

Freshwater Vital Signs Monitoring Plan for National Parks in the Northeast Temperate Network (NETN)

PHASE III: Development of Freshwater Monitoring Protocols for High Priority Vital Signs

Submitted to the National Park Service by:

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PROBLEM STATEMENT

National Park managers are directed by federal law to know the status and trends in the condition of natural resources under their stewardship in order to fulfill the National Park Service mission of conserving the scenery, and the natural and historic objects and wildlife in national parks unimpaired. In order to fulfill this mission, it is necessary to identify and understand changes in complex, variable and imperfectly understood natural systems and to provide insight into whether observed changes are within natural levels of variability or indicate excessive human influence. The Northeast Temperate Network (NETN) consists of 10 parks in 7 states. These parks are grouped together based on their common ecological resources, northeastern temperate forests and the wetland and aquatic systems that accompany them. Currently, the Parks and Historic Sites in this network do not all have monitoring programs in place that will adequately identify trends in the status of the freshwater resources over the long term.

PURPOSE OF PROPOSED PROJECT

Recognizing the need for comprehensive long-term monitoring of ecological resources within the U.S. National Park system, the National Park Service undertook a major new initiative to develop a program for long-term monitoring of "vital signs" or indicators of ecological integrity within the parks. The Inventory and Monitoring Vital Signs Program incorporates a three-phase approach:

Phase 1- define goals and objectives; begin the process of identifying, evaluating and synthesizing existing data; develop draft conceptual models; and complete other background work;

Phase 2- prioritize and select vital signs and develop specific monitoring objectives for each park and the network; and,

Phase 3- develop detailed plans to implement monitoring; including the development of sampling protocols, a statistical sampling design, and a plan for data management and analysis.

Phases 1 and 2 have been completed. This proposal is confined to phase 3: developing freshwater monitoring protocols for high priority vital signs in NETN parks.

OBJECTIVE

The objective of this project is to draft, a freshwater monitoring protocol that includes Standard Operating Procedures for all identified high priority vital signs, and quality control.

METHODS AND APPROACH

The objective, as stated above will be achieved through the steps outlined below.

1) **Write protocol development summaries** for all high priority vital signs. Protocol development summaries will include the vital sign, the parks where the protocol will be implemented, the justification/issues being addressed, specific monitoring questions and objectives to be addressed by the protocol, the basic approach, principal investigators and NPS lead; and development schedule, budget, and expected interim products.

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2) Identify and prioritize existing projects that would address vital signs monitoring goals. Meet with park staff where appropriate to identify overlap between current programs and high priority vital signs. Identify possibilities for achieving vital signs monitoring goals through integration with existing programs. This would involve an evaluation of long-term objectives of the existing programs, their site design, and personnel.

3) Draft protocols. Draft protocols including standard operating procedures for the high priority vital signs listed below:

- Water quantity
- Water chemistry
- Fish in lakes and streams
- Nutrient Enrichment
- Macroinvertebrates in streams
- Exotic plants- early detection
- Exotic animals- early detection

In most cases, there are existing standard operating procedures that will be referenced and modified as necessary to make them applicable to the goals of the vital signs program in NETN parks. Integration with existing state and (or) park protocols will be done where appropriate and feasible.

Developed protocols will be comprehensive, applicable to the network, but ready for implementation in individual parks. A Quality Assurance/Quality control SOP will be associated with each protocol as well as SOPs regarding staff qualifications and training, sampling schedules, and equipment. Lab SOPs will be written and (or) referenced as appropriate.

A protocol development summary will also be written for zooplankton community composition as an indicator of lake water quality, but protocols will not be written as a part of this proposal.

4) Develop a sampling design in each of the following ten parks within the Northeast Temperate Parks Network:

The NETN sampling design will consist of a fixed site trends network made up of two components; a historical site network, and a stratified random design network. The historical site network will build on established sites that address the goals and objectives of the Inventory and Monitoring Program, and have the added advantages that they were often targeted sites chosen based on accessibility, vulnerability, and (or) ability to obtain discharge measurements at a range of flows. Existing sampling locations will be prioritized by USGS staff in collaboration with park staff.

The random design component will allow us to make inferences to a larger population of sites within the parks. Aquatic resources at each park will be stratified by type (stream, pond, lake), size, and relative abundance and selected randomly where feasible. Where parks in the NETN have limited freshwater aquatic resources, sites will be selected from each resource.

Sampling protocols will summarize the overall spatial design for each park, will include detailed maps and descriptions of where samples will be taken, and will describe the overall statistical sampling methodology used. Designs will also include justifications for collocating or not collocating sampling for various vital signs and for the attributes used to stratify the park (e.g.,

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cost of access, types of water resources). Sampling design details will include where, when, how large a sample size, and how often selected vital signs will be measured (frequency).

5) Protocol testing Limited testing of protocols will be done during one field season. Testing will be conducted in Acadia National Park. Testing will be limited to tests of methods, equipment and time estimates per sample, and will not include tests of staffing scenarios, and or sampling schedules. USGS equipment will be used for testing where available. Budget includes provisions for additional equipment rental if necessary for field tests.

6) Data reporting, storage, management and QA/QC. Data fields that will be necessary for data storage and management will be identified. A database for reporting, storing and managing water data will be identified and (or) developed in collaboration with NETN staff. An SOP that addresses all aspects of data management and long-term storage and accessibility will be provided.

7) Plans for data analysis, report card and identification of thresholds for management actions SOPs will be written outlining how data will be analyzed, including who is responsible and how often analysis will occur. Initial thresholds will be identified for all vital signs where data are available with the understanding that these levels can be modified as further data collection better defines the range of natural variability. Thresholds and analyses will be rolled together, where meaningful, to create a freshwater aquatic report card for each park which would drive management actions.

8) Prepare a budget An overall budget that summarizes the start-up, annual and periodic costs of the monitoring program will be developed.

9) Refine Protocols based on steps 1-6. Based on limited testing and individual park review, protocols will be refined and then made available to the NPS for review.

10) Address NPS and USGS colleague review comments. USGS Report approved, printed, and distributed. Electronic version of protocols supplied to NPS.

PERSONEL

A Maine District staff hydrologist will oversee the project as the project chief. The project chief will work with a staff Hydrologic Technician and consult with on-staff colleagues who have expertise in biologic indicators, GIS, and sampling design. Personnel will accomplish the objectives through regular contact with I&M staff, and park managers. Park site visits and field testing will also be conducted as necessary.

DEADLINES:

Dec 15, 2004	Protocol Development Summaries delivered to NPS
Jan 15, 2005	Draft cost benefit analysis for all measures delivered to SUNY ESF and NPS
March 15, 2005	Draft water chemistry SOP delivered to NPS
May 15, 2005	Draft water chemistry protocol delivered to NPS
Nov 15, 2005	All protocols delivered to NPS
Sep 31, 2006	Final protocols reviewed, approved and printed

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PHASE III BUDGET

<u>Labor</u>	<u>FY05</u>	<u>FY06</u>	
Hydrologist (1 FTE)	\$70,500	\$20,200	
Hydrologic Technician (1/4 FTE)	\$17,700		
Biologist (80 hrs)	\$5,300		
Equipment	\$3,000		
Travel	\$3,600		
computer support	\$3,000	\$500	
vehicle use	\$2,500		
printing cost		\$1,500	
Overhead (15%)	\$15,840	\$3,330	
TOTAL	\$121,440	\$25,530	\$146,970