



# Biodiversity Discovery

## A Foundation for Resource Protection and Stewardship

The National Park Service is charged with protecting the diversity of living organisms (i.e., biodiversity) found within its lands. Yet, as the National Park Service nears its second century, it has been estimated that as many as 80–90 percent of species in parks are undiscovered.

This gap in knowledge makes it impossible to protect living resources

from emerging threats—such as climate change, invasive plants and animals, disease, and human population pressures—or to keep ecosystems intact.

To help address this gap, the National Park Service is undertaking a new effort, Biodiversity Discovery, to both document the diversity of life in parks and ensure the future of park scien-

tific study by engaging the next generation of scientists, educators, and park supporters.

Investing in Biodiversity Discovery activities at multiple scales will be invaluable to the future of our parks. By combining solid science and public passion and interest, we can help ensure preservation of our living resources.



Boston Harbor Islands National Recreation Area Intertidal BioBlitz, 2008. Researchers and volunteers explore Peddocks Island on a quest to discover all life in the intertidal zone.

## 10 Quick Facts

- 1. First comprehensive park-wide effort:** ATBI in Great Smoky Mountains National Park, ongoing since 1998
- 2. Parks involved in Biodiversity Discovery activities:** 40+
- 3. New species to science:** 1,059 species newly scientifically described
- 4. New species for parks:** 18,723 described species discovered in parks where they were not known to exist
- 5. Volunteers:** 17,000+
- 6. Largest event:** Santa Monica Mountains National Recreation Area and National Geographic Society (NGS) BioBlitz in 2008 had 6,000+ participants, including professors, students, National Park Service (NPS) scientists, and public volunteers. BioBlitzes with National Geographic will happen annually until 2016, the 100th anniversary of the National Park System.
- 7. Largest multi-park effort:** Colorado Plateau All-Taxa Biodiversity Inventory, involving 17 parks
- 8. Partners:** Discover Life in America, The National Geographic Society, The Nature Conservancy, non-profit park associations, and many, many others
- 9. Biggest challenges to Biodiversity Discovery:** Securing ongoing funding, coordinating data management and specimen collections, collaborating with researchers, engaging non-profit partners, identifying staff to run events
- 10. Next NPS/NGS BioBlitz:** Saguaro National Park, fall 2011



## Building a Scientific Foundation for Management Decisions

Biodiversity Discovery refers to a variety of efforts to discover and document our natural heritage. These range from multi-decadal All Taxa Biodiversity Inventories (ATBIs) that aim to document all species in a geographic area to BioBlitzes that search for species within a given time frame.

Biodiversity Discovery often focuses on smaller life forms, such as insects, fungi, bacteria, and other little-studied groups that we are beginning to understand as key to ecosystem integrity and resilience.

These activities complement NPS inventory and monitoring by expanding our knowledge about park reference conditions.

This information serves as crucial baseline data to compare the variety and distribution of living things as temperatures, precipitation, pollution, and other large-scale patterns change. It also

enables parks to proactively manage threats such as invasive species and overuse.

As pressures on parks increase, knowledge gained from Biodiversity Discovery efforts provide a foundation upon which parks can build sound, long-term plans for preservation.

### Needs:

- Data management and curatorial support, including assistance with database coordination
- Access to taxonomic expertise, sampling protocols, and other technical support
- Coordination with the broader scientific community, via Taxonomic Working Groups (TWiGs), Biodiversity Information Facilities (BIFs), and other partnerships



Scientists and volunteers sort, identify, and catalog true bug specimens at Acadia National Park's 2008 Hemiptera Blitz.



# Fostering Public Passion for Science in Parks

Because Biodiversity Discovery events often require excited minds and willing hands, but not a degree in science, they appeal to kids and non-scientists of all ages as much as they do to PhDs.

Also, because these events allow a person to jump right into the exciting part of science (i.e., the wiggling or slimy or beautifully blooming part), Biodiversity Discovery is an ideal way to introduce youth to hands-on science.

Many gateway communities, especially near urban parks, have little knowledge of or access to the amazing biodiversity that exists literally on their doorsteps. Biodiversity Discovery participants experience park resources with expert scientists, building appreciation and



Trapping moths at Santa Monica Mountains National Recreation Area's 2008 BioBlitz. Photo courtesy National Geographic Society.

constituencies for scientific studies in parks.

The human-power in volunteer Biodiversity Discovery activities can be enough to accomplish surveys and collections in just a few days. This would not be possible through

traditional research projects, with park staff, or with researchers working alone over many years.

Many volunteers return every year and have become park enthusiasts. This passion for parks and biodiversity helps support the NPS mission to understand and protect park resources.

## Needs:

- Volunteer management and logistical support
- A common evaluative framework to assess benefits to volunteers and citizen scientists
- Continued Service-wide support

## Advancing Science and Stewardship

Biodiversity Discovery helps us confirm the presence of plants and animals and discover new species. As we move into the second century of protection of parks, this knowledge will:

- **Serve as a scientific baseline:** Understanding what we have before ecosystem-altering events, whether natural or human-caused, helps us prepare for, adapt to, and mitigate the effects of drastic habitat change on species assemblages and adaptations.
- **Reveal emerging problems in living resources:** Like the vital signs tracked by the NPS Inventory and Monitoring Program, many of the species identified via Biodiversity Discovery may be indicators of broader ecosystem functioning and complementary to vital signs information.
- **Answer questions on a national scale:** A project to model the distribution of bee species in 75+ parks across the United States has been funded by the Climate Change Response Program to examine possible effects of climate variation on a critical ecosystem service, pollination. Such coordinated studies leverage the geographic scope of the National Park System to answer ecological questions of national interest.

*Today, we face challenges of historical significance in global climate change, biodiversity loss, and habitat fragmentation due to human activities.*

*Biodiversity Discovery utilizes the expertise of the scientific community and the enthusiasm of tomorrow's scientists to identify and maintain the species and genetic diversity that are the foundation of ecosystem resilience in parks and surrounding communities.*

*While initiated by parks, efforts to coordinate at a national level are improving our ability to address comprehensive needs of species throughout their geographic ranges, enabling better capability to adapt, migrate, and persist.*

*Together, we can ensure these vital components of our natural heritage and legacy remain intact for future generations.*

Dr. Herbert C. Frost, Associate Director,  
Natural Resource Stewardship and Science,  
National Park Service

# Notable Discoveries

Biodiversity Discovery has revealed amazing things, and it hasn't been just scientists who make these discoveries. Kids and volunteers also have collected plants and animals that turn out to be rare, new to a park, or sometimes even new to science. These discoveries improve our understanding of species requirements, ecosystem functioning, and related stewardship activities.

- **Rare species in common places:** At Yosemite National Park, scientists are just beginning to explore a vast system of caves under their more-well-known towering walls of granite. While they expected discoveries in less disturbed caves, a new species of pseudoscorpion (*Parabosum yosemite*) was found in a cave that thousands of people visit every year.
- **Silent invasions:** During Yellowstone National Park's first BioBlitz in 2009, five species of earthworm were discovered in undisturbed, backcountry areas. Every one was a European invasive species. Non-native earthworms can cause significant damage to soil ecosystems, and no one knows how badly invaded national park lands may be. Before the BioBlitz, the merits of earthworms were primarily debated by anglers rather than resource managers.
- **Most common but least studied:** As part of Big Thicket National Preserve's "Thicket of Discovery" ATBI, two new species of trematodes were discovered, *Lissorchis amniculensi* and *Caecincola autumnae*, which are both fish parasites. Parasitism is probably the least understood way of life on the planet, but ironically it is also the most



common, represented in about 70% of the world's taxa. Parasitic worms can teach us about host animal diversity, abundance, and food web interactions.

- **Some discoveries take time:** After years of biodiversity activities at Great Smoky Mountains National Park, a new pattern of life emerged there. Unlike the park's plants, diversity of some of the most numerous and species-rich groups of life (insects and spiders) appears to level off or increase above mid-elevations. This means a much greater percentage of the park's natural biodiversity may be at risk to being displaced upwards and "squeezed off" mountain peaks by temperature increases than park staff originally surmised.
- **Park surveys contribute to national efforts:** Congaree National Park has hosted annual Butterfly Counts over the last 14 years. More than 170 citizen scientists have documented almost 3,800 specimens, representing 138 Lepidoptera species. Data are entered and reported through the North American Butterfly Association national database. Consistent data from across North America are necessary to reveal climate-related trends and patterns.



Santa Fe College students inspect the contents of their aspirator used to collect small invertebrates during an ATBI event in 2008 at Death Valley National Park.



All insect and plant scans are courtesy of Discover Life in America.



Natural Resource Program Center

Science, Stewardship, Solutions

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