# Outline for Vital Signs Monitoring Plans

Each network of parks that receives funding from the Natural Resource Program Center to develop a monitoring program is required to prepare a monitoring plan describing the monitoring program and the various tasks and decisions that contributed to the final selection of indicators to be monitored. Drafts of the Phase 1 and Phase 2 reports need to be peer reviewed and approved by the Regional I&M coordinator, and the full monitoring plan that contains all of the material in the following outline will require peer review and approval at the WASO level before it is implemented. Monitoring plans should follow the format outlined below, with the following considerations:

- A network monitoring plan should be a relatively concise document, on the order of 100 pages, that summarizes the why, what, where, when and how of the network's monitoring program. The monitoring plan would refer to various documents that are posted on websites or placed in appendices that provide the reference material and details involved in planning and designing the monitoring program. For example, a network might establish a website where documents such as the full sampling protocols, data management plan, and descriptions of past and current monitoring efforts by the parks and potential partners are posted. The monitoring plan would then refer to the documents posted on the website via hyperlinks. The various 'program documentation' documents and databases that a network develops in the process of planning and designing their monitoring program (e.g., park questionnaires, workshop reports, databases summarizing issues and monitoring questions for each park) could also be posted on the website to provide additional background information and justification for the final monitoring plan. The monitoring plan and supporting documentation might eventually be distributed on a CD by a network. In addition to the monitoring plan, networks may also want to develop a 5-10 page stand-alone document that presents the highlights of the full monitoring plan.
- The chapter headings listed below must be used by all networks; e.g., Chapter 1 Introduction and Background, Chapter 2 Conceptual Ecological Models, Chapter 3 Vital Signs, etc. Within each chapter, however, each network is free to organize the material however they want to make the plan more easily understood and organized.
- The guidance lays out an iterative process for planning, designing and implementing a monitoring program. The Phase 1 report is a first draft of Chapter 1 (Introduction and Background) and Chapter 2 (Conceptual Ecological Models) of the monitoring plan. The Phase 2 report is a revision and update of Chapters 1 and 2, plus a first draft of Chapter 3 (vital signs). The Phase 2 report serves as the documentation for GPRA Goal 1b3 Vital Signs, i.e., that the network parks have (tentatively) identified their vital signs, and will also be used by park planners and for other purposes. The draft Phase 3 report should include additional revisions and updates to Chapters 1, 2, and 3, plus a first draft of the remaining chapters. Some of the material in the Phase 2 report should be condensed or deleted from the Phase 3 monitoring plan.

Monitoring Plan Outline:

Executive Summary

Chapter 1. Introduction and Background

- Explain the purpose of the monitoring program, including a summary of legislation, NPS policy and guidance, the 5 Servicewide monitoring goals, Servicewide and park-specific strategic (GPRA) goals for performance management that are relevant to the monitoring, and any statements from park enabling legislation that establish the need to monitor natural resources. This section should help answer the question, "Who is interested in the information provided by monitoring, and why?"
- To provide additional focus about the purpose and desired outcome of the monitoring program, provide a set of monitoring objectives and/or questions. Objectives and questions can be stated in more general terms here in Chapter 1, but the monitoring protocols referenced in Chapter 5 should present a set of specific, measurable objectives that meet the test of being realistic, specific, and measurable.
- Give an overview of each park and its natural resources. More detailed descriptions of each park and its resources could be included in an appendix. What is the importance of the park's natural resources in a regional or national context?
- For air quality monitoring, present a table or some clear, thorough presentation of all existing air quality monitoring within the network. Identify any Class I air quality parks in the network.
- For water quality monitoring, identify parks that have waters where constituents exceed water quality standards and are listed on state Clean Water Act 303d lists or constituents that may be threatened to become degraded. Also identify parks that have waters designated as Outstanding National Resource Waters or other special protective designations in their state water quality standards. Draft guidance for identifying these waters is contained in WRD's 5-part guidance (see http://science.nature.nps.gov/im/monitor/vsmTG.htm#TGWater ).
- What are the most important management issues and scientific issues for each park? What are the most important agents of change and stressors that may cause changes in park resources?
- Give an overview of natural resource monitoring that is currently being done in each park or that occurred previously, as well as any widely-accepted monitoring efforts used on adjacent lands by other agencies.
- Describe the overall process used to determine the goals and objectives for the monitoring program, and to select the vital signs for monitoring park resources and providing the information needed to manage the parks.

Chapter 2. Conceptual Ecological Models

- Provide a summary of the understanding of the park ecosystem, including conceptual models developed prior to and during the scoping process. This summary should focus on aspects of the ecosystem that are relevant to the monitoring program.

Chapter 3. Vital Signs

- Present a more detailed discussion of the process and criteria used by the network to identify, prioritize, and select vital signs, and provide the results of scoping workshops and other efforts to identify the most important issues and data needs for parks in the network.
- Present a single "short list" of vital signs for the network that is consistent with the vital signs framework scheme (http://science.nature.nps.gov/im/monitor/vs_framework.htm). A table in the format generated by the vital signs framework database is recommended. The network's vital signs should represent those deemed most critical for monitoring the condition of park natural resources and addressing the 5 monitoring goals, and should include vital signs being monitored through other programs, agencies, and funding sources. The list may include vital signs that the network hopes to implement in the foreseeable future, but may not currently be able to fund.
- For water quality plans, identify pollutants that exceed water quality standards. Specific guidance for other water quality constituents that may serve as vital signs indicators is contained in WRD's 5-part guidance (http://science.nature.nps.gov/im/monitor/vsmTG.htm#TGWater ).

Chapter 4. Sampling Design

- Describe the overall statistical sampling design that allows inferences to be made to areas larger than those actually sampled. Detailed maps and descriptions of where samples will be taken can be included in the protocols or an appendix, but summarize the overall spatial design for each park here.
- For each park, describe the approach used to determine where sampling will occur for each vital sign, including justification for collocating or not collocating sampling for various vital signs. Provide justification for the attributes used to stratify the park (e.g., cost of access, terrain features such as elevation and slope, soils or vegetation map).
- For water quality monitoring, describe what is known about average values and variability in the various strata and how the sampling scheme will insure that the value obtained will be representative of the target population being studied. If the variability and typical values in various potential strata is not well understood, typically pilot scale monitoring should be initiated to determine these values before the monitoring design is finalized.

Chapter 5. Sampling Protocols

- For those vital signs that are currently being monitored or for which the network plans to develop a protocol and implement monitoring within the next 5 years, give an overview of each sampling protocol that will be used to monitor the vital signs. The monitoring plan should include either the draft or completed protocol (posted on a website or included in an appendix), or a "Protocol Development Summary" document (PDS) for each protocol that will be implemented within the next 5 years.
- At a minimum, this chapter should include a table that summarizes key information from the protocols or PDS documents for each protocol to be developed. Key information should include the name of the protocol, a brief justification statement, the specific measurable objectives of the protocol, a list of the parks where it will be implemented, and a link to the protocol or PDS document.

- List the specific, measurable objectives for each vital sign selected for monitoring, and wherever possible, give the threshold value or "trigger point" at which some action will be taken.
- For each protocol, identify the target population or "sampling frame" and the sampling units.
- Generally accepted Standard Operating Procedures for the collection of data for constituents that may serve as water quality vital signs are provided in WRD's 5-part guidance (http://science.nature.nps.gov/im/monitor/vsmTG.htm#TGWater). Standard Operating Procedures (SOPs) used should be those that insure that the data is comparable with other large regional data sets, to the extent possible.

Chapter 6. Data Management

- Provide an overview of the process for entering, editing, storing, and archiving data collected by the various components of the monitoring program, including metadata procedures. For most networks, this chapter will duplicate or be largely the same as the executive summary of the network's data management plan. The full Data Management Plan should be posted on a website or attached as an appendix.
- See WRDs 5-part guidance (http://science.nature.nps.gov/im/monitor/vsmTG.htm#TGWater) for special requirements for entering and managing water quality data in the Environmental Protection Agency's STORET database.

Chapter 7. Data Analysis and Reporting

- Summarize material from the data management plan and sampling protocols that describe the network's procedures for ensuring that data collected by the monitoring program will be analyzed, including who is responsible and how often analysis will occur.
- Reports are intended for a variety of audiences. Describe the various reports, websites, and other products of the monitoring effort, including what they will include, who the intended audience is, how often they will be produced and in what format, and who will be responsible for ensuring that data are analyzed and reported in a timely manner.

Chapter 8. Administration/Implementation of the Monitoring Program

- Describe the makeup of the Board of Directors and Science/Technical committees for the network of parks, and their role in developing the monitoring strategy and implementing and promoting accountability for the monitoring program.
- What is the staffing plan for the monitoring program? Who will be involved in the program, where will be they be stationed, and what is their role in the program?
- Integration with other park operations: describe how the monitoring program integrates with other park operations such as interpretation, law enforcement, and maintenance.
- Partnerships: Describe other agencies and individuals that are part of the monitoring program. List cooperative agreements and other partnership agreements that are in place.
- For field sampling efforts to be performed in house, describe how they will be supported in terms of staff training and/or previous experience, field equipment to be dedicated to the effort (vehicles, instruments), anticipated in-house lab work to support operation, maintenance, and calibration of equipment and its documentation, and the necessary safety considerations in performing field tasks. (Note: each Network may want to standardize their own Safety Plan to cover monitoring efforts, particularly in regard to water quality sampling)

- Periodic Reviews: explain the process and schedule for periodic reviews of the overall program and various components and protocols.

Chapter 9. Schedule

- Summarize the frequency of sampling for the various components of the monitoring program (e.g., during what season of the year, and whether sampling should occur annually or once every several years.)
- Identify the target completion date for protocols still to be developed, or for other tasks that will require additional time to complete before a component of the monitoring will be implemented.

Chapter 10. Budget

- Provide an overall budget that summarizes the annual and periodic costs of the monitoring program. At a minimum, provide a one-year budget for the first year after the monitoring plan is expected to be approved and implemented. Use the budget categories from the annual administrative report budget program (e.g., income, personnel, cooperative agreements, operations/Equipment, etc.). Use round numbers (e.g., salaries for network staff could be rounded to the nearest $1,000; cooperative agreements to nearest $1,000).

Chapter 11. Literature Cited (we recommend the format used in the journal Ecology; see examples in http://science.nature.nps.gov/im/monitor/docs/Literature_Cited_Style.doc).

Glossary – Definitions of key terms should be consistent with the glossary (http://science.nature.nps.gov/im/monitor/glossary.htm) on the monitoring website. Add other pertinent terms as needed.

Appendices

(supporting documentation such as workshop reports, sampling protocols, the data management plan, and other documents that are referenced by the main monitoring plan could be posted on an internet website or included in appendices, perhaps as a separate volume).