

Graduate Student Mini-Grants for the 2011 BioBlitz



Jason Schaller, WNPA mini-grant recipient, demonstrating a vinagaroon at the BioBlitz

Final Report to Western National Parks Association
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Saguaro National Park

Summary

On October 21-22, 2011, the National Park Service, the National Geographic Society, and a number of other partners hosted the 2011 BioBlitz, the largest event in the history of Saguaro National Park. The BioBlitz included more than 2,000 school children, approximately 1,500 members of the public and over 600 ambassador volunteers, including approximately 150 scientists, who together celebrated the biological diversity of Saguaro National Park while collecting data from the park's desert, desert grassland, riparian, woodland and forest areas. As part of this event, funds provided the Western National Parks Association were used to award competitive "mini-grants" to University of Arizona students who were asked to combine their biological expertise with innovative citizen science programs. Four students or student groups organized the following projects: 1) an in-depth study of endophytes (fungi that live inside vascular plants) conducted by Tucson Magnet High School students; 2) a huge bird survey effort throughout the entire park involving more than 65 volunteer amateur ornithologists; 3) the organization of historic data on more than 13,000 saguaros for a re-survey of a 1941 saguaro plot by high school students; and 4) a beetle inventory by a student who demonstrated live insects at the Biodiversity Festival and played a starring role in the nationally broadcast Electronic Field Trip. This very successful program added great value to the BioBlitz and demonstrated the unique scientific support that WNPA offers western US national parks.

Introduction

The BioBlitz is a partnership between the National Park Service (NPS) and the National Geographic Society that takes place in a different national park each year, and is linked to the 100th anniversary of NPS in 2016. In essence, it is a 24-hour event where all taxonomic groups in a park are studied by teams of scientists, citizen volunteers, and students. Major goals of the BioBlitz are to involve the local community with the park's outstanding natural resources and to help popularize science by providing student and adult citizen scientists an opportunity to work with expert biologists in the field. A two-day "Biodiversity Festival," featuring booths, activities and presentations, provides a celebratory and educational context for the BioBlitz.

The 2011 BioBlitz at Saguaro National Park was the fifth of 10 such events since 2006. Held during the weekend of October 21-22 throughout both districts of the park, the BioBlitz attracted more than 2,000 school children, approximately 1,500 members of the public and over 600 volunteers. Two days of round-the-clock exploration and documentation provided a snapshot of the many life forms, ranging in size from microscopic water bears (tardigrades) to American black bears, that occur in this 91,445-acre park.

The purpose of this WNPA program was to provide competitive mini-grants of \$500-\$2,000 to advanced graduate students with relevant taxonomic expertise. Our goal was to encourage student experts to participate in the BioBlitz while overseeing citizen scientists and students in the field and interpreting their specialty to the public in unique ways. After the event, we expected that each student would analyze his or her data and prepare a report with results, interpretation, and recommendations. The program was designed to provide students with the opportunity to connect their science to the public while ensuring that the data produced by the BioBlitz would have long-term value to the park.

Methods

We implemented this program by advertising it with a flyer (Figure 1) distributed to a number of local universities and college web sites including (but not limited to) the University of Arizona. Students were asked to submit their qualifications along with a 2-page proposal that addressed three main criteria: create a taxonomic inventory for the BioBlitz that includes a "Citizen Science" component; include an educational product, such as a web page or pre-BioBlitz classroom visit; and include a final report that will summarize what is known about the particular taxonomic group in Saguaro National Park and make recommendations for future inventory work.

We received 9 proposals, which were reviewed and ranked based on the criteria described in the flyer by a committee of scientists with different taxonomic backgrounds and an interest in the BioBlitz: Andy Hubbard (NPS Sonoran Desert Inventory and Monitoring Network), Catherine Workman (National Geographic Society BioBlitz science coordinator), Rick Brusca (Arizona Sonora Desert Museum and University of Arizona), Larry Norris (Desert Southwest Cooperative Ecosystems Study Unit), and Bill Broyles

(Western National Parks Association). From these 9 proposals, 4 were selected: Jason Schaller from the University of Arizona (UA) entomology lab (beetles), MM Nandi Devan and other students from the UA Elizabeth Arnold mycology lab (endophytes), Jherime Kellaher from the UA School of Natural Resources (birds), and Theresa Foley from the UA Dept. of Atmospheric Sciences (saguaros).

Anna Iwaki, a BioBlitz intern working at Saguaro National Park, helped administer the program, communicating with graduate students before, during, and after the BioBlitz, providing logistical and safety support for them during the event, and working with park biologist Don Swann in helping review, edit, and compile final reports and other documents.

Results

We received final reports from all 4 student projects, which are being provided separately to WNPA. Below are highlights from these projects.

Jason Schaller – beetles. Jason and his colleagues conducted the first comprehensive beetle (family Carabidae) inventory of the Rincon Mountain District of Saguaro National Park, and summarized the state of knowledge of this taxonomic group in the park in a final report. In total, they collected 104 specimens representing 16 species, identified 20 additional species from the Rincons in the University of Arizona Insect Collection, and compared the Rincon findings with species collected in the nearby Santa Catalina Mountains.

Jason's project was unique in that he studied beetles prior to the BioBlitz, during summer when conditions for beetles were optimal, then spent the 2 days of the BioBlitz (as well as 2 previous days) interpreting insects to the public at the Biodiversity Festival. Jason was truly one of the stars of the events, appearing in a large number of web sites and videos. He took on a major role in the Electronic Field Trip that was shown live in classrooms all over the United States on the day of the BioBlitz, and was estimated to have reached greater than 90,000 students. Jason also appears in video new stories by the National Parks Magazine (<http://www.youtube.com/watch?v=6-qFPRZoxyU>) and the National Science Foundation: (<http://www.youtube.com/watch?v=jphLPcsyf2c>).

Students from the Elizabeth (Betsy) Arnold mycology lab – endophytes. MM Nandi Devan, Nick Massimo, Kayla Arendt, Brett Baxter, Susan Furr, Chan Jung, Dustin Sandberg and several other students in the Arnold mycology lab at the University of Arizona conducted an extensive collecting and interpretive program on endophytes, which are fungi that live within the tissue of vascular plants. They set up a large exhibit in the Science Tent, and invited the public to hike out into the field, take plant samples, then extract endophyte DNA using microscopes. They worked directly with a class of science students from Tucson Magnet High School before and after the BioBlitz. The students collected samples at the park, extracted the DNA, and identified species in the lab.

This program was one of the most widely acclaimed parts of the BioBlitz. It received a huge amount of publicity and was featured on numerous videos and news accounts. It also produced impressive results: 191 new species of endophytes for Saguaro National Park from 5 fungal classes, revealing surprising diversity within the park.

In addition to links made available through the Arnold lab website (<http://www.endobiodiversity.org/endobiodiversity-research-and-outreach-national-geographics-bioblitz>), Betsy Arnold's students were featured in a number of BioBlitz videos and news stories, including: <http://vimeo.com/33289093>; <http://video.nationalgeographic.com/video/education-videos/education-general/edu-bioblitz-2011>; <http://www.youtube.com/watch?v=JUHLyokRf-s>; and http://www.tucsonsentinel.com/local/report/102711_bioblitz/saguaro-parks-plant-animal-species-studied-bioblitz.

Jherime Kellermann – birds. Jherime Kellermann organized, with the help of the Tucson Audubon Society, what was certainly the largest bird survey ever to take place in Saguaro National Park. At least 65 volunteers and several hundred students participated in these programs, which included 16 locations in the Tucson Mountains and 21 in the Rincon Mountains. Some of the Rincon transects were quite remote and involved overnight hikes and camping activities as high as Manning Camp at 8000 feet.

A total of 105 bird species were detected during the 24-hour survey, including 95 species in the Rincon Mountains and 55 species in the Tucson Mountains. Jherime produced an excellent, illustrated report on birds and their communities within Saguaro National Park.

Theresa Foley – saguaros. Prior to the BioBlitz, Saguaro National Park decided to use the event to kick off a re-survey a one-mile square section ("section 17") of the park that was first surveyed in 1941. Theresa's project was to organize the historic data for this project. Actually, to say that Theresa "organized" the data is an understatement: she created and populated a database that included multiple observations of more than 13,000 saguaros that had been collected in logbooks by the original scientists on the project.

Theresa also produced a poster for interpreting the project to the more than 120 high school students who counted, measured, and mapped saguaros in Section 17 during the BioBlitz. In addition she worked with park staff to organize the event and continued to volunteer in Section 17 after the BioBlitz. She presented the results of Section 17 at the Arizona Geographic Information Council Annual Conference and is co-author on a scientific paper (in preparation) about the re-survey. The results of the re-survey indicate that saguaros in this area of the park, which were in decline for many decades, are rebounding. Most saguaros in Section 17 today are young, healthy plants that should become visible on a landscape scale in the coming decades.

Conclusion

All of the students involved made significant contributions to education and interpretation during the BioBlitz, and many continued to participate with the park during

the following year. For example, Theresa Foley continued to volunteer for the Section 17 project during 2011-2012 and collaborate with NPS staff; Betsy Arnold's students continued their project with Tucson High School throughout the school year, and made additional field trips to Saguaro National Park. Betsy Arnold also participated in the WNPAs promotional film with Ted Danson. In addition to the web site links presented above, results from the students project were reflected in Saguaro National Park's website, the National Geographic website, and probably literally dozens of blogs, media websites, and other public outlets. In addition, we presented the results of the students projects at WNPAs (Don Swann's presentation on Citizen Science in December 2012), to Saguaro volunteers in January 2012, and to the park's interpretive staff during annual interpretive training in 2012.

Support for Graduate Student Projects

2011 BioBlitz – Saguaro National Park



Each year, the National Geographic Society and the National Park Service sponsor a BioBlitz in a national park. Saguaro National Park will host the 2011 BioBlitz on October 21-22, 2011. The main goals of this 24 hour event are to survey all taxonomic groups in the park, engage citizen scientists in biological research in the field, and get people interested and excited about biological diversity on earth and here in the Tucson area.

Thanks to funding from the Western National Parks Association, Saguaro National Park will be offering financial support for graduate students who will both participate in the BioBlitz and in following up on improving knowledge of different taxonomic groups at Saguaro National Park. If you have a taxonomic specialty (e.g., lichens, beetles, nematodes, rodents, ferns, etc.) and are interested in doing science with the public, we encourage you to apply.

We are accepting proposals in the range of \$500 to \$2000. Please submit a proposal of 2 pages, plus a 1-page summary of scientific qualifications. Proposals meeting the following criteria have a better chance of success:

- Includes a taxonomic inventory during the BioBlitz with a "Citizen Science" component;
- Includes an educational product, such as a web page or pre-BioBlitz classroom visit;
- Includes a final report that will summarize what is known about the particular taxonomic group in Saguaro National Park and make recommendations for future inventory work.

For more information on applying for these funds, please email Anna_Iwaki@nps.gov or call Anna Iwaki at (520) 733-5178.

Figure 1. Call for proposals for the BioBlitz mini-grants. Proposals were reviewed and ranked by a committee of scientists who selected 4 proposals.



Figures 2-3. Theresa Foley helped develop the re-survey of a 1 mi² historic saguaro plot first established in 1941. Left: during the BioBlitz more than 120 high school students participated in this survey, which continued throughout 2012. Below: educational poster that Theresa created for the event.

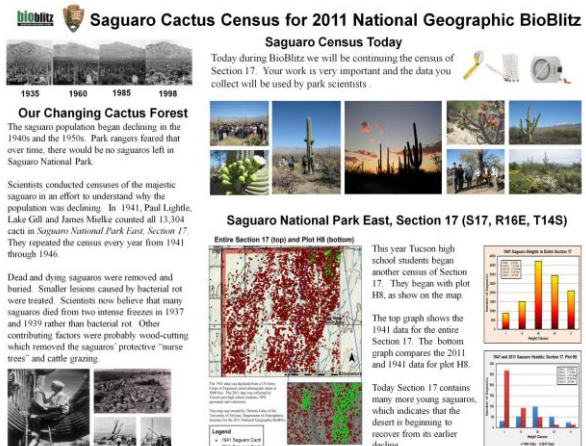




Figure 4. Jason Schaller, an entomology student with University of Arizona, photographed with a vinegaroon (*Mastigoproctus giganteus*) at the Biodiversity Festival in Saguaro National Park's west district. Jason conducted an inventory of beetles in the park.

Watch The Saguaro National Park EFT On Demand...



Figure 5. Jason (shown here with Saguaro intern Yesenia Gamez and ranger Katy Hooper) was a star of the BioBlitz Electronic Field Trip, a nationally-distributed webinar that reached literally hundreds of thousands of students and is available for viewing at <http://www.nationalparks.org/our-work/programs/electronic-field-trip>. Jason was also featured in a number of news videos, podcasts, and web products.



Figure 6: Students from Tucson High, with University of Arizona undergraduate researcher Nick Massimo, measuring percent slope in areas where they collected endophyte samples from shrubs in Saguaro National Park. In addition to Nick, team members in the Elizabeth Arnold lab at UA included MM Nandi Devan, Kayla Arendt, Brett Baxter, Susan Furr, Chan Jung, and Dustin Sandberg.



Figure 7. Video clip of Kayla Arendt, in the Arnold lab exhibit in the Science Tent at the BioBlitz, demonstrating to visitors how field samples of endophytes are isolated from plant tissue. <http://video.nationalgeographic.com/video/education-videos/education-general/edu-bioblitz-2011>.



Figure 8. UA associate professor Betsy Arnold looks through a loupe to identify a plant found during the BioBlitz. Photo by D. Stolte/UANews.



Figure 9. Photos from Jherime Kellermann's final report highlights the park's birds and their ecological communities – in this case, Black-throated grey warbler and Acorn woodpecker, found during the BioBlitz in the gradient of woodland communities in the Rincon Mountains.