harry Potter universe

Bug Off!
Blacklick Woods Metro Park - Nature Center
26th January 2:00 pm - 3:00 pm
Learn about some of the interesting ways insects defend themselves

46th Annual Winter Hike
Clear Creek Metro Park - Thomas-Mathias Parking Lot
26th January 10:00 am - 2:00 pm
Enjoy a 1- or 3-mile self guided hike, or choose from one of two guided 5-mile hikes

Tracks Off the Trails
Blendon Woods Metro Park - Nature Center
27th January 2:00 pm - 3:00 am
Join for an off-trail hike as we search for animal scat, tracks, and signs!

Bison: Behind the Scenes
Battelle Darby Creek Metro Park - Nature Center
27th January 1:00 pm - 2:00 pm
See how park staff tend to bison

46th Annual Winter Hike
Inniswood Gardens Metro Park - Gardens Entrance
27th January 2:00 pm - 4:00 pm
Join for a guided 2-mile hike along the trails and garden paths

Citizen Science

Citizen Science is a crowd-sourced scientific research conducted, in whole or in part, by amateur or non-professional scientists - regular citizens! It is the public participation in making new scientific discoveries. A citizen scientist is an individual who voluntarily contributes their time, effort, and resources toward scientific research. Citizen scientists come form all walks of life and all age groups, and don't necessarily have a formal science background. The motivation for a citizen scientist is a hands-on involvement in something they are interested in or care about, and make a contribution for the advancement of science. Citizen science harnesses that interest and curiosity of the individual participants, turning science into a hobby, and connects them to projects that benefit from their energy and dedication.

There's a vast gamut of citizen science projects and it's very likely to find a project that matches one's interest. Anyone can participate and at their own convenience and comfort. The fields that citizen science help advance are diverse — ecology, natural history, astronomy, genetics, biochemistry, and much more. Citizen science is a collaborative effort that can tackle issues at local scales, such as identifying the source of pollution in a single stream; or extend to global scales across continents, such as mapping world's great animal migrations, leading to discoveries and understanding that a single or even a group of few professional scientists could never achieve by themselves.

Historical Perspective

Before science first emerged as a profession, keen amateurs and volunteers conducted scientific research and made key contributions to the understanding of phenomena such as climate, evolution, geology, astronomy, etc. When science became a profession in the 1800s, contributions from non-professionals continued. While the term Citizen Science might be new, the concept is not. The field of oceanography was born out of a citizen science project led by Matthew Fontaine Maury, an officer in the US Navy. He crowd-sourced sailors from 13 different countries to collect standardized observations while they sailed that led to the publication of "Wind and Current Chart of the North Atlantic" in 1847. The comprehensive wind and ocean current charts made sailing safer and faster for everyone.

The first use of the term "citizen scientist" can be found in the magazine New Scientist in an article about ufology from October 1979. The first recorded example of the use of the term is from 1989, describing how 225 volunteers across the US collected rain samples to assist the Audubon Society in an acid-rain awareness-raising campaign. The term was first defined in the mid 1990's as the two dimensions of the relationship between citizens and science. Finally, the terms *citizen science* and *citizen scientist* entered the Oxford English Dictionary in June 2014, defined as "scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions".

Data Quality When properly designed, carried out, and evaluated, citizen science is a sound and rigorous process of scientific discovery, indistinguishable from conventional science. Datasets produced by volunteer citizen scientists can have reliably high quality, on par with those produced by professionals. Citizen scientists could be collectively considered a data acquisition instrument, and just like an experimentalist would calibrate their instruments in the lab to collect data, professional scientists leading and managing citizen science projects have developed statistical techniques and other protocols to calibrate the citizen scientist contributors.

Age Demographic Citizen science extends through all age groups. There are several citizen science projects that kids undertake. For example, the Ohio Young Birders Club, founded by kids themselves in 2006, has members ranging from ages 12-18. In partnership with the Cornell Lab of Ornithology, these young citizen scientists not only make active contribution to science, the organization has become a model for youth birding programs across the country, while giving their adult advocates resources to encourage and support.

Data Management Data collected through citizen science programs are vast and also spread far and wide, which calls for proper data management and documentation. DataONE (dataone.org) is developing resources for citizen science project organizers and professional scientists alike to help them better manage, document, and share their data.

Economic Aspect Citizen science also has economic benefits. Initial investment in citizen science can save on overall costs to an organization. Various federal, state, and local agencies and non-governmental organizations have several volunteers for every paid employee. One study found that in a subset of 388 biodiversity monitoring projects, over 1.3 million volunteers were contributing up to $2.5 billion in kind annually. Closer to home, in 2017, the Columbus and Franklin County Metro Parks had 732 volunteers who provided 28,923 hours of collective service, which would amount to several hundred thousand in equivalent dollars.

Citizen Science in the Digital Realm

Digital citizen science was first popularized in 1999 with **SETI@home** project at University of California, Berkeley, that utilized the computers of volunteers during their idle time to sift through radio telescope data in search of alien signals. In 2002, UCB engineers released a generalized software along the concept of *distributed computing*, known as the Berkeley Open Infrastructure for Network Computing (**BOINC**, boinc.berkeley.edu). By 2005, there were dozens of BOINC projects with thousands of users all over the world.

David Baker, a biochemist at University of Washington in Seattle, was working on a notoriously difficult problem of protein folding: determining how a linear chain of amino acids curls up into a three-dimensional shape that minimizes the internal stresses and strains — presumably the protein's natural shape. In 2005, he created a BOINC project called **Rosetta@home** in which volunteers download a small software and let their home computers work on solving the problem

when sitting idle. If the users wanted, they could watch on a screen saver as their computer methodically tugged and twisted the protein in search of a more favorable configuration. Volunteers watching their computers work on folding the protein in different configurations quickly realized how slow the progress was and had their own suggestions on how they saw it could fit better. Baker realized that even a small protein can have several hundred amino acids, so computers have to plod through thousands of degrees of freedom to arrive at an optimum energy state. But humans, blessed with a highly evolved talent for spatial manipulation, can often see the solution intuitively. His team created a new interface for Rosetta@home - the online game of **Foldit** (fold.it), in which players compete, collaborate, develop strategies, accumulate game points and move to different playing levels — all while folding proteins. With Foldit, the concept of *distributed computing* was expanded to *distributed thinking* and into a domain where the computing skills of humans and machines worked in tandem, resolving a problem that had stumped scientists for a decade.

Andrew Westphal, a UCB physicist, was part of NASA's Stardust mission launched in 1999. The objective was to collect samples of a comet on a collecting tray with aerogel that was exposed to space during the years of cruising. After the spacecraft's capsule carrying the samples fell back to earth in January 2006, Westphal used an imaging microscope to take 1.6 million images of the aerogel. The challenge was to find the microscopic pieces of interstellar dust in the images and not be fooled by the cracks in the brittle aerogel or by particles of Earth dust that had embedded from the start. It was almost impossible to develop an automated algorithm and have computers find those pieces in the image, and Westphal estimated that it would take a century for one person to peruse them all. So, he and his team launched **Stardust@home**, a continuing BOINC project that enlists the pattern-recognition abilities of thousands of volunteer 'dusters'. Bruce Hudson, a resident of Midland, Ontario, had always liked looking at stars. So, he joined the project as a citizen scientist. In March 2010, at the Lunar and Planetary Science Conference in Houston, Texas, Westphal announced that Hudson had found the first probable piece of stardust.

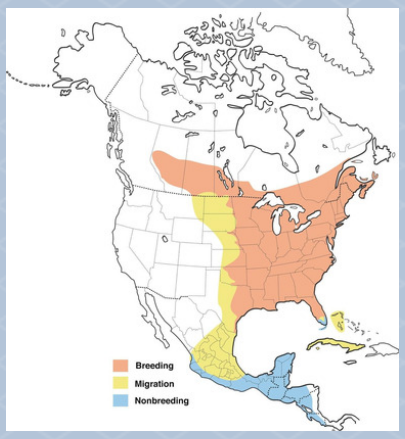
Citizen Science in Environmental Science

Perhaps no other field of science has advanced more through citizen science than the field of natural history and environmental science, so much so that it relies heavily on citizen scientists for data collection. Citizen science in environmental conservation has double benefits — (1) enabling science that may not otherwise be feasible due to scale or other reasons, (2) engage people in decision-making processes by increasing firsthand understanding of conservation or environmental issues, encouraging participants to become more responsive to the issues they care about.

Understanding the environmental problems we are facing today requires a comprehensive understanding of the Earth's ecosystem — comprised of a myriad of species of flora and fauna and their interrelationship. The biological and physical systems of our planet are undergoing changes at a rapid rate due to the impact of human activities — urbanization, deforestation, land conversion for agriculture, etc. The entire ecosystem is so intricately interwoven that any change in a single condition could have a much larger impact. Additionally, certain species of plants and animals are

more directly linked to the environmental conditions — such as water-quality in streams or the air-quality — and hence are known as *indicator species*. Consequently, it's imperative to document the biodiversity, so that appropriate conservation strategies could be informed. Cataloging even a fraction of the unknown diversity is a monumental task. This cataloging is achieved through the *biotic/biodiversity surveys*, which document all the living organisms — plants and animals.

This is where citizen science plays a key role. Citizen scientists all across the world turn their hobby of plants, trees, butterflies, birds, etc. into a more formal procedure of documenting what they see, and aid the advancement of environmental science. This kind of data collection is not possible by any other means. Range maps (like the one shown here) of several animals and plants can only be drawn when hundreds of thousands of citizen scientists contribute their sightings and observations to a centralized database. To learn the long migration routes of several migratory birds, it would never be realistically possible for a few scientists to follow those birds and track where they go, what route they take, or what places they stop to "refuel"; instead it's the small contributions of individual citizen scientists who report what they see in their vicinity that collectively makes a wealth of data for scientists to study, analyze and draw the "big picture".



Range map of Ruby-throated Hummingbird
Source: Cornell Lab of Ornithology

Citizen Science + Modern Technology

Modern technology has greatly assisted in advancing both environmental science as well as citizen science. Back in the day, one would need to net and capture, say, a butterfly in order to identify it. This process was not everybody's cup of tea, to say the least. Digital cameras greatly simplified that process in not only helping with the identification of the species after the fact, but also encouraged citizen scientists, who could now easily take pictures of their observations and submit their data. And with the advent of information technology, it took citizen science to a whole another level. Participants could take pictures from their cell phones and immediately submit it to an online database. Several such online repositories exist where citizen scientists can submit their observations. For instance, **eBird** (ebird.org) and **NestWatch** (nestwatch.org) are online repositories from Cornell Lab of Ornithology, where users can submit their bird sightings and observations of their nesting sites, respectively. With millions of users worldwide contributing their observations, it creates a rich data for scientists to not only study birds but also climate change which is indicated from any deviations from the normal patterns. **iNaturalist** (inaturalist.org) is another such online repository. A joint initiative of California Academy of Sciences and National Geographic Society, it started as a Master's project at UC Berkeley's School of Information in 2008. In 2017, there were a total of 3,269,227 observations submitted by members worldwide. The official description of this resource reads "iNaturalist is an online social network of people sharing biodiversity information to help each other learn about nature". What makes iNaturalist unique is that not only can anyone

submit their observations, they can also start their own projects and collect data from community members as well as collaborate. All of these online repositories also have very user-friendly mobile apps, making them even more easy and convenient for the citizen scientists to participate.

The Ohio Odonata Society conducted its first comprehensive survey of the dragonflies in the state from 1991-2001, where participants recorded their observations by mostly netting and capturing the specimens. Over the course of a decade, there were about 30,000 observations submitted and most participants were professional scientists or had an entomology background. The Society wanted to update the records since the original survey and Ohio Dragonfly Survey was launched in 2017 to run through 2019. The new survey is based primarily on the iNaturalist platform. The result. Not only did the participation of citizen scientists in the survey increased dramatically, the new survey surpassed the number of observations submitted to the original survey in less than two years!

Epilogue

One may think that to fight climate change, we need environmentally-friendly policies which have to come from the higher branches of government, but according to Prof. Lonnie Thompson, Distinguished University Professor at OSU and a world-renowned climatologist, in his years of experience working with the communities as well as with the Congress in Washington, he found that change always comes from the ground-up, and not from the top! Citizen science projects can facilitate a bidirectional flow of information between the public, environmental scientists, natural resource managers, and environmental policy organizations, helping gain a better understanding of public priorities and social contexts. For example, the Scenic Rivers Program of Ohio Department of Natural Resources is driven by community-engagement in caring for the water quality in their streams. The initiative to designate a river as state-scenic or national-scenic doesn't originate from the ODNR; instead it's the community that comes together and collectively decides that they want to protect and conserve the health of their streams and rivers, and reaches out to the authorities. "Scenic river designation is a cooperative venture among state and local government, citizen groups, and local communities within a watershed. The designation process ultimately depends on the support and protection of local governments and citizens."

So, if you feel concerned about climate change and want to do something about it, you can take action and get involved. Join several other citizen scientists in making a significant and meaningful contribution towards protecting and conserving the environment

Citizen Science in Prison

Citizen science transgresses not just socio-economic boundaries but even physical ones — including prison walls! Nalini Nadkarni, a researcher at Evergreen State College, WA, was studying slow-growing mosses and finding best ways to cultivate them. With partial funding from the National Science Foundation, she employed an unlikely team of citizen scientists — inmates of Cedar Creek Corrections Center, a medium security prison in Littlerock, WA. Her Moss-in-Prisons project was designed to help ecologists replace large quantities of ecologically important mosses that are regularly stripped illegally from Pacific Northwest forests by horticulturalists. In addition to managing the Moss-in-Prisons research, Nadkarni helped the facility's inmates run various projects that promote sustainable living — including an organic garden that produces 15,000 pounds of fresh vegetables every summer, a bee-keeping operation and a composting operation that processes one ton of food per month.

One member of Nadkarni's research team, who was released from Cedar Creek, enrolled in a Ph.D. program in microbiology at the University of Nevada and presented his Cedar Creek research at the annual meeting of the Ecological Society of America in August 2008.

Few Citizen Science Opportunities in Central Ohio

Metro Parks - tinyurl.com/y7kdnlwd
Volunteer with Metro Parks and get involved with
- butterfly survey
- bluebird monitoring
- vernal pool survey
- Project FeederWatch
- and more

ODNR Scenic Rivers Program - tinyurl.com/y8y9v8cs
Become a Stream Quality Monitor to evaluate the water quality by documenting the macro invertebrate inhabitants

Ohio Dragonfly Survey - tinyurl.com/yasudeek
Contribute to the Ohio Dragonfly Survey by photographing a dragonfly and submitting to the project on *iNaturalist*

For more opportunities to get involved, visit the Project Nature - Get Involved page
tinyurl.com/y8phdxw2

Find a Citizen Science Project of your Interest in your Vicinity

Sci Starter - scistarter.com

USGS Projects - tinyurl.com/y972w4ay

Nature Conservancy - tinyurl.com/y8rqqeee

Citizen Science for Kids - tinyurl.com/ydchs56g

Habitat Network (YardMap) - content.yardmap.org

National Wildlife Federation
Garden for Wildlife | Certified Wildlife Habitat
nwf.org/Garden-for-Wildlife

Online Platforms to Submit Observations

iNaturalist - www.inaturalist.org

Project NOAH - www.projectnoah.org

eBird - ebird.org

NestWatch - nestwatch.org

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