FINAL REPORT VOLUME III

Federal Lands Alternative Transportation Systems Study

Summary of National ATS Needs

prepared for

Federal Highway Administration
Federal Transit Administration

in association with

National Park Service
Bureau of Land Management
U.S. Fish and Wildlife Service

prepared by

Cambridge Systematics, Inc.

and

BRW Group, Inc.

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Daniel Krechmer, Lewis Grimm, Daniel Hodge, Diana Mendes, Frank Goetzke

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Cambridge Systematics, Inc.
150 CambridgePark Drive, Suite 4000
Cambridge, MA 02140

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This report documents alternative transportation needs in lands managed by the National Park Service, the U.S. Fish and Wildlife Service, and the Bureau of Land Management.

Volume III includes a summary of alternative transportation needs and estimated costs between 2001 and 2020. The alternative transportation needs are categorized by agency, state, and transit mode. This volume also describes the study methodology used to determine ATS needs, and issues that can be addressed through transit implementation.

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Cambridge Systematics, Inc.
150 CambridgePark Drive, Suite 4000
Cambridge, Massachusetts 02140

in association with

BRW Group, Inc.
Parsons Transportation Group
Battelle Memorial Institute
California Polytechnic State University
Salish Kootenai College
Glen Weisbrod

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Executive Summary

Tourists first began visiting Yellowstone soon after the Civil War ended, experiencing the park in its pristine and unspoiled state. Since that time, visitors have been traveling to national parks and other federally-managed lands to enjoy the natural beauty and cultural or historical significance offered by these unique sites. Over the last century, the number of such sites has increased greatly and visitation has grown dramatically, a reflection of the heightened desire of the public to experience these special places.

Many of the most popular sites have levels of use so high that the visitor experience is compromised, and natural, cultural, and historic resources are threatened. In many cases, these impacts are due less to the number of people visiting the site than the number of automobiles that are accommodated. To respond to this situation, Section 3039 of the Transportation Equity Act for the 21st Century (TEA-21) required the Secretary of Transportation, in coordination with the Secretary of the Interior, to "undertake a comprehensive study of alternative transportation needs in national parks and related federal lands." The goal of the study is to identify opportunities for application of Alternative Transportation Systems (ATS), or transit, to relieve traffic congestion and parking shortages; enhance visitor mobility and accessibility; preserve sensitive natural, cultural, and historic resources; provide improved interpretation, education and visitor information services; reduce pollution; and improve economic development opportunities for surrounding communities. A key study objective was to quantify the extent and costs of transit needs as a basis for a potential future Federal lands ATS funding program.

The study identified ATS needs at sites managed by the National Park Service (NPS), the Bureau of Land Management (BLM), and the U.S. Fish and Wildlife Service (USFWS). Two hundred seven sites were evaluated in the study through either field visits or telephone surveys. Individual reports were prepared for each of these sites, and a wide range of ATS needs and alternatives were identified. Of the 207 sites evaluated, 137 were found to have transit needs, the majority of which can likely be met by using shuttle bus services operating on a seasonal basis. It is important to recognize that the transit needs included in this study were identified through a limited planning and analysis process. Extensive additional planning, analysis and public involvement will be required to determine the technical, financial and/or environmental feasibility for these potential transit solutions prior to the selection of a preferred alternative. Transit needs were identified for each of the three Federal land management agencies as follows:

- 118 of the 169 NPS sites;
- 6 of the 15 BLM sites; and
- 13 of the 23 USFWS sites.

Needs were identified for both the short-term period (2001-2010) and the long-term period (2011-2020). The total need for the 20-period is estimated at approximately $1.71 billion. Of this $1.71 billion, approximately 40 percent ($678 million) is required between 2001 and

2010, with the remaining 60 percent ($1.03 billion) required between 2011 and 2020. Table ES.1 summarizes the ATS needs identified in the study.

Table ES.1 Summary of Alternative Transportation System Needs on Federally-Managed Lands*

	Short-Term Costs (2001-2010)	Long-Term Costs (2011-2020)	Total Costs (2001-2020)
National Park Service			
Surface	$510,000,000	$ 827,000,000	$1,337,000,000
Water	94,000,000	123,000,000	217,000,000
NPS Total	**$604,000,000**	**$ 950,000,000**	**$1,554,000,000**
Bureau of Land Management			
Surface	$ 6,000,000	$ 7,000,000	$ 13,000,000
Water	9,000,000	8,000,000	17,000,000
BLM Total	**$ 15,000,000**	**$ 15,000,000**	**$ 30,000,000**
U.S. Fish and Wildlife Service			
Surface	$ 40,000,000	$ 53,000,000	$ 93,000,000
Water	19,000,000	14,000,000	33,000,000
USFWS Total	**$ 59,000,000**	**$ 67,000,000**	**$ 126,000,000**
GRAND TOTAL	**$678,000,000**	**$1,032,000,000**	**$1,710,000,000**

* Note: All estimates are in 1999 dollars and are not adjusted for inflation.

The growth in costs between the short-term (2001-2010) and the long-term (2011-2020) periods is a result of two types of cost increases. A number of capital intensive projects were identified during the study that will require long lead times to plan and obtain funding. Therefore, the capital costs for these projects are included in the long-term period costs. Secondly, the annual operations and maintenance costs increase substantially because of the greater number of systems operating during the long-term period.

It should be noted that other transit planning and implementation activities on federally-managed lands were occurring while this study was conducted. One notable example is the Grand Canyon transit project. The project is being developed in an entirely separate planning and project development process. It is anticipated that the funding for the project will be generated entirely from revenues collected at the park, and will need no subsidies for capital and operating costs. Therefore, the capital and operating costs are not included in this study. Additionally, both this study and the *Inventory and Assessment of National Park Visitor Transportation Systems* report, prepared in 1999 for the NPS, identified existing transportation systems and tours that are currently run as concessions and are expected to continue their operation without subsidy. Costs for improving, expanding, operating, and maintaining these systems were not included in this study.

In general, bus transit is currently the most common form of transit service operating on Federal lands, and is likely to continue as the predominant mode, although water transportation needs are significant as well.

The study found that, at a majority of sites, transit needs are modest and can be served by a small number of vehicles operating on a seasonal basis. At many sites, there appear to be opportunities to recover at least a portion of operations and maintenance costs through fares. At a smaller number of sites, it may be possible to charge fares that are adequate to recover a portion of capital investment as well.

Transportation needs and resource preservation are the most significant factors influencing transit needs identified in the study. Many site managers believe that transit can serve as a cost-effective method of accommodating additional visitor demand, while at the same time preserving resources and providing the visitor a more pleasant and enlightening experience.

There appears to be a strong justification for a Federal funding program that will assist in addressing transit needs of federally-managed lands and help provide the financial stability required for these systems to succeed. Since it is unlikely, however, that this program will be capable of addressing all of these needs, partnerships with State and local governments, private business interests, and support groups will be critical in order to establish an effective transit program for Federal lands.

1.0 Introduction

Tourists first began visiting Yellowstone soon after the Civil War ended. These early visitors experienced the park in its pristine and unspoiled state. Over the last century, visitors have continued to enjoy the natural beauty and cultural or historical significance of the national parks and other federally-managed lands, and the number of these parks and lands has increased greatly. At the same time, visitation has grown dramatically, a reflection of the heightened desire of the public to experience the unique environments that characterize these special places.

Some of the sites have a level of use so high that it compromises the visitor experience and degrades natural, cultural and historic resources. In many cases, these impacts are not a function of the number of people visiting the site, but of the number of automobiles that are accommodated. The goal of this study is to identify opportunities for application of Alternative Transportation Systems (ATS), or transit, to help address these problems.

This volume of the Federal Lands ATS report summarizes the transit needs identified at sites managed by the NPS, the USFWS, and the BLM. Section 1.0 describes the legislative mandate behind the study, its overall goals and objectives, a definition of ATS, and a summary of the work tasks conducted. Section 2.0 describes the missions and goals of the NPS, the BLM, and the USFWS as they relate to transportation issues. This section also includes a brief description of initiatives that have been undertaken to improve transportation planning and promote transit on Federal lands, and a summary of existing NPS transit services. Section 3.0 includes a summary of issues that can be addressed by transit implementation. These include transportation, resource preservation, economic and community development, recreational, and tribal issues. Section 4.0 includes a description of transit needs identified in the study. Section 5.0 includes a discussion of opportunities for raising revenue to support transit systems. Section 6.0 summarizes the transit needs identified in this volume of the Federal Lands Alternative Transportation Systems Study.

Whiskeytown National Recreation Area, California

1.1 Section 3039 of the Transportation Equity Act for the 21st Century (TEA-21)

In 1998, the "Transit in Parks Act," or TRIP bill, was proposed by Senator Paul Sarbanes of Maryland. The goal of the bill as stated was "to encourage and promote the development of transportation systems for the betterment of the national parks and other units of the national park system, national wildlife refuges, recreational areas, and other public lands in order to conserve natural, historical and cultural resources and prevent adverse impact, relieve

congestion, minimize transportation fuel consumption, reduce pollution (including noise and visual pollution) and enhance visitor mobility and accessibility and the visitor experience." As proposed, the bill would have authorized $50 million annually over five years for alternative transportation systems that provide access to lands managed by the NPS, the BLM, and the USFWS. Specific objectives of the bill are highlighted in Figure 1.1.

Figure 1.1
Objectives of the "Transit in Parks" Act

To encourage and promote the development of transportation systems for the betterment of the national parks and other units of the National Park System, national wildlife refuges, recreational areas, and other public lands in order to conserve natural, historical and cultural resources and prevent adverse impact, relieve congestion, minimize transportation fuel consumption, reduce pollution (including noise and visual pollution) and enhance visitor mobility and accessibility and the visitor experience;

Initiate a new Federal transit program which would authorize $50 million in funding in each of the next five years to the three Federal Land management agencies in the Department of the Interior – the National Park Service, the U.S. Fish and Wildlife Service, and the Bureau of Land Management. The program will allocate capital funds for transit projects, including rail or clean fuel bus projects, pedestrian bike paths, or park watercraft access, within or adjacent to national park lands;

Formalizes the cooperative agreement between the Secretary of Transportation and the Secretary of the Interior to exchange technical assistance and to develop procedures related to the planning, selection and funding of transit projects in national park lands; and

To undertake a comprehensive study of alternative transportation needs in the national parks and related public lands eligible for assistance under this program. The study will better identify those areas with existing and potential problems of congestion and pollution, or which can benefit from mass transportation services, as well as identify and estimate project costs for these sites.

The proposed legislation built upon two prior initiatives:

- A study of alternative transportation strategies in national parks was mandated by the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. The study identified many of the problems of overcrowding, traffic congestion, and pollution that were impacting the visitor experience in the more heavily visited national parks.


Natchez National Historic Park, Mississippi

- In November 1997, Secretary of Transportation Rodney Slater and Secretary of the Interior Bruce Babbitt signed a Memorandum of Understanding (MOU) in which the two departments agreed to work together to address transportation and resource management needs in and around the national parks. The MOU described some major issues facing site managers of Federal lands, and is quoted in Figure 1.2.

Figure 1.2
Department of Transportation – Department of the Interior
Memorandum of Understanding

"Congestion in and approaching many national parks is causing lengthy traffic delays and backups that substantially detract from the visitor experience. Visitors find that many of the national parks contain significant noise and air pollution, and traffic congestion similar to that found on the city streets they left behind.

In many national park units, the capacity of parking facilities at interpretive or scenic areas is well below demand. As a result, visitors park along roadsides, damaging park resources and subjecting people to hazardous safety conditions as they walk near busy roads to access visitor use areas.

On occasion, national park units must close their gates during high visitation periods and turn away the public because the existing infrastructure and transportation systems are at, or beyond, capacity for which they were designed."

The Transit in Parks Act was not enacted but portions of it were adopted in TEA-21 including Section 3039, which called for the Secretary of Transportation, in coordination with the Secretary of the Interior, to "undertake a comprehensive study of alternative transportation needs in national parks and related public lands." This study was managed jointly by the Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA), and carried out by a consultant team led by Cambridge Systematics, Inc. and BRW, Inc.

1.2 Goals and Objectives of the Study

The study was conducted to assess the opportunities and need for transit services for the NPS, the BLM, and the USFWS. Study tasks included:

Rocky Mountain National Park, Colorado

- Identifying existing and potential problems related to congestion, resource impacts, and visitor experience that might be addressed by transit;
- Identifying and describing transit needs at sites managed by the NPS, the BLM, and the USFWS;
- Quantifying, on a national basis, transit needs for each of the three agencies including project development, capital, and operating and maintenance costs;
- Describing potential benefits from successful implementation of ATS including those related to protecting the site's natural, cultural or historic resources, improving transportation services, increasing economic development in surrounding communities, and improving the visitor experience; and
- Providing a potential framework for a funding program to implement transit systems on federally-managed lands.

1.3 Definition of Alternative Transportation Systems (ATS)

For the purposes of this study, ATS refers to transit services. The study identified existing transit services that need to be expanded or modified, as well as new transit services. The identified transit needs include services that would operate completely within the Federal sites, and services that would link Federal sites to surrounding communities.

Transit vehicles identified in this study include trams, standard transit buses, small buses, historic trolleys, trolley cars, waterborne vessels, and aerial tramways. The ATS needs cost figures in the study include project development costs, capital costs, and operations and maintenance costs.

1.4 Summary of Study Tasks

The Federal Lands Alternative Transportation Systems Study includes a report with four separate volumes. These volumes correspond to four study tasks, as described below.

Task 1. Develop an Inventory of Transit Technologies That May Be Appropriate for Use in Public Lands Settings

Trams at Shark Valley, Everglades National Park, Florida

Volume I identifies existing and emerging transit technologies appropriate for application on Federal lands. The consultant team utilized as a basis for this work the NPS 1994 *Alternative Transportation Modes Feasibility Study: Visitor Transportation System Alternatives*. Work included reviewing the alternative transportation modes described in the NPS study and updating the information as necessary. New emerging technologies including alternative fueled vehicles were incorporated, and economic data were updated. The consultant team sponsored an industry outreach session with developers and manufacturers of alternative transportation vehicles at the 1999 American Public Transit Association (APTA) conference. Volume I includes detailed descriptions of many different vehicle technologies, in addition to information on clean fuel vehicles and ITS applications.

Task 2. Identify Funding Sources for Federal Lands Transit Systems

Volume II describes various public and private funding sources available for developing, implementing, operating, and maintaining transit systems. A variety of funding programs to support these activities are available through the FHWA and the FTA in Title 23, U.S.C. and Title 49, U.S.C., respectively. Chapter 2 of Title 23, U.S.C. includes the Federal

Lands Highway Program. This program primarily provides funding for roadway and bridge projects, but may also be used to fund ATS projects in the national park system, the forest highway system, and the Indian reservation roads system. Other FHWA and FTA programs that fund transit systems are established to provide funds primarily to States, Metropolitan Planning Organizations (MPO), and transit operators. In order for the Federal land management agencies (FLMA) to receive funding or benefits from these programs, they must partner with State or local governments, or transit operators. While competition for Federal funds is intensive, some sites have successfully partnered with State DOTs, MPOs, and surrounding communities to fund transit projects.

Task 3. Develop Estimates for National Transit Needs

Task 3, the results of which are documented in this volume, quantified transit needs for the three FLMAs. Figure 1.3 identifies the cost categories used in the analysis. This task was accomplished through a series of site visits and telephone interviews with Federal site managers. Representatives of the NPS, the BLM, and the USFWS were asked to identify sites that may have transit needs. Each of the identified sites was included in one of the following categories:

Figure 1.3
Breakdown of Potential ATS Costs

Timeframe

- Short-Term (2001-2010)
- Long-Term (2011-2020)

Agency

- National Park Service
- Bureau of Land Management
- U.S. Fish and Wildlife Service

State

- Summary of costs by State

ATS Modes

- Surface
- Water Transportation

Project Cost Categories

Project Development
- Planning
- Engineering design
- Environmental evaluation
- Procurement activities

Capital Expenses
- Vehicles
- Vessels
- Maintenance Facilities
- Storage Facilities
- Docks and Piers
- Shelters

Operations and Maintenance
- Operating labor
- Fuel and supplies
- Vehicle maintenance
- Facilities maintenance

1. Sites that have existing ATS;

2. Sites that have conducted a formal planning process for the implementation of ATS services;

3. Sites that have identified a potential need for ATS through General Management Plans or other formal planning processes; and

4. Sites that have identified a potential need for ATS through informal means.

Badlands National Park, South Dakota

The NPS identified a total of 169 sites that may have some ATS need, and identified a sample of 47 for site visits. Telephone calls were made to most of the other 122 sites, although day trips, or "mini-visits" were made to 15 sites that were located near consultant team offices. Visits were made to all of the 23 potential ATS sites identified by the USFWS and the 15 sites identified by the BLM. Figures 1.5 to 1.8 show the locations of sites that were visited for each of the three agencies, in addition to the NPS sites that were contacted by telephone.

Reports were developed for each of the 207 sites that were visited or contacted by telephone. The objectives of these reports, which are provided in Appendix C, were to:

- Identify existing conditions at the site;
- Document existing and anticipated transportation issues;
- Document non-transportation issues that may be addressed through transit options;
- Document site plans related to transportation; and
- Identify potential ATS solutions.

Different report formats were used for site visits and call/mini-visit sites, as documented in Figure 1.4. Following completion of the reports, potential transit alternatives were summarized, compiled, and categorized as shown previously in Figure 1.3. A cost estimation methodology was applied to each alternative, and the consultant team developed estimates of key cost estimation parameters including estimated ridership, route miles, days and hours of operation, and vehicle type. Needs for maintenance and storage facilities, shelters, additional parking spaces, and informational programs were also identified. Appendix A includes documentation of the cost estimation methodology.

As described in later sections of this volume, many transit needs were identified through this process. Over 60 percent of the sites contacted identified needs for ATS funding. Transit needs, including project development, capital costs, and operating and maintenance costs, are estimated at $1.71 billion over the next 20 years. For the most part, systems required are relatively small and would operate on a seasonal basis.

Russian River Ferry,
Kenai National Wildlife Refuge, Alaska

Task 4. Provide a Potential Framework for an ATS Funding Program on Federally-Managed Lands

Volume IV provides a potential framework for a Federal lands transit program. It includes legislative recommendations, policy guidance recommendations, information on transit needs and related funding estimates, and proposed transit monitoring and reporting criteria.

Figure 1.4
Site Visit Report Outline

1. Summary
2. Background Information
   - Location
   - Administration and Classification
   - Physical Description
   - Mission and Goals of the Site
   - Visitation Levels and Visitor Profile
3. Existing Conditions, Issues and Concerns
   - Transportation Conditions, Issues and Concerns
   - Community Development Conditions, Issues and Concerns
   - Natural or Cultural Resource Conditions, Issues and Concerns
   - Recreational Conditions, Issues and Concerns
4. Planning and Coordination
   - Site Unit Documents
   - Public and Agency Coordination
5. Assessment of Need
   - Magnitude of Need
   - Feasible Alternatives

Call Site Report Outline

1. Site Description
2. Existing Transit Services
3. Transit Needs
4. Basis of Transit Needs

Figure 1.5 National Park Service
Call Sites

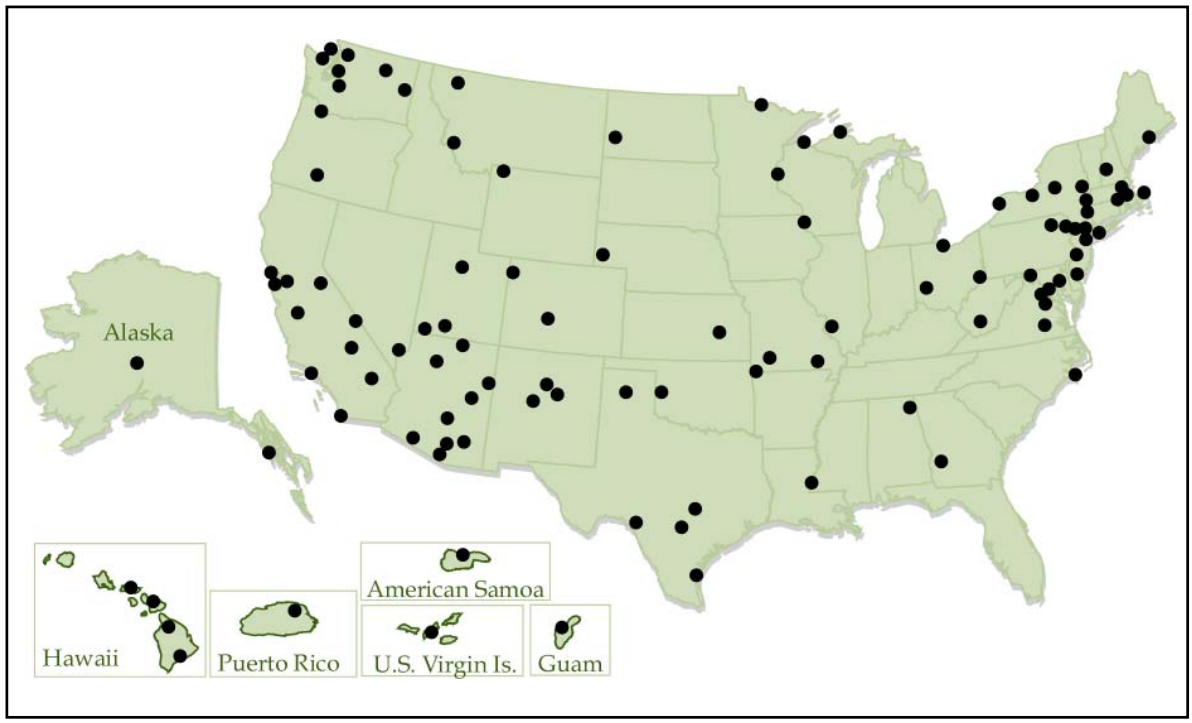
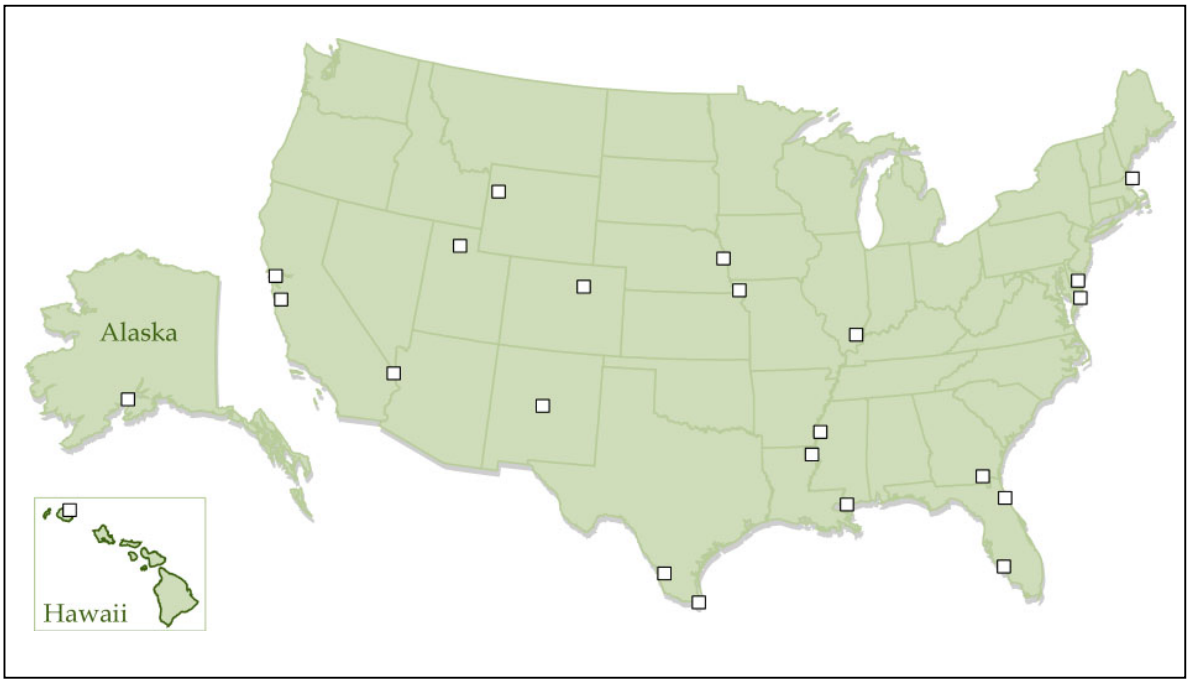


Figure 1.6 National Park Service
Visited Sites

Figure 1.7 Bureau of Land Management
Visited Sites

Figure 1.8 U.S. Fish and Wildlife Service
Visited Sites



2.0 Background

2.1 Mission and Goals of Agencies

This volume identifies ATS needs for three of the FLMAs in the Department of the Interior: the NPS, the BLM, and the USFWS. These agencies have different missions and goals that impact their policies toward transportation, as discussed below.

National Park Service

The mission of the NPS, as defined in the National Park Organic Act of 1916, is "to promote and regulate the use of Federal areas known as national parks, monuments and reservations, by such means and measures as to conform to the fundamental purpose of the said parks, monuments and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." The act created the NPS within the Department of the Interior to protect the 40 national parks and monuments already in existence, in addition to those yet to be established.

The roots of the NPS date back to 1872 when Congress passed the Yellowstone National Park Act, marking the first time that the Federal government specifically preserved lands "for the benefit and enjoyment of the people." Additional parks and monuments were added over the next 44 years until the 1916 Act unified management under the NPS. In 1933, 63 national monuments and military sites were transferred to the NPS, marking a broadening of the NPS mission to historical sites, as well as those of scenic and scientific significance. A more recent legislative initiative, the General Authorities Act of 1970, included all areas administered by the NPS in one system and clarified the authorities applicable to the system. The NPS currently manages 379 park units covering more than 81 million acres, and has approximately 16,000 permanent and 5,500 seasonal employees. There were 287 million recreational visitors to NPS sites in 1999.

The guiding principles of the NPS, as identified in the recent NPS document, *Management Policies to Guide the Management of the National Park System 2000*, cover a broad range of interests and responsibilities as shown in Figure 2.1. Achieving the delicate balance required between visitor service and preservation of natural, historic, and cultural resources is one of the NPS' greatest challenges. These principles guide the application of transportation policies in the NPS system and illustrate the often contradictory missions that must be addressed.

A 1997 memorandum of understanding (MOU) executed between the Secretaries of the Interior and Transportation called for a "comprehensive effort to improve public transportation in national parks." The MOU identified a number of negative impacts from increasing traffic congestion and emphasized the need for an enhanced level of

transportation planning to conserve national resources while providing meaningful and pleasant visitor experiences. Both the resources and technical expertise of the U.S. DOT are provided at the request of the NPS to develop solutions to transportation problems in the national park system. Specific goals of the MOU are listed in Figure 2.2. A series of specific activities related to transportation policy and coordination are also defined, including development of technical tools, management systems, and cooperative programs.

Figure 2.1
National Park Service Guiding Principles

Excellent Service	Providing the best possible service to park visitors and partners.
Productive Partnerships	Collaborating with Federal, State, tribal and local governments, private organizations, and businesses to work toward common goals.
Citizen Involvement	Providing opportunities for citizens to participate in the decisions and actions of the National Park Service.
Heritage Education	Educating park visitors and the general public about their history and common heritage.
Outstanding Employees	Empowering a diverse workforce committed to excellence, integrity, and quality work.
Employee Development	Providing developmental opportunities and training so employees have the ‘‘tools to do the job’’ safely and efficiently.
Wise Decisions	Integrating social, economic, environmental, and ethical considerations into the decision-making process.
Effective Management	Instilling a performance management philosophy that fosters creativity, focuses on results, and requires accountability on all levels.
Research and Technology	Incorporating research findings and new technologies to improve work practices, products, and services.
Shared Capabilities	Sharing technical information and expertise with public and private land managers.

Little Round Top, Gettysburg National Military Park, Pennsylvania

Figure 2.2
Stated Goals of the MOU between the Secretaries of Transportation and the Interior

Develop and implement innovative transportation plans;

Establish personnel exchange and information sharing systems;

Establish interagency project agreements for developing and implementing transportation improvement initiatives;

Develop innovative transportation planning tools; and

Develop innovative policy, guidance, and coordination procedures for the implementation of safe and efficient transportation systems that are compatible with the protection and preservation of the National Park System's cultural and natural resources.

U.S. Fish and Wildlife Service

Kilauea Point National Wildlife Refuge, Hawaii

The U.S. Fish and Wildlife Service is the principal Federal agency responsible for conserving, protecting, and enhancing fish, wildlife, plants, and their habitats for the continuing benefit of the American people. The agency has been known as the Fish and Wildlife Service since 1940, but its roots go back to the establishment by Congress of the U.S. Fish Commission in 1871. Key functions of the USFWS include enforcement of Federal wildlife laws, protection of endangered species, management of migratory birds, restoration of nationally significant fisheries, and conservation and restoration of wildlife habitat such as wetlands. The USFWS currently manages 520 refuges, 66 fish hatcheries, 78 ecological services field stations and thousand of small wetlands and other special management areas covering more than 91 million acres, and has approximately 7,500 employees.

Morgan Brake National Wildlife Refuge, Mississippi

While the major responsibilities of USFWS revolve around protection and management of fish and wildlife, refuges also offer a wide range of recreational and educational opportunities. These include visitor centers, wildlife trails, environmental education programs, and fishing and hunting programs. An estimated 34 million people annually participate in recreational opportunities on USFWS sites.

While most sites receive relatively few visitors, there are a number of heavily visited sites that are located on beaches, in close proximity to major tourist areas or near urban areas. Some of these sites, such as the J.N. "Ding" Darling National Wildlife Refuge (NWR) at Sanibel Island, Florida and the Santa Ana NWR in south Texas, have implemented transit to mitigate the impact of automobile travel and provide improved interpretive experiences for their visitors. Other sites such as the Parker River NWR in Massachusetts, the Bayou Sauvage NWR in

New Orleans, and the Rocky Mountain Arsenal NWR now being developed near Denver, are planning increased use of transit to balance similar goals. In these and other refuges, the needs analysis found that transit alternatives have the potential to address recreational needs while helping to preserve and protect valuable resources.

Bureau of Land Management

Red Rock Canyon National Conservation Area, Nevada

The mission of the Bureau of Land Management is "to sustain the health, diversity and productivity of the public lands for the use and enjoyment of present and future generations." The BLM's holdings of over 270 million acres constitute one-eighth of the U.S. land area and are located primarily in the western states. Today's BLM was formed in 1946 through a merger of two established agencies: 1) the General Land Office that was formed in the early 1800s to survey and oversee the disposition of Federal lands; and 2) the U.S. Grazing Service, which was formed in the 1930s to manage public rangelands. The responsibilities and mandate of the BLM were established through the Federal Land Policy and Management Act of 1976. This legislation established that lands would remain in public ownership and would be available for multiple use, defined as "management of the public lands and their various resources so that they are utilized in the combination that will best meet the present and future needs of the American people."

BLM-owned lands encompass a variety of environments including forests, high mountains, arctic tundra, and deserts. Management activities focus on a wide variety of resources and activities, including:

- Energy and minerals;
- Environmental education;
- Land title information;
- Land sales;
- Right-of-way;
- Recreation; and
- Management of threats to public health safety and property.

Potential ATS applications on BLM lands revolve primarily around the agency's recreational mission. A wide array of activities take place on BLM lands, including hunting, fishing, camping, hiking, boating, hang gliding, off-highway vehicle driving, mountain biking, birding and visitation to historic or cultural sites. Water-oriented recreation is one of the most popular activities on BLM lands. BLM lands contain a total of 2.2 million acres of lakes and reservoirs, 6,600 miles of floatable rivers, and over 500 boating access points. There are over 4,500 miles of National Historic, Scenic, or Recreational Trails through BLM

lands in addition to multi-use trails for a variety of activities. An estimated 60 million recreational visitors use BLM lands annually. The agency has 8,800 full-time equivalent employees. A number of BLM sites are experiencing traffic congestion and parking shortages similar to those experienced at some of the major NPS sites. Long-distance hiking trips are also popular at some BLM locations, creating a need for one-way public transportation links. Another important use of BLM lands is for winter housing for northern retirees that migrate to warm climates for the winter. The LaPosa Long-Term Visitor Area along the Arizona-California border and its gateway community of Quartzite experience severe congestion during winter months due to this activity.

2.2 Transportation Activities

Background on existing transit at national parks can be found in the NPS report *Inventory and Assessment of National Park Visitor Transportation Systems* prepared in 1999 (VTS study). That study focused on an inventory of existing transit systems rather than a needs assessment for new or expanded transit systems, which is the focus of this study. Table 2.1 highlights information on existing NPS transit systems.

Table 2.1 National Park Service Visitor Transportation System Inventory
Summary of Results

NPS Units with VTS Identified	50
Number of VTS Identified	63
Percentage of systems using alternate fuel vehicles	10%
Percentage of systems concessionaire owned and operated	65%
Percentage of systems NPS-owned and operated	16%
Percentage of systems receiving NPS financial support	27%
Percentage of systems making payments to NPS	63%
Percentage of systems reporting plans to modify or expand	59%

Source: *Inventory and Assessment of National Park Visitor Transportation Systems*, Final Report prepared for National Park Service by Parsons Brinckerhoff Quade and Douglas, August 6, 1999.

The primary purpose for most of the systems identified in the VTS study – about 60 percent – was visitor enhancement, defined as offering interpretive opportunities, simplifying travel within the park, or making it easier to see park features. The next most highly ranked purpose for ATS systems identified in the study – about 20 percent – was resource protection, including reduction of traffic congestion, noise and air pollution, and adverse affects to park resources and values. System needs were identified in the VTS study, although these needs were not quantified.

A number of other recent initiatives have been undertaken by the U.S. DOT and FLMAs to improve transportation planning and to promote transit. A "Transportation Planning Guidebook" was recently prepared by the NPS with financial and technical support from the U.S. DOT. The guidebook provides basic information on U.S. DOT funding programs, the State and regional transportation planning process, and examples of successful partnerships that have led to project implementation. The guidebook is available on an "Alternative Transportation Systems" section of the NPS web site (http://www.nps.gov/transportation/alt/guidebook/).

A series of four seminars were recently sponsored by the NPS and the U.S. DOT. In addition to the FLMAs, their partners, and U.S. DOT officials, a number of State, regional, and local transportation officials participated. Both presentations and charettes were used to provide training to FLMA field personnel in transportation planning, transportation systems funding, and partnerships.

In FY 2000, the NPS and the FHWA set aside approximately $8.4 million from the Federal Lands Highway Program, Park Roads and Parkways Program, for ATS projects. They funded 28 planning projects totaling $5.1 million and nine implementation projects totaling $3.3 million. A small amount of additional funding was also provided for transportation work to be conducted as part of the General Management Planning process. These are not new funds, but funds that are being shifted from roadway projects to transit. This shift in funds reduces the amount of annual funding available for park road improvements to approximately $100 million. It is estimated that an annual funding level of $120 million is required to keep park roads from deteriorating further. Therefore this shift in funds increases the gap between available funding and the funding needed to maintain the roadway system in its current condition.

3.0 Issues That Can Be Addressed by Alternative Transportation Systems

Great interest has been expressed by Federal lands site managers in ATS (transit) systems. These managers recognize that various issues and concerns can be addressed by providing visitors with alternatives to the private automobile. This section describes transportation, resource preservation, economic and community development, recreational, and tribal issues that can be addressed through transit implementation.

3.1 Transportation Issues

As described in Section 2.0, many site managers view transit as a means of meeting visitor transportation and mobility needs This section summarizes the numerous and varied transportation-related issues that influence ATS needs.

Cades Cove, Great Smoky Mountains National Park, Tennessee

Increased levels of automobile traffic are causing parking problems and congestion that can detract severely from the visitor experience. Visitors travelling to some of the more heavily visited national parks such as the Grand Canyon, Rocky Mountain, Great Smoky Mountains, Acadia, and Yosemite may find traffic congestion and parking problems similar to those they left behind in crowded urban areas. Roadways operating at congested levels of service have been extensively documented as part of site planning efforts. All of these sites have either implemented transit service or are in the process of doing so. Parking shortages are also common at smaller, less heavily visited sites, including Devil's Tower National Monument (NM), Walnut Canyon NM, Dinosaur NM, Kilauea Point National Wildlife Refuge (NWR), Point Reyes National Seashore (NS), and Mesa Verde National Park (NP).

The goals of the three FLMAs related to recreation and quality of visitor experience cannot be achieved with congested roadways and overcrowded parking areas. In most sites, expansion of roadway and/or parking capacity is not an acceptable solution to transportation problems because of limited funding, unacceptable additional impact to resources, or both.

Entrance to Rocky Mountain National Park, Colorado

New roadway construction is increasingly difficult to implement. For example, Congress authorized the Foothills Parkway, a 72-mile road paralleling the northern boundary of the Great Smoky Mountains NP, in the 1940s. To date, only 22 miles have been completed with an additional 16 miles under construction. Due to development along the right-of-way, environmental constraints, and increased construction costs, it now appears that completion of the entire parkway may cost up to $300 million.

A number of sites such as the Eisenhower farm at the Gettysburg National Military Park, the Eugene O'Neill National Historic Site (NHS), and the ranch at the Lyndon B. Johnson NHS do not have any parking due to either the wishes of family members or a desire to preserve the original character of the sites. ATS (or transit) services sometimes provide the only option available to visit these sites. Other historical sites, such as the Weir Farm NHS in Connecticut and the Roosevelt-Vanderbilt NHS in New York are considering plans to institute remote parking with transit service as a means of reducing the amount of traffic affecting the site.

Many sites included in the study could not be reached by most visitors without transit service. These include water-oriented sites such as the Channel Islands NP, Boston Harbor Islands National Recreational Area (NRA), Statue of Liberty/Ellis Island NM, the USS Arizona Memorial, and the Manitou Islands in the Sleeping Bear Dunes National Lakeshore (NL). All of these sites have either addressed, or are in the process of addressing, perceived deficiencies in their existing water transportation service. In addition to the major investment required in equipment, piers, and docking facilities, water-oriented sites often have limited landside parking.

Manitou Island Transit Ferry Terminal
Leland, Michigan

New water transportation services were also identified as a possible method of serving beach areas with limited roadway access and parking constraints. The Merritt Island NWR/Canaveral NS, and the Gateway NRA in New York are two sites where water transportation has great potential to improve access that is now very difficult via existing roadways.

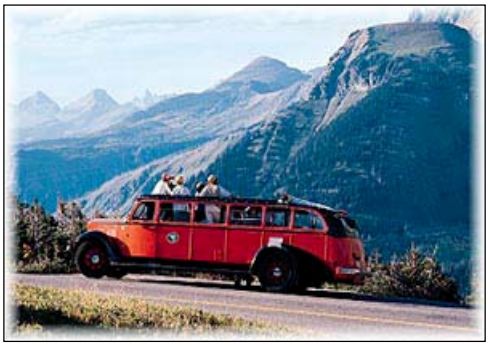
There are significant transportation needs at urban and suburban sites. Urban sites are generally small in physical size and commemorate historical events or cultural themes that make interpretation a highly desirable part of the visitor experience. Visitors often have difficulty navigating urban streets, and parking at sites may be limited and/or expensive. In many cases, visitors simply need better information on how to use existing public transportation service. Major sites such as the Independence National Historic Park (NHP) and the San Francisco Maritime NHP are well served by existing transit systems, but outreach is needed to help visitors more effectively use these systems. Accommodation of tour buses is also a problem at many urban sites.

Many suburban sites are not well-served by existing transit, but could be served with route extensions or new routes operated by local transit authorities. Santa Monica Mountains NRA, Cuyahoga Valley NRA, and the Chattahoochee NRA in Georgia are three recreational areas that are located close to existing transit systems but have little or no direct service. All are considering plans that would bring additional transit services to their site. Services would not only allow transit-dependent persons to take advantage of these resources, but would help to spread demand from heavily-used areas into more lightly used ones. A number of rural transit properties have successfully applied this philosophy. The transit system in Gatlinburg, Tennessee recently extended one of their routes to serve several destinations in the Great Smoky Mountains NP, including the Visitor Center, trailheads, and a major campground. The city transit system in Hot Springs, Arkansas runs a free rubber-tired trolley route to the park's Observation Tower on Hot Springs Mountain.

Santa Monica Mountains National Recreation Area, California

3.2 Resource Preservation Issues

Resource preservation is a major goal of all three FLMAs. In the early years of national park development, the automobile was not viewed as a negative influence on resources but as a technology that permitted the public to experience these sites more comfortably and conveniently. Early road designers and site managers recognized the importance of environmentally sensitive design and established the principle that facilities should "lie lightly on the land." Park roadways such as the Going-to-the-Sun Road in Glacier NP and the Skyline Drive in the Shenandoah NP represent some of the most impressive engineering accomplishments of that era. The major parkways of the NPS, including the Blue Ridge, Natchez Trace, and George Washington Parkways, also represent this tradition.



"Red Bus" – Glacier National Park, Montana

The impact of roads and parking on scenic resources is a major concern at Federal sites as traffic congestion increases. Facilities designed to harmonize with the surrounding environment are being taxed by demand. Expansion of facilities or the construction of new facilities in popular activity areas threatens the scenic values that are central to the parks' purposes. Many park units, like Yosemite, Sequoia, and Mount Rainier, are seeking to reduce the extent of parking areas in the most valued scenic areas.

In a number of historic parks, particularly those containing Civil War battlefields, the park roads themselves are historic resources. At Gettysburg, Antietam, and other sites, Civil War veterans laid out carriage roads in the 1890s and early 1900s. These roads were designed to promote understanding of the sequence of events and to provide visitors with access to key vantage points. It is a priority of the NPS to preserve as closely as possible the original character of these roads.

Carlsbad Caverns National Park, New Mexico

At Gettysburg off-road parking at some of the more popular stops along the auto tour such as Little Round Top is causing resource damage. A similar phenomenon is occurring along the popular Cades Cove loop road in the Great Smoky Mountains NP and Tuolumne Meadows area in Yosemite. Carlsbad Caverns NP is an example of a unique resource that is being threatened by the proximity of visitor parking and park maintenance activities. A proposed relocation of these activities would require an ATS to shuttle both visitors and employees to the site.

Suburban development is occurring around many of these sites, increasing pressure to use site roads as commuter routes. Valley Forge, Richmond, and Fredericksburg/Spotsylvania are among the sites that are experiencing these pressures. Preservation of other historic sites is often not compatible with widened roadways and larger parking areas. Harpers Ferry, San Antonio Missions, Natchez, and Marsh-Billings-Rockefeller are among the National Historic sites and parks that have implemented transit or are considering doing so in order to avoid additional parking that will detract from the character of the site.

Major Commuter Route, Valley Forge National Historic Park, Pennsylvania

While preservation of wildlife and natural environments is critical to the mission of all three agencies, it is the primary mission of the USFWS. A number of the refuges included in this study are located near densely developed urban areas or popular beach resorts, and thus come under significant pressure for recreational use. The Chincoteague NWR in Virginia includes a heavily visited beach area (operated by the Assateague NS of the NPS) that is subject to frequent storms. The parking area has been either totally or partially destroyed five times in the last 20 years. Due to proximity of wetlands and wildlife habitat, it may be impossible to restore the current number of parking spaces in the future. The NPS and the USFWS are working together with the local community to identify an ATS solution that can be put in place if a large

Chincoteague National Wildlife Refuge, Virginia

number of parking spaces are permanently lost. The J.N. "Ding" Darling NWR in Florida has implemented a tourist tram that helps to relieve the heavy traffic volumes on the refuge's only public road, and also provides educational information on the sensitive refuge environment.

3.3 Economic and Community Development Issues

Great Smoky Mountains National Park
Tennessee and North Carolina

The NPS, the BLM, and the USFWS have long had complex relationships with nearby communities that are economically dependent on Federal lands. The BLM manages a number of activities, including mining and grazing, that provide a livelihood to many residents of the Western states. The USFWS hosts uses such as hunting and fishing that provide subsistence for local residents and, in some locations, attract economic activity from visitors. One of the missions of the NPS is to provide for public enjoyment of the resources they manage. As a result, the NPS sites are primary generators of tourism in many locations throughout the U.S. Many of the major national parks have spawned the development of "gateway" communities that are nearly as well-known as the parks that they border. Gatlinburg, Tennessee, Jackson Hole, Wyoming, Estes Park, Colorado, and Bar Harbor, Maine are examples of communities that have grown with visitation to the National Park System.

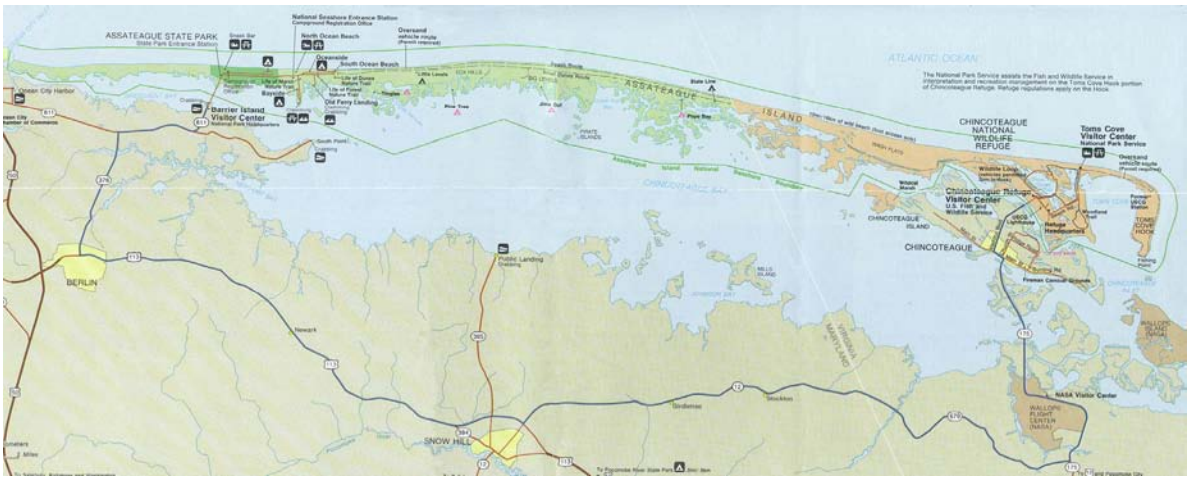
Communities located near heavily visited sites have a tremendous stake in decisions made by Federal lands site managers. As tourism has increased and resource-based industries such as agriculture and mining employ fewer people, the economic dependence of many gateway communities on nearby Federal lands has become greater than ever. These communities are experiencing first hand the impacts of traffic congestion and overcrowding that are resulting from increased tourism. Many are attracting businesses such as casinos, amusement parks, and theaters that draw visitors whose primary destination is not the Federal lands site.

Hot Springs National Park, Arkansas

Most gateway communities take a generally positive view toward economic development. Other options for raising tax revenue and providing employment to local residents simply do not exist in many of these communities, and tourist-related employment is considered by some to be cleaner and safer than the resource industries that preceded it.

The difficult challenges of community and economic development have encouraged site managers to become more active in local community

planning activities. Increased participation comes out of a desire to preserve and protect the resource, but also to create a positive relationship with the local community. With limited funds available to maintain Federal lands sites and to service a growing number visitors, partnerships are being emphasized. Close working relationships with local and State agencies, as well as the private sector and private non-profit support organizations ("Friends" groups) are essential for most site managers. Many have been working closely to promote "eco-tourism" and other activities that are compatible with agency and site mission statements. Assateague Island National Seashore, for example, spearheaded the formation of a coalition to encourage eco-tourism through development of trail systems that link the lightly-visited inland areas of Maryland's Eastern Shore with the beach. An important objective of this effort was to maintain the rural character of the area, while attracting an increased share of tourist dollars.



Assateague Island National Seashore/Chincoteague National Wildlife Refuge and Maryland Eastern Shore

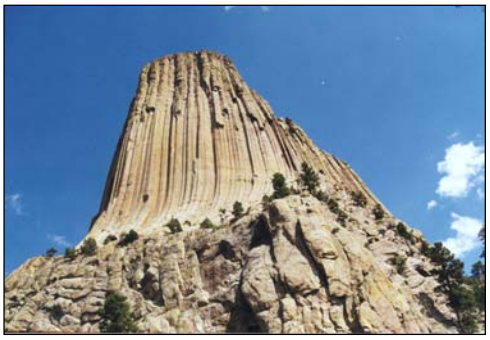
The role of transit in supporting economic and community development varies depending on site location and visitation levels. For example, strong cooperation between local communities, business interests, the State of Maine and Acadia NP led directly to the implementation of the successful Island Explorer shuttle bus system in the summer of 1999. The local business community and the four municipalities on Mount Desert Island agreed to contribute to the system so that fares were not required. The system not only relieves pressure on the park's overcrowded roads and parking areas, but it also increases patronage to the business district of Bar Harbor by providing transportation to this area even when parking areas are full.

Assateague Island National Seashore, Maryland

At other sites, however, there has been less support for transit system implementation. Local residents in Chincoteague, Virginia (Chincoteague NWR and Assateague NS) are currently working with the support of the FHWA, the FTA, and the Virginia DOT to develop a transit system that will be acceptable

to the community. There has been concern there, and at other sites, that transit system implementation represents a first step toward automobile restrictions or bans. Gateway community representatives frequently express concern that such restrictions would result in decreased visitation and negative economic consequences. The Gettysburg National Military Park (NMP) was able to overcome such concerns, and the park committed in its General Management Plan to work with other governmental agencies and private partners to provide two shuttle routes in conjunction with the development of a new Visitor Center. One of these shuttle routes will provide a direct link to the Borough of Gettysburg, encouraging greater visitation in the downtown area. Sites such as the Yosemite NP were able to achieve consensus that ATS services were needed, but experienced great difficulty agreeing on what services should be provided.

While some communities do not currently believe that there are benefits from transit, others are working with sites to relocate Visitor Centers to their communities, and to implement transit to shuttle visitors to the site. These proposals have the dual objective of promoting visitation and economic development in the gateway community, while helping to preserve and protect site resources. Transit is an important component of proposed changes at sites such as Little Bighorn National Battlefield, Parker River NWR, Devil's Tower NM, and Oregon Caves NM.



Devil's Tower National Monument, Wyoming

Employee transportation is also a significant economic concern at Federal lands sites. Everglades NP and Shenandoah NP both noted a need for transit services to help attract and retain good employees. The remote location of many sites makes commuting prohibitive for some employees, particularly those with low-paying or part-time jobs.

Many transit proposals constitute one element of a larger site or General Management Plan. As a result, it is often difficult to document the specific economic impact of project implementation and ongoing operation. There were several examples of sites where increased visitation resulting directly from transit operation could be estimated. Estimates for this sample of sites are documented in Section 4.0.

King Range National Conservation Area, California

3.4 Recreational Issues

Transit was frequently identified by site managers as a tool that could be used to improve recreational opportunities for visitors. In many cases, recreational needs overlap with the economic and community development issues identified in Section 3.3. Gateway communities and Federal lands sites have identified opportunities to combine

resources in order to enhance recreational activities. Long-distance recreational trails that serve Federal lands sites as well as local and State recreational facilities are being developed in many areas of the country. The Allegheny Portage NHS and Johnstown Flood NM in western Pennsylvania are both on the route of the Allegheny Heritage Trail, which includes hiking, bicycling, and water trails. The Indiana Dunes National Lakeshore is participating in the development of the Calumet Bicycle Trail across its property. This trail is one link in a system that will permit riders to travel from the Chicago area into southeastern Michigan on an exclusive bikeway. Transit options have been proposed to enable users to make one-way trips and return via transit. At the King Range National Conservation Area managed by the BLM in California, one-way hiking trips are popular along a remote portion of the Pacific Coast. While informal "jitney" services are now available to return visitors to their point of origin, site managers identified a need for a more formalized system of transportation to serve this need.

At many sites, popular trails have capacity to accommodate more recreational users; however parking at trailheads is often limited. National Recreation Areas located near major urban centers are used regularly by local residents for walking, running, or bicycling. Areas such as the Cuyahoga Valley NRA in Ohio, the Chattahoochee NRA in Georgia, and the Santa Monica NRA in California are all located near major transit systems, but have limited transit access. At the Chattahoochee NRA, a need was identified for shuttle services from nearby office buildings to serve workers wishing to use the park after hours or on weekends. This would make use of available parking and reduce the need to expand parking areas in the NRA.

Multi-use Trail, Cuyahoga National Recreation Area, Ohio

Transit can also help to provide the visitor with a higher quality experience and a better understanding of the characteristics and/or history of the site. At the Adams NHS in Massachusetts, the park contracts with a local trolley operator to provide transportation between the Visitor Center, the Adams Birthplaces, and the "Old House" where four generations of the family lived. The service has transportation benefits in that it relieves visitors from having to negotiate a difficult street pattern and find scarce parking spaces. It also enables park personnel to tell the family story in a logical, sequential manner. At the Manitou Islands in the Sleeping Bear Dunes NL, park rangers ride boats to the islands and use the opportunity to educate visitors about the sensitivity of the island environment.

Trolley, Adams National Historic Site, Massachusetts

3.5 Tribal Issues

Tribal relationships and agreements with parks and other federally-managed lands are important considerations in the evaluation and selection of ATS at certain sites. Tribal lands may limit access to Federal sites, tribal governments may have to be involved in transportation planning efforts due to the impact of proposed solutions on lands that are important to tribes; and tribal resource protection needs must be considered.

Access to and from federally-managed lands can be significantly affected by the presence of large tracts of adjacent or surrounding tribal lands. If large tracts of tribal lands are located between a Federal lands site and population centers, and there is no access to the sites through the tribal lands, transit services between the population center and the Federal site may not be economically feasible, or desirable due to the length of the transit route.

Transportation planning coordination efforts between tribal governments and the FLMAs effect transit evaluation and selection. At Mesa Verde NP and Aztec Ruins NM, the Native American Graves Protection and Repatriation Act (NAGPRA) process for area tribes requires the consultation of 24 separate tribes from the area before making improvements to the transportation system. Any alternative transportation plans need to be submitted and reviewed, and official comments must be taken from all tribes on the consultation list. Tribes have favored land uses that minimize the level of development, minimize the impacts of visitation by containing visitation to a few locations, and leave the land in a natural state.

Transit evaluation and selection may be effected by the presence of tribal historic/cultural/ archaeological resources. Sites that are bounded by reservations often have a significant concentration of these types of precious, irreplaceable resources. Tribal governments often want to limit public visitation to these resources. Transit services could assist in limiting or eliminating disturbance to these resources, or interpreting them in a manner that is acceptable to the tribal governments.

Aerial View of Aztec Ruins National Monument, Looking North

4.0 Assessment of Alternative Transportation System Needs

This section provides a summary of ATS needs identified in the study. Detailed reports were prepared for each of the sites evaluated in the study, and are included in Appendix C. These reports provide more detailed documentation on the nature of transit needs and their justification.

Section 4.1 includes an overview of transit needs identified in the study, including a list of the largest capital projects. Section 4.2 contains cost estimates of transit needs aggregated by agency, State, mode (surface or water), system status (expanding existing or new), and type of expenditure (project development, capital, and operations and maintenance). Section 4.3 discusses potential economic impacts of implementing transit on federally-managed lands. These include impacts on the national economy resulting from purchase of goods and services such as buses. This section also estimates the local economic impacts that could be generated if transit systems bring additional visitors to a site.

4.1 Overview of ATS Needs

This study identified a wide range of transit needs. The majority of needs identified can be met by some type of shuttle bus service operating on a seasonal basis. Table 4.1 lists all the sites that were reviewed for transit needs during this study. The table provides the following information:

- Sites which were studied but transit needs were not identified (non-bold text);
- **Sites where transit needs were identified (bolded text)**;
- Type of existing transit service (if any);
- Annual visitation to the sites; and
- Type of evaluation performed during the study (field visit or telephone survey).

Table 4.2 summarizes the transit needs identified in the study for each site including mode(s). Two hundred seven sites were evaluated in the study. Of the 207 sites evaluated, 137 were found to have transit needs. Transit needs were identified for each of the FLMAs as follows:

- 118 of the 169 NPS sites;
- 6 of the 15 BLM sites; and
- 13 of the 23 USFWS sites.

Table 4.1 Sites Reviewed for Transit Needs During This Study

Site	Visit/ Call	Annual Visitation	Existing Transit System
Bureau of Land Management			
Anasazi Heritage Center	V	35,000	
Boise Front	V	55,000	
Fort Ord	V	18,000	
Grand Staircase Escalante National Monument	V	207,500	
Iditarod National Historic Trail	V	50,000	
King Range National Conservation Area	**V**	**132,000**	
La Posa Long-Term Visitor Area	**V**	**22,500**	
National Historic Oregon Trail Interpretive Center	V	150,000	
North Moab Recreation Area	**V**	**90,000**	
Parker Strip Recreation Management Area	**V**	**1,750,000**	
Payette River Corridor	V	137,000	
Pompeys Pillar National Historic Landmark	V	56,700	
Red Rock Canyon National Conservation Area	**V**	**1,100,000**	**Small/medium bus**
Snake River Birds of Prey National Conservation Area	V	245,000	
Yaquina Head Outstanding Area	**V**	**470,000**	
U.S. Fish and Wildlife Service			
Bayou Sauvage National Wildlife Refuge	**V**	**500,000**	**Standard bus**
Bear River Migratory Bird Refuge	V	33,000	
Chincoteage National Wildlife Refuge	**V**	**1,400,000**	
Crab Orchard National Wildlife Refuge	V	1,286,000	
DeSoto National Wildlife Refuge	V	259,000	
Ding Darling National Wildlife Refuge	**V**	**800,000**	**Tram**
Don Edwards San Francisco National Wildlife Refuge	V	300,000	
Havasu National Wildlife Refuge	V	552,000	
Kenai National Wildlife Refuge	**V**	**400,000**	**Small/medium bus**
Kilauea Point National Wildlife Refuge	**V**	**225,000**	
Laguna Atascosa National Wildlife Refuge	**V**	**250,000**	
Merritt Island National Wildlife Refuge	**V**	**500,000**	**Small/medium bus**
Morgan Brake National Wildlife Refuge	V	125,000	
National Elk Refuge	V	604,000	
Okefenokee National Wildlife Refuge	**V**	**330,000**	
Parker River National Wildlife Refuge	**V**	**250,000**	
Prime Hook National Wildlife Refuge	V	80,000	
Rocky Mountain Arsenal National Wildlife Refuge	**V**	**100,000**	
San Pablo Bay National Wildlife Refuge	V	1,000	
Santa Ana National Wildlife Refuge	**V**	**160,000**	**Tram**
Squaw Creek National Wildlife Refuge	V	132,000	
St. Marks National Wildlife Refuge	**V**	**250,000**	
Tensas River National Wildlife Refuge	**V**	**105,000**	

Note: Bolded sites have ATS needs identified in the study. Details of the types of ATS needs identified at each of these sites are provided in Table 4.2.

Table 4.1 Sites Reviewed for Transit Needs During This Study (continued)

	Visit/ Call	Annual Visitation	Existing ATS
National Park Service			
Acadia National Park	**C**	**3,000,000**	**Standard bus**
Adams National Historic Park	**C**	**65,000**	**Historic trolley**
Alibates Flint Quarries National Monument	C	3,250	
Allegheny Portage National Historic Site	**V**	**120,000**	
Amistad National Recreation Area	C	1,130,000	
Antietam National Battlefield	**V**	**250,000**	
Apostle Islands National Lakeshore	C	237,000	Water transportation
Arches National Park	**V**	**850,000**	
Assateague Island National Seashore	**V**	**2,300,000**	**Transit system (bus)**
Aztec Ruins National Monument	**V**	**72,000**	**Small/medium bus**
Badlands National Park	**V**	**1,021,000**	
Bandelier National Monument	**C**	**350,000**	
Big Hole National Battlefield	C	65,000	
Big South Fork National River and Recreation Area	**V**	**875,000**	**Scenic Rail System**
Black Canyon of the Gunnison National Park	**C**	**210,000**	
Blackstone River Valley National Heritage Corridor	C	N/A	
Bluestone National Scenic Riverway	C	57,000	
Boston Harbor Island National Recreation Area	**V**	**120,000**	**Water transportation**
Boston National Historical Park and African-American National Historic Site	**C**	**2,800,000**	**Transit system service**
Bryce Canyon National Park	**C**	**1,700,000**	
Cabrillo National Monument	**C**	**1,200,000**	**Small/medium bus**
Canaveral National Seashore	**V**	**450,000**	
Canyon de Chelly National Monument	C	845,000	Truck tours
Cape Cod National Seashore	**C**	**4,850,000**	**Tram**
Cape Lookout National Seashore	C	357,500	Water transportation
Carlsbad Caverns National Park	**V**	**550,000**	
Chamizal National Monument	C	186,500	
Channel Islands National Park	C	574,250	Water transportation
Chattahoochee River National Recreation Area	**V**	**2,900,000**	
Chiricahua National Monument	**C**	**195,000**	**Small/medium bus**
Colonial National Historic Park	**V**	**9,000,000**	
Colorado National Monument	**V**	**525,000**	
Crater Lake National Park	**C**	**472,000**	**Boat tours**
Cuyahoga Valley National Recreation Area	**V**	**3,500,000**	**Standard bus Scenic Rail System**
Dayton Aviation Heritage National Historic Park	**C**	**500,000**	
Death Valley National Park	C	1,177,750	
Delaware and Lehigh National Heritage Corridor	C	N/A	
Delaware Water Gap National Recreation Area	**V**	**5,000,000**	

Note: Bolded sites have ATS needs identified in the study. Details of the types of ATS needs identified at each of these sites are provided in Table 4.2.

Table 4.1 Sites Reviewed for Transit Needs During This Study (continued)

	Visit/ Call	Annual Visitation	Existing ATS
National Park Service (continued)			
Denali National Park and National Preserve	**C**	**372,000**	**Standard bus**
Devil's Postpile National Monument	**V**	**125,000**	**Small/medium bus**
Devil's Tower National Monument	**V**	**400,000**	
Dinosaur National Park	**C**	**450,000**	**Tram**
Edison National Historic Site	C	61,500	
Effigy Mounds National Monument	**C**	**70,000**	
Eugene O'Neill National Historic Site	**C**	**5,000**	**Small/medium bus**
Everglades National Park	**V**	**1,000,000**	**Tram/boat tours**
Fire Island National Seashore	**C**	**550,000**	**Water transportation**
Fort Caroline National Monument	C	129,500	
Fort Clatsop National Memorial	**V**	**470,000**	
Fort McHenry National Monument & Historic Shrine	**C**	**684,758**	**Transit system service**
Fort Stanwix National Monument	**C**	**50,000**	
Fort Vancouver National Historic Site	C	365,000	
Fredericksburg & Spotsylvania National Military Park	**V**	**1,800,000**	
Gateway National Recreation Area	**V**	**7,800,000**	**Standard bus Water transportation**
Gauley River National Recreation Area	C	230,250	
Gettysburg National Military Park/ Eisenhower National Historic Site	**V**	**1,800,000**	**Standard bus**
Glacier National Park	**C**	**1,800,000**	**Small/medium bus Standard bus**
Glen Canyon National Recreation Area and Rainbow Bridge National Monument	**C**	**300,000**	**Boat tours**
Golden Gate National Recreation Area (without Muir Woods National Monument)	**C**	**13,050,000**	**Transit system service Water transportation**
Grand Canyon National Park	V	4,500,000	Standard bus
Grand Teton National Park	**V**	**2,757,000**	
Great Smoky Mountains National Park	**V**	**10,000,000**	**Historic trolley**
Haleakala National Park	**C**	**1,100,000**	
Harpers Ferry National Historic Park	**C**	**370,000**	**Standard bus**
Hawaii Volcanoes National Park	**C**	**200,000**	
Hopewell Culture National Historic Site	**V**	**37,000**	
Hot Springs National Park	**V**	**1,500,000**	**Historic trolley**
Independence National Historical Park	C	2,999,000	Transit system service
Indiana Dunes National Lakeshore	**V**	**2,000,000**	**Transit system service**
Isle Royale National Park	**C**	**5,125**	**Water transportation**
Jefferson National Expansion Memorial	**C**	**1,000,000**	**Small/medium bus**
Jimmy Carter National Historic Site	C	49,500	
Johnstown Flood National Memorial	**V**	**180,000**	
Joshua Tree National Park	C	1,410,500	

Note: Bolded sites have ATS needs identified in the study. Details of the types of ATS needs identified at each of these sites are provided in Table 4.2.

Table 4.1 Sites Reviewed for Transit Needs During This Study (continued)

	Visit/ Call	Annual Visitation	Existing ATS
National Park Service (continued)			
Kalaupapa National Historic Park	**C**	**75,000**	**Small/medium bus**
Keweenaw National Historic Park	**C**	**100,000**	
Klondike Gold Rush National Historical Park	C	108,000	
Lake Chelan National Recreation Area	C	45,750	
Lake Mead National Recreational Area	**C**	**9,000,000**	
Lake Meredith National Recreation Area	C	1,636,500	
Lake Roosevelt National Recreation Area	C	1,545,000	
Little Bighorn Battlefield National Monument	**V**	**400,000**	
Little River Canyon National Preserve	C	300,000	
Lowell National Historic Park	**C**	**550,000**	**Rail**
Lyndon B. Johnson National Historic Park	**C**	**125,000**	**Small/medium bus Standard bus**
Maggie L. Walker National Historic Site	V	9,500	
Manassas National Battlefield Park	**C**	**1,000,000**	
Manhattan NPS Sites (St. Paul's Church)	**C**	**8,000**	
Marsh-Billings-Rockefeller National Historical Park	**V**	**40,000**	
Martin Van Buren National Historic Site	C	20,000	
Mesa Verde National Park	**V**	**700,000**	**Tram**
Minute Man National Historic Park	**C**	**1,000,000**	**Standard bus**
Mojave National Preserve	**C**	**375,000**	
Montezuma Castle National Monument	**C**	**750,000**	
Morristown National Historical Park	**C**	**543,250**	
Mount Ranier National Park	**C**	**2,000,000**	
Muir Woods National Monument	**C**	**900,000**	
Natchez National Historic Park	**V**	**41,000**	**Historic trolley**
National Capital Parks	**C**	**30,000,000**	**Tram**
National Park of American Samoa	**C**	**11,200**	**Tram**
New Jersey Coastal Heritage Trail	C	N/A	
New River Gorge National Recreation Area	C	1,197,500	
North Cascades National Park	**C**	**32,750**	
Olympic National Park	C	3,577,000	
Oregon Caves National Monument	**V**	**100,000**	
Organ Pipe Cactus National Park	**C**	**300,000**	**Small/medium bus**
Ozark National Scenic Riverway	C	1,548,000	
Padre Island National Seashore	**V**	**900,000**	
Pea Ridge National Military Park	**C**	**92,000**	
Pecos National Historical Park	**C**	**45,000**	
Perry's Victory and International Peace Memorial	C	185,500	
Petersburg National Battlefield	**C**	**400,000**	

Note: Bolded sites have ATS needs identified in the study. Details of the types of ATS needs identified at each of these sites are provided in Table 4.2.

Table 4.1 Sites Reviewed for Transit Needs During This Study (continued)

	Visit/ Call	Annual Visitation	Existing ATS
National Park Service (continued)			
Petrified Forest National Park	**C**	**675,000**	
Petroglyph National Monument	C	77,500	
Pinnacles National Monument	**C**	**95,000**	**Small/medium bus**
Point Reyes National Seashore	**C**	**2,500,000**	**Standard bus**
Potomac Heritage Trail	C	N/A	
President's Park	C	1,334,000	
Pu'ukohola Heiau National Park	**C**	**200,000**	
Redwood National and State Parks	**V**	**1,400,000**	
Richmond National Battlefield Park	V	82,000	
Rocky Mountain National Park	**V**	**3,000,000**	**Standard bus**
Roosevelt Campobello International Park	C	150,000	
Roosevelt-Vanderbilt National Historic Sites	**C**	**385,000**	
Ross Lake National Recreation Area	C	425,250	
Saguaro National Park	**C**	**3,000,000**	
Saint-Gaudens National Historic Site	**C**	**35,000**	
Salem Maritime National Historic Site	**C**	**750,000**	
San Antonio Missions National Historic Park	**C**	**1,100,000**	**Standard bus**
San Francisco Maritime National Historical Park	**C**	**3,500,000**	
San Juan Island National Historical Park	**C**	**250,000**	**Small/medium bus**
San Juan National Historic Site	**C**	**2,300,000**	**Tram**
Santa Monica Mountains National Recreation Area	**V**	**561,000**	**Transit system service**
Saratoga National Historical Park	C	170,250	
Saugus Iron Works National Historic Site	C	23,000	
Scotts Bluff National Monument	**C**	**150,000**	**Small/medium bus**
Sequoia and Kings Canyon National Parks	**C**	**1,500,000**	**Small/medium bus**
Shenandoah National Park	**V**	**1,750,000**	**Small/medium bus**
Sitka National Historic Park	**C**	**180,000**	
Sleeping Bear Dunes National Lakeshore	**V**	**1,300,000**	**Water transportation**
Statue of Liberty and Ellis Island National Monument	C	5,200,500	Water transportation
St. Croix National Scenic Riverway	C	452,750	
Steamtown National Historic Site	**C**	**185,250**	**Scenic rail**
Sunset Crater Volcano National Monument	V	176,000	
Tallgrass Prairie National Preserve	**C**	**100,000**	**Small/medium bus**
Theodore Roosevelt Inaugural National Historic Site	C	12,500	
Theodore Roosevelt National Park	C	448,250	
Thomas Stone National Historic Site	C	7,000	
Timpanogos Cave National Monument	**C**	**125,000**	
Tonto National Monument	**C**	**80,000**	
Tumacacori National Historic Park	**C**	**62,500**	**Small/medium bus**

Note: Bolded sites have ATS needs identified in the study. Details of the types of ATS needs identified at each of these sites are provided in Table 4.2.

Table 4.1 Sites Reviewed for Transit Needs During This Study (continued)

	Visit/ Call	Annual Visitation	Existing ATS
National Park Service (continued)			
USS Arizona Memorial, Pearl Harbor	**V**	**1,500,000**	**Water transportation**
Valley Forge National Historic Park	**V**	**1,700,000**	**Standard bus**
Vicksburg National Military Park	C	1,006,000	
Virgin Islands National Park	**C**	**557,000**	
Voyageurs National Park	**C**	**250,000**	**Water transportation**
Walnut Canyon National Monument	**V**	**115,900**	
War in the Pacific National Historical Park	C	134,000	
Washita Battlefield National Historic Site	C	7,000	
Weir Farm National Historic Site	**C**	**10,000**	
Wheeling Heritage Area	C	N/A	
Whiskeytown National Recreational Area	**V**	**850,000**	
Wilson's Creek National Battlefield	**C**	**250,000**	
Wolf Trap Farm Park for the Performing Arts	**C**	**500,000**	**Small/medium bus**
Women's Right National Historic Park	**C**	**75,000**	
Wupatki National Monument	V	217,500	
Yellowstone National Park	**C**	**3,121,000**	
Yosemite National Parks	**C**	**4,000,000**	**Standard bus**
Zion National Park	**C**	**2,500,000**	**Tram**

Note: Bolded sites have ATS needs identified in the study. Details of the types of ATS needs identified at each of these sites are provided in Table 4.2.

Table 4.2 ATS Needs by Site

	Tram	Standard Bus	Other Bus	Historic Trolley	Water Transportation	Rail
Bureau of Land Management						
King Range National Conservation Area			●			
La Posa Long-Term Visitor Area			●			
North Moab Recreation Area			●			
Parker Strip Recreation Management Area					●	
Red Rock Canyon National Conservation Area			*			
Yaquina Head Outstanding Area			●			
U.S. Fish and Wildlife Service						
Bayou Sauvage National Wildlife Refuge		*	●			
Chincoteage National Wildlife Refuge	●					
Ding Darling National Wildlife Refuge	*		●		●	
Kenai National Wildlife Refuge			*			
Kilauea Point National Wildlife Refuge			●			
Laguna Atascosa National Wildlife Refuge			●			
Merritt Island National Wildlife Refuge			*			
Okefenokee National Wildlife Refuge	●		●			
Parker River National Wildlife Refuge		●	●			
Rocky Mountain Arsenal Nat. Wildlife Refuge	●		●			
Santa Ana National Wildlife Refuge	*		●			
St. Marks National Wildlife Refuge			●		●	
Tensas River National Wildlife Refuge			●			
National Park Service						
Acadia National Park		*				
Adams National Historic Park				*		
Allegheny Portage National Historic Site			●			
Antietam National Battlefield		●	●			
Arches National Park		●	●			
Assateague Island National Seashore			*			
Aztec Ruins National Monument			*			
Badlands National Park			●			
Bandelier National Monument			●			
Big South Fork National River and Recreation Area			●			*
Black Canyon of the Gunnison National Park			●			
Boston Harbor Island National Recreation Area					*	
Boston NHP & African-American NHS				*	●	
Bryce Canyon National Park			●			
Cabrillo National Monument			*			
Canaveral National Seashore					●	
Cape Cod National Seashore	*		●			
Carlsbad Caverns National Park		●				
Chattahoochee River National Recreation Area		●	●			
Chiricahua National Monument			*			
Colonial National Historic Park			●			
Colorado National Monument			●			
Crater Lake National Park					●	
Cuyahoga Valley National Recreation Area		*				*
Dayton Aviation Heritage National Historic Park				●		●
Delaware Water Gap National Recreation Area			●			
Denali National Park and National Preserve		*				
Devil's Postpile National Monument			*			

* Existing Transit Improvements Needed.
● New Transit Need.

Table 4.2 ATS Needs by Site (continued)

	Tram	Standard Bus	Other Bus	Historic Trolley	Water Transportation	Rail
National Park Service (continued)						
Devil's Tower National Monument		●	●			
Dinosaur National Park	*					
Effigy Mounds National Monument			●			
Eugene O'Neill National Historic Site			*			
Everglades National Park			*			
Fire Island National Seashore			●		*	
Fort Clatsop National Memorial		●				
Fort McHenry National Monument & Historic Shrine		*			●	
Fort Stanwix National Monument			●			
Fredericksburg & Spotsylvania Nat. Military Park			●			
Gateway National Recreation Area		*			*	
Gettysburg National Military Park		*	●			
Glacier National Park		*	*			
Glen Canyon NRA and Rainbow Bridge NM		*				
Golden Gate National Recreation Area		●			●	
Grand Teton National Park			●			
Great Smoky Mountains National Park			●	*		
Haleakala National Park			●			
Harpers Ferry National Historic Park		*	●			
Hawaii Volcanoes National Park			●			
Hopewell Culture National Historic Site			●		●	
Hot Springs National Park				*		
Indiana Dunes National Lakeshore			*			
Isle Royale National Park					*	
Jefferson National Expansion Memorial		●	*			
Johnstown Flood National Memorial			●			
Kalaupapa National Historic Park			*			
Keweenaw National Historic Park				●		
Lake Mead National Recreational Area		●				
Little Bighorn Battlefield National Monument		●	●			
Lowell National Historic Park					*	*
Lyndon B. Johnson National Historic Park		*	*			
Manassas National Battlefield Park				●		
Manhattan NPS Sites			●			
Marsh-Billings-Rockefeller Nat. Historical Park			●			
Mesa Verde National Park†	*	●				
Minute Man National Historic Park		*	●			
Mojave National Preserve			●			
Montezuma Castle National Monument		●	●			
Morristown National Historic Park			●			
Mount Ranier National Park		●	●			
Muir Woods National Monument			●			
Natchez National Historic Park			●	*		
National Capital Parks	*					
National Park of American Samoa	●		●			
North Cascades National Park			●			

* Existing Transit Improvements Needed.

● New Transit Need.

† Mesa Verde NP needs include both surface tram (existing) and aerial tram (proposed)..

Table 4.2 ATS Needs by Site (continued)

	Tram	Standard Bus	Other Bus	Historic Trolley	Water Transportation	Rail
National Park Service (continued)						
Oregon Caves National Monument			●			
Organ Pipe Cactus National Park			*			
Padre Island National Seashore			●			
Pea Ridge National Military Park			●			
Pecos National Historical Park			●			
Petersburg National Battlefield			●		●	
Petrified Forest National Park		●				
Pinnacles National Monument			*			
Point Reyes National Seashore		*				
Pu'ukohola Heiau National Park		●				
Redwood National and State Parks			●			
Rocky Mountain National Park			*			
Roosevelt-Vanderbilt National Historic Sites			●			
Saguaro National Park			●			
Saint-Gaudens National Historic Site			●			
Salem Maritime National Historic Site					●	
San Antonio Missions National Historic Park		*				
San Francisco Maritime National Historical Park			●		●	
San Juan Island National Historical Park			*			
San Juan National Historic Site	*					
Santa Monica Mountains Nat. Recreation Area		*	●		●	
Scotts Bluff National Monument			*			
Sequoia and Kings Canyon National Parks		●	*			
Shenandoah National Park			*			
Sitka National Historic Park		●				
Sleeping Bear Dunes National Seashore					*	
Steamtown National Historic Site						*
Tallgrass Prairie National Preserve			*			
Timpanogos Cave National Monument			●			
Tonto National Monument			●			
Tumacacori National Historic Park			*			
USS Arizona Memorial, Pearl Harbor					*	
Valley Forge National Historic Park		*	●		●	
Virgin Islands National Park					●	
Voyageurs National Park					*	
Walnut Canyon National Monument			●			
Weir Farm National Historic Site			●			
Whiskeytown National Recreational Area		●	●		●	
Wilson's Creek National Battlefield			●			
Wolf Trap Farm Park for the Performing Arts			*			
Women's Right National Historic Park	●					
Yellowstone National Park			●			
Yosemite National Park		*				
Zion National Park	*					

* Existing Transit Improvements Needed.

● New Transit Need.

It is important to note that the needs quantified in this study are not exhaustive for the three agencies. Specifically, over 200 NPS sites were not included in the study at all, and it is likely that some of these sites have transit needs. Also, during the time data were being collected for this project, there were studies underway at some of the sites included in the study. Some of these studies had not established a need or developed a specific transit system solution for which costs could be estimated. While these potential needs are recognized in the reports included in Appendix C, they could not be quantified to be included in the cost estimate developed for this report.

One notable project that had planning and implementation activities occurring during this study, but is not included in study, is the Grand Canyon NP transit project. This project is being developed in an entirely separate planning and project development process. It is anticipated that funding for the project will be generated entirely from revenues collected at the park, and will not need subsidies for capital and operating costs. Therefore, costs associated with the Grand Canyon project are not included in the cost estimates developed in this study. The Grand Canyon project is documented in Appendix C for informational purposes only.

It is important to recognize that the transit needs included in this study, including several capital-intensive projects, were identified through a limited planning and analysis process. Extensive additional planning, analysis and public involvement will be required to determine the technical, financial and/or environmental feasibility for these potential transit solutions prior to selecting preferred alternatives. The selected alternatives may differ substantially from the transit strategies identified as part of this study. The proposed Mesa Verde NP aerial tramway is an example of such a project, and is only one of a range of alternatives under preliminary consideration. In addition, some projects, such as proposed rail systems at Lowell and Dayton National Historic Parks, may serve local transit needs as well as Federal lands sites, and thus could be eligible for traditional transit funding programs.

Some of the capital-intensive projects identified in this study include:

- Construction of an aerial tramway with supporting shuttle bus service at the Mesa Verde NP;
- A long-term loop shuttle plan for Yosemite NP that would run as frequently as every 2.5 minutes during peak periods;
- Replacement of buses for the Denali NP system;
- 3.5-mile extension of the Lowell National Historic Park (NHP) historic trolley system;
- Trolley line linking Dayton NHP with Wright-Patterson Air Force Base;
- Purchase of ferries for a multi-route system for the Boston Harbor Islands;
- A mandatory shuttle at the Petrified Forest NP; and
- Replacement of ferries at the USS Arizona at Pearl Harbor.

4.2 Transit Needs Cost Summary

This section includes cost estimates of transit needs on federally-managed lands. The transit needs identified fall into three primary types of transportation: bus transit, rail/ guided transit, and waterborne transit. Because of the small number of rail projects identified, bus and rail needs are combined into a single "surface" transportation category in the tables. Estimates were developed for project development, capital, and operations and maintenance costs. Project development costs include conceptual planning, engineering design, and environmental evaluation. Capital costs include vehicle capital costs and other capital costs. Vehicle capital costs include the costs of purchasing vehicles (bus, tram, trolley, etc.) or waterborne vehicles (monohull, catamaran, etc). Other capital costs include maintenance and storage facilities, parking areas, docks, piers, administrative facilities, shelters, and waiting areas, and construction management costs for projects requiring significant construction. Operations and maintenance costs include the full range of administrative, operating and maintenance costs, including labor, benefits, fuel, parts, marketing expenses, and insurance. For the purposes of this study, operations and maintenance costs were generally estimated based on a single hourly operating cost that incorporates all of the factors identified above. A more detailed description of the cost estimation process is included in Appendix A.

Table 4.3 includes the short-term and long-term transit needs identify by agency and mode. All costs are presented in constant 1999 dollars and are not adjusted for inflation. Short-term needs are those anticipated between 2001 and 2010, while long-term needs are those expected to occur between 2011 and 2020. The total combined need for both periods (2001-2020) is estimated at approximately $1.71 billion. Of this total amount, approximately $678 million is required between 2001 and 2010 (short-term), with the remaining $1.03 billion required between 2011 and 2020 (long-term).

The growth in costs between the short-term and long-term periods is a result of two types of cost increases. A number of capital intensive projects were identified during the study that will require long lead times to plan and obtain funding. Therefore, the capital costs for these projects are included in the long-term period costs. Secondly, the annual operations and maintenance costs increase substantially because of the greater number of systems operating during the long-term period.

In general, bus transit is currently the most common mode of transit service operating on Federal lands, and is likely to continue as the predominant mode, although waterborne transit needs are significant as well. Table 4.3a provides a summary of potential ATS needs by agency and mode. Total combined short-term and long-term surface transit needs between 2001 and 2020 is approximately $1.44 billion, or 84 percent of the total transit need identified. Total combined short-term and long-term waterborne transit needs between 2001 and 2020 is approximately $267 million, or 16 percent of the total ATS need identified. Table 4.3b provides a more detailed breakdown of the estimated costs by agency, mode, and type of expenditure.

Table 4.3 Summary of Alternative Transportation System Needs on Federally-Managed Lands*

	Short-Term Costs (2001-2010)	Long-Term Costs (2011-2020)	Total Costs (2001-2020)
National Park Service			
Surface	$510,000,000	$ 827,000,000	$1,337,000,000
Water	94,000,000	123,000,000	217,000,000
NPS Total	**$604,000,000**	**$ 950,000,000**	**$1,554,000,000**
Bureau of Land Management			
Surface	$ 6,000,000	$ 7,000,000	$ 13,000,000
Water	9,000,000	8,000,000	17,000,000
BLM Total	**$ 15,000,000**	**$ 15,000,000**	**$ 30,000,000**
U.S. Fish and Wildlife Service			
Surface	$ 40,000,000	$ 53,000,000	$ 93,000,000
Water	19,000,000	14,000,000	33,000,000
USFWS Total	**$ 59,000,000**	**$ 67,000,000**	**$ 126,000,000**
GRAND TOTAL	**$678,000,000**	**$1,032,000,000**	**$1,710,000,000**

* Note: All estimates are in 1999 dollars and are not adjusted for inflation.

Table 4.3a Summary of Potential ATS Needs by Agency and Mode

	Total Transit Costs (2001 – 2020)		
	Surface	Water	Total
NPS	$1,337,000,000	$217,000,000	$1,554,000,000
BLM	13,000,000	17,000,000	30,000,000
USFWS	93,000,000	33,000,000	126,000,000
TOTAL	**$1,443,000,000**	**$267,000,000**	**$1,710,000,000**

National Park Service

Transit needs were identified at 118 of the 169 NPS sites evaluated. Bus transit accounts for the greatest proportion of ATS needs identified at NPS sites, and includes a wide variety of bus types including full, medium, and small buses, trams, trams with trailers, and trolley buses. In some locations, alternative fuel vehicles are proposed.

Table 4.3b Potential ATS Needs by Agency, Mode, and Type of Expenditure*

	Short Term 2001-2010				Long Term 2011-2020			
	Project Development	**Vehicle Capital Costs**	**Other Capital Costs**	**Operations & Maintenance**	**Project Development**	**Vehicle Capital Costs**	**Other Capital Costs**	**Operations & Maintenance**
National Park Service								
Surface	$28,688,111	$123,678,125	$63,582,445	$292,818,340	$41,411,679	$182,413,125	$130,304,000	$472,613,540
Water	7,288,750	24,100,000	22,000,500	40,709,800	7,179,200	41,800,000	8,343,000	65,738,600
NPS Total	**$35,976,861**	**$147,778,125**	**$85,582,945**	**$333,528,140**	**$48,590,879**	**$224,213,125**	**$138,647,000**	**$538,352,140**
Bureau of Land Management								
Surface	$ 136,100	$ 925,000	$ 249,000	$ 4,947,800	$ 71,200	$ 1,025,000	$ 50,000	$ 6,126,000
Water	338,775	900,000	1,358,500	6,737,600	112,925	900,000	0	6,737,600
BLM Total	**$ 474,875**	**$ 1,825,000**	**$ 1,607,500**	**$ 11,685,400**	**$ 184,125**	**$ 1,925,000**	**$ 50,000**	**$ 12,863,600**
U.S. Fish and Wildlife Service								
Surface	$ 1,689,650	$ 6,060,000	$ 4,590,000	$ 28,317,100	$ 2,233,000	$ 10,545,000	$ 3,912,000	$ 36,098,300
Water	1,026,600	1,600,000	3,533,000	12,562,000	256,650	1,600,000	0	12,562,000
USFWS Total	**$ 2,716,250**	**$ 7,660,000**	**$ 8,123,000**	**$ 40,879,100**	**$ 2,489,650**	**$ 12,145,000**	**$ 3,912,000**	**$ 48,660,300**
TOTAL	**$39,167,986**	**$157,263,125**	**$95,313,445**	**$386,092,640**	**$51,264,654**	**$238,283,125**	**$142,609,000**	**$599,876,040**

* Note: All estimates are in 1999 dollars and are not adjusted for inflation.

The total 20-year transit needs on NPS sites is approximately $1.55 billion. Of this total, approximately $604 million is needed between 2001 and 2010, and approximately $950 million is needed between 2011 and 2020.

The majority of the identified NPS transit needs are for surface transit systems. The total 20-year cost estimate for surface transit systems is approximately $1.34 billion. Of this total, approximately $510 million is needed between 2001 and 2010, while approximately $827 million is needed between 2011 and 2020.

The total 20-year cost estimate for NPS waterborne transit systems is approximately $217 million. Approximately $94 million is needed between 2001 and 2010, and approximately $123 million is needed between 2011 and 2020.

Bureau of Land Management

Transit needs were identified at 6 of the 15 BLM sites evaluated. Waterborne transit needs account for the greatest proportion of ATS needs identified at BLM sites. Bus transit needs include medium and small shuttle bus systems.

The total 20-year transit needs on BLM sites is approximately $30 million. Of this total, approximately $15 million is needed between 2001 and 2010, and approximately $15 million is needed between 2011 and 2020.

The majority of the identified BLM transit needs are for waterborne transit systems. The total 20-year cost estimate for waterborne transit systems is approximately $17 million. Approximately $9 million is needed between 2001 and 2010, and approximately $8 million is needed between 2011 and 2020.

The total 20-year cost estimate for BLM surface transit systems is approximately $13 million. Approximately $6 million is needed between 2001 and 2010, and approximately $7 million is needed between 2011 and 2020.

U.S. Fish and Wildlife Service

Transit needs were identified at 13 of the 23 USFWS sites evaluated. Bus transit needs account for the greatest proportion of transit needs identified at USFWS sites, including a wide variety of technologies such as full, medium, and small buses, trams, and trams with trailers. Waterborne transit needs include small monohulls.

The total 20-year transit needs on USFWS sites is approximately $126 million. Of this total, approximately $59 million is needed between 2001 and 2010, and approximately $67 million is needed between 2011 and 2020.

The majority of the identified USFWS transit needs are for surface transit systems. The total 20-year cost estimate for surface transit systems is approximately $93 million. Approximately $40 million is needed between 2001 and 2010, and approximately $53 million is needed between 2011 and 2020.

The total 20-year cost estimate for USFWS waterborne transit systems is approximately $33 million. Approximately $19 million is needed between 2001 and 2010, and approximately $14 million is needed between 2011 and 2020.

Potential ATS Needs by Agency, System Status and Type of Expenditure

Table 4.4 provides funding needs for existing systems (including expansion of those systems) and new systems. The total project development and capital costs for existing systems between 2001 and 2020 is $282 million. The total project development and capital costs for new systems during the same period is $442 million.

This increased demand for new systems is the major factor driving the increase in projected needs between 2011 and 2020. Between 2001 and 2010 roughly half of the projected need is for existing and/or expanded systems and half is for new systems. Between 2011 and 2020, the proportion of projected need for new systems rises to approximately 70 percent, a result of the fact that a number of capital-intensive projects were identified for this period. These projects require a long lead time for planning, implementation, and funding.

It should be noted that for the BLM and the USFWS, the needs in the "other capital costs" category go down in the long-term period, and in several cases are reduced to zero. This is because "other capital costs" primarily include major items such as maintenance facilities, docks, and piers. It was assumed that the life of these facilities would exceed 20 years. Therefore, if such an investment were included during the short-term period (2001-2010) and there was no proposed expansion of the system during the long-term period (2011-2020) then no needs would be assumed in the "other capital costs" category during the long-term period. Vehicles and vessels, on the other hand, were assumed to have a 10-year life, so replacement needs are identified in the long-term (2011-2020) period.

Potential ATS Needs by State

Tables 4.5 through 4.7 summarize transit needs by State. Table 4.5 shows the total ATS needs in the short- and long-term periods, and the total ATS needs for the entire study period (2001-2020) by State. Table 4.6 provides detailed information that supports the total costs shown in Table 4.5. In Table 4.6, the ATS costs for each state are separated into up-front costs (project development and capital) and operations and maintenance costs. Table 4.7 further breaks down the information provided in Tables 4.5 and 4.6. The up-front costs shown in Table 4.7 are separated into project development costs, vehicle capital costs, and other capital costs.

Table 4.7 also indicates the number of transit systems identified in each state. Some states have sites where more than one transit system identified, for example, both surface and water transportation systems. States with over $10 million in capital needs identified for the 2001-2010 period are Alaska, California, Colorado, Washington, D.C., Florida, Hawaii, Massachusetts, Montana, Nevada, New York, Utah, and Washington. States that have an estimated need of over $1 million annually in operations and maintenance costs are Alaska, Arizona, California, Colorado, Florida, Hawaii, Massachusetts, Michigan, New Mexico, New York, Texas, Utah, Virginia, and Washington. States with the largest increases in capital expenditures in the long-term period are Colorado, California, Massachusetts, Arizona, Wyoming, and Virginia.

Table 4.4 Potential ATS Needs by Agency, System Status, and Type of Expenditure*

	Costs for Existing and Expansion of Existing Systems					Costs for New System					Total Up-Front Costs for Existing, Expanded, and New Systems	Total Operations and Maintenance Costs
	Project Development	Vehicle Capital Costs	Other Capital Costs	Total Up† Front Costs	Operations & Maintenance	Project Development	Vehicle Capital Costs	Other Capital Costs	Total Up† Front Costs	Operations & Maintenance		
Short Term (2001-2010)												
BLM	$ 45,000	$ 450,000	$ 0	$ 495,000	$ 2,419,800	$ 429,875	$ 1,375,000	$ 1,607,500	$ 3,412,375	$ 9,265,600	$ 3,907,375	$ 11,685,400
FWS	979,700	2,995,000	2,642,000	6,616,700	8,817,800	1,736,550	4,665,000	5,481,000	11,882,550	32,061,300	18,499,250	40,879,100
NPS	21,659,119	93,298,125	42,066,000	157,023,244	147,646,800	14,317,742	54,480,000	43,516,945	112,314,687	185,881,340	269,337,931	333,528,140
Subtotal	**$22,683,819**	**$ 96,743,125**	**$44,708,000**	**$164,134,944**	**$158,884,400**	**$16,484,167**	**$ 60,520,000**	**$ 50,605,445**	**$127,609,612**	**$227,208,240**	**$291,744,556**	**$386,092,640**
Long Term (2011-2020)												
BLM	$ 22,500	$ 450,000	$ 0	$ 472,500	$ 2,419,800	$ 161,625	$ 1,475,000	$ 50,000	$ 1,686,625	$ 10,443,800	$ 2,159,125	$ 12,863,600
FWS	281,850	2,995,000	0	3,276,850	8,817,800	2,207,800	9,150,000	3,912,000	15,269,800	39,842,500	18,546,650	48,660,300
NPS	8,367,606	94,973,125	10,743,000	114,083,731	151,895,800	40,223,272	129,240,000	127,904,000	297,367,272	386,456,340	411,451,004	538,352,140
Subtotal	**$ 8,671,956**	**$ 98,418,125**	**$10,743,000**	**$117,833,081**	**$163,133,400**	**$42,592,697**	**$139,865,000**	**$131,866,000**	**$314,323,697**	**$436,742,640**	**$432,156,779**	**$599,876,040**
TOTAL (2001-2020)	**$31,355,775**	**$195,161,250**	**$55,451,000**	**$281,968,025**	**$322,017,800**	**$59,076,864**	**$200,385,000**	**$182,471,445**	**$441,933,309**	**$663,950,880**	**$723,901,334**	**$985,968,680**

* Note: All estimates are in 1999 dollars and are not adjusted for inflation.

† Note: Total Up-Front Costs include project development costs, vehicle capital costs and other capital costs.

Table 4.5 Potential ATS Needs by State*

State	Short-term (2001-2010) Total	Long-term (2011-2020) Total	Total 2000-2020 Costs
Alaska	$ 44,707,800	$ 36,972,300	$ 81,680,100
Arizona	37,389,525	90,708,875	128,098,400
Arkansas	2,957,500	2,940,500	5,898,000
American Samoa	6,988,600	3,106,100	10,094,700
California	69,432,150	222,128,150	291,560,300
Colorado	25,016,000	162,603,100	187,619,100
Connecticut		3,192,200	3,192,200
Washington, D.C.	24,000,000	21,000,000	45,000,000
Florida	41,077,900	31,973,700	73,051,600
Georgia	7,482,550	6,998,950	14,481,500
Hawaii	32,848,700	35,302,850	68,151,550
Indiana	392,600	369,100	761,700
Iowa	327,600	325,100	652,700
Kansas	5,074,000	10,090,900	15,164,900
Louisiana	2,181,500	4,620,800	6,802,300
Maine	4,017,594	3,831,281	7,848,875
Maryland	12,645,450	10,365,250	23,010,700
Massachusetts	68,550,275	108,360,925	176,911,200
Michigan	16,882,600	14,893,225	31,775,825
Minnesota	5,543,000	3,476,625	9,019,625
Mississippi	3,099,800	3,046,800	6,146,600
Missouri	5,284,300	5,219,550	10,503,850
Montana	25,163,050	18,759,450	43,922,500
Nebraska	859,200	854,200	1,713,400
Nevada	15,117,350	8,087,650	23,205,000
New Hampshire	599,600	597,100	1,196,700
New Mexico	22,526,000	22,158,500	44,684,500
New York	34,919,150	26,855,875	61,775,025
North Carolina	11,369,400	9,985,700	21,355,100
Ohio	7,713,700	9,310,150	17,023,850
Oregon	5,656,500	4,215,950	9,872,450
Pennsylvania	10,440,750	11,712,350	22,153,100
Puerto Rico	5,688,800	4,814,150	10,502,950
Tennessee	1,574,400	3,110,100	4,684,500
Texas	15,846,200	15,290,100	31,136,300
Utah	43,944,800	40,063,900	84,008,700
Vermont	933,100	933,100	1,866,200
Virginia	25,553,375	33,830,325	59,383,700
Washington	23,745,777	17,881,037	41,626,814
West Virginia	6,711,200	8,350,400	15,061,600
Wyoming	3,575,400	13,696,500	17,271,900
TOTAL	**$677,837,196**	**$1,032,032,819**	**$1,709,870,014**

* Note: All estimates are in 1999 dollars and are not adjusted for inflation.

Table 4.6 Potential ATS Needs by State, Up-Front Costs and Operations and Maintenance Costs*

State	Short-Term 2001-2010 Costs		Long-Term 2011-2020 Costs		Total 2000-2020 Costs	
	Up-Front Costs†	Operations & Maintenance	Up-Front Costs†	Operations & Maintenance	Up-Front Costs†	Operations & Maintenance
Alaska	$ 30,261,000	$ 14,446,800	$ 22,525,500	$ 14,446,800	$ 52,786,500	$ 28,893,600
Arizona	10,246,675	27,142,850	26,238,625	64,470,250	36,485,300	91,613,100
Arkansas	426,500	2,531,000	409,500	2,531,000	836,000	5,062,000
American Samoa	4,260,000	2,728,600	377,500	2,728,600	4,637,500	5,457,200
California	27,029,550	42,402,600	68,157,150	153,971,000	95,186,700	196,373,600
Colorado	10,596,200	14,419,800	131,183,300	31,419,800	141,779,500	45,839,600
Connecticut			115,000	3,077,200	115,000	3,077,200
Washington, D.C.	24,000,000		21,000,000	0	45,000,000	
Florida	14,639,100	26,438,800	5,534,900	26,438,800	20,174,000	52,877,600
Georgia	1,903,950	5,578,600	1,420,350	5,578,600	3,324,300	11,157,200
Hawaii	16,695,350	16,153,350	15,467,900	19,834,950	32,163,250	35,988,300
Indiana	77,000	315,600	53,500	315,600	130,500	631,200
Iowa	55,000	272,600	52,500	272,600	107,500	545,200
Kansas	2,015,200	3,058,800	2,155,900	7,935,000	4,171,100	10,993,800
Louisiana	682,500	1,499,000	840,000	3,780,800	1,522,500	5,279,800
Maine	1,567,594	2,450,000	1,381,281	2,450,000	2,948,875	4,900,000
Maryland	5,977,650	6,667,800	3,697,450	6,667,800	9,675,100	13,335,600
Massachusetts	29,499,375	39,050,900	48,749,625	59,611,300	78,249,000	98,662,200
Michigan	6,331,800	10,550,800	3,290,225	11,603,000	9,622,025	22,153,800
Minnesota	2,991,000	2,552,000	924,625	2,552,000	3,915,625	5,104,000
Mississippi	286,000	2,813,800	233,000	2,813,800	519,000	5,627,600
Missouri	984,500	4,299,800	919,750	4,299,800	1,904,250	8,599,600
Montana	16,533,250	8,629,800	10,129,650	8,629,800	26,662,900	17,259,600
Nebraska	110,000	749,200	105,000	749,200	215,000	1,498,400
Nevada	10,068,550	5,048,800	3,038,850	5,048,800	13,107,400	10,097,600
New Hampshire	55,000	544,600	52,500	544,600	107,500	1,089,200
New Mexico	3,570,000	18,956,000	3,202,500	18,956,000	6,772,500	37,912,000
New York	16,230,350	18,688,800	8,167,075	18,688,800	24,397,425	37,377,600
North Carolina	5,685,600	5,683,800	4,301,900	5,683,800	9,987,500	11,367,600
Ohio	3,412,300	4,301,400	3,516,550	5,793,600	6,928,850	10,095,000
Oregon	2,814,100	2,842,400	1,100,950	3,115,000	3,915,050	5,957,400
Pennsylvania	2,307,750	8,133,000	2,123,750	9,588,600	4,431,500	17,721,600
Puerto Rico	2,149,200	3,539,600	1,274,550	3,539,600	3,423,750	7,079,200
Tennessee	210,000	1,364,400	367,500	2,742,600	577,500	4,107,000
Texas	2,408,200	13,438,000	1,852,100	13,438,000	4,260,300	26,876,000
Utah	11,528,000	32,416,800	6,741,500	33,322,400	18,269,500	65,739,200
Vermont	52,500	880,600	52,500	880,600	105,000	1,761,200
Virginia	7,742,775	17,810,600	13,290,925	20,539,400	21,033,700	38,350,000
Washington	11,400,637	12,345,140	5,535,897	12,345,140	16,936,534	24,690,280
West Virginia	3,072,800	3,638,400	3,295,200	5,055,200	6,368,000	8,693,600
Wyoming	1,867,600	1,707,800	9,280,300	4,416,200	11,147,900	6,124,000
TOTAL	**$291,744,556**	**$386,092,640**	**$432,156,779**	**$599,876,040**	**$723,901,334**	**$985,968,680**

* Note: All estimates are in 1999 dollars and are not adjusted for inflation.

† Note: Total Up-Front Costs include project development costs, vehicle capital costs and other capital costs.

Table 4.7 Potential ATS Needs by State and Type of Expenditure*

State	Short-Term Costs (2001-2010) # Transit Systems**	Project Development	Vehicle Capital Costs	Other Capital Costs	Operations & Maintenance	Long-Term Costs (2011-2020) # Transit Systems**	Project Development	Vehicle Capital Costs	Other Capital Costs	Operations & Maintenance
Alaska	4	$ 2,751,000	$21,150,000	$ 6,360,000	$ 14,446,800	4	$ 1,375,500	$21,150,000	$ 0	$ 14,446,800
Arizona	9	1,190,175	3,850,000	5,206,500	27,142,850	11	4,104,625	15,800,000	6,334,000	64,470,250
Arkansas	2	36,500	390,000		2,531,000	2	19,500	390,000		2,531,000
American Samoa	2	710,000	200,000	3,350,000	2,728,600	2	177,500	200,000	0	2,728,600
California	16	3,669,550	15,190,000	8,170,000	42,402,600	20	5,890,650	44,315,000	17,951,500	153,971,000
Colorado	7	1,530,200	6,530,000	2,536,000	14,419,800	8	21,153,300	20,030,000	90,000,000	31,419,800
Connecticut						1	15,000	100,000		3,077,200
Washington, DC	1	4,000,000	20,000,000			1	1,000,000	20,000,000		
Florida	8	1,974,600	5,030,000	7,634,500	26,438,800	8	504,900	5,030,000	0	26,438,800
Georgia	2	196,950	1,335,000	372,000	5,578,600	2	85,350	1,335,000	0	5,578,600
Hawaii	6	1,984,350	13,480,000	1,231,000	16,153,350	6	898,900	14,155,000	414,000	19,834,950
Iowa	1	5,000	50,000		272,600	1	2,500	50,000		272,600
Indiana	1	7,000	50,000	20,000	315,600	1	3,500	50,000	0	315,600
Kansas	2	183,200	400,000	1,432,000	3,058,800	2	242,900	1,100,000	813,000	7,935,000
Louisiana	2	32,500	650,000		1,499,000	3	40,000	800,000		3,780,800
Maine	1	204,469	1,313,125	50,000	2,450,000	1	68,156	1,313,125	0	2,450,000
Maryland	3	528,650	3,425,000	2,024,000	6,667,800	3	272,450	3,425,000	0	6,667,800
Massachusetts	12	4,410,875	8,200,000	16,888,500	39,050,900	13	7,341,125	25,170,000	16,238,500	59,611,300
Michigan	3	1,055,300	2,370,000	2,906,500	10,550,800	3	373,225	2,710,000	207,000	11,603,000
Minnesota	1	498,500	800,000	1,692,500	2,552,000	1	124,625	800,000	0	2,552,000
Mississippi	2	26,000	220,000	40,000	2,813,800	2	13,000	220,000	0	2,813,800

* Note: All estimates are in 1999 dollars and are not adjusted for inflation.

** Some sites have multiple transit systems.

Table 4.7 Potential ATS Needs by State and Type of Expenditure* (continued)

State	Short-Term Costs (2001-2010) # Transit Systems**	Project Development	Vehicle Capital Costs	Other Capital Costs	Operations & Maintenance	Long-Term Costs (2011-2020) # Transit Systems**	Project Development	Vehicle Capital Costs	Other Capital Costs	Operations & Maintenance
Missouri	3	89,500	875,000	20,000	4,299,800	3	44,750	875,000	0	4,299,800
Montana	2	2,440,250	9,425,000	4,668,000	8,629,800	2	704,650	9,425,000	0	8,629,800
Nebraska	1	10,000	100,000		749,200	1	5,000	100,000		749,200
Nevada	3	1,291,550	2,600,000	6,177,000	5,048,800	3	438,850	2,600,000	0	5,048,800
New Hampshire	1	5,000	50,000		544,600	1	2,500	50,000		544,600
New Mexico	4	520,000	3,050,000		18,956,000	4	152,500	3,050,000		18,956,000
New York	7	2,188,850	7,465,000	6,576,500	18,688,800	7	702,075	7,465,000	0	18,688,800
North Carolina	2	947,600	4,065,000	673,000	5,683,800	2	236,900	4,065,000	0	5,683,800
Ohio	4	390,300	1,890,000	1,132,000	4,301,400	4	343,550	2,190,000	983,000	5,793,600
Oregon	3	445,100	925,000	1,444,000	2,842,400	3	125,950	975,000	0	3,115,000
Pennsylvania	6	280,750	1,335,000	692,000	8,133,000	7	211,750	1,610,000	302,000	9,588,600
Puerto Rico	2	358,200	1,185,000	606,000	3,539,600	2	89,550	1,185,000	0	3,539,600
Tennessee	1	10,000	200,000		1,364,400	1	17,500	300,000	50,000	2,742,600
Texas	6	301,200	1,750,000	357,000	13,438,000	6	102,100	1,750,000	0	13,438,000
Utah	4	1,798,000	6,150,000	3,580,000	32,416,800	5	491,500	6,200,000	50,000	33,322,400
Vermont	1	2,500	50,000		880,600	1	2,500	50,000		880,600
Virginia	7	967,275	4,025,000	2,750,500	17,810,600	7	1,882,925	7,910,000	3,498,000	20,539,400
Washington	2	1,482,692	5,040,000	4,877,945	12,345,140	2	495,897	5,040,000	0	12,345,140
West Virginia	1	400,800	1,800,000	872,000	3,638,400	2	311,200	1,950,000	1,034,000	5,055,200
Wyoming	1	243,600	650,000	974,000	1,707,800	1	1,196,300	3,350,000	4,734,000	4,416,200
TOTAL	**146**	**$39,167,986**	**$157,263,125**	**$95,313,445**	**$386,092,640**	**159**	**$51,264,654**	**$238,283,125**	**$142,609,000**	**$599,876,040**

* Note: All estimates are in 1999 dollars and are not adjusted for inflation.

** Some sites have multiple transit systems.

The costs associated with transit needs identified in the Eastern states primarily include major expansions of water transportation systems associated with the Boston Harbor Islands National Recreation Area and the Gateway National Recreation Areas in New York and New Jersey. Other waterfront sites in the Boston and New York regions would be included in these projects as well, including the Boston National Historic Park and the Statue of Liberty, Ellis Island. At sites such as the USS Arizona Memorial in Hawaii and Denali NP in Alaska, high costs result from a need to replace aging equipment. Some of the major projects discussed at the beginning of this section, such as the Mesa Verde Aerial Tramway and the Yosemite Loop Shuttle expansion, have a major impact on long-term costs.

It should be noted that for a number of States identified in Table 4.7, the needs in the "other capital costs" category go down in the long-term period, and in several cases are reduced to zero. This is because "other capital costs" primarily include major items such as maintenance facilities, docks, and piers. It was assumed that the life of these facilities would exceed 20 years. Therefore, if such an investment were included during the short-term period (2001-2010) and there was no proposed expansion of the system during the long-term period (2011-2020) then no needs would be assumed in the "other capital costs" category during the long-term period. Vehicles and vessels, on the other hand, were assumed to have a 10-year life, so replacement needs are identified in the long-term (2011-2020) period.

4.3 Economic Impacts

The provision of transit in federally-managed lands can have national economic implications as well as significant economic benefits for local areas surrounding the sites. These local and overall economic effects can be relevant for project planning as well as for program financing.

Impacts on public and private sector revenues and spending patterns occur as a result of three basic forces: 1) capital investment in equipment and facilities; 2) ongoing transportation system operations; and 3) changes in site visitation and associated visitor spending. The economic impacts can also have very different interpretations, depending on whether they are examined from the viewpoint of the national economy or the viewpoint of local economic development. The economic impacts and benefits on a national and local level are discussed below.

National Perspective

The implementation of transit service requires continued capital investment and ongoing operations activities. Based on the estimated level of investment and ongoing operations for these systems, the following types of economic effects are expected to occur:

- Increased capital investment in transportation vehicles – mostly buses, with some waterborne vessels and rail or other types of shuttle systems. Such vehicle purchases support vehicle manufacturers, and associated production-related jobs.

- Increased capital investment in right-of-way and terminal facilities – including parking lots, benches, shelters, loading docks or piers, vehicle maintenance and storage facilities, and in some cases dedicated travel lanes or other right-of-way improvements. The construction of these facilities would provide construction-related jobs.

- Increased project development expenditures – including engineering, architecture, and planning design work for new transit projects. These expenditures generate additional income and jobs for design and planning firms.

- Increased transportation-related employment including operating and maintaining transit equipment and facilities that would provide jobs and associated income for vehicle operators and repair/maintenance workers.

- Increased spending on suppliers of materials and services – including suppliers of sheet metal, motors, rubber tires, plastic interior components, and other parts required by the vehicle manufacturers. It would also include suppliers of wood, gravel, cement, structural metal, or other materials needed for the facility construction. It would further include suppliers of motor fuel and replacement parts needed for ongoing operation of the vehicles.

- There could also be induced effects caused by the spending of income by workers. In other words, when new jobs are created, they provide new sources of income that generate additional consumer spending demand, which creates the need for additional jobs.

- Other effects on visitor spending patterns at some sites will also occur, because they will be able to accommodate greater demand and provide a higher level of service to visitors. While those effects represent definite benefits to visitors around the country, their economic effects would differ greatly from site to site. When viewed from the perspective of the overall national economy, though, they would appear as a redistribution of where visitor spending occurs and would not be expected to change the aggregate total amount of household spending on recreation activities in the U.S.

Potential National Level Impacts

The total capital and operating costs of ATS at all of the proposed sites were estimated and then summed to represent the national-level "direct effect" of the ATS program. The spending mix associated with these direct effects was also calculated based on available information about the types of vehicles, facilities and services being proposed. (All estimates in this section are in constant 1999 dollars.)

These direct effects will generate additional flows of income and support additional jobs through the U.S. economy. The calculations of these flows of dollars, and particularly the indirect and induced effects, were calculated using the IMPLAN version of the national input-output model. That national model is primarily based on inter-industry purchase and spending data compiled by the U.S. Department of Commerce, Bureau of Economic Analysis.

Capital investment over the next 20 years, if all the transit needs identified in the study were funded, will involve $650 million of one-time direct spending, and is estimated to ultimately support over $1.9 billion in total business output (sales), providing over 16,000 job-years of employment and $605 million in personal income in the U.S. Due to the equipment-intensive nature of vehicle manufacturing, the capital investment element of the program is expected to support roughly 25 jobs per million dollars of direct expenditure.

Project development expenditures are estimated to be $90 million over the next 20 years. These professional service purchases are expected to generate $287 million of output, support 3,500 job-years of employment, and provide $118 million in income.

Average annual expenditures on operations and maintenance are expected to be $49 million per year. These expenditures are estimated ultimately to support $129 million in total business output (sales) each year, providing almost 1,900 jobs and $54 million in total personal income every year. Due to the more labor-intensive nature of transit operations and maintenance, that element of the program is expected to support roughly 40 jobs for each million dollars in direct spending.

Table 4.8 summarizes these overall national economic effects described above. It is important to note that national spending on other types of programs or services (instead of transit) could also support jobs and provide income to workers within the U.S. Thus, these figures represent just the economic effects of spending on the transit program, and do not reflect the opportunity costs of foregoing other possible uses of Federal funds.

Table 4.8 National Economic Effects
Potential Economic Impacts of Program Investment and Operations

Category	Direct Program Expenditures	Total Effect – National Level		
		Output	Employment	Income
One-time Capital Expenditures	$650M	$1,929M	16,600	$605M
One-time Project Development Expenditures	$ 90M	$ 287M	3,500	$118M
Annual Operations & Maintenance	$ 49M	$ 129M	1,900	$ 54M

All money figures in millions of constant 1999 dollars; total effects calculated using IMPLAN model for U.S.

Potential Local/Regional Economic Impacts

From the perspective of communities in the local area surrounding a Federal lands site, the economic effects of implementing transit are different from the national perspective:

- The effects of changes in *visitor spending* patterns, while viewed as a redistribution of spending at the national level, are potentially very significant for the local economies of

affected areas. For some gateway communities, clogged roads, insufficient parking, or other problems of site access are now constraining the number of visitors or the length of time they stay in the community. In some of those cases, transit can increase the number of visitors to the site and increase the amount of visitor spending in the surrounding communities. The aggregate change in local spending is both a measure of direct economic impact on the local economy and an indicator of the increase in site visitation that reflects benefits to site visitors.

- The direct capital investment in *purchases* of transportation vehicles will generally not provide jobs or income to local workers unless there happened to be a manufacturer of transit vehicles in the local area. That does not appear to be the case for most transit sites. Therefore, this analysis assumes that vehicle purchases (bus, boat, etc.) fully affect the national economy but affect the relevant local economies to a much lesser degree.

- The direct spending on *construction* of right-of-way, docks and piers and terminal/maintenance facilities will provide local construction jobs and associated income for workers which would generally not occur without the transit investment. The construction activity would represent a net growth of jobs and income generated in the local area, as long as there are residents of the local area who could travel to the site to work on the construction.

- The direct *operations* activities would provide jobs and associated income for operators and maintenance workers which also will most likely not occur without the transit investment. Operations activity will provide a net growth of jobs and income generated in the local area, as long as there are qualified residents who could travel to work at the site.

- The broader *indirect* effects will be much smaller at the local level than at the national level, since they will occur only insofar as there are some local area suppliers of materials used in manufacturing or delivery of the vehicles (very limited in most cases) or local area suppliers of construction materials and services (generally applicable for most areas).

- The *induced* effects caused by spending of worker income will also represent economic growth at the local level, insofar as it represents additional dollars spent on food, clothing, and other consumer purchases which would not occur without the additional local jobs supported by the transit program.

Potential Local Economic Impacts for Five Case Studies

The localized effects will differ by location, depending on a) the expected change in visitation to the specific site, b) the amount of visitor-oriented business activity occurring in surrounding communities, c) the nature of the proposed ATS system construction and operation, and d) the size and diversity of the county economic base (as a source of suppliers for related goods and services). These localized effects are illustrated through five examples.

For each of these examples, specific counties surrounding (or adjacent to) the federally-managed sites and their gateway communities were identified. Counties included in the

analysis were those impacted economically by site visitation. The indirect and induced effects on those local counties were then calculated using county-specific IMPLAN models. These IMPLAN models provide different estimates of local (county) impacts for each site by accounting for the following factors:

- The levels of business activity to be supported in each county will differ depending on the nature of the ATS spending and the projected change in visitor spending. Those projects requiring less equipment and more operators, and those projects with larger ATS impacts on visitation, will also tend to have larger local job impacts.

- The levels of business activity to be supported in each county will also differ depending on the portion of total spending which goes to local firms, as opposed to suppliers outside the county. Those counties with larger and more diverse business sectors will tend to keep more of the business sales for goods and services suppliers within the county.

The level of income generated in each county will further differ depending on the average wage levels in that county. Those counties with higher wage rates will also provide more income per job.

Chincoteague National Wildlife Refuge and Assateague National Seashore (Accomack County, Virginia) – One potential proposal for Chincoteague National Wildlife Refuge includes tram service between the town, the visitor center, and the beach. The beach is currently operating below its carrying capacity on peak days because of parking constraints. The proposed improvements would allow the site to serve an additional 24,000 visitors and, as shown in Table 4.9, would result in $1.2 million in new visitor spending yearly dependent on the availability of local accommodations. This increased demand for food, lodging, and retail purchases could expand local business sales (including indirect and induced effects) by almost $1.7 million, providing 47 jobs and a potential net growth of $640 million in local income. The ATS operations and maintenance activities could lead to an additional $132,000 in county-wide business sales, providing roughly three new jobs and a net growth of $63,000 in local income. One-time capital expenditures could generate a further $1.3 million in local business sales, providing $436,000 in local personal income (with the equivalent of 17 local jobs for one year).

Table 4.9 ATS at Chincoteague National Wildlife Refuge
Potential Local Economic Impacts on Accomack County, Virginia

Category	Direct Program Effect	Total Effect on County Economy		
		Output	Employment	Income
One-Time Capital Expenditures	$2,924,000	$1,283,000	17	$436,000
Annual Operations & Maintenance	$ 215,000	$ 132,000	3	$ 63,000
Annual Visitor Spending	$1,200,000	$1,680,000	47	$640,000

All money figures in millions of constant 1999 dollars; total effects calculated using county-level IMPLAN model.

Salem Maritime Historic Site (Essex County, Massachusetts) – An ATS proposal for Salem includes establishment of a water ferry route connecting Boston and Salem. The availability of ferry service could result in 25,000 new visitors and over $1 million of visitor spending annually in the Salem area. Of these visitors, 80 percent are expected to come from outside Essex County and many of them are expected to spend at least one night in the Salem area, thus increasing the demand for local restaurant, retail, and lodging services. In all, activity associated with tourist spending plus operation of ferry facilities will generate an additional $2.2 million of business sales, providing over 40 jobs with a net growth of almost $1 million in personal income (see Table 4.10). One–time capital investment in construction of facilities and purchases of boats will also generate $2.7 million in business sales, providing over $1.1 million in local personal income (with the equivalent of another 32 local jobs for one year).

Table 4.10 ATS at Salem Maritime Historic Site
Potential Local Economic Impacts on Essex County, Massachusetts

Category	Direct Program Effect	Total Effect on County Economy		
		Output	Employment	Income
One-Time Capital Expenditures	$4,867,000	$2,702,000	32	$1,129,000
Annual Operations & Maintenance	$ 370,000	$ 467,000	6	$ 180,000
Annual Visitor Spending	$1,090,000	$1,720,000	36	$ 730,000

All money figures in millions of constant 1999 dollars; total effects calculated using county-level IMPLAN model.

Merritt Island National Wildlife Refuge/Canaveral National Seashore (Brevard County, Florida) – An ATS proposal for Merritt Island National Wildlife Refuge includes two new shuttle buses and one new water ferry. These improvements will allow the site to serve over 20,000 more visitors per year. Although a majority of these new visitors will be day-trippers and thus generate less in the way of "new" economic activity, it is estimated 20 percent of the new visitors will be non-locals staying overnight, whose spending will generate new business sales in the county. In all, new "non-local" visitors plus ATS operations will together generate nearly $1.7 million in business sales, providing roughly 39 jobs with a net growth of $725,000 in local income (see Table 4.11). One-time capital investment in the buses, vessels and ferry facilities will also generate nearly $2.9 million in business sales, providing almost $1.1 million in local personal income (with the equivalent of another 36 jobs for one year).

Table 4.11 ATS at Merritt Island National Wildlife Refuge/ Canaveral National Seashore
Potential Local Economic Impacts on Brevard County, Florida

Category	Direct Program Effect	Total Effect on County Economy		
		Output	Employment	Income
One-Time Capital Expenditures	$3,667,000	$2,850,000	36	$1,092,000
Annual Operations & Maintenance	$ 270,000	$ 220,000	4	$ 105,000
Annual Visitor Spending	$1,000,000	$1,460,000	35	$ 620,000

All money figures in millions of constant 1999 dollars; total effects calculated using county-level IMPLAN model.

Chiricahua National Monument (Cochise County, Arizona) – A shuttle bus proposed for Chiricahua National Monument is expected to bring 42,000 new visitors to the site annually. These visitors, the majority of whom will be campers, could spend up to $2.3 million in the local area (see Table 4.12). In all, spending by the additional visitors, along with the economic impacts of the new transit system could together generate over $3.4 million in business sales, provide up to 113 jobs and a net growth of nearly $1.3 million in local income. One-time capital investments include $400,000 in vehicle costs. Since there are no locally purchased capital items, business sales are zero.

Table 4.12 ATS at Chiricahua National Monument
Potential Local Economic Impacts on Cochise County, Arizona

Category	Direct Program Effect	Total Effect on County Economy		
		Output	Employment	Income
One-Time Capital Expenditures	$ 400,000	$ 0	0	$ 0
Annual Operations & Maintenance	$ 220,000	$ 84,000	3	$ 35,000
Annual Visitor Spending	$2,350,000	$3,320,000	110	$1,250,000

All money figures in millions of constant 1999 dollars; total effects calculated using county-level IMPLAN model.

Gettysburg National Military Park (Adams County, Pennsylvania) – The ATS proposal for Gettysburg is part of a larger park enhancement program which also includes a new, expanded visitor center. The ATS part of that program involves two shuttle bus services – one to take visitors from the visitor center to downtown Gettysburg, and a second to circulate around the park area. The visitor center and shuttle services are intertwined, so it is not possible to assign proportional credit to any of these components alone.

Overall, the addition of these services is expected to add 150,000 more visitors each year, as well as increase the average length of stay and amount of spending for the existing base of visitors. As shown in Table 4.13 these factors will lead to an increase of over $23 million in visitor spending in the Gettysburg area. In all, new visitors plus ATS operations will together generate over $32 million in business sales, providing roughly 800 jobs with a net growth of over $12.8 million in local income. One-time capital investment for the ATS alone will generate another $816,000 of business sales, providing $333,000 in local personal income (with the equivalent of another 11 jobs for one year).

Table 4.13 ATS at Gettysburg National Military Park
Potential Local Economic Impacts on Adams County, Pennsylvania

Category	Direct Program Effect	Total Effect on County Economy		
		Output	Employment	Income
One-Time Capital Expenditures	$ 1,780,000	$ 816,000	11	$ 333,000
Annual Operations & Maintenance	$ 295,000	$ 294,000	7	$ 143,000
Annual Visitor Spending	$23,460,000	$31,870,000	790	$12,670,000

All money figures in millions of constant 1999 dollars; total effects calculated using county-level IMPLAN model.

The specific examples above are meant for illustrative purposes only. With the exception of the Gettysburg National Military Park, none of the alternatives identified have been through a formal planning/project development process. However, the analysis clearly indicates that: 1) there would be a favorable overall economic impact from implementing transit; and 2) at sites where additional visitors can be accommodated, but additional automobiles cannot, implementation of ATS can provide communities with economic benefits including increased income and employment.

5.0 Opportunities for Raising Revenue

Volume II of this study, "Financing Opportunities for Alternative Transportation Systems," includes a discussion of the wide variety of public and private funding sources available to fund transit on Federal lands. However, opportunities also exist to recover revenue to offset operations and maintenance costs through fares. The potential for fare revenue was estimated for the transit alternatives developed for the sites. Estimated revenues were based on fares charged on existing systems and on the type of service provided. For short shuttle routes, it was generally assumed that fares could not be charged. It was assumed in most cases that where automobile drivers were not charged a fee for entrance/use of the site, transit users also could not be charged an entrance/use fee. While these estimates will need to be refined with market research on a site-by-site basis, about $19 million in annual potential revenue was identified for the 2001-2010 period, an amount that would cover just over 50 percent of estimated operations and maintenance costs. In the 2011-2020 period, estimated revenue is projected to increase to $36 million, or 60 percent of total operations and maintenance costs. These revenue estimates probably represent an upper limit that can be achieved and do not account for the fact that additional expenditures may be needed to provide a level of service that would attract paying customers. The cost of an additional interpreter is an example of additional expense that may be incurred. However, experience indicates that services such as the Denali National Park bus service, that are designed with a strong understanding of the market, could help to substantially reduce operating subsidies required for the program.

Some of the options for raising revenues are as follows:

- The site can charge fares for use of the ATS, similar to those charged by a traditional transit system. One of the problems with this option is that average party size is relatively high, and fares can become expensive for families and large groups. If free parking is provided at the visitor destinations within the site, such groups are likely to remain in their automobiles. Family or group fares can be used to mitigate this problem. Water transportation systems and trams are generally more successful in charging fees than traditional shuttle bus services. Such fees can be substantial such as the distance-based fares in Denali National Park, which range from $12.50 to $31.00 for adults. The Manitou Island Transit Ferry at the Sleeping Bear Dunes National Lakeshore charges $20 for a round trip fare and the NPS charges an additional $7.00 for park admission. Because of the unique nature of these experiences and the limited capacity of the transportation system, such fares do not appear to inhibit usage.

- The local transit authorities that provide transit service to the sites can charge their normal fare. This is true of services provided to the Great Smoky Mountains National Park by the City of Gatlinburg Transit System and the Assateague Island National Seashore by the Ocean City, Maryland transit system.

- Sites that charge entry fees could permit those who park-and-ride and use the transit system to enter for free. The number of automobiles permitted into the site could also be limited through a reservation system, which also would encourage transit usage. Where the site has an objective of controlling visitation to a specific area, this option could have promise.

- Sites may provide "value-added" transit services with interpreters and charge a fee for those services. One prominent example is the "Freedom Trail Trolley" service that is being developed by the Boston National Historic Park in partnership with a private transit operator and the Freedom Trail Foundation. The goal is to provide a high-quality interpretive experience that tells the story of the park's many historic sites in a logical, accurate, and compelling fashion. While the fare for this service has not been set, it is viewed as a "premium" service that will command a relatively high fare.

However, there are impediments to charging user fees at various sites. The Great Smoky Mountains National Park, for example, cannot by legislation charge entry fees. This increases the challenge of providing transit service within the park at Cades Cove, which is currently overwhelmed with automobile traffic at peak periods. Acadia National Park initially instituted fares on a limited system but found little interest among riders. The park and its partners made a decision to provide free service when they implemented the Island Explorer shuttle bus system in 1999, and raised revenue from a variety of other sources. These examples highlight the need for thorough planning and analysis when developing a financing strategy for a transit system, especially those that include user fees.

While many ATS systems will require ongoing operating subsidies, the options listed above provide good opportunities to raise revenue from users. Site managers must understand their market and in many cases will need to apply market research techniques to determine whether fares can be charged, and if so, at what level.

6.0 Conclusion

The Federal Lands Alternative Transportation Systems Study has identified significant needs for ATS in Federal lands owned by the NPS, the BLM, and the USFWS. Potential ATS needs have been identified at 137 of the 207 sites evaluated for the study. Total ATS needs for the 20-year period between 2001 and 2020 are estimated at $1.71 billion in constant dollars with $678 million estimated for the short-term period, 2001-2010, and $1.03 billion for the long-term period, 2011-2020. These costs include project development, capital, and operations and maintenance costs.

Over the 2001-2010 period, project development and capital costs are estimated at $291 million and operations and maintenance costs are estimated at $386 million or approximately $39 million annually. It is estimated that project development and capital costs will increase in the 2011-2020 period to $432 million and operations and maintenance costs will increase to $600 million or approximately $60 million annually.

In general, bus transit is currently the most common mode of transit service operating on Federal lands, and it likely to continue as the predominant mode, although water transportation needs are significant as well. Total combined short-term and long-term surface transit needs for project development, capital, and operations and maintenance costs are approximately $1.44 billion. Waterborne transit needs for the 20-year period are approximately $267 million.

During the 2001-2010 period, approximately half of the projected transit needs are for improving or expanding existing systems. Because several large new projects have been identified for the 2011-2020 period, approximately 30 percent of the projected transit needs are for improving or expanding existing systems, and approximately 70 percent are for new systems.

The study found that, at a majority of sites, transit needs are modest and can be served by a small number of vehicles operating on a seasonal basis. At many sites there are good opportunities to recover at least a portion of operations and maintenance costs through fares and increased fees.

Implementation of transit on federally-managed lands can help to achieve the following goals:

- Relieve traffic congestion and parking shortages;
- Enhance visitor mobility and accessibility;
- Preserve sensitive natural, cultural, and historic resources;
- Provide improved interpretation, education and visitor information services;
- Reduce pollution; and
- Improve economic development opportunities for gateway communities.

Transportation needs and resource preservation goals often work together to encourage implementation of transit services. Many sites can accommodate additional visitors but cannot provide the roadway and parking capacity required for additional automobiles. Reasons may include negative resource impacts of roadway and parking construction, prohibitive cost, or both. Many site managers believe that transit can serve as a cost-effective method of accommodating additional demand, while at the same time preserving resources and providing the visitor a more pleasant and enlightening experience.

There appears to be strong justification for a Federal funding program that will assist in addressing Federal lands transit needs and help to provide the financial stability required for these systems to succeed. Since it is unlikely, however, that this program will address all of these needs, partnerships with local governments, private business interests, and support groups will be critical in order to establish an ongoing and successful ATS program for Federal lands.

Appendix A

Conceptual Transit Planning Guidelines

Conceptual Transit Planning Guidelines

This section documents the general guidelines used to estimate the capital and operating costs of the conceptual transit services defined in this project.

A number of parameters impact the capital and operating cost of any type of transit service. These include, but are not limited to, the following:

- The assumed transit operating speed;
- The assumed service frequency or headway;
- The assumed daily, weekly, and annual hours of operation;
- The operating costs of the vehicles;
- The capital cost of the vehicles and supporting facilities such as passenger waiting shelters; and
- The need for vehicle maintenance facilities.

Each of these topics is briefly discussed below. A brief discussion of ridership estimation methodology is presented at the conclusion of this appendix.

Assumed Transit Operating Speed

For any particular transit mode, a route operating at the highest practical speed between its terminus points without stopping is more efficient than one which is required to make stops on a regular basis at a number of intermediate locations. Thus, for example, an express bus operating between a suburban park-and-ride lot and a downtown business district operates more efficiently than if the same vehicle were used on a local bus route with stops every few blocks.

For the general type of alternative transit services considered at any of the NPS, FWS, and BLM sites, it was assumed that only bus or tram type vehicles would be operated. Similarly, it was considered likely that one of two types of routings would be operated:

- An internal site shuttle with multiple stops along internal park roadways; and
- A linkage between either multiple site units or from a Federal lands area to a nearby gateway community using existing public roadways.

In the case of an internal site shuttle, an average operating speed of 15 mph was assumed. In the case of a linkage type operation between multiple site units or from a Federal lands area to a nearby gateway community, an average operating speed of 30 mph was assumed.

It must also be noted that the cycle time (the time required for each vehicle to complete a run and be ready for its next run) includes layover and recovery time. For the purposes of this analysis, an average layover/recovery time of five minutes or 10 percent of the run was used, whichever was greater. Average operating speeds different from these values were used when unique operating conditions made default values unrealistic.

Assumed Service Frequency

The assumed service frequency or headway is one of the most important factors in defining the cost of transit operations. For example, at an assumed operating speed of 15 mph (4 minutes per mile), it would take 60 minutes for a bus to complete a 15-mile long round-trip. Including a 10 percent layover/recovery time factor, the total cycle time would be equal to (60 minutes) X (1.10) = 66 minutes. At an assumed service frequency of once every 60 minutes, a trip of this length would require:

(66 minutes per trip)/(60-minute service frequency) = 1.1 buses (say 2 buses)

At a service frequency of once every 30 minutes, a trip of the same length would require:

(66 minutes per trip)/(30-minute service frequency) = 2.2 buses (say 3 buses)

At a service frequency of once every 15 minutes, a trip of this same length would require:

(66 minutes per trip)/15-minute service frequency) = 4.4 buses (say 5 buses)

For the purposes of this analysis, a range of service frequencies was employed, with a "low" level of service being once every 30 minutes (2 buses per hour), a "medium" level of service being once every 15 minutes (4 buses per hour), and a "high" level of service being 6-8 buses per hour (a bus every 8-10 minutes).

Any "fractional" buses determined through this process (i.e., a 50-minute round trip/a 30-minute service frequency = 1.67 vehicles) were rounded up to the next full integer value (i.e., 2 vehicles).

In addition, a 15 percent spare vehicle ratio was assumed, with a minimum of two spare vehicles in most cases.

Assumed Daily, Weekly, and Annual Hours of Operation

Once the number of vehicles required to operate a particular transit service at a specified headway was defined, it was necessary to translate this into the amount of service being provided, in terms of either vehicle-miles or vehicle-hours, or both. Given the conceptual nature of this analysis, only vehicle-hours of operation were usually estimated.

To the degree possible, vehicle-hours of operation were tailored to the specific and unique needs of each unit. The seasonal needs of each site were determined using visitation statistics if available. Also, varying service levels over the course of the day and by day of week (i.e., more on Saturday and Sunday than on Monday-Friday) were included for each site as necessary.

While recognizing the special nature of visitation at many of the sites that have been visited, (i.e., widely varying visitation levels throughout the year), the following general planning assumptions were used as "default" values where no better information was available:

- For any park or other Federal lands area where transit service is to be provided, the service was assumed to operate 10 hours per day (i.e., 8:00 a.m. until 6:00 p.m.);
- For any park or other Federal lands area where transit service is to be provided, the service was assumed to operate seven days per week;
- For parks and other Federal lands with heavy summer visitation levels, transit services were assumed to operate only from May 1 through September 30 of any given year (153 days per year, including holidays); and
- For parks and other Federal lands with relatively steady visitation levels throughout the year, transit services were assumed to operate from January 1 through December 31 of any given year (365 days per year, including holidays).

Thus, for example, a transit route which requires the use of two (2) buses to provide the assumed service frequency that is located in a park with heavy summer visitation levels resulted in the following annual hours of operation:

(2 buses/hour) X (10 hours per day) X (153 days per year) = 3,060 annual vehicle-hours

Assumed Operating Cost of Vehicles

Once an estimate was made of the annual vehicle-hours of service to be operated, it was necessary to translate this into an estimated annual operating cost for the service. The operating cost of any particular transit service can vary widely, and is dependent upon such factors as driver salaries, the cost of fuel, maintenance costs, etc.

In the course of previous work for the National Park Service, BRW determined that a cost of $50.00 per vehicle-hour is a good, all-inclusive approximation of typical transit operating costs. While higher and lower operating costs per hour have been observed, the

typical mid-point of the range, for a number of different vehicle types and operating conditions, is approximately $50.00 per hour.

For the purposes of this conceptual level analysis, this value of $50.00 per vehicle-hour was generally used. However, for those situations where an existing ATS service was already in operation with documented operating costs per vehicle-hour significantly lower than this "default" value of $50.00 per hour, these documented lower costs were used.

For the example discussed above, a transit service requiring 3,060 annual vehicle-hours of operation would cost approximately:

(3,060 vehicle-hours) X ($50.00 per vehicle-hour) = $153,000 annually.

Capital Costs of the Vehicles

As in the case of transit operating costs, a wide range of costs are observed with respect to the capital acquisition costs of transit vehicles. For example, the 1994 Alternative Transportation Modes Feasibility Study conducted for the National Park Service by BRW identified costs for 10-20 passenger shuttle/van type vehicles in the range of $25,000 to $50,000 per vehicle, depending upon equipment. Similarly, this earlier study identified a cost range of $150,000 to $200,000 for a "standard," full-size (40-foot) urban transit bus capable of carrying 40-50 passengers. More recent work by BRW identified an average capital cost for a "full-size" urban transit bus of approximately $300,000 per vehicle.

For the purpose of this analysis, the following unit costs for "standard" bus type vehicles were used:

Small/Medium Bus	$225,000 each
Full-Size Bus	$300,000 each
Over the Road/Tour Coach	$350,000 each

These costs are for transit type buses. Many sites may be able to use school-bus type buses or shuttle-vans, which are much lower in cost. For example, Denali National Park's entire ATS operation is run with Blue Bird transit-style school buses, which cost on the order of $100,000 each.

For those locations where a "shuttle" or "tram" type service was considered, the following unit costs were used:

Powered Drive Unit	$100,000 each
Unpowered Trailer	$ 65,000 each

Adjustments were made based on cost information developed for the Volume I report.

Vehicle Maintenance Facilities

Where new transit services are being proposed, there may be a requirement for some type of maintenance facility to be provided as well. For the purposes of this project, three options were considered: 1) an appropriate vehicle maintenance facility already exists; 2) no such facility exists and would thus have to constructed in order for the proposed ATS service to be operated; or 3) the number of vehicles was too small (6 or less) to justify construction of a new facility, so it was assumed that services would be provided by an existing operator, with a facility, but that some expansion may be needed.

For the purposes of this conceptual level analysis, the following maintenance facility planning and design guidelines and unit costs were employed.

For small bus fleets such as those likely to be associated with virtually any Federal lands ATS services, the vehicle maintenance bays can be multi-function. The minimum size assumed for such a vehicle maintenance facility was one bus bay with an adjacent shop and parts storage area and a small office. The resulting minimum requirement was a 45' X 55' building. In addition, outdoor vehicle storage space requires 10.5-foot wide lanes with enough length to accommodate the fleet. A unit length of the assumed vehicle length plus 5.0 feet was used to determine the length of the vehicle storage lanes.

The unit costs used at Mount Rainier National Park for a newly recommended vehicle maintenance building and associated equipment were: $130 per square foot for the building, plus $10 per square foot for paved vehicle storage areas.

Space requirements for various vehicle maintenance functions were assumed as follows:

Maintenance Facility Factors	**Example – 10 Bus Fleet**
General Repairs – 1 bay/20 buses	10/20 = 0.50 bay
Inspection – 1 bay/50 buses	10/50 = 0.20 bay
Major Repairs – 1 bay/60 buses	10/60 = 0.17 bay
Brake Repairs – 1 bay/100 buses	10/100 = 0.10 bay
Tire Repair – 1 bay/200 buses	10/200 = 0.05 bay
Body Repair – 1 bay/75 buses	10/75 = 0.13 bay
Brake Shop – 4 square feet/bus	Total = 1.15 bays (say 2 bays)
Tire Shop – 4 square feet/bus	
Common Work Area – 6 square feet/bus	
Equipment Storage – 5 square feet/bus	
Body Shop – 4 square feet/bus	
Parts Storage – 20 square feet/bus	
Total Shop Space – 43 square feet/bus	(43 SF/bus) X (10 buses) = 430 SF

Assuming a 40' long, 10' wide (including mirrors) transit bus, the minimum dimension of each enclosed bus maintenance bay would be as follows:

- Length = 40 feet + 10 feet (front clear area) + 10 feet (rear clear area) = 60 feet;
- Width = 10 feet + 10 feet (side clear area) + 10 feet (side clear area) = 30 feet; and
- Maintenance bay area = (60 feet) X (30 feet) = 1,800 square feet.

In addition, space should be provided in the building for offices, restrooms, and driver shower and break rooms. These auxiliary areas typically require approximately 15 percent of the total estimated shop space. For the example shown above, the auxiliary areas would be approximately (0.15) X (430 SF) = 65 SF. The total building size for this example 10-bus fleet would thus be as follows:

Maintenance Bays	2 bays @ 1,800 sq. ft./bay = 3,600 sq. ft.
Shop Area	430 sq. ft.
Offices, Other	65 sq. ft.
	Total = 4,095 sq. ft. (say 4,100 sq. ft.)

At an average cost of $130 per square foot, this example maintenance facility would cost approximately ($130 per sq. ft.) X (4,100 sq. ft.) = $533,000. An additional 60 percent was then added to building costs to account for site preparation, utilities, construction planning, and construction supervision, thus raising the total cost to $853,000.

Similarly, outside storage for the example 10-bus fleet would require approximately:

(40 foot bus length + 5 foot space between vehicles)
X (10.5 foot wide lanes)
X (10 vehicles) = 4,725 sq. ft. of paved area
+ 10% for vehicle circulation = (0.10) X (4,725 sq. ft.) = 473 sq. ft.

Total = 4,725 + 473 = 5,198 sq. ft. (say 5,200 sq. ft.)

(5,200 sq. ft.) X ($10.00 per sq. ft.) = $52,000

The total cost of this example 10-vehicle maintenance facility, including outside vehicle storage, would be approximately $533,000 + $52,000 = $585,000. An additional 50 to 60 percent was added to the estimated cost of the facility for land cost, utilities and construction management.

Other ATS System Related Costs

In addition to vehicles and associated maintenance facilities, the operation of an ATS system may also have additional capital costs. These primarily include the provision of passenger waiting shelters or the creation/expansion of parking areas for visitor vehicles.

In the case of passenger waiting shelters, the use of standard, commercially available shelters was assumed for the purposes of this conceptual level analysis. A typical high-quality, low-maintenance passenger waiting shelter with a capacity of 10-15 people costs approximately $10,000 installed on site.

With regard to parking areas for visitor vehicles, it was assumed that approximately 100 automobile sized parking spaces could be provided for each acre of land provided for this purpose. This assumes that the parking area contains full-size parking stalls, circulation lanes of relatively generous width, and a moderate amount of landscaping. Using these assumptions, every 100 spaces (requiring an area of approximately 43,560 sq. ft.) would cost approximately (43,560 sq. ft.) X ($10 per sq. ft.) = $435,600 (say $436,000).

These values for passenger waiting shelters and visitor parking areas were used as appropriate.

While these values are appropriate for estimating the initial, one-time capital acquisition cost to initiate any newly proposed services, it is acknowledged that even the best maintained transit vehicles will eventually wear out and need to be replaced. The generally accepted life expectancy of a bus type transit vehicle is 12 years. ***Therefore, for any Federal lands transit services that are assumed to be initiated over the next 10 years (i.e., 2001-2010), a replacement of the vehicle fleet will be required during the subsequent 10-year period (i.e., 2011-2020). If a particular transit service is not anticipated to be initiated until 2010 or later, no replacement of the vehicle fleet is assumed.***

Guidance on ATS Ridership Estimation

The estimation of ridership for any public transit service is, at best, an inexact process. However, based on the experience of the consultant team in the conduct of similar transportation studies at a variety of units of the National Park Service over the past several years, the following method was used for the estimation of potential ATS ridership.

1. Determine which of the following three cases best describes the proposed ATS service being proposed:

   - A ***voluntary*** service that is supplemental to private vehicle access to the site.
   - A ***mandatory*** service that is designed to accommodate a portion of the visitors to and from the area. Most commonly, this is the volume of visitors in excess of the capacity of the existing roads and/or parking areas. Alternatively, this may be the visitor demand currently using a facility that the NPS or other FLMA would like to relocate to an ATS system due to resource impacts.

- A ***replacement*** for private vehicle access that would serve all visitors (or perhaps only all day-use visitors).

2. ***For the voluntary/supplemental service***, best judgment was used to estimate potential demand. Unless there is a significant impediment to driving to the site, the demand for this type of service can be expected to be low, perhaps only five to 10 percent of total daily visitors. However, if parking is hard to find and the alternative ATS service offered is good, demand can be substantially higher. For example, in the Yosemite Valley, the NPS shuttle service attracts more than one boarding passenger per daily visitor.

3. ***For the mandatory service***, the capacity of the existing private vehicle access system, which will probably be constrained by the available parking supply was determined. The capacity of the access system to exiting and/or forecast demand was then compared. The percentage of visitors that would need to be served by an ATS system to avoid overflow parking or excessive traffic congestion on the access roadways was then estimated. It was assumed that traffic and visitor management measures would be taken to limit vehicle access to the available capacity and that the excess demand uses the ATS system provided.

4. ***For the replacement for private vehicle access type of services***, the ATS system demand was assumed to be equal to the existing (or forecast) visitation level.

For any particular site, it should be noted that changes in visitor access policies are likely to affect the estimated ridership. The effects of these policies are uncertain and may result in demand that is higher or lower than existing conditions.

There are also some general "rules of thumb" that can be applied to daily demand estimates to arrive at peak-hour demand forecasts. As a "default" value, 12 percent of daily demand was used as an estimation of peak-hour demand. Most parks have a three- to four-hour period in the morning when arrivals equal 10 to 12 percent of daily arrivals and a similar three- to four-hour period in the late afternoon or early evening. Many parks have conditions that cause unusual demand patterns. For example, Old Faithful Geyser eruptions at Yellowstone National Park are followed by high volumes of visitor egress, sunsets at the Grand Canyon are followed by high volumes of egress, and special programs at Carlsbad Caverns cause concentrated demand. To the degree possible by existing data or observations by site personnel, such special conditions were considered in the estimation of potential ATS system demand.

Appendix B

Economic Impact Methodology

Economic Impact Methodology

National Impact Methodology

The total capital and operating costs of ATS at all of the proposed sites were estimated and then summed to represent the national-level "direct effect" of the ATS program. The spending mix associated with these direct effects was also calculated based on available information about the types of vehicles, facilities and services being proposed.

These direct effects will generate additional flows of income and support additional jobs through the U.S. economy. The calculations of these flows of dollars, and particularly the indirect and induced effects, were calculated using the IMPLAN version of the national input-output model. That national model is primarily based on inter-industry purchase and spending data compiled by the U.S. Department of Commerce, Bureau of Economic Analysis.

Local Impact Methodology

The localized effects will differ by location, depending on a) the expected change in visitation to the specific park, b) the amount of visitor-oriented business activity occurring in surrounding communities, c) the nature of the proposed ATS system construction and operation, and d) the size and diversity of the county economic base (as a source of suppliers for related goods and services). These localized effects are illustrated through five examples.

For each of these examples, specific counties surrounding (or adjacent to) the national parks and their gateway communities were identified. Counties included in the analysis were those impacted economically by site visitation. The indirect and induced effects on those local counties were then calculated using county-specific IMPLAN models. These IMPLAN models provide different estimates of local (county) impacts for each site by accounting for the following factors:

- The levels of business activity to be supported in each county will differ depending on the nature of the ATS spending and the projected change in visitor spending. Those projects requiring less equipment and more operators, and those projects with larger ATS impacts on visitation, will also tend to have larger local job impacts.

- The levels of business activity to be supported in each county will also differ depending on the portion of total spending which goes to local firms, as opposed to suppliers outside the county. Those counties with larger and more diverse business sectors will tend to keep more of the business sales for goods and services suppliers within the county.

- The level of income generated in each county will further differ depending on the average wage levels in that county. Those counties with higher wage rates will also provide more income per job.

Appendix C

Field Reports