

# ALL TAXA BIODIVERSITY INVENTORY OF THE GREAT SMOKY MOUNTAINS NATIONAL PARK AND OTHER NATIONAL PARKS

## PROSPECTUS

### **Background/Summary**

Since the advent of the Servicewide Inventory and Monitoring Program, the National Park Service (NPS) has shown real progress in its goal to achieve the first level of natural resource inventories at the 250 NPS sites with significant resources. The level one inventories identified in NPS-75 (the Inventory and Monitoring Guideline), however, do not even begin to address the species groups where the vast majority of biodiversity occur. Park managers can never fully appreciate park ecosystem losses, threats and restoration opportunities until they know most of what lives in their park, its relative abundance, distribution and general ecological role.

Here we outline the objectives and rationale for an All Taxa Biodiversity Inventory (ATBI) of Great Smoky Mountains National Park (GRSM), and eventually other parks. "The ultimate goal is to establish an accurate inventory of all life forms within a park . . ." (NPS-75, page 16).

### **What is an ATBI?**

Note: The concepts and refinements of biodiversity inventories used below come largely from the work of Dr. Dan Janzen, University of Pennsylvania/Guanacaste Conservation Area, Costa Rica.

Simply stated, an ATBI attempts to inventory most of the life in an area. By inventory, we mean:

1. Documenting nearly all the species in each group;
2. For each taxon, mapping its general distribution in the Park;
3. Asserting a relative abundance, or for special interest species, ranges of density;
4. A synopsis of each taxon's natural history/ecological role, potential uses, other remarks.

In addition to inventory work, we envision a strong educational component that will increase the public's general understanding of the diversity of life and the benefits to society from conserving wild biodiversity in our parks. We will gather and disseminate information to the public, other agencies and scientific communities via the World Wide Web. Society should derive additional benefits through the facilitation of the discovery and commercial development of natural products and the use of beneficial organisms for the biological control of pests.

### **Why the Smokies?**

We believe that GRSM is the ideal park in which to start an ATBI program in North America because of its biological diversity, geographic location, and large user constituency. The Park has over 500,000 acres, is centrally located relative to eastern population centers, and serves an estimated nine million visitors per year, more than any other National Park worldwide. Because of the Park's central location, many species occurring in the eastern United States are likely to be included in the Park's ATBI, making the information that we produce of widespread value far beyond the Park. Finally, the Park is biologically rich, possibly containing more species than any other North American park. It contains the largest stands of now rare eastern old-growth forest, over 100,000 acres in total, and is part of a very old mountainous area that is known for its numbers of endemic species. Many taxa have not been extensively collected within the region, and we anticipate considerable cooperation from scientists who have expressed interest in working with and describing new material from the Park.

## Why Now?

It is a propitious time to undertake an ATBI program within North America. Until recently, attention was directed on the international effort to conduct an ATBI in the Guanacaste Conservation Area (GCA) in Costa Rica. Although the Costa Rican ATBI has been abandoned (see Science, 9 May, 1997), we can learn much from it and hope to transfer the impetus it generated within the scientific community for an ATBI to North America. In addition, there are fundamental biological and logistical differences that should make our task in temperate North America considerably simpler than the one in tropical Costa Rica. For instance, the estimated number of beetle species in the GCA is the same as for all of North America, approximately 30,000 species, and there are many fewer undescribed species in GRSM than in the GCA. Logistics are more favorable here and there is also a network of interested universities in the area, an enthusiastic professional staff for support and coordination, and upgraded scientific facilities that are being developed by a very successful "Friends" group.

Although the proposed ATBI program will be a large, sustained undertaking, it can grow and be completed in practical phases. We intend to first focus on selected arthropods and plants, leaving difficult taxa (e.g., most microorganisms) until the systematic infrastructure and technology improve.

Three intensive inventories are currently underway in GRSM: spiders (funded by the National Science Foundation), parasitic wasps (funded by the "Friends of GRSM") and neo-tropical breeding birds (funded equally by the "Friends" and USGS-BRD). As funds become available, we plan to expand to the other insect and other invertebrate groups for which existing experts have already offered their help. Ultimately, we will need to inventory groups for which experts do not exist, and the program will need to encourage the development of new systematists for these taxa.

## Other Parks

As an ultimate goal servicewide, we would like to eventually see ATBI's within all national parks that are representative of the major biomass within the United States and its territories. However, because the dilution of available resources across numerous parks will threaten the synergism from an ATBI's critical mass, we propose that the GRSM be the initial focus of the program and then serve as the model and training center to facilitate ATBI's in other parks. As this advanced inventorying spreads out to other parks in planned phases, parks will share expertise, learn from our experience in GRSM, and gain the efficiency of scale. We also propose to closely interface our efforts with other inventories such as in Costa Rica with the GCA and globally with the Smithsonian Institute's Man and the Biosphere Biodiversity Program.

## Costs

We estimate that more than 100,000 multicellular species may occur within GRSM and that there are possibly 200,000 - 300,000 species in North America. For an inventory in Costa Rica of an estimated 235,000 species, the proposed budget of the ATBI was \$90 million, of which \$20 million had been committed by international sources when the project ended prematurely. The initial phases of the inventory within GRSM are relatively modest and can be done for \$100 - 300,000 per year, running for at least ten years, depending on funding level.

The NPS manages the first and arguably the best National Park System in the world. An ATBI has never been undertaken before, anywhere, but it is doable. When completed its value to park management alone, would make the effort worthwhile. The knowledge gained will also "set the standard" nationally and internationally for inventories, significantly increase interest by the scientific community and the public; it will also generally focus attention on the role the National Park System plays as an ark for biodiversity, in the face of a wide array of local, regional and global threats. Our intent is that the National Park Service show leadership by coordinating an All Taxa Biodiversity Inventory, initially at Great Smoky Mountains National Park.

# Discover Life in America

<u>Get Involved</u>	Enter data about yourself so that you can get involved.	<u>Education</u>	Training teachers & students how to study biodiversity and put their findings on the Web.
<u>Scientific Research</u>	Plans & methods for study of Great Smokies & elsewhere.	<u>Events</u>	Events and travel information.
<u>Flora &amp; Fauna</u>	Natural History information; identification guides; checklists.	<u>Who's Involved</u>	Email addresses & other data on our partners; organizational structure; correspondence.

---

Discover Life in America is a volunteer science and education non-profit organization to study, use, conserve, and enjoy the diversity of life. Our founding principle is to forge a partnership among scientists, students, and other citizens both to teach and to learn while doing science. Everyone can contribute to the knowledge needed to better manage and protect biodiversity and thus improve our environmental health and economic wellbeing.

Our first mission is to complete a comprehensive study of *all* the species in the Great Smoky Mountains National Park--an ATBI of the Great Smokies (see Science, June 11, 1999). As we gain synergy from this geographically focused effort, we will share our experience and help studies and educational programs elsewhere.

This Web site helps coordinate our activities, provides training and research guidance, and disseminates information on the taxonomy, identification, natural history, and ecology of species. The usefulness of its documents, images, sounds, databases, and links will grow as we all contribute. We ask for your help and invite you to get involved.

---

We moved to [www.discoverlife.org](http://www.discoverlife.org) in July, 1998. The site will be "under construction" until we complete the ATBI in 2010 and present our findings here. Currently, all pages are in draft form, their accuracy unchecked. We seek your help to collect, present, and correct information. Please get involved, send us input, and help better understand and manage biodiversity. -- Keith Langdon ([keith\\_langdon@nps.gov](mailto:keith_langdon@nps.gov)) and John Pickering ([pick@pick.uga.edu](mailto:pick@pick.uga.edu))

*Last modified 15 June, 1999.*

---