

# NPS Inventory and Monitoring Program Emerges From I&M Task Force

By Gary Williams

*Editor's Note: Following is the first of three articles by Gary Williams, I&M Program Coordinator in the NPS Washington Office, dealing with development and implementation of a Systemwide I&M Program. In this issue, we begin with Inventory Status; the Spring issue will cover Monitoring; the Summer issue will deal with how the Program will interact with the National Biological Survey.*

In 1989, the NPS Associate Director for Natural Resources appointed a special Servicewide Task Force and charged it with developing a workable plan for implementing I&M on a programmatic basis throughout the entire National Park System.

The group's development effort built on the 1987 "Evison Report," and it recommended a two-phase approach. During the first 10 years (Phase I) the focus was to: (1) prepare the parks for long-term monitoring, and (2) develop the expertise and experience to design and implement effective natural resource monitoring programs in individual park units; for Phase II, the long-term monitoring was to be extended to all natural resource parks in the NPS and continued in perpetuity.

**NPS-75**, a Servicewide policy guideline for designing and implementing I&M programs in park units, was published in 1992. The Servicewide I&M Program Coordinator will work directly with a National Technical Advisory Committee established to assist in program development and oversight and with all 10 Regional I&M Coordinators. The park units containing significant quantities of natural resources have been identified, and collectively they represent the NPS "I&M System."

Five Program Goals will guide Phase I of the Servicewide Program:

(1) Natural Resource Inventories (see Table 1); (2) Ecosystem Monitoring; (3) Planning and Management Technology; (4) Program Integration; and (5) Partnerships and Cooperation.

## Status of Natural Resource Inventories

The acquisition of the natural resource data sets described in Table 1 for approximately 250 I&M park units can best be accomplished through implementation of a well-coordinated, systemwide data collection initiative. By such an undertaking, as opposed to requesting each individual park to obtain its own data, the Service can better insure that the inventory will satisfy a number of important criteria. For example, the

information collected at the very least should contain the "core" set of data needed to deal with park planning and management. In a similar manner, the data collection effort must address the issues of long-term data compatibility and integrity. Baseline data must be collected and maintained in accordance with clearly defined protocols and quality assurance standards.

Cost effectiveness is another major consideration in data acquisition. To reduce costs, the Service will consider clustering park units to achieve economies of scale. Costs may also be minimized by negotiating agreements with sister Federal agencies. Thus, Phase I natural resource inventory will be conducted as a Washington Office initiative with strong regional and park oversight and priority setting.

(Note: This section provided by Dr. Sue Glenn)

## Species Lists/Biodiversity

A major inventory effort in FY 1993 was completion of the NPFAUNA.PC databases compiled by U/CA under the direction of Dr. James Quinn. These databases contain

checklists of mammal, bird, fish, herb, and plant species found in approximately 190 NPS units. Documentation of this information also is included and the Federal Status of each species has been updated.

All nomenclatural differences in species names among parks and regions were standardized; some of the databases were changed to reflect comments received from international review of the system. The data then were sent back to the regions for a final review before the data is distributed within and outside the NPS in FY 1994.

Through distribution of these data sets, the Service anticipates that other agencies and individuals with additional relevant knowledge of species occurrences in parks will come forward and make that information available. This may include biologists who have seen species in parks that do not appear in the database, as well as museums and plant herbaria with specimens to add to the database. Distribution of these lists also may encourage biologists to assist the parks in special inventories. Although the databases

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**Table 1.** Recommended minimal data standards for Inventory and Monitoring Park Units.

1. Bibliography of manuscripts, old maps and other historical information related to science and resource management. This information must be park specific
2. Compilation of existing species lists. Should include ALL species lists available and an estimate of their quality.
3. Field inventory of species (plant and animal) of special concern.
4. Listing of Threatened and Endangered endemic or non-natives species.
5. Status and distribution of species and abiotic features of special concern.
6. Current ( $\leq 5$  years old) maps for:
  - Vegetation
  - Watershed boundaries
  - Topography (DLG and DEM preferable)
  - Hydrography (from topographic maps)
  - NPS Park Management Zones and Special Designations (e.g. Landmarks, RNA, etc.)
7. Location and Classification of:
  - Streams
  - Wetlands
  - Lakes
  - Groundwater
8. Basic Precipitation and Meteorological Data
9. Basic water chemistry factors for selected water bodies. Factors should include:
  - Alkalinity
  - Conductivity
  - PH
  - Dissolved Oxygen
10. Location of existing nearby ambient air quality monitoring stations
11. Atmospheric particulates
  - CA
  - MG
12. Visibility

will reflect only currently compiled information and are not meant to reflect a complete species inventory, they should be useful in planning future cost-effective species inventories.

(Note: This section provided by Drs. Dave Graber and Bill Halvorson)

### Vegetation Mapping

Beginning in 1994, NPS and the National Biological Survey (NBS) will begin developing vegetation maps for approximately 235 NPS units and environs in the conterminous U.S. (Alaskan units will be mapped through a separate funding effort.) Contracting partners in the current multi-million dollar endeavor are the Environmental Systems Research Institute (ESRI), and a team of sub-contractors including The Nature Conservancy (TNC).

Development of a vegetation/land cover map is one of the first critical needs for park management. Vegetation is considered a "fundamental" data layer for wildland stewards because, like terrain and hydrography, it is central to characterizing a landscape and is the driving variable for so much else, such as wildlife, fire dynamics, and even the movement of carbon and nitrogen through ecosystems.

The classification system proposed by the contractors (Table 2) is becoming a standard among land management agencies worldwide... a hierarchical system based on dominant plant physiognomy (morphology and phenology) at higher levels, and floristics—the dominant species—the lowest, "series" level. Thus an open stand of Douglas-fir (*Pseudotsuga menziesii*) would be classified as a terrestrial "Evergreen Needle-leaved Woodland with Rounded Crowns," Douglas-fir series. This system, adapted by TNC from an international classification that permits comparisons at different levels, already is in use by the USFWS Gap Analysis Program.

The vegetation mapping contract was developed to get the approximately 235 natural resource park units mapped at the series level and to provide information urgently needed by the NPS Washington Office and by a growing list of regional to international land management and conservation efforts. Not only can this information answer questions such as "How much short perennial bunchgrass is protected by the NP System?" it also can be integrated with data collected on other land ownerships to provide continent-scale information that can track such global phenomena as pollution effects or response to climate change.

**Table 2.** Proposed classification scheme for the National Park Service vegetation mapping project.

### A. PHYSIOGNOMY

System: Terrestrial/Aquatic – (hydrological regime)

Class: Woodland – (spacing and height of dominant form)

Subclass: Evergreen Woodland – (morphological & Phenological similarity)

Group: Temperate Evergreen Needle-leaved – (climate, latitude, growth form, leaf form)

Formation: Evergreen Needle-leaved Woodland with Rounded Crowns – (mappable units)

### B. FLORISTICS

Series (or Cover Type): Doug Fir Woodland – (dominant species)

Community (or Association) – (subdominant or associated species with similar ecological processes)

The mapping effort also will provide information at the park unit level and the tools to pursue more detailed questions. Mapping will be done at the series (dominant species) level with (1) a minimum mapping unit of 0.5 ha, and (2) precise registration to the USGS 1:24000 map series, making certain that at least 80 percent of the mapped units are classified and drawn accurately. The maps, with their detailed vegetation structure information, will give parks an excellent reference point for monitoring change caused by such disturbance factors as fire, insects, drought, disease, or weather; for analyzing wildlife habitat; and for determining site suitability for management activities.

Data will be provided foremost in the form of GRASS-format GIS files. Analog maps at 1:24000 scale, the aerial color photography used for type delineation, narrative descriptions of each vegetation class, and detailed information from field plots used in characterization.

The quality of the classification and mapping efforts will be increased by cooperation of park and regional office NPS staff and by the availability of related thematic data (such as geology, soils, or terrain). NPS staff should provide information and their own experiences for the process.

The NPS recommended to the NBS that the first parks to be mapped be in the midwest grassland park areas. It is expected that this first mapping and classification effort will require adjustments as the work proceeds. Input from many quarters at these early stages will ensure that the products will be usable and can easily be coordinated with other land management activities.

For additional information or comments about the vegetation mapping initiative, contact Mike Story at (303) 969-2619 or leave a message on cc:mail.

(Note: This section provided by Dean Tucker and Gary Rosenlieb)

### Water Resources Data

A cooperative endeavor initiated in 1993 by the NPS Servicewide I&M Program and the NPS Water Resources Division (WRD), the NPS Baseline Water Quality Inventory and Analysis Project is a three year effort designed to characterize baseline water quality at all units of the NP System containing significant natural resources.

Specific objectives are to (1) retrieve water quality and related data from the EPA's STORET and other database systems; (2) develop a complete inventory of all retrieved data; (3) produce descriptive statistics and appropriate box and whiskers and time series plots of the water quality data to characterize annual, seasonal, and period of record central tendencies and trends; (4) compare park water quality data with relevant EPA national water quality criteria on a station-by-station basis; and (5) reformat the water quality and other related data for use with the park-based Water Quality Data Management System (currently under development in the WRD) and other appropriate analytical tools.

Every park unit participating will receive a detailed analog report and several hydrographic digital databases, including all water quality parameter data, 1:100,000 scale hydrography, surface-water quality monitoring station locations, stream gage locations, National Point Discharge Elimination System permit locations, and drinking water intake locations.

The results of this effort are intended to enable park resource managers and the WRD to compare and contrast water quality data collected as part of ongoing I&M programs with historical water quality trends and to design better park-based water quality I&M programs. One component of this project is

to demonstrate how the digital databases and analog report can be used to determine where additional baseline water quality monitoring is needed. The park water quality databases produced by this effort will lay the groundwork for allowing regions and the WRD to generate regional and national assessments of the status of park water quality.

Completing the work will take approximately three years. Parks will be completed in the priority order established by regional water resource coordinators and the Servicewide I&M Program. Servicewide review and comment already has been obtained on the draft Baseline Water Quality Inventory and Analysis for Rock Creek Park and revisions are being made. Once the new procedures are finalized, production of Baseline Water Quality Inventory and Analysis reports for all participating parks will commence.

For additional information or comments, contact Dean Tucker at (303) 225-3516, Gary Rosenlieb at (303) 225-3518, or leave a message for either on cc:mail.

## **Digital Cartographic Data**

Digital cartographic products are being obtained through a 50:50 cost-sharing agreement with the USGS and will provide several of the basic data layers needed for park-based GIS. Standard products available under this cooperative agreement are topographic maps, digital line graphs, digital elevation models, and digital orthophoto products.

The cost share program benefits both NPS and USGS. In addition to obtaining important spatial data sets needed to support park management, research, and planning, the effort will accelerate population of the National Digital Cartographic Data Base, and enhance support for OMB Circular A-16, Coordination of Surveying, Mapping, and Related Spatial Data Activities.

In total, approximately \$1.07 million of Servicewide I&M funds were made available in 1993 to acquire cartographic data sets for approximately 40 park units in 9 NPS Regions.

For additional information or comments about acquisition of digital cartographic products, contact Leslie Manfull at (303) 969-2964 or leave a message on cc:mail.