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New River Gorge Natural Resource Assessment: Methodology and Critique

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Introduction

In 2003, I was given a contract to complete a natural resource assessment for New River Gorge National River with funding obtained by the National Park Service (NPS) Northeast Region from the natural resources and planning offices of the NPS Washington office. My natural resource assessment would meet the goals of the Natural Resource Challenge in assisting the park with the general management plan (GMP) process, which began in 2004. My specific tasks were to gather, synthesize, summarize, and present relevant, useable, understandable, and transferable information about natural resources of the park. In particular, I evaluated the current condition and status of the intrinsically significant natural resources found at the park, identified threats to the resources, recognized information gaps in current data that prevented the park from adequately addressing these issues, and suggested management, including research, recommendations. In addition, I described the current natural resource condition at the park in a historic context in order to elucidate how past land use influenced the landscape that we experience in the park today. The ultimate purpose of the natural resources assessment was to ensure that existing natural resource information and issues are incorporated into the planning process.

Methods

In order to conduct the assessment of natural resources at the park, all relevant reports and publications were identified by using NatureBIB, searching park libraries, meeting with resource managers, and directly contacting researchers who have conducted projects pertinent to natural resources in the park. In addition, I conducted a literature search for articles based on natural resources research conducted in and around the park. For the literature search, I used electronic databases; reference proceedings of conferences, meetings, and workshops; United States Department of Agriculture (USDA) and NPS technical bulletins; journal articles; and websites. Electronic databases included Agricola, Biological Abstracts, and Biological and Agricultural Index. After an initial review of the literature and information, general areas of particular relevance to the park were identified. These areas—biotic resources (plants and animals), forest and other habitat community resources (habitat types, community processes), and hydrologic/geologic resources (water, soil, rock)—then became the focus topics for three workshops held in West Virginia in May 2003. These workshops were attended by invited resource managers, academic and governmental researchers, and research technicians. The purposes of the workshops were to identify all past and on-going natural resource studies, acknowledge gaps in knowledge about the resources, and suggest desired future conditions and management prescriptions for natural resources (Table 1). In addition, the participants gave their collective opinion on what were the intrinsically signifi-

9:00–9:15 a.m.: Introductions

9:15–10:00 a.m.: Background on GMP, NPS policy, the park's founding legislation, and implications to setting desired future conditions (DFCs) and suggested management recommendations and related actions to implement these recommendations. Review preliminary important natural resource list provided by participants. (This list was generated from suggestions that I solicited from participants approximately three weeks prior to the workshop). Also, explain and review maps of GIS data layers provided by the park's natural resource managers that indicate location and relationships of certain biotic resources in park.

10:00–11:00 a.m.: Update important natural resource list and/or add knowledge gaps; add significance rankings (local, regional, national, global) to identified important natural resources.

11:00–noon: Discussion of list and prioritize (prioritize top 5–10).

Noon–12:30 p.m.: Lunch (this can be working).

12:30–1:30 p.m.: For each important natural resource, formulate DFCs (small groups for each prioritized resource).

1:30–2:00 p.m.: Report back on DFCs to large group.

2:00–2:30 p.m.: Discuss and fine-tune DFCs.

2:30–3:30 p.m.: Develop preliminary management prescriptions for each resource/process or identify knowledge gaps (small groups).

3:30–4:00 p.m.: Report back to entire group of participants.

4:00–4:30 p.m.: Identify future needs for GMP process; resources to focus on; future assignments.

Adjourn by 5:00 p.m.

Table 1. Time line and agenda for natural resource workshops to assist in natural resource assessment for New River Gorge National River, May 2003.

cant natural resources found in the park. The attendees at these workshops became the source of a cadre of knowledgeable natural resource professionals who could provide technical review of the natural resource assessment report and aid in the GMP process.

After the workshops were conducted, I performed a thorough review of all identified and collected reports and publications. The information contained in the reports and publi-

cations was consolidated, synthesized, and summarized in a manner that portrayed the historical and existing park ecosystems and identified the intrinsically significant natural resources of the park. For each resource category identified, current status and significance, threats to the resource, gaps in knowledge, and suggested management recommendations were described and formulated. In all, I scanned, read, or referenced over 30,000 pages of documents in preparing the natural resource assessment report.

A relevant natural resource area that was not a focus of a workshop was air resources. There has been very little research conducted on air resources in the park. Therefore, the consulting firm Air Resource Specialists was contracted with in order to analyze data from air monitoring sites located near the park as surrogates to assess air quality and visibility and related impacts on park resources.

During the consolidation and synthesis of reports, publications, and data, the large blocks of deciduous forest found in and around the park were identified as having global significance. In order to identify the regions of the park that contained forests with a diversity of habitat elements and minimal fragmentation, I subcontracted with a researcher from the West Virginia Natural Heritage Program to perform a GIS analysis. This researcher was assisted by GIS staff at the park who provided road and utility right-of-way data layers.

In order to provide an organized database containing the majority of the reports and documents cited in the natural resource assessment report, a Synthesis (information management system) database was created by the Synthesis Regional Support Center at James Madison University in Harrisonburg, Virginia. Synthesis is an information management system for efficiently locating, organizing, integrating, and disseminating data (including GIS data) and information. The park Synthesis database contains 81 full-text-searchable documents cited in the natural resource assessment. The documents included in the database were those that I felt were especially informative (e.g., data rich), comprehensive (e.g., Water Resources Management Report), recent (published after 1990), or that were unwieldy in their hardcopy form (e.g., Marshall University vertebrate reports; Pauley et al. 1997). Two compact disks were provided by the Synthesis Regional Support Center. The first CD contains the executable files to run Synthesis and the second contains the park-specific data files. These CDs were copied and disseminated with the final natural resource assessment report.

Once the final draft natural resource assessment report was completed, it was distributed to NPS professionals and a dozen technical reviewers for peer review. The comments of all reviewers were considered and were incorporated into the final report, as appropriate.

Results

A 226-page draft of a final natural resource assessment report was prepared and disseminated to NPS and external technical reviewers 13 months after the project was initiated. Reviews of the report took another 15 weeks to complete. After considering editorial suggestions, I revised and edited the report. I then sent the report out to selected peer reviewers for a second round of review. A final report (129 pages) was printed and disseminated to interested parties in March 2005. A PDF version of the report is available at http://www.nps.gov/nero/science/.

Aside from the important natural resource categories, I prepared a section in the report that describes the historic land use and its potential effects on the current status and conditions of natural resources in the park. This section was divided into three areas: presettlement natural resource conditions and effects of Native Americans, effects of European settlement and industrialization, and effects of resource protection and modern land uses.

The natural resource assessment report summarized the natural resources of the park into the following categories: animal resources; plant resources; geologic, geomorphologic, and soil resources; hydrologic resources; and air resources. For each natural resource element or issue (e.g., oak forests, mammals, fish, geomorphology, etc.) the following categories were delineated with sections subheaded as follows:

- *Current status and significance,* describing the resource's status in and significance to the park, including information about species of special concern;
- *Threats and condition,* describing important existing and/or potential threats and the resource's current condition;
- *Gaps in knowledge,* describing information gaps in current data that are preventing the park from adequately addressing threats to the resources; and
- *Suggested management recommendations*, a bulleted list. This list may not be as extensive as the ones developed at the workshops and detailed in the appendices. These management recommendations are the ones that I think are most pertinent and effective at this time.

I also included a section in the report that identified park-wide perceived or potential threats to multiple natural resources at the park. These threats included oil and gas operations, mountaintop and other mining, New River Parkway construction, and recreation.

Several tables listed the rare, threatened, or endangered species or communities found in the park. In addition, maps depicted current park boundaries and major towns, historic towns and mining operations, and large blocks of continuous forest that contain a minimum of fragmenting features such as roads, utility rights-of-way, and other development. These maps of forest blocks were the result of the subcontracted GIS analysis and delineate areas where park managers may want to encourage natural succession and minimize development. The appendices included in the assessment report contained all the suggested desired future conditions and management recommendations formulated by the natural resource professionals who attended the focused workshops.

Discussion

My overall objective in preparing the natural resource assessment report was to provide comprehensive coverage of natural resource issues specific to the park while maintaining scientific rigor in the presentation of findings. New River Gorge National River has been the subject of numerous natural resource studies and data collection efforts. NPS Inventory and Monitoring (I&M) Program efforts are well underway in this park and my natural resource assessment made use of outputs such as progress reports that summarize data gathered through the program. The assessment process from its inception to completion of the draft

final report took approximately 800 hours of my time. This project consumed significantly more time than I expected. If a comprehensive natural resource assessment for a major natural resource park is to be completed in 12 to 15 months, a full-time project leader may need to be hired. In addition, the reiterative review process was very time consuming (it took approximately 13 months). However, by having a template to follow, this review and editorial process may be significantly shortened.

A heavier reliance on carefully selected subcontractors to complete assessments for individual resource elements and issues could, potentially, relieve some of the burden of summarizing, consolidating, and synthesizing natural resource information from the project coordinator. Nonetheless, I suggest using subcontractors with caution. As previously discussed, due to my lack of expertise in the areas of air resources and GIS, I opted to hire subcontractors to perform analyses in these areas. Overall, I was pleased with the timeliness and thoroughness in which subcontractors completed their work. However, once the draft final natural resource assessment report was sent out for peer review, problems with using subcontractors became apparent. Namely, the sections in the report that were prepared by subcontractors were some of the most heavily critiqued portions of the report. I believe this occurred for three reasons. First, because subcontracted work was written by someone other than me, their work did not necessarily flow well with the rest of the report. I tried to improve the flow during my editorial process but inconsistencies and disjunctions in wording and descriptions were apparent to the reviewers. The problems associated with integrating work from a variety of writers, I feel, will be inherent in any report that relies heavily on subcontracted work. Second, because I was not familiar with the current or available research for the resource issues that I subcontracted out, I relied entirely on the expertise of the individual subcontractor and could not provide a critical technical review of their work. Having a subcontractor send out their work for peer-review and revision prior to incorporating it into the assessment report may alleviate some of these issues, although it may increase the length of time it takes for the subcontractor to complete his or her work and could be more costly. Third, subcontractors may not really understand the objectives of the assessment project. I believe having a model format for the assessment report will be an important step in clarifying these objectives.

In preparation of the assessment report, I was careful to avoid using language that could be construed as decision-making from the public's perspective. For instance, management recommendations and desired future conditions developed in consultation with resource managers and researchers were labeled as "suggested" management recommendations and desired future conditions. By using this wording, this assessment is simply another input—in addition to public review—in assisting park managers when deciding which recommendations and desired future conditions to adopt. Additionally, I attempted to make the assessment report less technical than a scoping report or a management plan. Again, I wanted to make sure that the report was useful to the planning process. Detailed citations and the Synthesis database, however, provide access to the detailed, technical information if needed.

The assessment process itself was very helpful in identifying and clarifying the intrinsically significant resources of the park. For example, prior to the assessment, the significant natural resources of the park were listed informally by park managers as follows:

- The geologic history is the most nationally significant feature of the New River, and the size and topographic relief of the gorge is an outstanding scenic resource.
- The New River Gorge has the most diverse assemblage of plant species of any river gorge in the Southern Appalachians.

Despite the preparation of these statements, when resource managers at the park were asked what about the geology is significant, they were unable to provide much clarification or elucidation. Some managers said the geology is significant because the New River is the second oldest river in the world. Likewise, with the plant diversity statement, resource managers were unable to provide a citation that documents it. The assessment process that I conducted for the park was able to clarify and justify these statements with scientific research and documentation.

Aside from helping park managers to support or clarify their significance statements, other intrinsically significant natural resources were identified through the assessment processes. For example, the expanse of contiguous eastern deciduous forest in the portion of West Virginia in which the park lies is the largest remaining relatively unfragmented tract of mid-latitude deciduous forest in the world (Riitters et al. 2002). In addition, neotropical bird migrant and amphibian diversity is globally significant, as is the presence of a globally rare ecological community—the Appalachian Flat Rock community (Vanderhorst 2001; Rosenberg et al. 2000; Southern Appalachian Biodiversity Institute 2004). The abundance of eastern woodrats in the park may be regionally or nationally significant as well (Wood 2001). The biological communities found on cliffs and in abandoned mine portals, which are relatively poorly understood, may also be regionally or nationally significant (McMillan et al. 2003; Nekola and Smith 1999).

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