Transportation Research Needs in National Parks: A Summary and Exploration of Future Trends

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THIS PAPER BRIEFLY EXPLORES PERTINENT FEDERAL LEGISLATION that has propelled efforts to study and address transportation issues in national parks. Interdisciplinary research involving fields ranging from engineering to social science is needed as transportation issues become more prevalent, both within park boundaries and surrounding communities. Two entities are discussed as being important to help guide managers as well as researchers given the complexity and interdisciplinary nature of transportation issues. The first is the Alternative Transportation Program within the National Park Service, and second is a newly formed committee entitled "Transportation Needs in National Parks and Public Lands" that is part of the Transportation Research Board (TRB), a unit of the National Research Council (NRC), a private, nonprofit institution that is the principal operating agency of the National Academy of Sciences and the National Academy of Engineering. Under a congressional charter granted to the National Academy of Sciences, the NRC provides expertise in science and technology to the government, the public, and the scientific and engineering communities. The focus of current research and the likely future direction of research, particularly in the social science field, is explored with respect to transportation issues in national parks.

Transportation legislation and national parks

There are currently over 8,055 miles of roads and parkways, 1,252 bridges, 60 tunnels, and extensive parking facilities within units of the national park system. To solve the growing congestion problem throughout the national park system, there are 63 visitor transit systems in 50 parks that vary in size ranging from single vehicles to bus fleets. The following federal transportation bills, dating from the early 1990s, have been a source of funds for the National Park Service to actively explore a variety of transportation modes to accommodate visitors:

- Intermodal Surface Transportation Efficiency Act (ISTEA; 1991);
- Transportation Equity Act for the 21st Century (TEA-21; 1998); and
- Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU; 2005).

These bills have brought increasing responsibilities (and resources) for transportation planning in the National Park Service, include the transportation enhancement, park roads and parkways, recreational trails, and scenic byways programs.

ISTEA and subsequent acts have encouraged the adoption of a transportation planning framework within the National Park Service that must integrate local, regional, and statewide transportation decision-making. There are increased opportu-

nities for national parks to work with states and local governments on transportation projects, with matching grants for a number of federally funded transportation programs. Since the department of transportation in each state is responsible for setting transportation policy with regard to future projects and funding decisions, it is critically important that the National Park Service be a partner in the transportation planning process.

Notable within the TEA-21 legislation was the directive for the secretary of transportation, in coordination with the secretary of interior, to "undertake a comprehensive assessment of transportation needs in national parks and related federal lands." This included the formation of a distinct program within the National Park Service called the Alternative Transportation Program. Also, a number of studies to examine transit needs, transit strategies, and feasibility studies were conducted and guided in part by this new program.

Alternative Transportation Program

The Alternative Transportation Program was launched in 1998. It is responsible for coordinating policies, projects, and activities related to planning and implementing alternative transportation systems within and to national park system units. The program also develops strategies and recommendations for servicewide application on issues crossing agency and state–federal jurisdictions. The mission statement of the program is: "Preserve and protect resources while providing safe and enjoyable access to and within the national parks by using sustainable, appropriate and integrated transportation solutions."

The program's website (www.nps.gov/transportation/alt) provides information on transportation issues, legislation, and planning documents. A principal document available at the site is the *National Park Service Transportation Planning Guidebook* (1999) that covers, among other items, National Park Service transportation planning policy, federal transportation legislation in relation to the National Park Service, principles of success through partnerships, and the ABCs of transportation planning. As the director of the Park Service noted on the occasion of the guidebook's initial publication: "I believe that as we move forward into the next century, some of our greatest threats to national parks will come from encroaching development and activities outside the park boundaries. For that reason, our ability to understand transportation planning and laws is vital to our success as managers."

To help cooperatively develop and integrate transportation planning into normal NPS activities, the Department of Interior signed a memorandum of understanding (MOU) with the Department of Transportation in November 1997. Several demonstration parks were identified in the MOU because of their complex transportation issues. All of the demonstration parks highlight one important principle that has become increasingly significant servicewide: to solve transportation and congestion problems, the NPS must look at these issues holistically, in a regional context, involving all partners. Working with various partners, especially federal transportation entities, the National Park Service has also been more successful at understanding and utilizing various surface transportation programs (Figures 1 and 2) and linking into a broader transportation research entity, such as the Transportation Research Board.

Figure 1. The National Park Service (NPS) has long relied on partnerships with outside organizations to enhance resource protection and the visitor experience. Chapter 3 of *The National Park Service Transportation Planning Guidebook* outlines steps in identifying potential partners; tools and approaches that can be used to successfully organize and formalize the role of partners; and how to build a "win–win" partnership. Ford Motor Company supports a partnership between the NPS, the National Park Foundation, and the Eno Transportation Foundation to place Masters- and Ph.D.-level scholars in national parks to assist in the development of transportation planning and analysis, coordination with local communities, and environmental and traffic studies. Transportation interpreter Brandy Brooks presents information to park visitors on the Fort Sumter National Monument ferry. Photo courtesy of NPS.

Figure 2. Through the coordinated efforts of NPS, the National Park Foundation, Ford Motor Company, the concessionaire Glacier Park, Inc., and other groups, 33 historic White Motor Company red buses have been restored. Operating on the Going-to-the-Sun Road in Glacier National Park, the red buses provide a great experience for visitors. Photo courtesy of the Transportation Research Board.

Transportation Research Board

One of the important outcomes of a closer working relation between the National Park Service and federal transportation programs is the committee on Transportation Needs in National Parks and Public Lands, which, as already noted, is part of the Transportation Research Board (TRB), a unit of the NRC. The committee was established by the TRB "to

serve as a national forum for transportation issues and public use as they relate to the management and conservation of the natural, cultural and scenic values of the national parks and other federal public lands. . . ."

The committee maintains a website (http://refugedata.fws.gov/trb) with information on members, past meetings (with minutes as well as links to presented research papers), and links to future meetings and other related transportation programs. There is a diversity of research findings presented at these meetings, ranging from various social science and engineering perspectives, including intelligent transportation technologies (ITS), economic impacts, and integration of alternative transportation, including motorized and nonmotorized forms. Some of the goals of the committee are to:

- Strengthen the organization and operation of the committee;
- Identify constituencies and audiences;
- Coordinate with other groups;
- Promote research on federal lands transportation issues; and
- Promote the dissemination of information on transportation on federal lands.

The committee is made up of representatives of diverse groups, including members from federal land management agencies (National Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service), federal transportation agencies (Federal Highway Administration, Department of Transportation), universities (Maine, Texas A&M, West Virginia), transportation research centers (Volpe, Western Transportation Institute, Texas Transportation Institute), private consultants, and nonprofit organizations such as the National Parks Conservation Association. One of the important functions of this group in the future will be to help define and develop research initiatives that will improve transportation planning within national parks and other public lands.

Current and future research

There is a growing body of research related to transportation issues in national parks. Some of the early studies that coordinated with the National Park Service Alternative Transportation Program included the Island Explorer bus transit system in Acadia National Park (Daigle and Lee 2000), which was supplemented with studies associated with ITS such as real-time arrival, parking conditions, automated next stops, etc. (Zimmerman, Coleman, and Daigle 2003; Daigle and Zimmerman 2004a; see Figure 3). Other studies have been important to evaluating transportation and perspectives of local communities (Daigle and Zimmerman 2004b; Dunning 2005). Research also continues to build on identifying potential indicators that are important to the visitor experience (Dilworth 2003; Turnbull 2003; Davenport and Borrie 2005; White 2007). Some of these studies have used multiple qualitative methods to refine elements of the visitor experience. Finally, research on the feasibility of alternative transit in national parks needs to continue (CSI/BRWGI 2001).

Some of the key issues identified by the Alternative Transportation Program are the following:

- Resource impacts must be managed;
- The automobile cannot always be the primary mode of transportation;
- Visitor transit systems are not simply utilitarian in nature;
- Baseline data generally needed to make

Figure 3. Acadia National Park was selected by the U.S. Departments of Transportation and Interior to test the effectiveness of intelligent transportation systems (ITS) in dealing with transportation problems within a national park setting. Real-time travel information was collected and disseminated to visitors on Island Explorer buses via an automated annunciator that transmitted an audio message and displayed the next bus stop on an electric sign within the bus. In addition, electric signs displayed real-time departure times of the next Island Explorer bus at bus stops. Pictured here is an electric bus departure sign at Village Green, Bar Harbor, Maine.

informed decisions are often not readily available;
- Transportation systems regularly transcend park boundaries;
- The park's resources are the attraction, not the mode of transportation;
- Existing infrastructure is often at or beyond capacity;
- Growing visitation requires complex, integrated transportation solutions;
- Visitors expect a consistent design standard within national parks; and
- New transportations systems are not always the solution.

Research suggests that more work needs to be completed to better understand community impacts, and to gauge partnerships that might include the local community, other natural resource agencies such as the Forest Service, state and federal transportation agencies, tourism entities, friends' groups, etc. Also, better monitoring programs based upon management objectives are needed. For example, at Acadia work was completed to assess differences in parking lot conditions (Figure 4) resulting from use of alternative transportation technologies (Daigle and Zimmerman 2004a), but

additional monitoring was suggested to assess the relationship of the alternative technologies to conditions of trails and other environmental factors. In fact, it was monitoring of these baseline conditions before and after the implementation of the alternatives that received the most discussion among participants at the 2007 George Wright Society conference session on examining transportation issues in national parks.

Conclusions

It is important to keep building a critical mass of information through research on transportation issues in national parks. Findings suggest that transportation issues in national parks are complex and challenging especially given the seasonal nature and rural location of many parks. In many cases, the visitor experience associated with using alternative transportation is much more than getting from point A to point B. While variables traditionally associated with transit use, such as efficiency and reliability, are important, there is evidence that suggests other variables, such as the transit providing information about the area, and environmental considerations in terms of reducing traffic congestion and pollution, play an equally important if not more important role for some visitors in terms of their motivation for using alternative transportation (Figures 5 and 6). Research will continue to play a vital role in the development of specific, measurable management objectives related to transportation issues in national parks. Baseline information and monitoring are important as indicators are identified for transportation-related management objectives, and standards for measuring progress towards those objectives are developed.

Figure 4. The parking conditions at two popular destinations in Acadia is important information to convey to visitors.

Finally, there are diverse research fields within social science, engineering, etc., through which scientific information related to transportation planning in national parks is scattered. It is important that entities such the TRB committee be utilized to help build a strong and cohesive research program and be a communication source between federal agencies, universities, the private sector, and nonprofit entities. The Alternative Transportation Program provides managers in national parks a vital link to useful planning documents and research that can help guide interactions with local communities and visitors. Updates and refinements of the relevant websites are important, as these will be utilized more frequently as national parks face more transportation-related issues.

Figure 5 (top). A free shuttle bus system was introduced in Zion National Park in Utah in 2000. The shuttle buses operate on the six-mile dead-end scenic roadway in the main canyon. The shuttle buses, which are the only way visitors can access the canyon during the peak summer months, connect to buses serving the gateway community of Springdale.

Figure 6 (bottom). Interpretive signage explains to visitors the need for a Zion shuttle.

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