

## II.1 Introduction

(See Section 1 of the current Nomination Form and Section 1, 2 and 3 of the original Nomination Forms)

1a) State Party:  
USA

1b) Name of World Heritage property:  
Great Smoky Mountains National Park

1c) Please provide geographical coordinates for the site to the nearest second. (In the case of large sites, please give three sets of geographical coordinates.)

Geographical coordinate: 35 degrees 26' 15" and 35 degrees 47' 0" North Latitude

Geographical coordinate: 83 degrees 45' and 84 degrees 0' West Longitude

1d) Give date of inscription on the World Heritage List.

date (dd/mm/yyyy): 06/12/1983

1e) Give date of subsequent extension(s), if any.

1f) List organization(s) responsible for the preparation of this site report.

### Organization #1

Organization Name: Great Smoky Mountains National Park  
Last Name: Ditmanson  
First Name: Dale  
Title: Superintendent  
Address: 107 Park Headquarters Road  
City: Gatlinburg  
State/Prov: Tennessee  
Postal Code: 37738  
Telephone: 865-436-1203  
Fax: 865-436-1204  
Email: GRSM\_Superintendent@nps.gov

## **II.2 Statement of Significance (see Section 2 of the current Nomination Form and Section 5 of the original Form)**

*2a) When a State Party nominates a property for inscription on the World Heritage List, it describes the heritage values of the property which it believes justifies the inscription of the property on the World Heritage List. Please summarize the justification for inscription as it appears in the original nomination of the property.*

The original nomination stated that Great Smoky Mountains National Park is a unique site of outstanding universal value and is nominated to the World Heritage List under Natural Criterion (ii) as an outstanding example representing significant ongoing biological evolution and under Natural Criterion (iii) as a property which "contains superlative natural phenomena, and features of exceptional natural beauty".

With regards to Criterion (ii) under the World Heritage List, Great Smoky Mountains National Park harbors the largest remaining remnant of the diverse Arcto-Tertiary geoflora era in the world. The park also has the largest block of virgin red spruce forest remaining on earth. It is also unique due to the diversity of plant species and the large virgin timber stands still remaining, which provide a unique window into the pre-Columbian past. There are a total of 130 tree species, 50 mammal species, and 200 bird species.

In Criterion (iii), Great Smoky Mountains National Park is world-renowned for the diversity of its plant and animal resources, the beauty of its ancient mountains, and the depth and integrity of the wilderness sanctuary within its boundaries. The significance and integrity of those resources is evident in the parks status as the core unit of one of America's international Biosphere Reserves.

In Criterion (iv), Great Smoky Mountains National Park has been used by prehistoric people starting perhaps 15,000 years ago, for hunting and gathering rather than as a permanent residence. The first contact between whites and the Cherokee Indians, who lived south of the present park, occurred circa 1566-67, and by the early 1800s, the Cherokee had been forced to cede much of their land. Subsistence farmers continued a traditional lifestyle, and circa 1880, commercial logging began, removing old growth forests from about 80 percent of the park's land.

*2b) At the time of initial inscription of a property on the World Heritage List, the World Heritage Committee indicates the property's outstanding universal value(s) (or World Heritage value(s)) by agreeing on the criteria for which the property deserves to be included on the World Heritage List. Please consult the report of the World Heritage Committee meeting when the property was listed and indicate the criteria for which the Committee inscribed the property on the World Heritage List. (Choose one or more boxes.)*

### Cultural Criteria

- i
- ii
- iii
- iv
- v
- vi

Natural Criteria

- i
- ii
- iii
- iv

2c) *At the time of initial inscription, did the World Heritage Committee agree upon a Statement of Significance for the WHS? (Consult the report or minutes of the World Heritage Committee meeting when the property was listed.*

NO

2c1) *If YES, please cite it here.*

2c2) *If NO please propose a Statement of Significance for the World Heritage Site based on the consideration given the property by the Committee when it inscribed the property on the World Heritage List. (Note: Following the completion of the Periodic Report exercise, the State Party, in consultation with appropriate authorities, will determine whether to proceed with seeking a Committee decision to approve any proposed Statement of Significance. The Committee must approve any proposed Statement of Significance through a separate, formal process. See 7g.)*

Great Smoky Mountains National Park is an area that was a major North American refuge for the preglacial warm temperate zone flora and fauna during the Pleistocene glaciation, and has one of the nation's richest inventories of both plant and animal species. A similar level of diversity is unknown in other temperate-zone protected areas of comparable size in the world. An ongoing scientific effort indicates that perhaps only 1/10 of all species have been discovered in the park.

Please see the justification in 2a for additional more specific language.

2d) *Since the original inscription of the property on the World Heritage List, has the World Heritage Committee agreed with a proposal by the State Party that the property be recognized for additional World Heritage values and added additional criteria to the inscription as a result of a re-nomination and/or extension of the property?*

NO

2d1) *If YES, please indicate which new criteria were added and the date.  
(dd/mm/yyyy)*

### **II.3 Statement of Authenticity / Integrity**

**(See Section 2 of the current Nomination Form and Section 4 of the original Form)**

*3a) In addition to meeting one or more of the criteria, which justify inscription on the World Heritage List, a natural or cultural property must meet the appropriate conditions of authenticity and/or integrity, as defined in clauses 24b and 44b of the Operational Guidelines for Implementing the World Heritage Convention. If at the time of inscribing the property on the World Heritage list, the State Party and the International Council on Monuments and Sites, ICOMOS and/or the International Union for Conservation of Nature and Natural Resources, IUCN, evaluated the authenticity and integrity of the property, please cite those evaluations here. (Please quote directly from the nomination, Committee minutes and the Advisory Body's evaluation.)*

The original nomination for Great Smoky Mountains National Park provided the following information:

The park is fully protected from development by existing legislation. The park is largely managed as a natural area. The preservation of natural objects, systems, and processes is the dominant objective. Most threats to the natural ecosystem are considered to be manageable in the long term. The effect of public use is concentrated in about 5 percent of the park.

*3b) Have there been significant changes in the authenticity or integrity of the property since inscription?*

NO

*3b1) If YES, please describe the changes to the authenticity or integrity and name the main causes.*

## II.4 Management

(See Section 4 of the current Nomination Form and Section 2 and 4 of the original Form)

*Management Regime*

4a) How can the ownership/management of the property best be described? (Select all that apply.)

- management under protective legislation
- management under contractual agreement(s) between State Party and a third party
- management under traditional protective measures
- other

*Please describe.*

Great Smoky Mountains National Park is owned by the United States Government on behalf of the American public. It is managed by the National Park Service, a federal agency. As a National Park, it receives the highest level of conservation protection afforded by federal law in the United States.

4b) Please indicate under which level of authority the property is managed

National

*Please describe*

National Park

4c) Please describe the legal status of the property. For example, is it a national, provincial or territorial park? A national or provincial historic site?

National Park

4d) Please provide the full name, address and phone/fax/e-mail of the agency(ies) directly responsible for the management of the property.

Contact #1

Agency Name: National Park Service  
First Name: Superintendent  
Last Name: Great Smoky Mountains National Park  
Address: 107 Park Headquarters Road  
City: Gatlinburg  
State/Prov: TN  
Postal Code: 37738  
Telephone: 865-436-1203  
Fax: 865-436-1204  
Email: GRSM\_Superintendent@nps.gov

Contact #2

Agency Name: National Park Service  
First Name: Director  
Last Name: National Park Service  
Address: U.S. Department of the Interior  
City: Washington  
State/Prov: D.C.  
Postal Code: 20240  
Telephone:  
Fax:  
Email:

4e) Please provide a list of key laws and regulations, which govern the protection and management of the cultural and natural resources of the property.

The Act of May 22, 1926 (44 stat. 616) provided for establishment of Great Smoky Mountains National Park "for the benefit and enjoyment of the people." In that Act, the park's purpose is further indicated by reference to the Act of August 25, 1916 (39 Stat. 535). Which established the National Park Service and which states that the fundamental purpose of national parks is "... to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

In addition, elements of the following apply:

National Park Service Organic Act, 1916  
Fish and Wildlife Coordination Act as amended (16 U.S.C. 1531 et seq)  
Wilderness Act (16 U.S.C. 1131 et seq)  
Water Resources Planning Act of 1965 (42 U.S.C. 1962 et seq)  
Concessions Policy Act of 1965 (16 U.S.C. 20 et seq)

Solid Waste Disposal Act (P.L. 89-272, October 20, 1965)  
National Historic Preservation Act of 1966 (16 U.S.C. 470 as amended by P.L. 96-575)  
National Trail System Act (16 U.S.C. 1241 to 1249)  
National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq)  
Noise Control Act of 1972 as amended (42 U.S.C. 4901 et seq)  
Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S.C. 4651 et seq)  
Federal Water Pollution Control Act (33 U.S.C. 208, 303, 401, 402, 404, 405, 407, 511, 1288, 1314, 1341, 1342, 1344)  
Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq)  
Safe Drinking Water Act (42 U.S.C. 300 f-j)  
Clean Air Act, as amended (42 U.S.C. 7401 et seq)  
Energy Supply and Environmental Coordination Act of 1974 (42 U.S.C. 1857b-1 et seq)  
American Indian Religious Freedom Act (42 U.S.C. 1966)  
Resource Conservation Act of 1976 (codified in scattered sections of 42 U.S.C.)  
National Park Service Management Policies, 2001  
Natural Resource Protection Act, 1990  
Government Performance and Results Act, 1993  
National Parks Omnibus Management Act, 1998  
Federal Cave Resources Protection Act, 1988  
Endangered Species Act 1973, amended 1982  
Migratory Bird Treaty Act, 1974  
National Historic Preservation Act, 1966

*4f) Please describe the administrative and management arrangements that are in place for the property concerned, making special mention of the institutions and organizations that have management authority over the property and the arrangements that are in place for any necessary coordination of their actions. Make special reference, if appropriate, to the role of First Nations in managing the property.*

The National Park Service has sole management responsibility for Great Smoky Mountains National Park. The Superintendent reports to a Regional Director, who reports to the NPS Director.

*4g) Please also note whether there have been any significant changes in the ownership, legal status, contractual or traditional protective measures, or management regime for the World Heritage Site since the time of inscription.*

none

4h) Is there a management plan for the property?

YES

*4h1) If YES, please summarize the plan, indicating if the plan is being implemented and since when, and the URL where the plan can be located, if available. (A copy of the plan should be submitted in December 2004. See Section 8)*

There is a General Management Plan for Great Smoky Mountains National Park, written in 1983. It is not available on the internet, but a copy can be obtained by writing to the Park Superintendent. Management plans are required by law. The plan contains sections on purpose, management objectives, the environment, management zoning, resources management, visitor use and services, and general development.

*4h2) If NO, is a management plan under preparation or is preparation of such a plan foreseen for the future?*

There are no current plans, as of 2004, for development of a new General Management Plan. However, amendments are in progress for specific portions of the park.

#### *Financial Resources*

*4i) What is the annual operating budget for the property in the current fiscal year? (For sites consisting of more than one property provide the budgets of constituent parts.)*

The Park's base-funded budget in FY 2004 is \$15,329,000 USD. Additional funds are sometimes acquired from the NPS for specific projects. Special legislation allows 100% retention of fees collected in the park (from camping) which averages \$1.3 million USD annually. Additionally, the Friends of the Smokies contributed \$1.2 million USD in 2003, and the Great Smoky Mountains Association contributed \$1.4 million USD.

Unlike many other national park units, there is no entrance fee.

#### *Sources of Expertise and Training in Conservation and Management Techniques*

*4k) Please describe any sources of specialized expertise, training, and services that come from sources off-site (e.g., training centers, museum conservation facilities).*

Denver Service Center  
Harpers Ferry Center  
NPS "TEL" satellite training courses  
Southeast Regional Archeological Center

There is a wide array of training available from NPS centers and other NPS sources.

Regional universities: University of Tennessee, North Carolina State University in Asheville, University of Georgia, and many other smaller colleges.

Most professional staff have Bachelor's degrees or better, including many with Master's degrees and 5 with Ph.D's.



4j) Please provide information about the number of staff working at the World Heritage Site (enter figures).

Full Time: 251 (Value must be a number)  
Part Time: 4 (Value must be a number)  
Seasonal: 49 (Value must be a number)  
Other: 100t (Value must be a number)

Please list the job categories of these staff (e.g., Park Superintendent, Historian, Ecologist, Interpreter, General Works/Maintenance Manager) and describe the specialized skills and expertise of the World Heritage Site's staff members.

Great Smoky Mountains National Park is a large park with a large staff. Administration, maintenance, and law-enforcement functions cover the range of professions that you might expect in managing a small city: managers, fiscal, information technology, personnel, contracting, police, search and rescue, mechanics, carpenters, grounds keepers, heavy equipment operators, trail crews, planners, electricians, etc. Additionally, the park employs professionals in the fields of landscape planning, public affairs, history, archeology, fire management, forestry, botany, fisheries and wildlife biology, fire management, GIS, data management, ecology, and others.

#### Visitation

4l) Are there any visitor statistics for the site?

YES

4l1) If YES, please provide the annual visitation for the most recent year it is available, indicating what year that is, a brief summary of the methodology for counting visitors, and briefly describe the trends in visitation. (In describing these trends, please use the year of inscription as a baseline.)

There were 9,189,543 visitors in 2003. Visitation in 1983, the year of inscription, was 8,435,475. Since that time, visitation has fluctuated to a high in 1999 at 10,283,598. Visitation has stayed fairly constant at about 9.3 million since then. We have no explanation for visitor fluctuation. These counts were made by estimating visitors by use of traffic counters at each park entrance, and applying a multiplier.

4m) Please briefly describe the visitor facilities at the property.

384 miles of roads (238 miles paved, 146 miles gravel)  
146 bridges  
151 cemeteries  
342 non-historic buildings with 42 water systems and 19 sewer systems  
10 campgrounds with 1,000+ sites

9 picnic areas with 1,200+ sites  
800 miles of trails, with 16 shelters containing 84 sites  
78 historic buildings  
1 hike-in lodge  
1 store which sells some food items  
horse-riding and bicycle-rental concessions

4n) *Is there tourism/visitor management plan for the property?*

NO

4n1) *If YES, please briefly summarize the plan, and provide a URL where the plan can be located.*

#### *Scientific Studies*

4o) *Please list key scientific studies and research programs that have been conducted concerning the site. (Please use the year of inscription as a baseline.)*

Approximately 160 research permits were issued in fiscal year 2003, with likely more than that number of research reports published annually concerning some aspect of the natural and cultural resources of Great Smoky Mountains National Park. Information on research in the parks can be found at <http://www1.nature.nps.gov/scienceresearch/research.htm>. The largest study ever conducted in the Park is the All Taxa Biodiversity Inventory (currently underway), which is an attempt to identify and learn about all life in the Park (see description in 4o2, below). Information about this study may be found at <http://www.discoverlifeinamerica.org/dlia/index.html>

4o1) *Please describe how the results of these studies and research programs have been used in managing the World Heritage Site.*

Science-based management is a cornerstone of the management philosophy of the Smokies. Whenever a new project is initiated, the best available science information is reviewed and considered in project planning. Examples include the reintroduction of extirpated species, or decisions on experimental reopenings of fishing for native trout. New GPS-based information on trail location is being used to update our trail maps. All projects which break ground or modify structures are reviewed by appropriate staff specialists regarding potential harm to the resources. Many other examples exist.

*4o2) What role, if any, has the property's designation as a World Heritage Site played in the design of these scientific studies and research programs? For example, has there been a specific effort in these programs to focus on the recognized World Heritage values of the property?*

The World Heritage designation has not been a factor in the design of the studies and research programs. However, the values for which Great Smokies was declared a World Heritage site (biodiversity) are the focus of a multi-year ongoing study aimed at inventorying all taxa in the park (vertebrates and invertebrates, vascular and non-vascular plants, slime molds, bacteria, etc.). This study, the All Taxa Biodiversity Inventory, has already resulted in the discovery of numerous species new to science, in addition to numerous range expansions of known species. Information about this study may be found at <http://www.discoverlifeinamerica.org/dlia/index.html>

#### *Education, Information and Awareness Building*

*4p) Is there a plaque at the property indicating that it is a designated World Heritage Site?*

YES

*4q) Is the World Heritage Convention logo used on all of the publications for the property?*

NO

*4r) Are there educational programs concerning the property's World Heritage values aimed at schools?*

NO

*4r1) If YES, please briefly describe these programs.*

*4s) Are there special events and exhibitions concerning the property's World Heritage values?*

NO

*4s1) If YES, please briefly describe them.*

*4t) Please briefly describe the facilities, visitor center, site museum, trails, guides and information material that are available to visitors to the World Heritage Site.*

In addition to the facilities described in 4m (above), Great Smoky Mountains has the following:

Free brochure and website, <http://www.nps.gov/grsm>

Visitor Centers open year-round inside the park at Sugarlands, Oconaluftee, and Cades Cove (which serve 2 million visitors).

Staff support four other off-site visitor centers on a cooperative basis.

Approximately 800 miles of trails in the park.

Great Smoky Mountains Association produces hundreds of publications related to the Park; many of these can be accessed at <http://www.smokiesstore.org/>

Visitor programs, including 160 interpretive walks, talks and tours per week, a "Parks-as-Classrooms" program which contacts 12,000 students annually, and a residential environmental education facility--the Great Smoky Mountains Institute at Tremont

*4u) What role, if any, has the property's designation as a World Heritage Site played with respect to the education, information and awareness building activities described above? For example, has the World Heritage designation been used as a marketing, promotional, or educational tool?*

The World Heritage designation has not been a key factor in the design of education, information, and awareness-building activities.

## **II.5 Factors Affecting the Property (See Section 5 of the current Nomination Form)**

*5) Please briefly identify factors affecting the property under the following headings: Development Pressures, Environmental Pressures, Natural Disasters and Preparedness, Visitor and Tourism Pressures, Number of Inhabitants Within Property and Buffer Zone and Other - major factors likely to affect the World Heritage values of the property. First discuss those that were identified in the original nomination, in the same order in which they were presented there, then those that have been discussed in reports to the World Heritage Committee since inscription, and then other identified factors.*

*This section should provide information on all the factors which are likely to affect a property. It should also relate those threats to measures taken to deal with them, whether by application of the protection described in Section 4e or otherwise.*

*Not all of the factors suggested in this section are appropriate for all properties. The list provided is indicative and is intended to assist the State Party in identifying the factors that are relevant to each specific property.*

*(In describing these trends, please use the year of inscription as a baseline.)*

*For EACH Factor, please specify the following:  
key actions taken to address factor  
any plans that have been prepared to deal with factor in the future  
whether the impacts of factor appears to be increasing or decreasing, and  
the timeframe for which the comparison is being made.*

### *Development Pressures*

*5a) Provide information about Development Pressures on the following: demolitions or rebuilding; the adaptation of existing buildings for new uses which would harm their authenticity or integrity; habitat modification or destruction following encroaching agriculture, forestry or grazing, or through poorly managed tourism or other uses; inappropriate or unsustainable natural resource exploitation; damage caused by mining; and the introduction of invasive nonnative species likely to disrupt natural ecological processes, creating new centers of population on or near properties so as to harm them or their settings.*

No such development pressures have taken place in the Smokies since date of nomination. The park has an active Compliance Management Board which ensures compliance with resource protection laws specified in the National Environmental Policy Act, National Historic Preservation Act, Endangered Species Act, etc.

## *Environmental Pressures*

*5b) Environmental pressures can affect all types of property. Air pollution can have a serious effect on stone buildings and monuments as well as on fauna and flora. Desertification can lead to erosion by sand and wind. What is needed in this section is an indication of those pressures which are presenting a current threat to the property, or may do so in the future, rather than a historical account of such pressures in the past.*

Air pollution is considered the most serious current environmental threat facing the park. Most of this pollution originates from electric utility plants outside of the park's boundaries. The Smokies has some of the worst air pollution in the national park system; it affects at least 28 plant species, and possibly animal species, as well. The National Park Service has no direct authority to regulate facilities which generate pollution. The most extensive air quality monitoring system in the National Park Service is underway at Great Smoky Mountains National Park. This information is used by advocates for cleaner air in the region.

The most recent serious threat from invasive species is from the non-native hemlock woolly adelgid, an insect which feeds on and kills eastern hemlock, an important plant species in the park. This insect has killed over 80 percent of the hemlocks in Shenandoah national park, located farther north from the Smokies. Extreme efforts are being made by park managers to apply all available methods to combat this threat. Hemlock trees in developed areas are being treated with insecticidal soaps and oils, as well as injectable insecticides. Park managers have also released predator beetles in an attempt to establish an ecological balance between the adelgids and the predator beetles to retain/maintain hemlock forests in the park.

Exotic plant and animal populations are typically difficult to contain, particularly in the case of the European wild boar, but effective methods (including trapping and hunting) are being used by park managers to keep the population in check. Major invasive exotic plants found in the Smokies include princess tree, multiflora rose, kudzu, Chinese lespedeza, wisteria, garlic mustard, Japanese grass, Japanese barberry, crown vetch, tree of heaven, mimosa, Chinese yam, oriental bittersweet, English ivy, and vinca--all of which are currently being treated and/or removed in the park.

### *Natural Disasters and Preparedness*

*5c) This section should indicate those disasters which present a foreseeable threat to the property and what steps have been taken to draw up contingency plans for dealing with them, whether by physical protection measures or staff training. (In considering physical measures for the protection of monuments and buildings it is important to respect the integrity of the construction.)*

The most likely natural disasters come from strong storms, such as hurricanes, which can occasionally reach this area (though not generally with as much force as areas closer to the ocean). Evacuation plans exist for those areas that could be cut off by road closures. Variable message signs are in place to indicate road closures. Park staff is highly experienced in backcountry search and rescue, if needed.

### *Visitor and Tourism Pressures*

*5d) In completing this section what is required is an indication of whether the property can absorb the current or likely number of visitors without adverse effects (i.e., its carrying capacity). An indication should also be given of the steps taken to manage visitors and tourists. Possible impacts from visitation that could be considered include the following:*

- i. damage by wear on stone, timber, grass or other ground surfaces;*
- ii. damage by increases in heat or humidity levels;*
- iii. damage by disturbance to the habitat of living or growing things; and*
- iv. damage by the disruption of traditional cultures or ways of life.*

Public use: The effect of public use pressures are concentrated in areas of high visitor use, such as visitor centers, campgrounds, and the most popular foot trails. These areas comprise only 5 percent of the park's land base. Camping is not permitted outside of designated camping areas. Given that 95 percent of the park is not heavily used, the park can absorb current levels of visitor use.

### *Number of Inhabitants Within Property and Buffer Zone*

*5e) Include the best available statistics or estimate of the number of inhabitants, if any, within the property and any buffer zone and describe any activities they undertake which affect the property.*

There are no permanent inholdings within the boundary of the park, although a small number of park staff are housed within the park, usually on a temporary basis. There is no official buffer zone surrounding the park. Private and commercial properties border a significant portion of the park, however they have limited impact on the park's resources to date. Development of these adjacent properties has increased since nomination. Also, national forest borders the park's boundaries in some areas.

### *5f) List Other Factors*

None.

## **II.6 Monitoring** **(See Section 6 of the current Nomination Form)**

### *Administrative Arrangements for Monitoring Property*

*6a) Is there a formal monitoring program established for the site? In this case, "monitoring" means the repeated and systematic observation and collection of data on one or more defined factors or variables over a period of time.*

YES

*6a1) If YES, please describe the monitoring program, indicating what factors or variables are being monitored and which partners, if any, are or will be involved in the program.*

A major component of the NPS national inventory and monitoring framework is a network of experimental or "prototype" long-term ecological monitoring (LTEM) programs. The tremendous variability among parks in ecological conditions, sizes, and management capabilities represent significant problems for any attempt to institutionalize ecological monitoring throughout the Service. To develop monitoring expertise throughout this range of ecological and managerial diversity, natural resource park units were grouped into 10 major biogeographic areas or biomes, and one park unit from each major biome was then selected to serve as a prototype LTEM program for that biome.

The Smokies was one of the initial prototype parks funded as part of a national monitoring program (circa 1990), and is therefore farther ahead of most national parks. The current vision of the prototype monitoring programs is that within the NPS, there should be a few parks with greater funding and staffing levels that serve as monitoring Research and Development sites. These prototype monitoring programs, which may also receive funding and scientific expertise from USGS scientists, are expected to develop and test sampling protocols and provide technical assistance and mentoring to other parks within their network and nationwide. By nature of these enhanced funding and staffing levels and USGS involvement, most prototypes are able to conduct a level of monitoring that is more comprehensive and intensive than what other parks can undertake.

Maintenance of biodiversity is the primary natural resource goal of park management. The park's I&M program has a strong ecological basis that includes components at multiple scales from landscape to species. Objectives of the program are to (1) measure change over time in the condition of selected key populations, communities and systems; (2) provide managers with practical information to help them preserve park natural resources; (3) provide information in an accessible data management system that will encourage research in the park; and (4) provide information to help other parks develop monitoring programs. Sampling protocols are being developed to address specific management issues such as bear and deer management, effects of balsam woolly adelgid and other exotic pests, and changes in forest structure due to acidification, fire suppression, and other factors. Now that specific protocols have been designed and tested, the park is beginning to design a park-wide, ecosystem monitoring program to serve as a model for the deciduous forest biome.



In 2004, we have undergone a review of our monitoring protocols and processes, and are revising our program accordingly. Great Smoky Mountains National Park is affiliated with the Appalachian Highlands Monitoring Network, and the Southern Appalachian Cooperative Ecosystems Studies Unit. The following indicators are being monitored at Great Smoky Mountains National Park:

- Vegetation communities: baseline succession; potential forces of alteration—exotic species, fire suppression; possible management solutions to exotic species (e.g. dogwood anthracnose and fire); how vegetation communities are changing, and agents of change.
- Rare plants: about 30 species comprising 60 populations, including state-listed and federally-listed threatened or endangered species; forest health concerns, succession; American ginseng (poaching); browse effects of white-tailed deer in Cades Cove.
- Forest insects, disease: monitoring of about 10 insect species or pathogens and their impact on the host (applying Forest Health Monitoring Protocols); e.g. Balsam woolly adelgid, beech scale, Hemlock woolly adelgid (not part of current formal monitoring program since it was not present when initial program started); rhododendron, mountain ash sawfly, butternut canker, and holly decline.
- Aquatic macroinvertebrates: park-wide, at 27 sites for 10 years; also intensive sampling at high-elevation locations on Noland Divide; parkwide work to provide early warning regarding changes in stream health throughout the park and to monitor long-term trends in water quality.
- Water quality: 2 phases – park-wide; Noland Divide. Parkwide—elevational trends, including vegetation and geological effects; effects of atmospheric deposition; Noland Divide—high-elevation watershed; sulfate and nitrate deposition; total nitrogen; changes in water chemistry; long-term trends; calcium, base cations.
- Brook trout monitoring: large-stream fish communities along elevational gradients; defining natural variation; abiotic and biotic measures; condition of different species present; Brook trout distributions in high elevation streams stressed by various factors; some other species even more sensitive to these stressors than trout; fish parasites (more of an inventory than monitoring).
- Bear bait station survey for population trends: park-wide on selected trails; though not robust, does provide indicator of population size.
- Hard mast surveys to look at influence of mast production on bears and hogs: used in conjunction with bear bait station
- Deer monitoring in Cades Cove: spotlight counts; herd health checks (abomasum); also distance sampling.
- Air quality: Largest program in the agency; 5 categories; ozone and trace gases, deposition (Nitrogen, Sulfur, Mercury, wet deposition, base cations) Particulates/visibility; meteorology/climate; ultraviolet (all wavelengths) radiation; judge attainment against health standards; provide exposure and dose response relationships to understand thresholds; validate models/simulations; integrated assessment with other resources (air, water, soil, fish, and vegetation); establish critical loads; forecast (air quality, climate, and weather – current and future); regulatory (exposure and response) help judge effectiveness of regulation and control strategies.
- Noland Divide high elevation 1 first-order stream: plus nearby tower for cloud water measurements; provides information on deposition, air quality issues (nitrate, sulfate deposition); many different entities have conducted studies here.
- Nitrogen saturation in high elevation soils (TVA 1985): biogeochemical cycling of the systems; nitrogen dynamics.

- Emission inventory inside the parks (required to be done every 10 years in Class I parks only).
- Precipitation: 50 rain gauges in the park; NPS, in association with Tennessee Valley Authority and the National Atmospheric and Oceanic Administration.
- Ozone effects/dendrochronology (with Auburn University): work on symptomatic ozone trees at 3 sites (adjacent to ozone monitoring); black cherry, tulip.
- Ozone garden: effects on clones of 3-4 native species of herbaceous plants (gardens at Twin Creeks, Purchase, and Tremont); expanding to other sites in western North Carolina and east Tennessee.
- Groundwater monitoring wells: wetlands; several sites on both sides of Park; 4-year data set; Rob Young (Western Carolina University); shows uptake of nutrients by wetlands; year-round water levels.
- Stream sediment data (with the Tennessee Valley Authority, Department of Energy, and Natural Resource Conservation Service): streambank restoration in Cades Cove.
- North Carolina Division of Environmental Quality: sample aquatic invertebrates in Cataloochee every other year; various other sites in the park; part of state-wide program.
- Game fish: creel data, but not very consistent levels of effort from year to year (this is part of law enforcement effort).
- Threatened and endangered fish: work by Conservation Fisheries, Inc. (funded by USFWS) on four species.
- Stream salamander populations: Purchase and Walker Valley at Tremont; look at seasonal and year-to-year variations in abundance; 10 species found in streams; conducting mark/recapture at Purchase Knob; general age distribution data; working more with larvae at Walker Valley; also approximately 40 hellbender salamanders are individually PIT tagged (mostly in Little River) by University of Florida.
- Vernal pool amphibians: multi-park, 12 years data, publications; originally funded by SERO, now by University of North Carolina at Asheville.
- Terrestrial salamanders: nearly 30 years of data; not originally set up as monitoring; protocol revised to be more quantitative about 11 years ago (University of North Carolina at Chapel Hill).
- Amphibian monitoring by USGS: 3 year study; started with an inventory but set up baseline for monitoring; protocols, comprehensive monitoring manual published, Oct. 2003, USGS Biological Resource Division, Gainesville Florida.
- Black bear population dynamics (University of Tennessee project): 30 years of data; NW ¼ of Park; one of longest-running bear monitoring projects in the country.
- Northern flying squirrel: federal endangered species; monitoring with North Carolina Wildlife Resource Council; nest-box surveys, begun in 1998; have not caught enough squirrels to do statistical analysis of population.
- Bats: hibernaculum counts every other year for federally endangered Indiana bats at Blowhole Cave (monitored with U.S. Fish and Wildlife Service and Tennessee Tech University); recently discovered female Indiana bats (maternity colony) in the park in summer and are monitoring those; Rafineque's big-eared bats in mines on Deep Creek (in cooperation with U.S. Fish and Wildlife Service).
- Elk: third year of reintroduction project; exclosures in southeast portion of park to examine changes in vegetation, study will go to at least 5 years, and perhaps a subset even longer; in addition, baseline mapping/count of highly palatable Turk's cap lily made along high-elevation locations near initial elk-release area.
- Feral hog diseases (pseudorabies and brucellosis): hogs are being brought in and released from other parts of the country; illegal (North Carolina Department of Agriculture and TN).

- Feral hog exclosures (~8 locations) are being re-sampled: set up about 20 years ago, infrequently sampled as funds become available; show decreases of flora over time.
- Peregrine falcon nesting: monitored by volunteers; not really quantitative, presence/absence of nest site, some data on reproductive success.
- Breeding Birds, MAPS stations (2 in the park): Monitoring Avian Productivity and Survivorship; international protocol; sites chosen based primarily on juxtaposition to educational group programs; analysis of changes in bird communities, both resident and neotropical migrants that breed in the Park; some rare species.
- High elevation breeding birds (Purdue University): comparing elevational transects at GRSM and Costa Rica; also long-term data on Spruce-fir bird communities, including data before loss of fir.
- Christmas bird counts: conducted annually since the 1930's; 2 circles include the park – Gatlinburg and Cades Cove (somewhat intermittent); none on NC side; not well controlled for effort-per-trail.
- Breeding bird surveys: 3 road routes that include parts of the Park; this is part of a national survey.
- Spring and fall migration bird counts (TN Ornithological Society): on Tennessee side of the Park; at least 5 years – low, middle and high-elevation routes; part of nationwide program
- Moths: flight seasons; light trapping every 2 weeks to monitor moth populations in response to season, weather; yearly fluctuations; over 600 species documented at Tremont alone in 5-year period; initiated at Purchase Knob in 2003; moths represent herbivores on a variety of different strata; detritivores – generalists and specialists in food habits.
- Monarch butterfly breeding/migrating populations on milkweed in Cades Cove: part of nationwide study looking at temporal and spatial variation in breeding populations, and causes of that variation.
- Gypsy moth monitoring (15 years) using pheromone traps for adults: also participating in USFS Rapid Detection program for new introductions (like Asian bark beetle); protocols have been developed – could be fairly easily and inexpensively monitored.
- Annual surveys for Southern Pine Beetle: monitor outbreaks; mapping of location and extent by aircraft – goes back to 1970's; USFS pays for this.
- Oregon State University plots on old-growth: 1-hectare plots; collaborating with Wright State in Ohio; re-measuring old-growth plots; forest productivity, cycling study in Albright Grove – old-growth vs. second growth; tons per acre of duff that fall from the trees each year (University of Illinois).
- Phenology of Rhododendron: annual bud counts/plant bloom at several locations (this shrub covers approx. 1/5 of park); measurement and synchrony.
- Spring ephemeral vascular plants: all species at one site near Chimneys (3 plots, blooming date, and sequence of flowering among species).
- Grassland restoration: monitoring for exotic plants on grassy balds; Cades Cove meadows – plots and transects used to determine effectiveness of various restoration techniques.
- Fire effects: monitoring effects of prescribed burns pre- and at set annual intervals post burn; inter-agency protocol; not wildfires; invasive exotic invasion of burn sites; coarse vegetation changes; stocking densities; no water quality issues.
- Control and monitor exotic plants: about 30 species, hundreds of sites in Park; "tactical" monitoring directly linked to eradication efforts.
- Fraser fir: 36 plots on three mountaintops; data collected every 10 years; DBH and basic stand characteristics.

- Phenology study of cloned lilacs: part of International GLOBE program - focuses on climate change; measures annual "vernalization" of plants up to higher latitudes; involves students in long-term ecological monitoring; lilacs not surviving well, monitoring may be discontinued in a few years.
- U.S. Forest Service Forest Inventory and Analysis: also, forest health plots; 90 plots throughout the park.
- Visitor use study: conducted every 10 years; part of long term data set on visitation, which affects resources in many ways.

*Key Indicators for Measuring State of Conservation*

*6b) At the time of inscription of the property on the World Heritage list, or while in the process of reviewing the status of the property at subsequent meetings, have the World Heritage Committee and the State Party identified and agreed upon key indicators for monitoring the state of conservation of the property's World Heritage values?*

NO

*6b1) If YES, please list and describe these key indicators, provide up-to-date data with respect to each of them, and also indicate actions taken by the State Party in response to each indicator.*

*6b2) If NO key indicators were identified by the World Heritage Committee and used so far, please indicate whether the World Heritage Site management authority is developing or plans to develop key indicators for monitoring the state of conservation of the property's World Heritage Values.*

Yes. Monitoring is currently in progress, and has been recently reviewed. Some changes will be made based on that review. Please see above for details of monitoring program.

### *Results of Previous Reporting Exercises*

*6c) Please describe briefly the current status of actions the State Party has taken in response to recommendations from the World Heritage Committee at the time of inscription or afterwards, through the process known as "reactive reporting." (Note: The answer to this question will be "not applicable" for many sites.)*

At its meeting in December 2001, the World Heritage Committee requested that the United States provide a report on air pollution at the Smokies with a view to determining whether or not the site should be placed on the List of World Heritage in Danger. The Committee was responding to information citing air pollution at the Smokies as a significant threat to the park and was concerned about the potential impact to the universal value of the site. The United States agreed to the request and, over the subsequent months, developed a thorough analysis of the issue prepared by a working group of National Park Service experts. The US report, submitted for consideration at the Committee's 2002 meeting, acknowledged that while air pollution was affecting the park, there wasn't enough evidence that the air quality threatened the universally significant features for which the park had been inscribed on the World Heritage List. In addition, the report documented that air quality conditions are being continuously monitored and many actions are being taken to reverse the detected deteriorating air quality trends and to restore the natural and scenic resources. The report recommended against inscribing the park on the In Danger List. The Committee accepted the recommendation. As described in response to 6a1, the extensive air quality monitoring program continues and actions to mitigate the effects are underway.

## **II.7 Conclusions**

### *World Heritage Values*

*7a) Please summarize the main conclusions regarding the state of the World Heritage values of the property (see items II.2. and II.3. above).*

While there has been development nearby the park, internal to the park there has been very little additional development (expansion of a visitor center was the largest) since the time of nomination. There have been additional exotic pest and plant species since the nomination, but there are control programs in place. Visitation has increased somewhat since the nomination date, but the very large majority of visitors stay in developed areas, limiting resource damage. The Great Smoky Mountains National Park remains intact regarding those values for which it was nominated to World Heritage Site status.

### *Management and Factors Affecting Site*

*7b) Please summarize the main conclusions regarding the management of and factors affecting the property (see items II.4. and II.5. above).*

Management of the Park remains consistent from the date of nomination. As a national park, the Smokies is given the highest protection for natural and cultural resources. The number of scientific studies has increased, as has the emphasis on science-based management and education about the park's resources.

### *Proposed Future Action(s)*

*7c) Please describe briefly future actions that the State Party has approved to ensure the conservation of the World Heritage values of the property.*

*These sample headings can be used as a checklist.*

- Modification of legal or administrative structure*
- Changes to financial arrangements*
- Increases to staffing level*
- Provision of training*
- Modification of visitor facilities*
- Preparation of a visitor management plan*
- Studies of public knowledge of the World Heritage Site*
- Emergency preparedness*
- Establishment or improvement of a monitoring program.*

Management of the Smokies is expected to remain constant for the foreseeable future in terms of the headings listed above.

*Responsible Implementing Agency(ies)*

*7d) Please identify the agency(ies) responsible for implementation of these actions described in 7c, if different from those listed in Section II.4.*

*Timeframe for Implementation*

*7e) If known, or predictable, please provide a timeline for the implementation of the actions described in 7c.*

NA

*Needs for International Assistance*

*7f) Is it anticipated that International Assistance, through the World Heritage Fund, will be requested for any of the planned actions described above?*

NO

*7f1) If YES, please state the nature of the request and when it will be requested, if known.*

*Potential Decisions for the World Heritage Committee*

*7g) Please indicate if the World Heritage Site management authority has preliminarily identified, as a result of this reporting exercise, an apparent need to seek a World Heritage Committee decision to change any of the following:*

*(Note: Following completion of the Periodic Report exercise, the State Party, in consultation with appropriate authorities, will determine whether to proceed with seeking a Committee decision on these changes. To request such changes, the State Party will need to follow a separate, formal process, subsequent to submitting the report.)*

- change to criteria for inscription
- change to Statement of Significance
- proposed new Statement of Significance, where previously missing
- change boundaries or buffer zone

## II.8 Documentation

(See Section 7 of the current Nomination Form and Section 3 of the original Nomination Form)

8a) Please review the original nomination for the property to determine whether it is necessary or advisable to supply, update or amend any of the following documentation for the World Heritage Site. Indicate what documentation will be supplied to supplement the information found in this report. (This documentation should be supplied at the time the Periodic Report is submitted to the World Heritage Centre, in December 2004.)

- a) Photographs, slides and, where available, film. This material should be accompanied by a duly signed authorization granting, free of charge to UNESCO, the non-exclusive right for the legal term of copyright to reproduce and use it in accordance with the terms of the authorization attached.
- b) Topographic or other map or site plan which locates the WHS and its boundaries, showing scale, orientation, projection, datum, site name, date and graticule.
- c) A copy of the property management plan.
- d) A Bibliography consisting of references to all the main published sources on the World Heritage Site, compiled to international standards.

8b) Do you have a digital map of the WHS, showing its location and boundaries?

YES

8bi) If yes, in what format(s) is the map?

ESRI Arc-view

8bii) Is it published on a publicly-accessible website?

YES

8biii) If yes, please provide the URL of the site where the map can be found. Must be a valid URL.

<http://www.dlia.org>