

Yellowstone National Park Bioblitz 2009



The recent BioBlitz on August 28 and 29th in the Northwestern corner of Yellowstone National Park documented over 1100 species in just 24 hours. The number of documented species continues to grow as taxonomic experts work in labs to identify additional organisms. Surprising to some, this was the first BioBlitz to occur within the park borders. After the 24-hour project many of the 100+ participating scientists and volunteers excitedly stated they were already contacting friends and colleagues to help out with the next BioBlitz in Yellowstone National Park.

Yellowstone National Park, the country's oldest park, is filled with researchers conducting studies and observations on bears and bison to bacteria in the hot springs. Much of the research, which focuses on the charismatic megafauna, provides managers and conservationists clues into wildlife behavior and population dynamics. What many people do not realize is how little we know about the majority of the life in Yellowstone National Park. Park managers would like to better understand ecosystem dynamics and potential threats to ecosystem stability. Even the 2.2 million acres of Yellowstone National

Park and the surrounding wilderness areas are not large enough to be immune to ecosystem degradation and the potential loss of species. Chief of Yellowstone Center for Resources, Tom Olliff, explained "my biggest concern moving forward is to better understand threats to the resources, such as climate change, invasive species and impacts from other forms of resource degradation."

A BioBlitz is a way to document species composition and presence at one point in time. This may serve as a benchmark to future managers of past environmental conditions. It is also a rare opportunity to gather many scientists and volunteers together for a short period of time. The first Yellowstone National Park BioBlitz brought 125 volunteer scientists (entomologists, ornithologists, botanists, herpetologists, mycologists, mammalogists and others specialists) together from across the country. This is a great opportunity for scientists to work alongside other taxonomic experts. The nematode team worked closely with the botanists and the mycologists (mushroom team) offered samples of giant puffball mushrooms to the entomologists to dissect and find burrowing insects. This type of cross pollination between



A team from the University of California, Riverside, developed a new rapid field survey methodology to work at the BioBlitz and search for nematodes. .

At least 90 Genera of nematodes were identified during the BioBlitz. As the team further analyzes the samples and runs DNA tests it looks like there may well be more than a few hundred species. This would indicate that Yellowstone National Park is potentially a very diverse place for nematodes.

The lichen survey, led by Sharon Eversman, found a total of 45 different species during their 24 hunt. This included a lichen with an unusual blue-green color that turned out to be *Aspicilia desertorum*, a new species for Yellowstone.

scientists is part of what makes a BioBlitz so successful. The data gathered is invaluable to the National Park Service and once the data is completed and verified, the full list of species and their locations will be secured in [NPSpecies](#), a [National Park Service](#) database. Here it will be a reference for future surveys and additional research.

An example of one poorly studied group is the terrestrial mollusks. Paul Hendricks, from the Montana Natural Heritage Program, led a team to survey for mollusks during the BioBlitz. They found a total of 13 species at least one of which is probably a new record. Further investigation of past records will have to be done to determine if the species in question, (*Punctum conspectum*) the striate spot snail, which is only 1.8mm in diameter, is a new record for Yellowstone National Park.

Paul DeLay and the nematode team from University of California Riverside, initially identified 45 species, but expect to find many more over the next few months of studying samples collected during the 24 hour event in Yellowstone. Nematodes are the most numerous multicellular animals on earth, occupying nearly every ecological niche in the world. So far about 80,000 species have been described, but it has been estimated that the total number of species is closer to 500,000. Since they have not previously been studied in Yellowstone National Park no one knows how many different types there are and what ecological roles they may fill. It is very possible that some of the organisms collected in Yellowstone National Park during the BioBlitz will be new to science.



“We hiked about 15 miles in the 24 hours and even worked at night surveying for owls.”
—Mary Schvetz, Colorado

“One great horned owl flew right up to us, which is the closest I have ever been to such a large bird.”
—Tana Stewart



Taking notes during the owl survey.



Scientists get a pre-event briefing from park staff.

The mushroom team worked under circumstances not usually favorable for fungus. August is a dry time of year and the Northwestern part of Yellowstone National Park is not known for mushroom diversity due to the low level of precipitation. Cathy Cripps, Assistant Professor in Plant Sciences and Pathology, MSU Bozeman, led the team and successfully documented 86 species of mushrooms. Two were new records for Yellowstone Park and one was new for both Montana and Idaho.

The botanical team led by National Park Service botanist, Jennifer Whipple, was composed of many government agency scientists from the Bureau of Land Management and the US Forest Service. Even during a difficult time of year to identify flowering plants they recorded 373 plant species. They also searched for some rare species documented in the park in the 1800s and found one new grass specimen, *Oryzopsis micrantha*.



The fungi group.

Rocky Mountain College Professor of Environmental Science and Botany, Jennifer Lyman, was very excited when she saw an unfamiliar grass on a survey with Mark Majereus. Lyman said, "We sat down with our identification keys and discovered that it was a new species not previously documented in Yellowstone National Park." This new plant, called little seeded rice grass (Oryzopsis micrantha), has a small population of only about fifteen clumps



(Oryzopsis micrantha)



"In the dry conditions, fungi fruit in moist microhabitats near streams, under logs and around lakes. So an exciting aspect of our hunt, took us into the willows along various streams where the moisture was holding to hunt more unusual fungi and those not normally collected. This is called "willow-diving" because mushroom hunters disappear deep into the willows and heads pop up periodically for air. Thankfully, we did not share the willows with any larger, furry, four-legged organisms. Many of these fungi are specialists that are mycorrhizal with willow or decay willow stems or leaves. A special collection of the shining white (Tricholma cingulatum) was discovered in one such spot and is the first record for Yellowstone National Park."

—Cathy Cripps

Kayhan Ostovar, Assistant Professor of Environmental Science and Jennifer Lyman, Professor of Environmental Science and Botany, brought a small group of upper level undergraduate students to work with the scientists. Ostovar was excited to provide this opportunity to students from Rocky Mountain College. “A BioBlitz is a great way to get students interested in biodiversity. The students were amazed at the effort put forth by the scientists and had the chance to meet some prominent biologists and work with them in the field.”



Graduate students worked closely with scientists.



Crystal Maier and Sara Jackson, students from MSU, collect aquatic insects from the Gardner River. Crystal and Sara show park visitors what they found in the Gardiner River.



Other regional college professors also participated. Mike Ivie, Associate Professor and Curator of Entomology at MSU Bozeman helped round up a collection of entomological experts composed of past students, colleagues and graduate students. Over 300 insects were identified on sight and others will continue to be recorded through more detailed laboratory analysis. Some specimens were shipped off to institutions with taxonomic experts.



Mike Ivie's crew sets up a malaise insect trap

The beetle team was very excited to learn from a park ranger that there was a large animal carcass nearby. Ivie said “There are 450 species of beetles found around elk and bison carcasses on just the northern range. That is perhaps a third of the beetle species in the Park, yet not one of them has had its ecological role studied in the way we have studied bears, wolves, elk or coyotes. One hundred and thirty years after the founding of Yellowstone National Park, we know the vertebrate species quite well and the ecological role of a dozen of them are very well established. But mammals comprise less than 1% of the multicellular biodiversity in an ecosystem. What are the other 8,000 species that are expected to occur in Yellowstone National Park, and what are their roles in the system? That is the nature of real biodiversity, the little things that run the world.



Payam Ostovar, project photographer and field assistant took a photo of a beautiful little tiger beetle while out assisting the herpetofauna team. Turns out it was another new record for Yellowstone National Park

Justin Runyon helped identify another diverse group of insects the Diptera (flies). A week after the BioBlitz he had recorded 128 species in 32 families, probably virtually all new records for the Park.

Jessica Rykken from Harvard University's Museum of Comparative Zoology, organized teams of park staff and volunteers to collect annelid worms, millipedes, centipedes, isopods, ants and bees (all previously poorly studied groups in Yellowstone National Park).



The specimens were sorted during the BioBlitz, packaged, and then sent to taxonomic experts across the country (ants to Harvard University, bees to the USGS Patuxent Wildlife Center in Maryland, and earthworm, centipedes, and millipede to Kansas State University).

The team looking for butterflies found 24 species, more than they expected this late in the season. This team also inventoried dragonflies and damselflies.



Jessica and her volunteer crew collect bees and ants



Sam Droege from the Patuxent Wildlife Research Center, has tentatively identified 46 species of bees from the specimens Jessica sent him. He thought this was “not too shabby for so few specimens and so late in the season” and went on to estimate that the true number of species in the park might be closer to 400 or 500. In order to get many of the specimens identified past the genus level, he is sending them on to other experts from the United States, Canada, and Switzerland.

Bruce Snyder, the earthworm and millipede expert from Kansas State University has identified two species of millipedes (one a new record for Yellowstone) and three species of centipedes. The centipedes were last examined in the 1940s so it will take some time to sift through old records to determine if these are new records or not. There were five species of earthworms with only one native species documented. European invasive species have been moved all over the world for hundreds of years. Common transport avenues include earthmoving activities, fish bait, soil with horticultural plants, and possibly vermicomposting.

“Intentionally imported European earthworms were probably brought westward as the land was settled—I’ve heard anecdotes about earthworms still being found on abandoned homestead sites. We’ve seen little evidence that native and invasive earthworms compete directly. The current hypothesis is that the natives are lost first due to disturbance, and then the invasives are introduced. Still a lot of work to be done on that front. However, we do know about a lot of other abiotic changes made by these earthworms, and none of it is good news. One of our concerns is that we don’t know how badly invaded our National Parks and Forests are. This may give us some idea!”

—Bruce Snyder



Julie York and her team of USFS, BLM, university, and private company biologists spent most of the night catching and inventorying bats. They found five species and took samples to check for white-nose syndrome.



At the conclusion of the 24-hour survey, scientists shared with the public some of their findings at a public “Discovery Tent” located in front of the visitor center in Mammoth Hot Springs. In addition, six educational organizations assisted in teaching about biodiversity within the Yellowstone area. It was a great opportunity for visitors to learn more about the biodiversity within the area and learn about the threats to biodiversity. The exchange of knowledge between scientists and with the public was a rare opportunity that allowed scientists to be recognized for their work and allowed the public to learn directly from the researchers.

The Yellowstone National Park BioBlitz is sponsored by the Greater Yellowstone Science Learning Center. Funding for this event comes from the Yellowstone Park Foundation through a donation from Canon,

USA, which was matched by the National Park Service Centennial Challenge. Partners in planning and implementing this event include the Yellowstone Association, Big Sky Institute (MSU Bozeman), Rocky Mountain College, and Yellowstone National Park. Kayhan Ostovar, Assistant Professor of Environmental Science from Rocky Mountain College and Ann Rodman, Yellowstone Center for Resources coordinated the event. Ostovar previously organized the first BioBlitz in Montana on the Yellowstone River in Billings at the Audubon Conservation Education Center.

