

Citizen Science in the Digital Age

Everyday people are making valuable contributions to long-term datasets.

The power of the populace

Many groups, institutions, and agencies have long recognized the power of mobilizing everyday citizens to help collect data or get a project done. As far back as 1900 Audubon garnered the help of thousands of amateur birders when they launched the first annual Christmas Bird Count program. Countless volunteers help keep the Appalachian Trail in ship-shape, and community-wide green-up/clean-up events pick up tons of trash along road-sides each year. Since the dawn of the internet age however, it's never been easier to make valuable contributions to science using a device most people carry with them everyday.

I'm not a scientist, but I play one on my phone

Armed only with a smartphone, people can become citizen-scientists when in their backyards, along their favorite national park trail, or even deeply immersed in a bustling city. With well over 100 citizen-science based apps now available for Android and iPhone devices, there is no lack of opportunity for people of all ages and avocations to significantly add to the collective knowledge base about many aspects of the natural world. The phrase "*there is an app for that*" has perhaps never been more true for natural resource monitoring. From birds to plants, fishes, turtles, phenology, lakes, mosquito-borne diseases, and even light pollution - if there is a cause you believe in there is likely already an app to help you contribute. The National Park Service has seen the potential of these apps to help their parks better understand the distribution and health of the resources within their borders. The [Northeast Temperate Network](#) (NETN) welcomes the help of all aspiring/moonlighting scientists to supplement the long-term monitoring programs with their own data. With so many apps to choose from, which ones are most valued by NETN scientists and parks? Following are a few biggest-bang-for-the-buck citizen-scientist apps that can really help out your neighborhood park.

eBird - a great flocking app

Much more than an online checklist for birders, [eBird](#) just may be the largest biological citizen science project in the world. Globally, over 350,000 birders use eBird, a website and app created by the Cornell Lab of Ornithology, to enter and share bird data - all of which is freely available to researchers and curious web surfers.

NETN has setup each of its parks as an eBird "hotspot", so anyone with the app downloaded on their phone can add park bird observations. Since eBird began in 2002, more than 100 studies have utilized its data. To help ensure integrity of bird observations, eBird relies on volunteer expert data reviewers that flag unusual sightings (a pink Flamingo in Poughkeepsie for example) and reach out to the birder to verify identification. Its popularity is still expanding, and it is fast becoming one of the largest biodiversity data resources in existence. On May 13th, 2017 - Cornell Lab's *Global Big Day*, participants from 150 countries reported more than 6,400 bird species (over 60% of bird species in existence) worldwide. Records continue to increase by an astounding 40% a year.

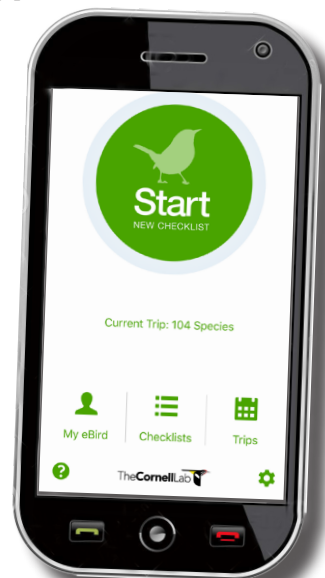
One of the coolest products eBird is able to create with this voluminous dataset is something they call [bird occurrence maps](#): a dynamic animation of bird species sightings in shades of orange in accordance to their density, moving through space and time across black maps. They have created more than 300 of these so far.

iNaturalist - near instantaneous ID



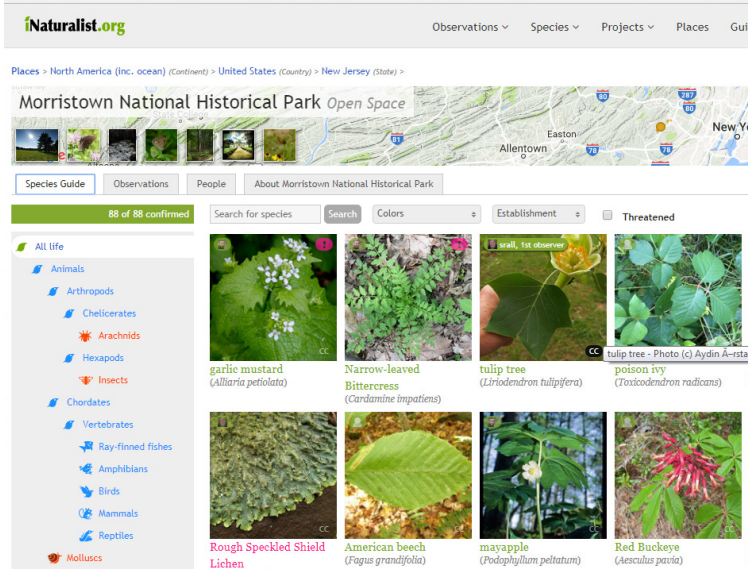
iNaturalist

Imagine pointing your smartphone camera at a some unknown-to-you plant, animal, fungus, or insect, and a



With the proliferation of smartphones the past 5 to 10 years, millions of people can more easily than ever become citizen scientists.





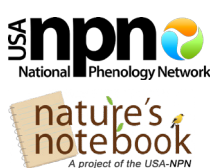
All NETN parks have their own iNaturalist webpage. Download the app and help add to the growing list of species!

few seconds later getting a positive ID for it. Well, that prospect is all that much closer to reality with the latest release of the [iNaturalist](#) app in late June. iNaturalist is a website/app built on the concept of mapping and sharing observations of all forms of life across the globe. Observations can be added through the website, but using the smartphone app is where its true power comes through. Like eBird, all observations are open data and provide valuable information to national parks and scientific research. So far, iNaturalist users have contributed about 5 million photos representing 117,000 species since it began in 2008. Today it's the largest collection of accurately tagged and labeled images for living things that's out there. And around 20,000 new photos are uploaded *every day*.

For the past few years, several NETN parks have created 'Bioblitz' projects within iNaturalist. Bioblitz's are single-day events where the public is invited to find all the samples they can of a particular taxa, or all living things. In 2016, the Weir Farm NHS Bioblitz garnered about 500 species observations in one day. All NETN parks are listed as specific locations within iNaturalist, and you can see what has been found at there by going to each park's [NETN Park Page](#) website and scrolling down to iNaturalist observations.

This vast and growing cornucopia of high quality species images is why the app can now give you near instantaneous ID of many living things found in North America and beyond. The latest version of the app uses

an artificial intelligence neural network (not science fiction, they can actually do this) to help identify what you've pointed your camera at. When the app's users upload photos from their smartphones, it also includes a date and a place. With a database of millions of photos to analyze, the app can 'learn' many species from the massive and well-organized dataset. It is likely to get even better at this as more observations are added.



Nature's Notebook - Signs of the seasons are shifting

Phenology, the study of the interplay of species and seasonal change, is a key indicator for monitoring climate change.

Now, just about everyone can help add to this important dataset by using the National Phenology Network's (NPN) app - [Nature's Notebook](#). The app allows amateur as well as professional naturalists to regularly record observations of plants and animals to generate long-term data sets about their movements and/or life-stages. Working with NPN, NETN parks identified several species they would find useful to be monitored over the long-term, including sugar maples, spring peepers, and monarch butterflies to name a few. You can learn more about helping out your nearest NETN park by downloading the [NETN Volunteer Guide for Phenology Monitoring](#) on our website.

Citizen-scientist phenology observations have already paid dividends helping to inform several scientific studies. One of which looked at the onset of spring in 276 national parks. By analyzing observed dates of first-bloom and first-leafout of some lilac and honeysuckle species, they found that spring arrived sooner in 76% of parks studied. Over half (53%) of them experienced extreme early springs that occurred during the earliest 5% of 1901-2012 observations.

Citizen science - it's in your hands (literally)

This was just a small sampling of the dozens of citizen-science based apps available today. Whether your interest is insects, climate change, birds, or wildlife - with a smartphone in your hand you have the power to help contribute genuine data to the global knowledge base of natural history of the planet. This data will help to inform scientific studies for years to come - scientist lab coat not necessary. Pretty cool. Download an app, step out the door, and give it a try today.



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