

# BioBlitzes: Citizen Science for Biodiversity in Florida

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*Biodiversity, or the variety of life in a given area, is under serious threat as a result of human activities. Human population and resource consumption are still growing, and are accompanied by climate change, habitat loss, and invasive species. The main purpose of a BioBlitz is to conduct a biodiversity inventory of a site at a given time, to document existing flora and fauna, while most places on Earth lack detailed information about local biodiversity.*

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## Citizen science to help biodiversity

Citizen science, also known as public participation in scientific research, is a set of activities that encourage broad participation of non-professionals in scientific research activities. Originally, citizen science helped professional or academic scientists gather a great deal of data over time and space, that they could not accomplish with traditional small research teams. Today, citizen science spans a spectrum of projects across almost all scientific topics and involves public participation throughout the entire process of research, from conceptualizing problems and questions for investigation, to raising money for projects through crowdfunding, and to analyzing, using, and sharing the results, in addition to data collection.

## What is a BioBlitz?

A BioBlitz is an intensive citizen-science biodiversity survey. We can define a BioBlitz using the following three features, which are essential in its success:

- First and foremost, a BioBlitz is a biodiversity survey. Experts and volunteers alike work together to conduct an intensive field survey to record as

many species (generally plants and animals) as possible living in a designated area. By field survey, we mean an actual tally on the ground of the biodiversity observed and encountered in this area during the time period. BioBlitzes are often organized in natural areas and parks, but can be set in any area where there is a demand or a need to monitor biodiversity. Conducting a BioBlitz in a human-dominated area can also document the impact of human activities on biodiversity. The first BioBlitz in the U.S. was a 24-hour event held at Kenilworth Park and Aquatic Gardens in Washington D.C. on May 31 and June 1, 1996, which allowed scientists and volunteers to identify more than 1,000 species. It was organized by the U.S. Geological Survey in partnership with the National Park Service (NPS), the National Biological Service, Anacostia Watershed Society, and New Columbia Audubon Society. Later on, NPS and National Geographic Society (NGS) collaborated from 2007 to 2016 to organize annual BioBlitzes in national parks. This collaboration culminated in a countrywide BioBlitz across national parks in 2016 as part of the National Park Service Centennial Celebration. Altogether, during these ten

years, NPS/NGS BioBlitzes have involved more than 50,000 participants in nearly 150 parks, and helped identify more than 22,000 species. BioBlitzes can even take place under water: In 2007, New Zealand hosted the first marine BioBlitz on the Wellington south coast, which led to the discovery of four new species, including an anemone (Plate 1).



*Plate 1: Several 5–10 cm-long anemones with 32 spotted tentacles were found by Malcolm Francis, a scientist from the National Institute of Water and Atmospheric Research.*

- Second, a BioBlitz is a citizen-science event, which means that BioBlitzes are open to public participation: volunteers are essential to detect local flora and fauna, but can also be instrumental in identifying species, entering the data so it can be scientifically used, and even validating and discussing other's find-

ings. As a matter of fact, volunteers are critical for a successful BioBlitz because they bring many pairs of eyes and a lot of enthusiasm. Enrolling a large group of volunteers with varied interests is the best way to produce a survey that is as exhaustive as possible and representative of an area's true biodiversity. For instance, the BioBlitz organized by NPS/NGS in Golden Gate National Recreation Area (California) in 2014 involved more than 9,000 people—including scientists, students, and volunteers—and found 2,350 species. BioBlitzes are led by plant and animal specialists, often researchers and naturalists trained to recognize fauna and flora. Specialists guide volunteers who can use their cellphones to actively participate in the survey by documenting the presence of biodiversity, contributing pictures, and identifying geographic coordinates.

- Third, a BioBlitz is an intensive survey. BioBlitzes are designed on a short time frame to give an exact snapshot of existing biodiversity at a given time.

They are typically conducted over a 24-hour period to find biodiversity around the clock. They can be organized for shorter periods of time (for instance 12 hours during daylight) to attract more volunteers, or for longer periods to accommodate the specificities of a particular survey. For instance, the marine BioBlitz organized on the Wellington south coast of New Zealand lasted over a month, due to the constraints of the marine environment.

### BioBlitzes in Florida

The 2010 NGS–NPS BioBlitz, a marine BioBlitz organized in southeast Florida's Biscayne National Park (April 30–May 1, 2010), was the biggest BioBlitz held in Florida. Two hundred scientists led the event with more than 2,500 participants, including 1,300 school children from Miami-Dade County. Eight hundred species were identified, including a number of species rare to the park such as the Silver-banded Hairstreak (*Chlorostrymon simaethis*), Mangrove

Cuckoo (*Coccyzus minor*), Bay-Breasted Warbler (*Setophaga castanea*), and nesting Roseate Spoonbills (*Platalea ajaja*) (Plate. 2). Divers observed three species of groupers (Black Grouper *Mycteroperca bonaci*, Red Grouper *Epinephelus morio*, and Gag Grouper *Mycteroperca microlepis*) on a night dive on the park's reefs. Participants also identified 11 species of lichens, 22 species of ants, and one tardigrade species—also known as a “water bear”—that had not been previously documented in the park. Most importantly, the highly invasive lionfish, two species of which are present in Florida (Red Lionfish *Pterois volitans* and the Common Lionfish *Pterois miles*), was not observed during the event, which provided baseline data to track the invasion of this species, now common throughout Western North Atlantic, Caribbean Sea, and Gulf of Mexico. Biscayne National Park BioBlitz was not the only one organized in Florida though, and many local BioBlitzes have been held in the past decade.



**Plate 2:** Examples of terrestrial species documented during the NPS/NGS BioBlitz of 2010 in Biscayne National Park, FL: A) Silver-banded Hairstreak (*Chlorostrymon simaethis*), B) Mangrove Cuckoo (*Coccyzus minor*), C) Bay-Breasted Warbler (*Setophaga castanea*), D) Roseate Spoonbills (*Platalea ajaja*).

How can BioBlitzes make a difference to science?

### Ongoing biodiversity monitoring

While already invaluable as one-time events, BioBlitzes can also be conducted

regularly at the same location, and thus provide repeated measurements of biodiversity through time. By accounting for the monitoring effort, it is possible to show how biodiversity changes over time, and thus to document trends, and assess conservation successes and current threats. As of the end of 2018, Wildlife Ecology and Conservation pro-

fessor and State Extension Specialist Mathieu Basille is leading a collaboration between UF/IFAS Extension and Broward County to set up a BioBlitz program in the county. Basille is also looking for people from other areas and organizations who are interested in getting involved and helping to expand efforts around Florida.

## Contribution to biodiversity atlases

Several biodiversity atlases are now available on-line, consisting in repositories of plant and animal occurrences. Some of these are global in nature (e.g., the Global Biodiversity Information Facility, GBIF, which now compiles almost one billion records from the entire world); others have a specialized purpose (such as the Early Detection and Distribution Mapping System, EDDMaps, for invasive species). On-line atlases allow extensive research on biodiversity and species distributions, and can be easily complemented by the data collected in the BioBlitzes.

## Rare and invasive species

BioBlitzes are unique tools to keep track of both rare and invasive species. When volunteers and scientists work together, they are able to identify uncommon or special habitats for protection and management, and rare species may be uncovered. Specifically, BioBlitzes can help assess the presence of Threatened and Endangered species, and contribute to the evaluation of their status. For instance, during the NPS/NGS BioBlitz of 2015 in Hawai'i Volcanoes National Park, volunteers documented 73 species at risk, including the Kamehameha butterfly (*Vanessa tameamea*), and the federally endangered nēnē (*Branta sandvicensis*), also known as the Hawaiian goose (Plate. 3). On the other hand, many alien species are categorized as invasive when they have a detrimental impact on an ecosystem. Appropriate response to invasions is only possible with early detection of those unwanted plants and animals, and BioBlitzes offer a way to monitor these threats to biodiversity. For instance, the National Park Service organizes a "Weed Blitz" each year in Glacier National Park to identify noxious weeds and infested areas. In 2016, 99 volunteers spent the morning learning how to identify and control five invasive plant species, and in the afternoon, pulled a total of 620 pounds of in-

vasive weeds, about the weight of a cubic yard of mulch, or half the weight of a polar bear.



**Plate 3:** Two species at risk documented during the NPS/NGS BioBlitz of 2015 in Hawai'i Volcanoes National Park, HI: A) Kamehameha butterfly (*Vanessa tameamea*), and nēnē or Hawaiian goose (*Branta sandvicensis*).

## How can BioBlitzes make a difference to participants?

### Scientists get input from local residents

Not only do scientists and the BioBlitz organizers get the data on the local species from BioBlitzes, but also the events can be valuable chances to interact with people from the area. These people may be interested in a variety of things related to the event, including a particular endangered or well-known species, a group of species such as fungi or birds, the importance of local natural areas, or the environment and science in general. Public participants may also be simply participating with a particular group such as their church or school

as a service activity. Scientists and Extension faculty, or other event organizers, therefore have a relaxed way to interact with these stakeholders, and both share their expertise as well as understand more about their stakeholders and the stakeholders' interest in biodiversity.

## Exploring and mapping

BioBlitzes are also great opportunities to explore natural areas from inside out. In addition to the pleasure of discovering places in parks that are seldom visited, volunteers can also help their favorite park map the site, their trails, and treasures. For instance, simply walking along trails with their cellphones or hand-held GPS units recording their tracks, people can contribute to improve the maps of the parks through collaborative projects such as OpenStreetMap. Similarly, marking remarkable items (e.g., the biggest, tallest, or oldest trees, or features such as shelters, boardwalks or statues) also helps parks to correctly map and document their trails, and eventually provide guides for the public that are more complete and accurate.

## Nature awareness through citizen science

Finally, BioBlitzes are a special chance for the public to engage in a scientific event to help preserve biodiversity and reconnect to flora and fauna in their natural habitats. During an exciting day, which does not bear the constraints of conventional scientific field surveys, people can enjoy their local parks and discover biodiversity in their backyards. BioBlitzes are open to all volunteers, whether adults or children, amateur naturalists or experts, or simply people who like to try new things. They give the public an opportunity to meet and learn from working scientists. If you are interested in BioBlitzes in your area, contact your Extension County Offices, or directly contact Mathieu Basille.