



NPS National Transit Inventory, 2013



Clockwise from top left: South Rim Shuttle Bus Service (Grand Canyon National Park); M.V. Ranger III (Isle Royale National Park); Yellowstone Historic Snow Coach (Yellowstone National Park); Lowell Historic Trolley (Lowell National Historical Park)

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Acknowledgements

The National Park Service Alternative Transportation Program would like to thank the numerous NPS transit system contacts who graciously provided their time, knowledge, and guidance in the development of this inventory. These individuals are listed in Appendix A.

Acronyms

The following acronyms are used in this report:

ATP	Alternative Transportation Program
FLAP	Federal Lands Access Program
FLTP/PRPP	Federal Lands Transportation Program/Park Roads and Parkways Program
FLREA	Federal Lands Recreation Enhancement Act
MAP-21	Moving Ahead for Progress in the 21 st Century
NPS	National Park Service
TRIP	Paul S. Sarbanes Transit in Parks Program

Key Findings in 2013

- **Providing visitor transit service remained a priority for many parks.** 131 discrete transit systems operated in 66 of the 401 NPS units. Five systems ceased operating, resulting in a total loss of transit service at 2 units. No new systems were added. (Page 5)
- **Transit provides critical access to sites in more than 10% of NPS units.** 44 systems provide critical access to an NPS unit or site because of resource/management needs and geographic constraints. (Page 7)
- **NPS passenger boardings are on par with mid-sized U.S. cities.** NPS transit systems accommodated 26.9 million passenger boardings in CY2013, similar to cities such as Sacramento, CA and Charlotte, NC. 21 million (78.1%) boardings were associated with the top 10 highest-use systems. (Page 11)
- **The 2013 government shutdown and Hurricane Sandy caused significant reductions in NPS transit passenger boardings.** National park units were closed 16 days due the government shutdown. The most used NPS transit system, the ferry system at Statue of Liberty and Ellis Island, was severely affected by Hurricane Sandy. Consequently, transit passenger boardings from 2012 to 2013 declined 19 percent across NPS. (Page 12)
- **NPS leverages the private sector to provide the majority of transit service.** 111 (85%) of systems are operated by a non-NPS entity under an agreement or contract. These systems account for almost 99% of passenger boardings. The remaining 20 (15%) transit systems are owned and operated by NPS and account for 1% of boardings. (Page 16)
- **NPS continues strong partnerships with local transit agencies.** 12 systems are operated by a local transit agency under a specific agreement with the NPS. NPS shares the operations and maintenance costs of several of these systems. (Page 7)
- **NPS has a significantly higher percentage of alternative fuel vehicles than its contract and concession operators.** 59.4% (165/271) of NPS-owned vehicles operate on alternative fuel, while 13% (85/656) of Non-NPS-owned vehicles operate on alternative fuel. (Page 18)
- **NPS transit systems may mitigate vehicle emissions, but the data is incomplete.** 42 Shuttle / Bus / Van / Tram systems and 16 Ferry / Boat systems emitted 18,927 metric tons of CO₂, or the equivalent of about 4,302 passenger cars each traveling the U.S. annual average distance (about 12,000 miles). If NPS transit vehicles are on average at least 40% occupied, then NPS transit systems mitigate, rather than contribute to emissions. System occupancy was not collected. (Page 19)
- **The NPS-owned vehicle fleet is aging.** The average NPS-owned 15 passenger van currently exceeds its recommended service life, while the average ages for NPS-owned 12 passenger vans and 28 passenger buses are only slightly below the recommended service lives for those vehicle types. (Page 22)
- **Similar to other NPS assets, transit vehicles have deferred maintenance and recapitalization needs.** NPS faces an estimated \$12.5 million in rolling stock deferred maintenance and an estimated \$55.2 million in recapitalization needs between 2014 and 2025 for its Shuttle / Bus / Van / Tram systems. These estimates include \$6.9 million average annual recapitalization needs over the next six years (2015 to 2020). The projected needs are calculated in nominal dollars and vary widely from year to year. (Page 23)

Introduction

The purpose of the National NPS Transit Inventory is to communicate the servicewide outcomes, benefits, and status of NPS transit to stakeholders, partner agencies, Congress, and the American public. This National NPS Transit Inventory is complementary to more detailed inventories developed by NPS regions. The National NPS Transit Inventory does not replace these efforts and is neither designed nor intended to influence investment or operations decisions of individual transit systems. Individual NPS units determine if they need a transit system and how such systems are operated.

The 2012 inventory[†] was the first comprehensive NPS Transit Inventory of these systems since 1998, covering surface, waterborne, and air systems. The 2012 inventory established the first accepted definition of NPS transit systems and provided a framework for future data collection; helped NPS comply with Public Law 112-141 Moving Ahead for Progress in the 21st Century (MAP-21) section 203 (c) which requires the NPS to conduct a facilities inventory; and compiled critical information for NPS Transportation Reauthorization Resource Paper. The 2013 and future inventories will help NPS:

- Implement and track progress of the Green Parks Plan, the National Long-Range Transportation Plan, Regional Long-Range Transportation Plans, A Call to Action, and the Capital Investment Strategy;
- Develop a transit performance measurement baseline;
- Comply with Executive Order 13514 which requires Federal agencies to measure, manage, and reduce greenhouse gas emissions;
- Communicate program information and projected capital needs internally and externally for future transportation reauthorizations;
- Identify and pursue novel transit funding sources; and
- Support updates to the Facility Management Software System for NPS-owned vehicles.

This 2013 inventory includes an update to all of the data elements collected for 2012, as well as some additional performance-oriented data elements (service miles, service hours, vehicle passenger capacity, and vehicle age) to support the national-level initiatives listed above. The new data elements allow NPS to estimate annual greenhouse gas emissions avoided through provision of transit service, average age of vehicles by vehicle type, current deferred maintenance, and future recapitalization needs.

Data Collection and Methodology

In preparation for the 2012 National NPS Transit Inventory, the NPS Washington Support Office's Alternative Transportation Program (ATP), in partnership with the transportation coordinators from each of the seven NPS regional offices, developed an objective definition of NPS transit systems to ensure consistent data collection across the nation and over time. Only units with systems that met all of the following three criteria were included in the inventory (see Appendix B for more information):

1. Moves people by motorized vehicle on a regularly scheduled service;[‡]

[†] NPS National Transit Inventory, 2012. http://ntl.bts.gov/lib/47000/47800/47871/NPS_WASO_2013_Transit_Inventory.pdf

[‡] Services with a posted schedule that have standard operating seasons/days of week/hours. Services which do not operate on a fixed route, or exist for the sole purpose of providing access to persons with disabilities, are not included.

2. Operates under one of the following business models: concessions contract; service contract; partner agreement including memorandum of understanding, memorandum of agreement, or cooperative agreement (commercial use authorizations are not included); or NPS owned and operated; and¹
3. All routes and services at a given unit that are operated under the same business model by the same operator are considered a single NPS transit system.

While there are additional transit systems that are critical to transporting visitors to and within NPS units, the ATP choose to limit the inventory to systems which NPS either has a direct financial stake in or expended resources to develop a formal contract or agreement.

A guiding principle of the effort was that reporting should be a minimal burden to unit and regional staff. As such, the inventory effort sought a modest set of easily reportable information available across all NPS units and system types:

- Transit system name and description;
- Passenger boardings;
- Business model;
- System purpose;
- System type/mode;
- Vehicle information including fuel type, capacity, and age (individual vehicle information for NPS-owned vehicles and system-level information for non-NPS vehicles);
- Owner and operator type (NPS or Non-NPS) and contact information;
- Funding sources used for fiscal year 2013; and
- Whether a local transit agency participates in the service.

The NPS ATP requested data for the calendar year (January through December) because most systems tend to collect information such as passenger boardings on that basis. Like the 2012 inventory, this 2013 inventory focused on a limited dataset and relatively modest goals, helping establish a data collection framework that depends on unit-level information. Future annual updates may include more detailed information, such as system operating costs.

Using the 2012 National NPS inventory as a starting point, the NPS ATP asked regional transportation coordinators to review the list of systems; identify new, closed, or consolidated systems; and update unit contact information. Contact information changed for 36 systems at 16 different parks. From there, the data collection team reached out to contacts at 66 units, of which all responded except Scotts Bluff National Monument. Appendix C includes a full list of surveyed transit systems by system purpose. Through these communications, the data collection team identified no new systems, four closed systems, and one consolidated system. Some systems reported incomplete information, including:

- Seven systems that did not report passenger boardings;
- One NPS-owned system that did not report vehicle ages and 15 that did not report service miles; and
- Nineteen non-NPS owned systems that did not report vehicle age and 37 that did not report service miles.

The data collection team used a Microsoft Access form to collect and compile information from park units for the 2013 inventory. The data collection team also gave unit contacts the option of

¹ For the purposes of this inventory, no distinction was drawn between memorandum of understanding, memorandum of agreement, and cooperative agreement. All were recorded as “cooperative agreement.”

providing the information over the phone. Many units chose to fill out the form, but some elected to answer over the phone. In contrast, for the 2012 inventory the data collection team collected all of the data over the phone and compiled it in a spreadsheet. While the 2013 collection methodology had some advantages, including more efficient collection, processing, and data pre-population, there were some disadvantages: some park contacts were unfamiliar with Microsoft Access, some partner groups and concessioners did not have the software program, and there was a greater potential for misinterpretation in cases where a phone conversation did not take place. The data collection team sought to address data quality issues by following up with units where problems were apparent.

Results

Detailed findings of the 2013 inventory are presented in the following sections:

- Summary of Year-on-Year Changes
- System Purpose
- System Characteristics and Locations
- Business Models
- Passenger Boardings
- Vehicle Fleets and Fuel Types
- Performance-Oriented Findings
- Funding

Summary of Year-on-Year Changes

Table 1 summarizes the differences in key findings between the 2012 and 2013 NPS National Transit Inventory results for data that the ATP collected both years.

Table 1: Changes to NPS transit systems documented between 2012 and 2013 inventory

Source: 2012 and 2013 NPS National Transit Inventory data

Key Findings	2012	2013
Number of Systems	147	131
Number of Parks Represented	68	66
Passenger Boardings	33.2 M	26.9 M
Passenger Boardings (Excluding 10 highest ridership systems)	6.1 M	5.9 M
Number of Vehicles	890	927
- NPS-Owned	323	278
- Non-NPS	567	651
Systems operated by Local Transit Agency	12	12
Systems that provide sole access/critical access	52 (sole access)	44 (critical access)

The large decline in the number of systems is explained by:

- **Discontinued systems:** Five systems were discontinued or consolidated. MORA, and VAFO each discontinued 1 system and YELL discontinued 2 systems and consolidated a 3rd system.
- **Reconsidering the definition:** Park contacts determined 10 GLBA systems and 1 GOGA system (a total of 11 systems) do not meet the inventory definition of NPS transit.

Since many of these units had multiple systems in 2012, the total number of units with systems only declined by two.

The large drop in passenger boardings between 2012 and 2013 (approximately 19%) reflects a number of factors: the sixteen day federal government shutdown in October 2013, the temporary closure of the Statue of Liberty and Ellis Island due to Hurricane Sandy (resulting in a 6 million drop in passenger boardings), the discontinuation and consolidation of 16 systems, and lack of data for some systems. Five systems did not report passenger boardings in 2012 compared to seven systems in 2013.*

There was a noticeable change in the number of reported NPS and non-NPS vehicles, but this result is most likely due to differences in reporting methodologies. In 2012, the data collection team asked units to report a simple tally of vehicles for each fuel type. In 2013, the data collection team asked for detailed vehicle-specific information which may have led to more accurate reporting.

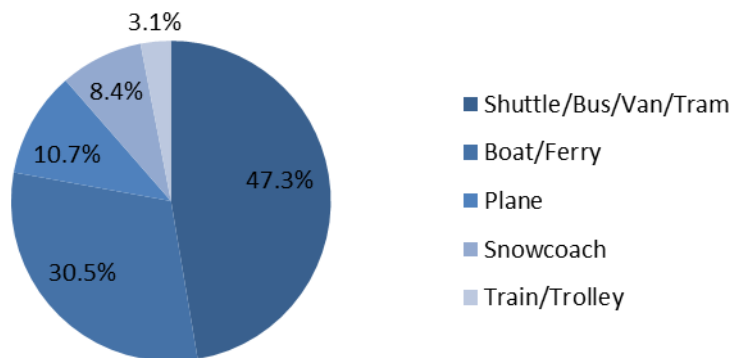
The drop in sole/critical access systems likely reflects a clarification of the reporting instructions provided to transit system contacts. Sole access was further clarified and re-termed to critical access for the 2013 inventory and future inventories.

System Purpose

The 2013 inventory identified 131 discrete transit systems spanning 66 of the 401 units of the NPS. NPS transit systems are diverse. Shuttle / Bus / Van / Tram systems make up the largest share of all system types (47.3%), followed by Boat / Ferry systems (30.5%), planes (10.7%), snowcoaches (8.4%), and trains/trolleys (3.1%) (see Figure 1).

Figure 1: Systems by mode (N=131 systems)

Source: 2013 NPS National Transit Inventory data



Unit staff identified the primary purpose of each system, as described below and as depicted in Figure 2:

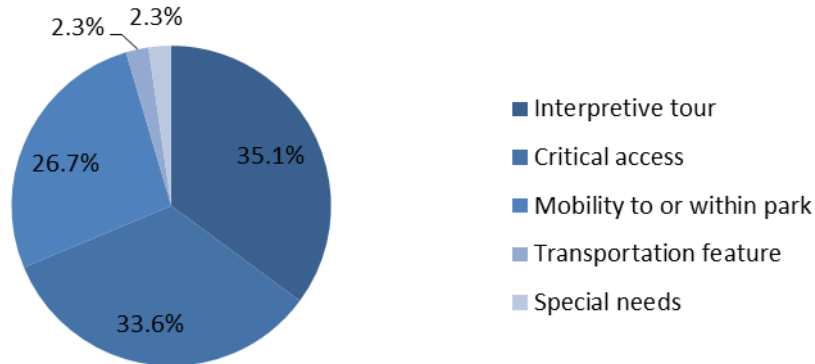
- 46 systems (35.1%) are part of guided **interpretive tours**;

* Park units did not provide passenger boardings for the Coastguard Beach Shuttle (CACO), ferry services at CUIS and DRTO, the Ross Lake Hiker Shuttle (NOCA/ROLA), and two Yellowstone snowcoach concessions (YELL).

- 44 systems (33.6%) provide **critical access** to an NPS unit or site that is not readily accessible to the public due to geographic constraints, park resource management decisions, or parking lot congestion;
- 35 systems provide **mobility to or within a park** as a supplement to private automobile access;
- 3 systems are **transportation features** that are a primary attraction of the park unit; and
- 3 systems meet the intermittent accessibility needs of visitors with **special needs**.

Figure 2: Systems by primary purpose (N=131 systems)

Source: 2013 NPS National Transit Inventory data



System Characteristics and Locations

As introduced in Table 1 and discussed further below, 131 NPS transit systems operated in CY2013. Figure 3 and Figure 4 place these systems in the contexts of primary system purpose, boardings, geographical location, and business model. Figure 3 shows the majority of boardings are on high-ridership shuttle and water-based systems operated through service contracts (12 systems) and concession contracts (58 systems). High-ridership systems are located primarily in the NPS Intermountain, Northeast, and Pacific West Regions. The Intermountain Region relies on service contracts to operate its high-ridership systems, while high-ridership systems in other regions are more likely to utilize concessions contracts. Figure 3 shows that these services either supplement private automobile access to or within park units or provide critical access to units/sites not readily accessible by automobile.

High-ridership shuttle systems are primarily provided via service contracts, while a greater proportion of the high-ridership water-based systems are provided through concession contracts. This likely reflects a greater business case for bidding out water-based systems to concessioners. Approximately 5 million of the 6 million passenger boardings recorded for water-based concession systems were associated with ferries for Alcatraz Island and the Statue of Liberty.

Cooperative agreements with local transit agencies and other partners (15 systems) accounted for a sizeable number of passenger boardings. Twelve systems are operated by a local transit agency under a specific agreement with the NPS. Passenger boardings among NPS owned and operated systems (20 systems) were low relative to the other business models. Most of these systems either provide critical access to a unit/site or an interpretive experience for visitors. The inventory also identified several smaller systems including 14 plane and 11 snowcoach concession systems and four train/trolley systems operated either by NPS, a concessioner, or under a service contract.

Figure 3: Passenger boardings by primary system purpose, business model, and system type (N=125 systems)

Source: 2013 NPS National Transit Inventory data

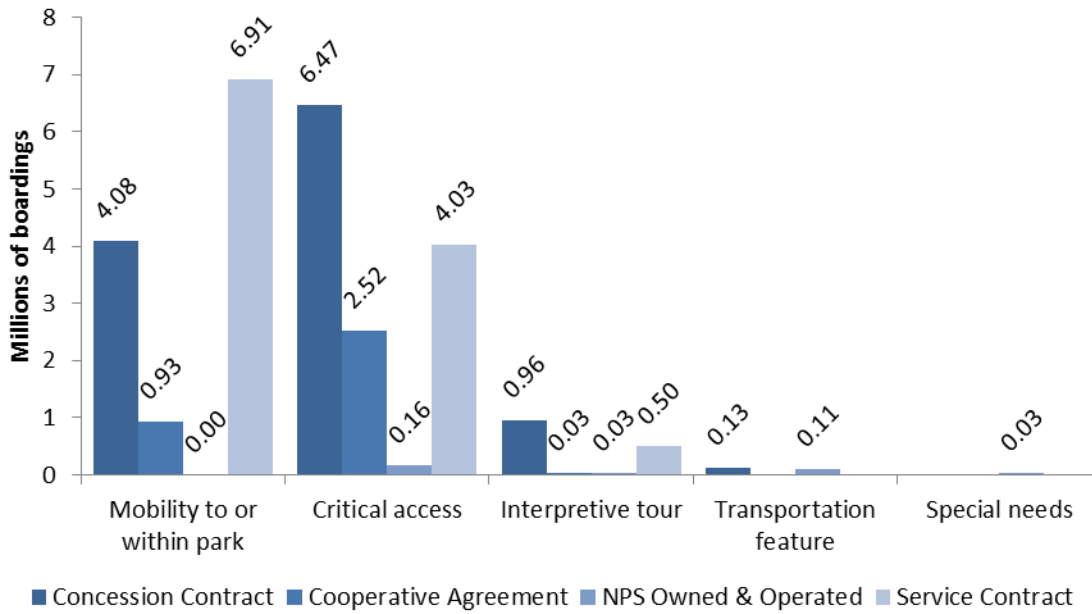
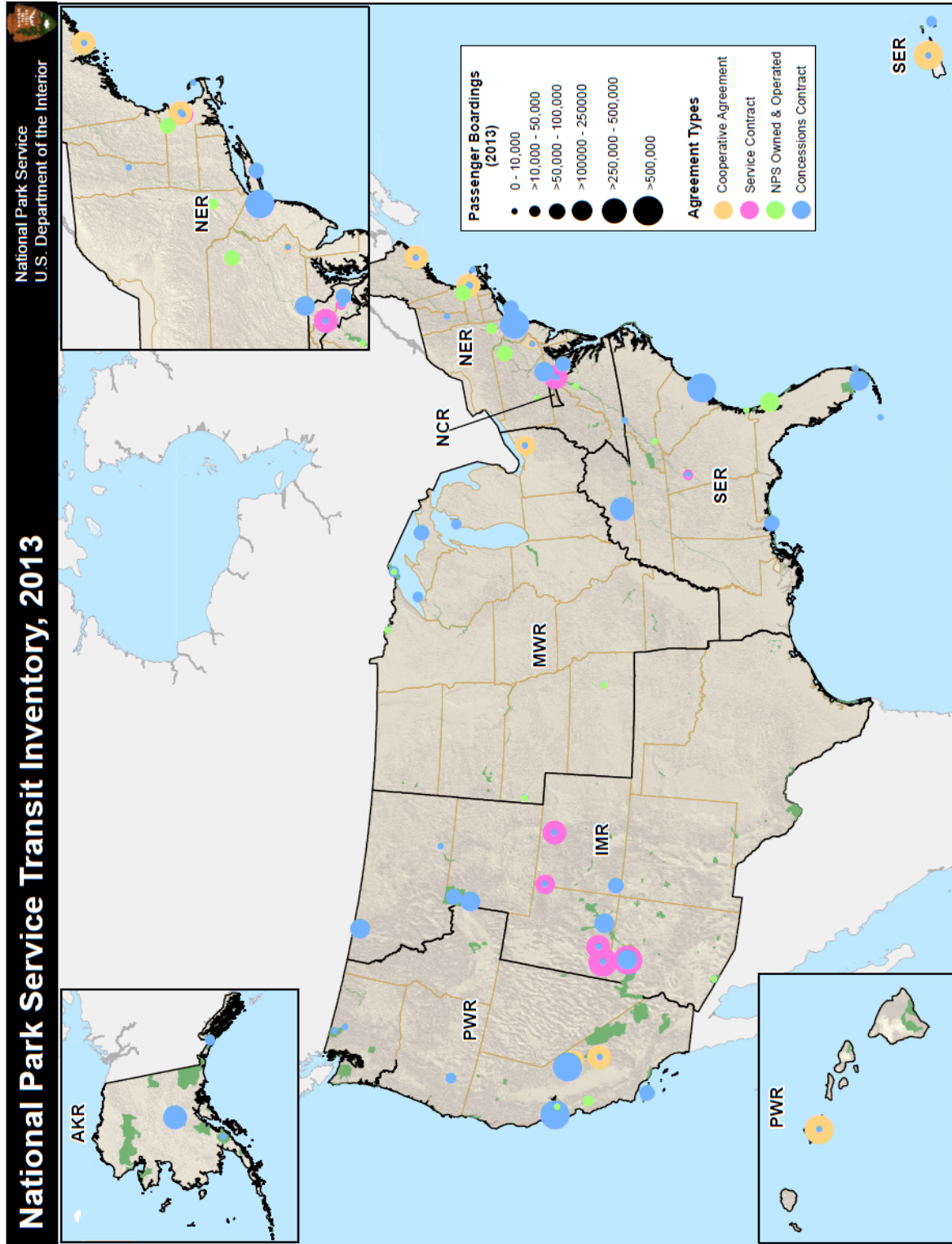


Figure 4: System locations, business models, and passenger boardings (N=131 systems)

Source: 2013 NPS National Transit Inventory data

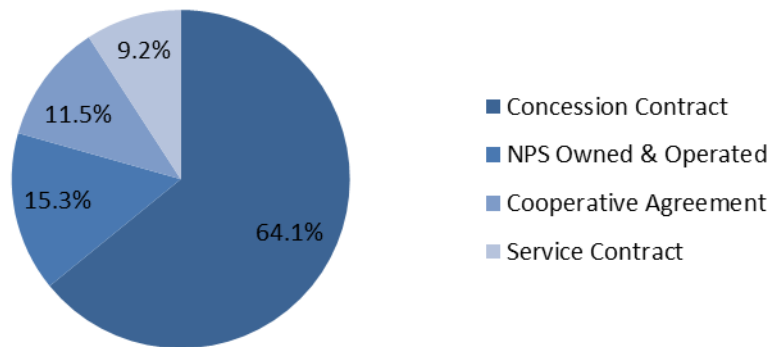


Business Models

Figure 5 shows that 84 (64.1%) of the 131 identified transit systems operate through concession contracts under which a concessioner pays the NPS a franchise fee to operate inside a unit. 20 (15.3%) transit systems are owned and operated exclusively by the NPS. 15 (11.5%) of the transit systems are operated under a cooperative agreement with another government agency or nonprofit. Only 12 (9.2%) of the transit systems are operated by a private firm under a service contract, although as illustrated in Figure 3 and Figure 9, these 12 systems accounted for a disproportionately high number of passenger boardings.

Figure 5: Systems by business model (N=131 systems)

Source: 2013 NPS National Transit Inventory data



Passenger Boardings

In CY2013 there were 26.9 million passenger boardings across all NPS transit systems.[†] If the 131 identified NPS transit systems were considered one enterprise and its passenger boardings compared to transit agencies across the country in the National Transit Database, this enterprise would rank 50th out of 785.[‡] For illustrative purposes, this would put NPS transit on-par with the primary transit systems in mid-sized cities like Sacramento, California and Charlotte, North Carolina. Excluding concession contracts and cooperative agreements, in which NPS tends to have a much smaller financial stake, NPS owned systems reported 11.7 million trips in 2013, suggesting NPS alone has the equivalent of the 88th largest transit system in the country.

Table 2 summarizes the methodologies park units used to count boardings. Systems directly recorded most passenger boardings (18.6 million out of 26.9 million) through manual or automated counters. Systems indirectly counted the remaining 8.4 million boardings through ticket sales or other means of estimation. Indirect methods of counting may vary across transit systems and methods. These indirect methods should be reviewed to ensure statistically correct estimation of boardings.

Table 2: Count methodology (N = 131 systems)

Source: 2013 NPS National Transit Inventory data

Count Methodology	# of Systems [‡]	Passenger Boardings (in millions)
Manual Counts	61	14.6
Ticket sales	51	7.8
Estimated	15	0.6
Automated Counter	4	4.0

Approximately 80% of boardings on NPS transit systems in CY2013 are attributable to the 10 highest use transit systems (by boardings). Table 3 summarizes these systems and shows passenger boardings for 2012 and 2013. Many systems experienced a significant increase or decrease in boardings for a variety of reasons. Table 4 summarizes the most dramatic changes and the accompanying text discusses contributing factors.

[†] A “passenger boarding” or “unlinked trip” occurs each time a passenger boards a vehicle. This is an industry standard measure also known as an “unlinked trip” and is used in the Federal Transit Administration’s National Transit Database. Although difficult to collect, future inventory efforts may consider directly documenting the number of passengers.

[‡] Federal Transit Administration National Transit Database. <http://www.ntdprogram.gov/ntdprogram/>. 2012 data is the most recent available data set.

[§] Six systems did not report passenger boardings or count methodology, although five of them did report passenger boardings for the 2012 inventory. For these six systems, the data collection team inferred count methodology based on business models and system description.

Table 3: Passenger boardings for the 10 highest use transit systems

Source: 2012 and 2013 NPS National Transit Inventory data

Rank	Park	System Name	2012 Boardings	2013 Boardings	Difference*	Business Model
1	GRCA	South Rim Shuttle Bus Service	6,177,000	6,135,279	-41,721	Service Contract
2	ZION	Zion Canyon Shuttle	3,461,665	3,650,812	189,147	Service Contract
3	YOSE	Yosemite Valley Shuttle	3,175,039	3,140,520	-34,519	Concession Contract
4	GOGA/ LCA	Alcatraz Cruises ferry	3,061,494	3,055,784	-5,710	Concession Contract
5	STLI/ELIS	Statue of Liberty Ferries	7,859,051	1,883,544	-5,975,507	Concession Contract
6	VALR	USS Arizona Memorial Tour	1,460,000	1,121,580	-338,420	Cooperative Agreement
7	FOSU	Ferry service	626,220	745,422	119,202	Concession Contract
8	SAJU	San Juan Trolley	394,250	560,228	165,978	Cooperative Agreement
9	SEKI	Giant Forest Shuttle	303,023	437,503	-134,480	Cooperative Agreement
10	ACAD	Island Explorer & Bicycle Express	458,268	423,998	-34,270	Cooperative Agreement

* Declines in boardings are partially explained by the Federal government shutdown in October 2013. Larger declines at STLI/ELIS are due largely to the temporary closure during 2013 of the Statue of Liberty and Ellis Island caused by Hurricane Sandy in October 2012.

Table 4 shows the largest 10 changes in boardings between 2012 and 2013 (excluding systems that did not report for either year). As mentioned previously, the large drop at STLI/ELIS is largely explained by the federal government shutdown in October 2013 and the temporary closure of the Statue of Liberty and Ellis Island due to Hurricane Sandy. Liberty Island was closed to the public between late October 2012 and early July 2013. Ellis Island was closed October 2012 through October 2013. The government shutdown likely impacted other systems, including VALR, as well. While the units were not specifically asked what accounted for large year-to-year changes, changes at DEPO, DINO, and VALR may in part be related to changing estimation methodologies or shifts in counting methodologies. Overall, passenger boardings decreased from 34.3 million in 2012 to 26.9 million in 2013.

Table 4: Largest change in passenger boardings between 2012 and 2013

Source: 2012 and 2013 NPS National Transit Inventory data

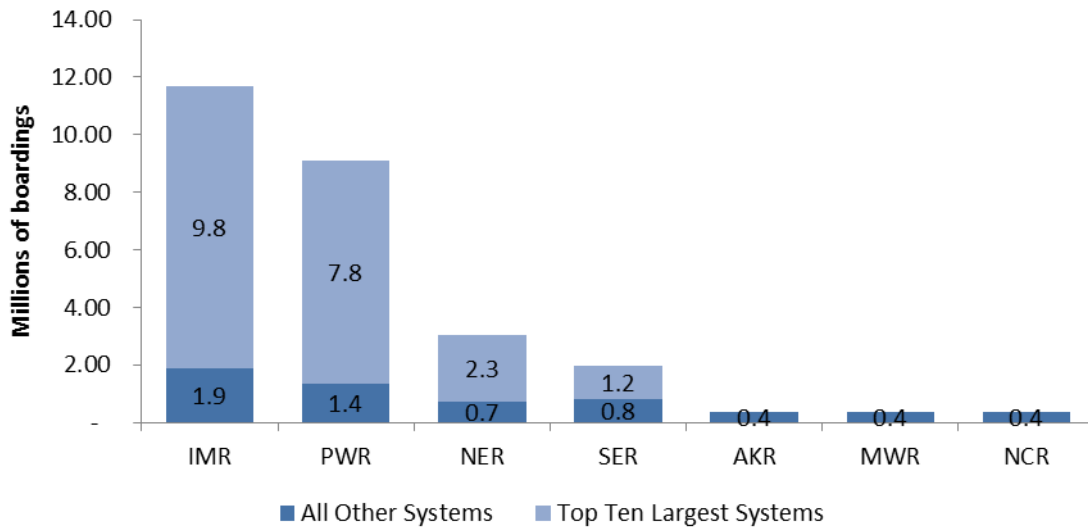
Rank	Park	System Name	2012 Boardings	2013 Boardings	Difference	Business Model
1	STLI/ELIS	Statue of Liberty Ferries	7,859,051	1,883,544	-5,975,507	Concession Contract
2	VALR	USS Arizona Memorial Tour	1,460,000	1,121,580	-338,420	Cooperative Agreement
3	ZION	Zion Canyon	3,461,665	3,650,812	189,147	Service
4	SAJU	San Juan Trolley	394,250	560,228	165,978	Cooperative Agreement
5	SEKI	Giant Forest Shuttle	303,023	437,503	134,480	Cooperative Agreement
6	ROMO	Bear Lake & Moraine Park shuttle, Hiker Shuttle to Estes Park	460,000	333,497	-126,503	Service Contract
7	DINO	Tram transit	80,000	190,000	110,000	Service Contract
8	DEPO	Reds Meadow Shuttle Bus	60,000	136,914	76,914	Cooperative Agreement
9	GRTE	Jenny Lake Shuttle Boat	217,234	156,642	-60,592	Concession Contract
10	MACA	Cave Tours Bus Shuttle	310,487	360,000	49,513	Concession Contract

* Declines in boardings are partially explained by the Federal government shutdown in October 2013. Larger declines at STLI/ELIS are due largely to the temporary closure during 2013 of the Statue of Liberty and Ellis Island caused by Hurricane Sandy in October 2012.

The Intermountain and Pacific West NPS regions each reported roughly 10 million passenger boardings in 2013, far exceeding other regions; however, if one were to remove the 10 highest use systems from consideration, each region ranged from 0.4 to 1.9 million boardings (see Figure 6).

Figure 6: Passenger boardings by NPS region (N=125 systems)

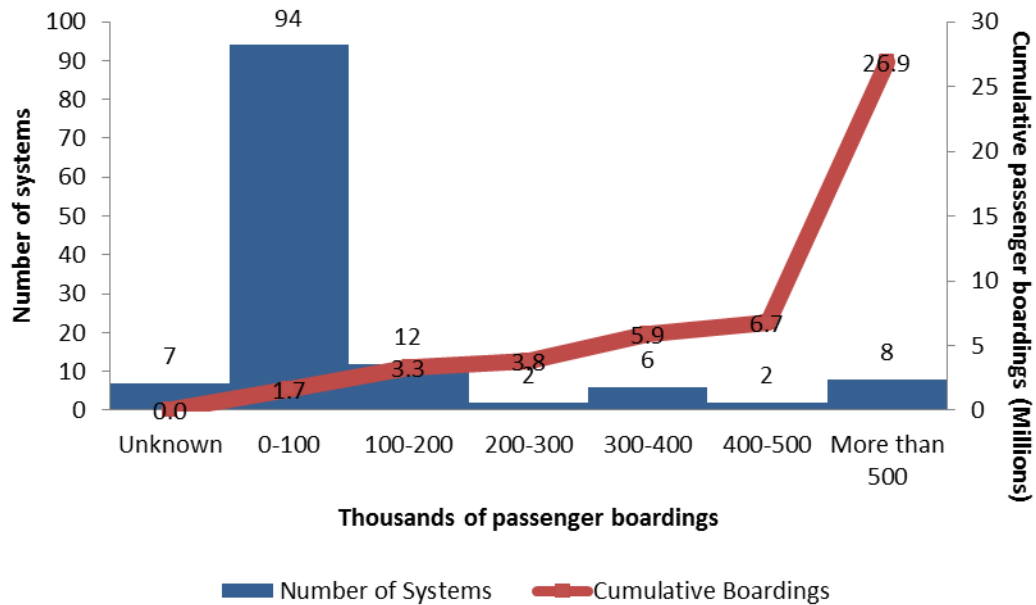
Source: 2013 NPS National Transit Inventory data



A further analysis of passenger boardings shows that 94 of the transit systems had less than 100,000 passenger boardings in 2013 (including 80 systems below 50,000 passenger boardings). Seven systems did not report passenger boardings in 2013. Figure 7 depicts the number of systems at different levels of boardings. As mentioned previously, most of the boardings on NPS transit systems are attributable to the 10 highest use transit systems (by boardings), which is emphasized in Figure 7.

Figure 7: Histogram of systems by passenger boardings (N=125 systems)

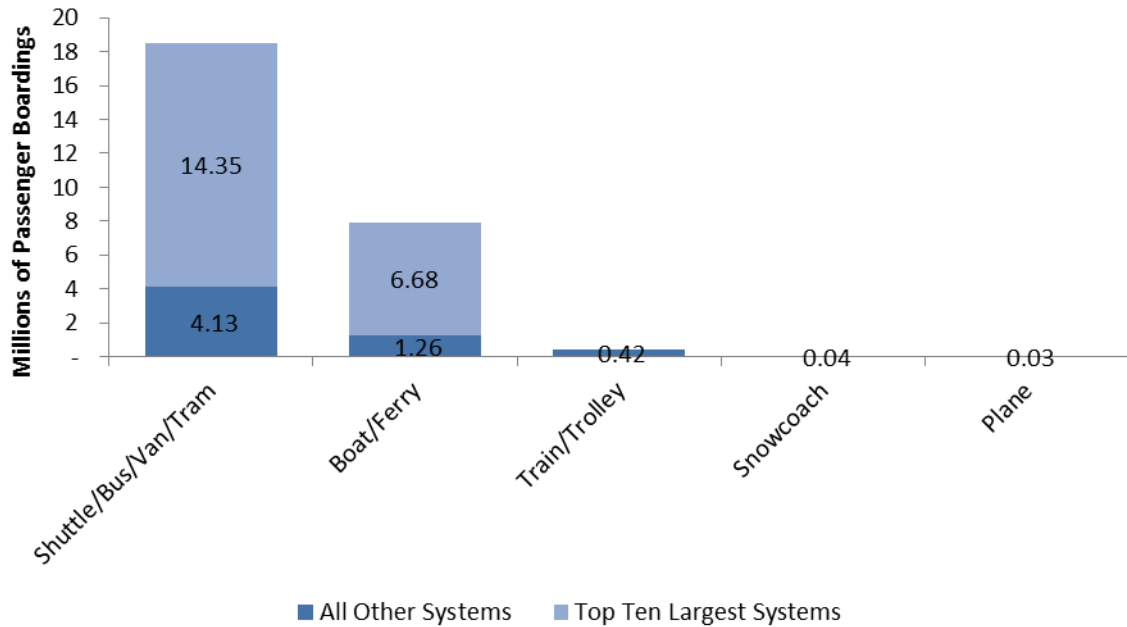
Source: 2013 NPS National Transit Inventory data



More than half of all passenger boardings (67.5%) were on shuttles/buses/vans/trams, while 29.5% were on boats/ferries. Trains/trolleys, planes, and snowcoaches accounted for 3.1% of all passenger boardings. However, excluding the 10 highest use systems, the share of passenger boardings for boats/ferries declines to 8.1%, while the share for trains/trolleys, planes, and snowcoaches increases (see Figure 8).

Figure 8: Passenger boardings by mode (N=125 systems)

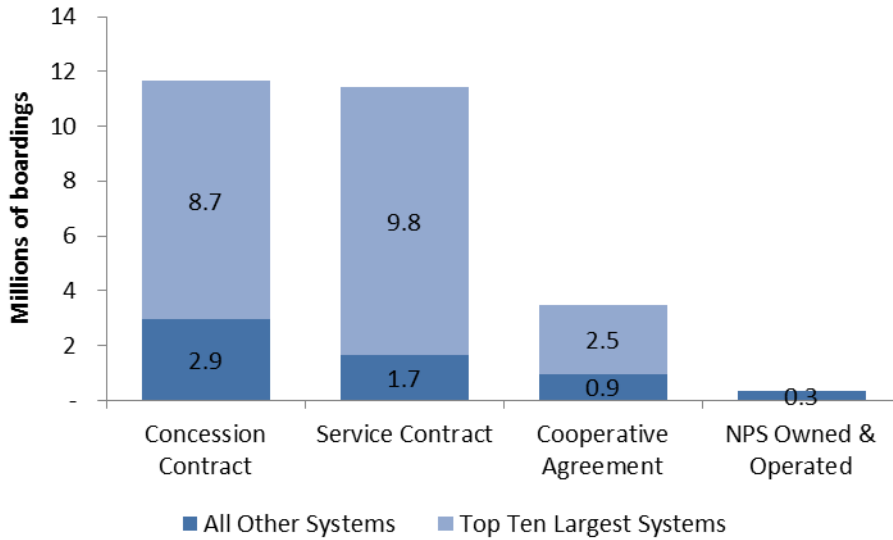
Source: 2013 NPS National Transit Inventory data



The majority of passenger boardings (43.3%) took place on systems operated under concession contracts. 42.5% took place under service contracts, 13% under cooperative agreements, and 1.2% under NPS owned and operated systems. However, if one were to remove the 10 highest use systems (four of which are concession contracts) from consideration, passenger boardings under each business model come into closer alignment (see Figure 9).

Figure 9: Passenger boardings by business model (N=125 systems)

Source: 2013 NPS National Transit Inventory data

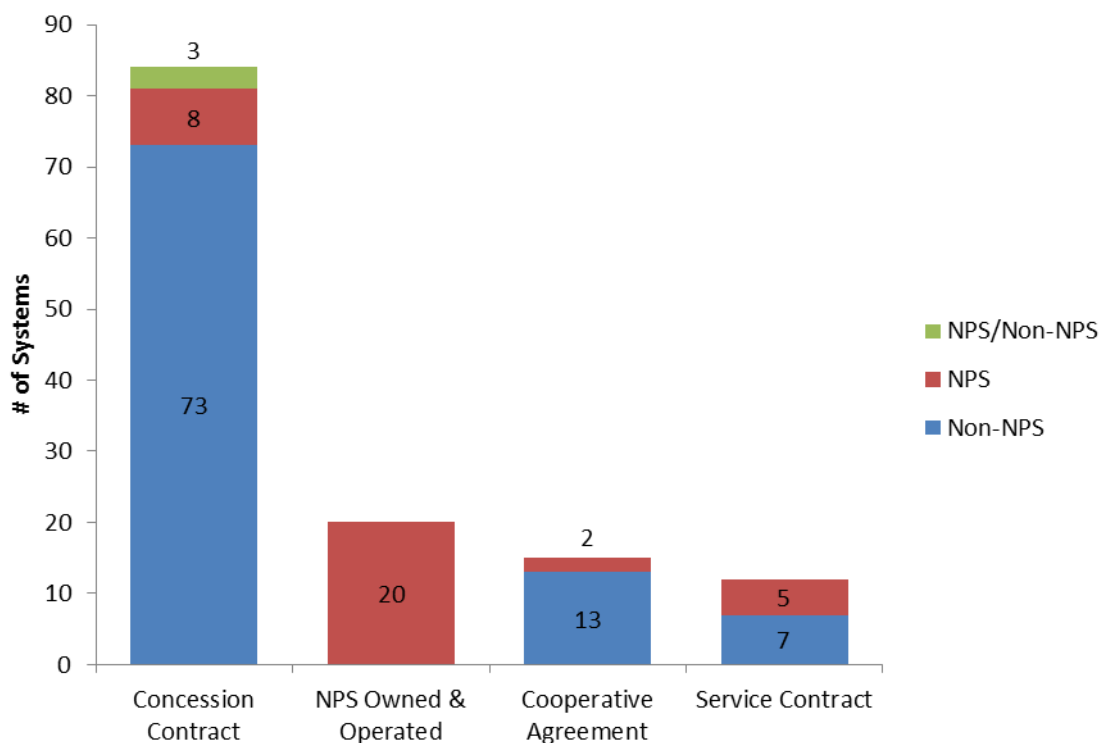


Vehicle Fleets and Fuel Types

A large percentage of the transit systems (64.1%) operate under concession contracts, of which 8 systems utilize vehicle fleets owned exclusively by the NPS. Three concessions systems (one at MACA and two at YELL) utilize a vehicle fleet comprised of both NPS and non-NPS vehicles. Most of the NPS-owned vehicles in these intermixed systems are the historic yellow buses and snow coaches at YELL that contribute to the visitor experience. 20 (15.3%) of the transit systems are owned and operated exclusively by the NPS. These systems tend to be small and provide critical access to a park or site (8 systems), are interpretive tours (6 systems), or provide service for special needs visitors or are a park transportation feature not easily provided by a private operator. 15 (11.5%) of the transit systems are operated under a cooperative agreement, of which 7 utilize vehicles owned by a local transit agency and 2 utilize vehicles owned by the NPS. 12 (9.2%) of transit systems are operated under a service contract, of which 5 are owned by the NPS (see Figure 10).

Figure 10: Fleet ownership by business model (N=131 systems)

Source: 2013 NPS National Transit Inventory data



The NPS transit system is comprised of a diverse fleet of vehicles operating on both conventional and alternative fuels. The NPS-owned fleet (271 vehicles) comprises all fuel types, with 60.9% of all vehicles classified as alternative fuel vehicles. The much larger (656 vehicle) non-NPS owned fleet is comprised of 13% alternative fuel vehicles (see Figure 11 and Figure 12).

Figure 11: Fleet: Conventional vs. Alternative fuel vehicles by ownership (N=927 vehicles)

Source: 2013 NPS National Transit Inventory data

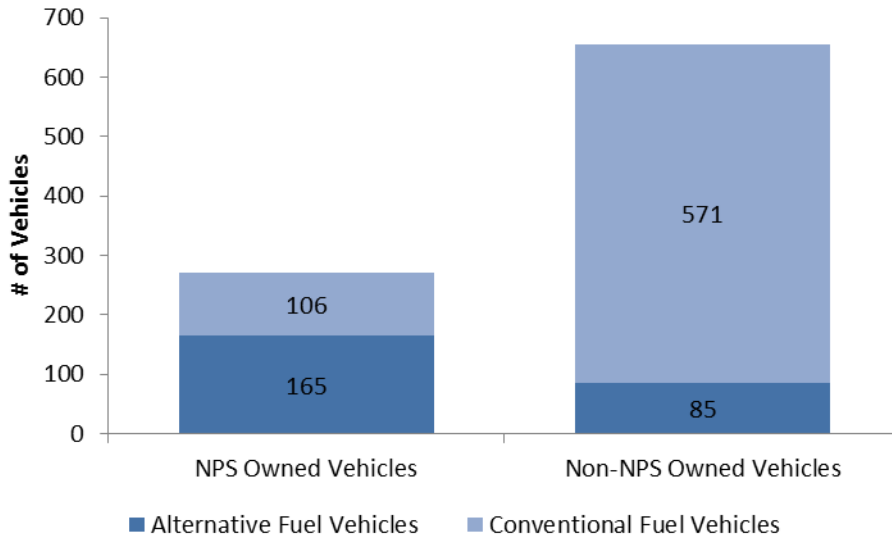
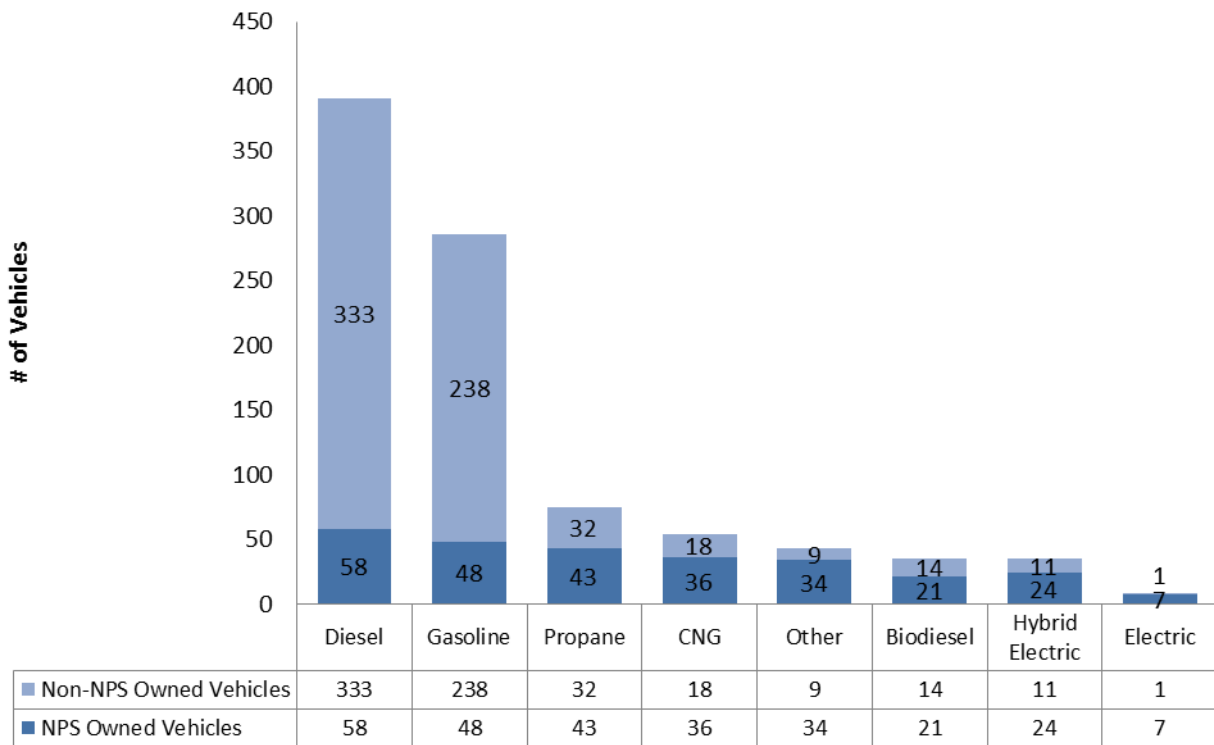


Figure 12: Number of vehicles by fuel type (N=927 vehicles)

Source: 2013 NPS National Transit Inventory data



Performance-Oriented Findings

Annual CO2 Emissions

The study team documented 18,927 metric tons of CO₂ emissions from 42 Shuttle / Bus / Van / Tram systems and 16 ferry/boat systems. This includes 4,959 metric tons of CO₂ emissions primarily from NPS-owned Shuttle / Bus / Van / Tram systems. To put this into perspective, the Environmental Protection Agency reports that in 2010 the average driver in the U.S. drove 12,332 miles; 2,153 such drivers would generate the equivalent of the reported Shuttle / Bus / Van / Tram system emissions, and 2,149 such drivers would generate the equivalent of reported ferry/boat emissions.[†]

CO2 Emissions Avoided

The more occupants in a transit vehicle, the more emissions are avoided because of the higher efficiency of the transit vehicle relative to the corresponding number of private automobiles. In the absence of vehicle occupancy data, the study team developed a range of estimates for net CO₂ emissions based on a corresponding range of transit vehicle occupancies. Table 5 and Figure 13 show these net emissions by vehicle ownership under scenarios for 38 Shuttle / Bus / Van / Tram systems where parks provided service miles.[†] For very low occupancy levels there are negative values, which indicate that under those scenarios the likely net result of NPS transit would be to contribute to CO₂ emissions, rather than avoid them. If shuttles were 40 percent filled, these systems do little better than break even. If shuttles were 80 percent filled, they would avoid an estimated net 9,893 metric tons of CO₂ (see Appendix D for methodology).

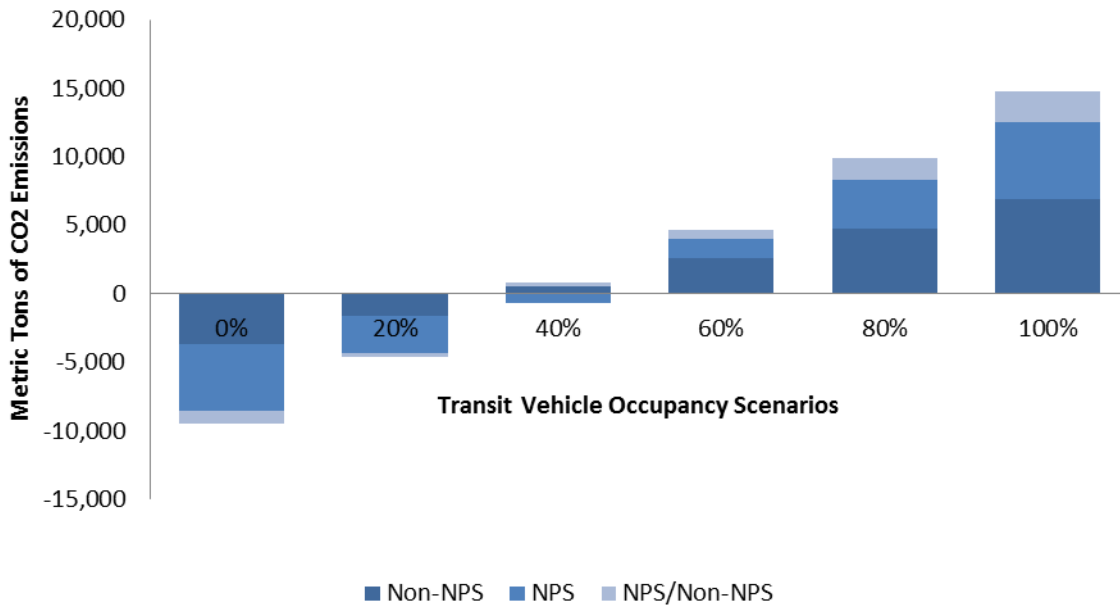
Table 5: Estimated net CO₂ Emissions (metric tons) avoided by vehicle ownership (N = 38 systems)

Assumed Transit Vehicle Occupancy	Non-NPS Owned Systems	NPS Owned System	NPS/Non-NPS Owned Systems	Total
0%	-3,721	-4,803	-950	-9,475
20%	-1,598	-2,723	-311	-4,633
40%	525	-644	328	209
60%	2,588	1,435	638	4,661
80%	4,772	3,514	1,607	9,893
100%	6,896	5,593	2,246	14,735

[†] U.S. Environmental Protection Agency. Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks. <http://www.epa.gov/otaq/consumer/420fo8o24.pdf>.

[†] Boat/ferry systems do not avoid vehicle trips and therefore are not included in this analysis. There was limited data collection for system types other than shuttle/bus/van/tram. Furthermore, the study team did not estimate emissions mitigated by electric vehicles because it did not collect detailed information about local power generation.

Figure 13: Estimated net CO2 emissions at various occupancy levels (N = 38 systems)



Average Age of Vehicles by Vehicle Type

Using standard replacement costs and service life assumptions shown in Appendix E, the average age of all NPS-owned vehicles is estimated to be slightly less than non-NPS vehicles; however, the NPS-owned Shuttle / Bus / Van / Tram fleet is estimated to be substantially older than the reported non-NPS vehicles (see Figure 14). The difference is partly explained by several ferry/boat systems owned by partners, which tend to have longer operating lives than rolling stock (see Figure 14). The impact of these ferry/boat systems on the age of non-NPS systems relative to NPS systems is balanced to some degree by the old age of historic NPS-owned snow coaches and trains/trolleys.

Figure 14: All Vehicles by Age Class (N = 706 vehicles)

Source: 2013 NPS National Transit Inventory data

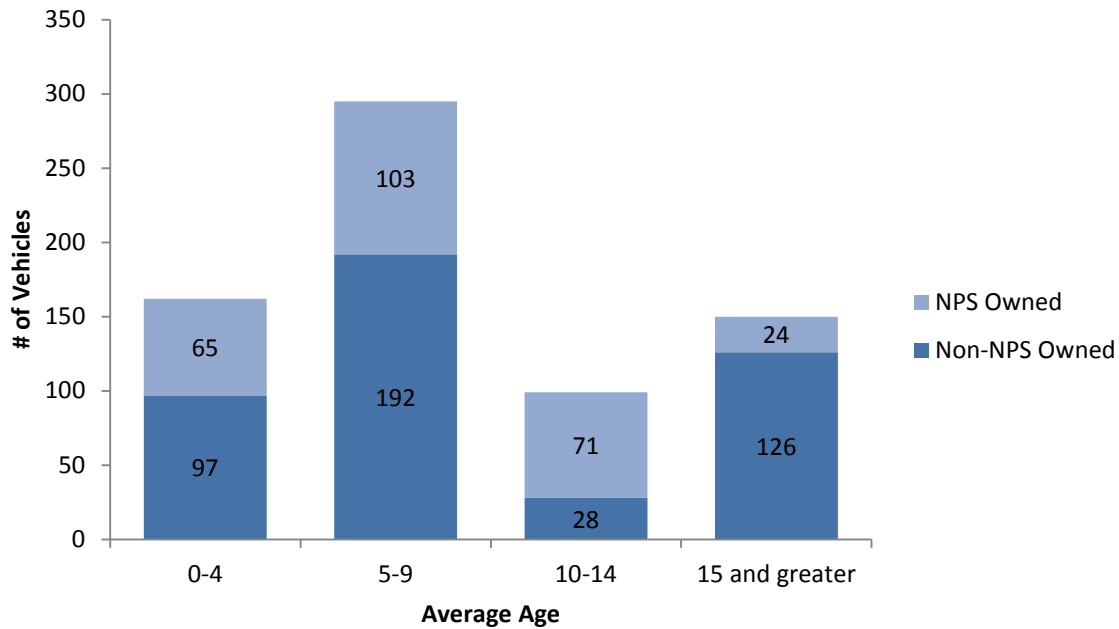


Table 6 shows the average age for NPS-owned vehicles by vehicle type. The data show that the average NPS-owned 15 passenger van is estimated to currently exceed its recommended service life. Similarly, the average ages for NPS-owned 12 passenger vans and 28 passenger buses are estimated to be only slightly below the recommended service lives for those vehicle types; the median age for each type shows that more than half of these vehicles are estimated to have exceeded their recommended service life.

Table 6: Vehicle age for NPS vehicle types (N=269 vehicles)

Source: 2013 NPS National Transit Inventory data

Vehicle Type	Average Age	Median Age	Service Life	Number of Vehicles
Ferry/boat	7.0	2	--	11
12 passenger, full-size passenger van	6.2	7	8	24
15 passenger, full-size passenger van	9.6	12	8	49
28 passenger bus	9.4	13	10	54
40 passenger bus	6.7	7	12	88
Other shuttle vehicle	2.4	3	--	20
Snow coach	44.0	44	--	18
Train/trolley	45.4	29	--	5
<i>Total Fleet</i>	<i>10.4</i>	<i>7</i>	<i>--</i>	<i>269</i>

Projected Recapitalization Costs

Using vehicle ages reported by NPS transit systems and standard replacement costs and service life assumptions shown in Appendix E, this inventory estimates \$12.5 million in deferred maintenance for NPS-owned Shuttle / Bus / Van / Tram rolling stock (see Table 7).

Table 7: Estimated NPS-owned shuttle/bus/tram/van deferred maintenance, 2008-2013 (N = 269 vehicles)

Source: 2013 NPS National Transit Inventory data

Year	Deferred Maintenance Costs	Number of Vehicles Requiring Replacement (by Type)					Units (Bold and Italics for units requiring > \$1 million)
		12 Pax Van	15 Pax Van	28 Pax Bus	40 Pax Bus	Other*	
2008-2013	\$12,485,000		34	36	9		ADAM, <i>GLAC, HAFE</i> , PINN, <i>ZION</i>

* Other includes tractors, golf carts, heavy trollies, school buses, and electric trams.

Assuming each NPS-owned shuttle/bus/tram/van vehicle is recapitalized in-kind at the end of its expected service life, the agency faces an estimated \$55.2 million in rolling stock capital costs between 2014 and 2025. The projected costs are calculated in nominal dollars and vary widely from year to year as vehicles from different systems are due to be replaced. Over the next six years (2015-2020), major recapitalization needs at GLAC, GRCA, MACA, YELL, YOSE, and ZION will contribute to an estimated \$6.9 million annual NPS recapitalization needs between 2015 and 2020 (see Table 8).

Table 8: Estimated NPS-owned shuttle/bus/tram/van rolling stock capital needs, 2014-2025 (N = 269 vehicles)

Source: 2013 NPS National Transit Inventory data

Year	Estimated Capital Replacement Costs	Estimated Number of Vehicles Requiring Replacement (by Type)					Units (Bold and Italics for units requiring > \$1 million)*
		12 Pax Van	15 Pax Van	28 Pax Bus	40 Pax Bus	Other**	
2014	\$407,500	13		1		1	EUON, <i>GLAC</i>
2015	\$17,495					1	CARL
2016	\$220,000	1	7				EUON, GLAC
2017	\$11,465,000		6	1	25		GLAC, ORPI, PINN, <i>YELL</i> , <i>YOSE</i>
2018	\$17,675,000	1	2	1	35	2	CUIS, EUON, <i>GRCA</i> , HOFR/ELRO/VAMA, PINN, YELL
2019	\$2,750,000	7			8		<i>GLAC</i> , YELL
2020	\$9,120,000	1		35	4	2	CUIS, HOFR/ELRO/VAMA, <i>MACA</i> , NOCA/LACH, SHEN, TAPR, YOSE, <i>ZION</i>
2021	\$6,527,500	1	1	10	9		<i>HAFE</i> , JOFL/ALPO, KEMO, <i>ZION</i>
2022	\$2,610,000	14		4	3	7	ADAM, GLAC, NOCA/LACH, SHEN, YOSE, ZION
2023	\$2,417,495			2	4	1	CARL, GLAC, <i>YOSE</i>
2024	\$792,500	1	6			5	EUON, GLAC, SAJU
2025	\$1,222,500		39			3	<i>GLAC</i> , MEVE, ORPI
Grand Total	\$55,224,990						

* In order to estimate a servicewide transit vehicle replacement cost, replacement years and costs for individual systems are estimated using servicewide assumptions. Year of replacement for individual transit systems is an estimate only and should not be used in place of better information and judgment of park staff making transit system-specific decisions.

**Other includes tractors, golf carts, heavy trollies, school buses, and electric trams.

Funding

The inventory documented a wide variety of funding sources used by the NPS to move people by transit in FY2013; however, the reported usage of these funding sources suggests possible confusion among some NPS system contacts. Contacts tended to underreport use of concession fees, FLTP Category III, and fares. Not all NPS contacts are versed in the details of the funding arrangements for individual systems (since many are operated by concessioners or partner agencies). Furthermore, some system contacts reported using funding programs for ineligible activities, indicating they may not be familiar with specific funding details.

Next Steps

The information from this inventory suggests opportunities for the following strategic programmatic initiatives:

- **Identify and pursue new transit funding sources.** Given the decreasing availability of NPS- and Federal Lands-specific transportation funding, the ATP is researching transportation funding sources not traditionally pursued by NPS units. This inventory helps the ATP identify existing systems eligible for these novel funding sources, build a community of practice for NPS transit contacts, and target technical assistance.
- **Create and foster an NPS transit community of practice.** This inventory provides the most up-to-date list of transit contacts in NPS, serving as the foundation for a community of practice within the agency.
- **Coordinate with the Commercial Services Program.** The inventory highlights the critical importance of concession systems for providing transit service to and within NPS units, which suggests the potential benefit of increased collaboration between the ATP and Commercial Services Program. This collaboration could include aligning data collection efforts and exploring changing business models of some systems in anticipation of reduced capital and operating funds.
- **Coordinate with the ATS Lifecycle Asset Management Development Group, Park Facility Management Division, and the NPS Financial Proforma effort.** This 2013 National NPS Transit Inventory represents the first comprehensive accounting of NPS-owned transit vehicles. The Alternative Transportation System Lifecycle Asset Management (ATSLAM) Development Group may eventually use the inventory as the basis for inventorying transit assets and systems in an NPS system of record, such as the Financial and Business Management System. The data could also support detailed financial work that is part of the NPS Financial Proforma effort.
- **Coordinate with Sustainable Operations and Climate Change Branch.** Executive Order 13514 requires federal agencies to measure, manage, and reduce greenhouse gas emissions. The NPS transit inventory provides the first comprehensive estimate of emissions from and emissions averted by transit system in the parks. These estimates provide valuable data for the Sustainable Operations and Climate Change Branch to help the NPS understand the impact of transit systems on global climate change.

Turnover at units and dramatic year-to-year changes point to the need to annually update the inventory to ensure continual improvement and ultimately provide performance management tools to improve NPS transit performance in the future. The lessons learned from this update to the National NPS Transit Inventory point to the following potential improvements in future inventories:

- **Create new and/or refine existing data elements.** To improve performance measures, request number of runs, occupancy by system, and financial information.
- **Improve data collection method and tool.** Consider disseminating the database tool over the internet to streamline the consolidation of data.
- **Explore alignment with NPS asset management and other business practices.** Keeping in mind the unique needs of the ATP, consider aligning inventory data collection efforts with existing businesses processes, particularly in support of the Capital Investment Strategy.
- **Standardize and validate reporting methodologies.** Due to varying degrees of familiarity that park contacts have with transportation terms and concepts, consider methods to further standardize and validate reporting, particularly for passenger boarding data.
- **Expand and improve the emissions analysis.** Measure net changes to criteria air pollutants and obtain more complete data from partners. The latter task may require increased collaboration with partners, particularly concessioners via the Commercial Services Program.
- **Collect more detailed vehicle information:** Emissions and replacement cost estimates could be further refined with more detailed vehicle type information.

Appendix A – Acknowledgements

The project team would like to acknowledge the following NPS staff for their contributions to this effort:

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Glen Canyon National Recreation Area

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Grand Canyon National Park

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Glacier National Park

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Yellowstone National Park

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Grand Teton National Park

Sue Walker
Organ Pipe Cactus National Monument

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Midwest Region

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Heather Brown
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Jennifer McMahon
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Richard Moore
Isle Royale National Park

Chuck Remus
Voyageurs National Park

Bill R. Smith
Pictured Rocks National Lakeshore

Chris E. Smith
Apostle Islands National Lakeshore

National Capital Region

Makayah Royal
National Capital Region

Ken Ferrari
Wolf Trap Farm Park National Park

Dick Swihart
National Mall

Northeast Region

Bob Holzheimer
Northeast Region

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Northeast Region

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Christina Briggs
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Len Bobinchock
Acadia National Park

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Caroline Keinath
Adams National Historical Park

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Christina Marts
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Giles Parker
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Shenandoah National Park

Pacific West Region

Dianne Croal
Pacific West Region

Justin DeSantis
Pacific West Region

Dave Ashe
Channel Islands National Park

Colleen Bathe
Sequoia National Park

Scott Burch
Crater Lake National Park

Jessica Carter
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World War II Valor in the Pacific National Monument

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Marvin Mann
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Eileen Martinez
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Buck Island Reef National Monument

William Gordon
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Dawn Leonard
Blue Ridge Parkway

George McHugh
Biscayne National Park

Sarah Perschall
Carl Sandburg Home National Historic Site

Andrew Rich
Fort Matanzas and Castillo de San Marcos
National Monuments

Maggie Tyler
Cumberland Island National Seashore

Nancy Walther
Kennesaw Mountain National Battlefield Park

Dianne Westfaul
Gulf Islands National Seashore

Appendix B – Definition of Transit

The NPS WASO Alternative Transportation Program (ATP) developed a definition for an “NPS transit system” prior to conducting the 2012 transit inventory. Only units with systems that met each of these three criteria were considered for the inventory:

1. Moves people by motorized vehicle on a regularly scheduled service;[†]
2. Operates under one of the following business models: concessions contract; service contract; partner agreement including memorandum of understanding, memorandum of agreement, or cooperative agreement (commercial use authorizations are not included); or NPS owned and operated; and[†]
3. All routes and services at a given unit that are operated under the same business model by the same operator are considered a single NPS transit system.

This definition was based on a review of past efforts, analysis of the existing transit portfolio, and individual and group conversations with the Regional Transportation Program Managers and the Federal Lands Highway Program Service-wide Maintenance Advisory Committee (FLHP-SMAC). In response to challenges encountered during the course of the inventory, the project team made small changes to the original draft definition to improve clarity. The team applied the definition uniformly to all potential systems to determine whether or not each should be included in the inventory.

In formulating the draft definition, the NPS ATP pursued two tandem goals: agreement and objectivity. As the seven regions of the park service have unique management, assets, services, needs, and approaches it was unlikely that a single definition could meet all needs entirely, but one goal was to create a single definition that all regions and WASO could agree upon and that met most of everyone’s needs. The second goal was to create an objective definition such that two different, reasonable people would apply the definition in the same way.

The NPS ATP investigated several potential criteria that stemmed from existing ATP documents, Transit in Parks Program (TRIP) documents and applications, and conversations with ATP stakeholders, as presented below.

Provides transit service: An “NPS transit system” should provide transit service. In the glossary of the National Transit Database, the Federal Transit Administration defines transit as synonymous with public transportation and public transportation is defined as follows in the Federal Transit Act, “transportation by a conveyance that provides regular and continuing general or special transportation to the public, but does not include school bus, charter, or intercity bus transportation or intercity passenger rail transportation provided by [Amtrak].” Conversations with NPS regional transportation coordinators further specified transit service should be limited to motorized conveyances. Based on this, the NPS ATP proposed the following criterion: “*moves people by motorized vehicle on a regularly scheduled service.*”

[†] Services with a posted schedule that have standard operating seasons/days of week/hours. Services which do not operate on a fixed route, are charter services for individual groups, or exist for the sole purpose of providing access to persons with disabilities, are not included.

[†] For the purposes of this inventory, no distinction was drawn between memorandum of understanding, memorandum of agreement, and cooperative agreement. All were recorded as “cooperative agreement.”

Is important to the NPS mission: The importance of transit systems to fulfilling the NPS mission is a core tenet of the ATP, as established in previous program plans and extensively discussed at program meetings. However, the simple question “Is this system important to the NPS mission?” is subjective and would return inconsistent results. For many systems, particularly those for which the NPS has a financial stake or has a formal contract or agreement in place, the answer seems clear: because the NPS has made an effort to provide the service, the service is assumed to be important to the mission. Other services, particularly those which are operated under commercial use authorization (CUA), are not as clearly essential to the mission. Thus, the NPS ATP proposed the following criterion: “*operates under one of the following business models: concessions contract; service contract; partner agreement including memorandum of understanding, memorandum of agreement, or cooperative agreement (commercial use authorizations are not included); or NPS owned and operated systems.*” The NPS ATP used “cooperative agreement” as a general term, encompassing all qualifying partner agreements (memorandum of understanding, memorandum of agreement, and cooperative agreement).

Concession contracts were included because they require resources and desire by the NPS to initiate. Also, after the bid and award process, concession contracts limit competition with other private operators and thus generally result in close working relationships with the NPS. Commercial use authorizations are not included because prospective CUA operators request permission from NPS to operate. These agreements are not initiated by the NPS and the resulting services are inherently not “NPS” systems.

CUAs were not included because these services are owned and operated by private operators, and the NPS only provides oversight to ensure the services are operated in accordance with NPS policies and requirements. There are hundreds of CUAs service-wide that provide visitors tours and transportation. The burden of collecting and reporting information on all of these systems could be burdensome to units and regions. If information were to be collected and reported on CUA services at all, an objective measure of importance would need to be identified and two key questions would need to be addressed. First, how does one objectively determine whether a service operated under a CUA is important versus non-essential to the NPS mission? This effort found only one sub-category of CUA that could be considered objective: services that provide sole access to an NPS resource. Second, should NPS represent as its own services for which it has no role in the acquisition, operations, or maintenance activities? Even for CUAs which provide sole access, this effort suggests not. This determination is not to suggest that the service is not important to the NPS, but rather to acknowledge that the service is not the responsibility of NPS – in other words, it is not an “NPS transit system.” These systems could be tracked separately but would not be included in the inventory.

Reduces VMT: Reduced VMT was a key factor in TRIP applications because, in theory, reducing VMT reduces emissions. However, the simple question of “Does a system reduce VMT?” was tested on candidate NPS transit systems, and answers tended to be complex and debatable. The NPS ATP determined that “reduces VMT” is not an objective criterion. Although reducing VMT can be a goal of NPS transit systems, it should not be a defining characteristic.

Provides critical access: Both TRIP and Category III have traditionally funded systems which provide sole access via alternative transportation. The question “Does a system provide critical access?” was tested on candidate NPS transit systems. However, not all NPS transit systems provide critical access, and not all systems which provide critical access meet other likely criteria of a definition, such as NPS having a financial stake. Thus, this would not contribute toward a simple, clear definition.

Tours versus transportation: The TRIP program made a distinction between interpretive tours and transportation, the former being a recreational activity itself, and the latter being the

conveyance of a passenger to or between activities. Whether a system is a tour or provides transportation was tested on candidate NPS transit systems. The distinction was often ambiguous. Many “transportation services” also provide interpretation or offer an experience on board. Many “tours” transport people to activities, allow people to get on and off, and/or take passengers to places in national parks that they could not access in their cars (for example, to a point on a body of water). Furthermore, both tours and transportation services further the visitor experience component of the NPS mission, and the NPS ATP sought not to prioritize one over the other. Although in daily life a transportation trip (often thought to be mandatory, for instance, to the grocery store) might be more important than a tour trip (often thought to be discretionary, for instance, a historical tour of a battlefield), in a recreational setting such as national park both types of trips may be vital to providing high quality visitor experiences.

Is part of a connected, multimodal network: Several stakeholders suggested this criterion. However, it is vague, and requires further definition of the term “connected, multimodal network.”

Identifying unique systems: In order to be consistent service-wide in counting the number of transit systems, the NPS ATP investigated methods for defining where one transit system stops and another starts and tested these with candidate NPS transit systems, particularly at units thought to have more than one system. Based on this, the NPS ATP proposed a final criterion: *“all routes and services operated by the same operator under the same business model at a given unit are considered a single transit system.”*

Once developed, the pilot definition was shared individually with the Transportation Program Manager from each of the seven NPS regions. Feedback from each region was generally supportive. The definition was also presented at the May 2012 Federal Lands Highway Program Service-wide Maintenance Committee. Again, reaction by meeting participants was generally supportive. The Associate Director, Park Planning, Facilities, and Lands, formalized the draft definition in August 2012 in a memo titled: “National Park Service Transit Inventory Definition and Next Steps.

Appendix C – 2013 NPS National Inventory System List

Critical Access Systems

Park Code	NPS Region	System Name	2013 Passenger Boardings	System Vehicle Type	Agreement Type	Vehicle Ownership	NPS Contact
ADAM	NER	Adams trolley	100,990	Shuttle / Bus / Van / Tram	Service Contract	NPS	Caroline Keinath
BISC	SER	Biscayne National Underwater Park Tours	7,000	Boat / Ferry	Concession Contract	Non-NPS	George McHugh
BOHA	NER	Boston Light Tour	4,874	Boat / Ferry	Cooperative Agreement	Non-NPS	Giles Parker
BOHA	NER	Thompson Island Ferry	50,000	Boat / Ferry	Cooperative Agreement	Non-NPS	Giles Parker
BOHA	NER	BOHA Ferries	213,678	Boat / Ferry	Cooperative Agreement	Non-NPS	Giles Parker
BUIS	SER	Dragonfly	654	Boat / Ferry	Concession Contract	Non-NPS	Susan Duke
BUIS	SER	Llewellyn's Charters	677	Boat / Ferry	Concession Contract	Non-NPS	Susan Duke
BUIS	SER	Jolly Roger Charters	1,515	Boat / Ferry	Concession Contract	Non-NPS	Susan Duke
BUIS	SER	Teroro II, Inc.	2,454	Boat / Ferry	Concession Contract	Non-NPS	Susan Duke
BUIS	SER	Caribbean Sea Adventures	8,988	Boat / Ferry	Concession Contract	Non-NPS	Susan Duke
BUIS	SER	Big Beard's Adventure Tours	12,405	Boat / Ferry	Concession Contract	Non-NPS	Susan Duke
CACO	NER	Coastguard Beach Shuttle	0	Shuttle / Bus / Van / Tram	NPS Owned & Operated	NPS	Karst Hoogeboom
CHIS	PWR	Channel Islands Aviation	189	Plane	Concession Contract	Non-NPS	Dave Ashe
CHIS	PWR	Island Packers	63,614	Boat / Ferry	Concession Contract	Non-NPS	Dave Ashe
CUIS	SER	Ferry service	0	Boat / Ferry	Concession Contract	Non-NPS	Maggie Tyler
DEPO	PWR	Reds Meadow Shuttle Bus	136,914	Shuttle / Bus / Van / Tram	Cooperative Agreement	Non-NPS	Deanna Dulen
DRTO	SER	Ferry service	0	Boat / Ferry	Concession Contract	Non-NPS	William Gordon
EISE	NER	EISE shuttle	104,870	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Carol Hegeman
EUON	PWR	NPS Shuttle	3,067	Shuttle / Bus / Van / Tram	NPS Owned & Operated	NPS	Tom Leatherman

Park Code	NPS Region	System Name	2013 Passenger Boardings	System Vehicle Type	Agreement Type	Vehicle Ownership	NPS Contact
FIIS	NER	Watch Hill Ferry	21,000	Boat / Ferry	Concession Contract	Non-NPS	John Mahoney
FIIS	NER	Sailors Haven Ferry	43,000	Boat / Ferry	Concession Contract	Non-NPS	John Mahoney
FOMA / CASA	SER	Ferry service	131,284	Boat / Ferry	NPS Owned & Operated	NPS	Andrew Rich
FOSU	SER	Ferry service	614,138	Boat / Ferry	Concession Contract	Non-NPS	Mark Davis
GLCA	IMR	Boat tours	108,350	Boat / Ferry	Concession Contract	Non-NPS	Julie Drugatz
GOGA / ALCA	PWR	Alcatraz Cruises ferry	3,055,784	Boat / Ferry	Concession Contract	Non-NPS	Jessica Carter
GUIS	SER	Ship Island Ferry	80,400	Boat / Ferry	Concession Contract	Non-NPS	Dianne Westfaul
HAFE	NCR	HAFE shuttle transport	270,222	Shuttle / Bus / Van / Tram	Service Contract	NPS	Dennis Ebersole
HOFR / ELRO / VAMA	NER	Roosevelt Ride	6,952	Shuttle / Bus / Van / Tram	NPS Owned & Operated	NPS	Scott Rector
ISRO	MWR	Royale Air Service Inc. float plane	621	Plane	Concession Contract	Non-NPS	Richard Moore
ISRO	MWR	MV Ranger III	1,567	Boat / Ferry	NPS Owned & Operated	NPS	Richard Moore
ISRO	MWR	MV Voyageur II and Sea Hunter III	8,094	Boat / Ferry	Concession Contract	Non-NPS	Richard Moore
ISRO	MWR	MV Isle Royal Queen IV	9,984	Boat / Ferry	Concession Contract	Non-NPS	Richard Moore
KEMO	SER	Shuttle Bus	11,594	Shuttle / Bus / Van / Tram	Service Contract	NPS	Nancy Walther
MACA	SER	Cave Tours Bus Shuttle	360,000	Shuttle / Bus / Van / Tram	Concession Contract	NPS/Non-NPS	Mark Rich
MACA	SER	Green River and Houchin Ferries	0	Boat / Ferry	NPS Owned & Operated	NPS	Steve Kovar
MEVE	IMR	Long House Trailhead tram	69,356	Shuttle / Bus / Van / Tram	Concession Contract	NPS	Allan Loy
PINN	PWR	Pinnacle Shuttle	19,270	Shuttle / Bus / Van / Tram	NPS Owned & Operated	NPS	Debbie Simmons
SAJU	SER	San Juan Trolley	560,228	Shuttle / Bus / Van / Tram	Cooperative Agreement	NPS	César A. Carreras
SEKI	PWR	Giant Forest Shuttle	437,503	Shuttle / Bus / Van / Tram	Cooperative Agreement	Non-NPS	Colleen Bathe
SHEN	NER	Rapidan Camp bus	2,836	Shuttle / Bus / Van / Tram	NPS Owned & Operated	NPS	Tim Taglauer
SLBE	MWR	Manitou Island Transit	10,839	Boat / Ferry	Concession Contract	Non-NPS	Phil Akers

Park Code	NPS Region	System Name	2013 Passenger Boardings	System Vehicle Type	Agreement Type	Vehicle Ownership	NPS Contact
STLI / ELIS	NER	Statue of Liberty Ferries	1,883,544	Boat / Ferry	Concession Contract	Non-NPS	Ben Hanslin
VALR	PWR	USS Arizona Memorial Tour	1,121,580	Boat / Ferry	Cooperative Agreement	Non-NPS	David Stransky
ZION	IMR	Zion Canyon Shuttle	3,650,812	Shuttle / Bus / Van / Tram	Service Contract	NPS	Jack Burns

Interpretive Tours

Park Code	NPS Region	System Name	2013 Passenger Boardings	System Vehicle Type	Agreement Type	Vehicle Ownership	NPS Contact
APIS	MWR	Excursion boat	28,820	Boat / Ferry	Concession Contract	Non-NPS	Chris E. Smith
BLRI	SER	Sharp Top Mountain Shuttle	3,232	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Dawn Leonard
CRLA	PWR	Rim Drive Trolley Tour	8	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Scott Burch
CRLA	PWR	Crater Lake Boat Tour	19,814	Boat / Ferry	Concession Contract	Non-NPS	Scott Burch
CUIS	SER	Land and Legacies Tour	4,389	Shuttle / Bus / Van / Tram	NPS Owned & Operated	NPS	Maggie Tyler
DENA	AKR	Air taxi 2	2,260	Plane	Concession Contract	Non-NPS	Jim LeBel
DENA	AKR	Air taxi 4	3,162	Plane	Concession Contract	Non-NPS	Jim LeBel
DINO	IMR	Tram transit	190,000	Shuttle / Bus / Van / Tram	Service Contract	Non-NPS	Gary Mott
EVER	SER	Shark Valley Tram Tour	66,558	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	William Gordon
EVER	SER	Gulf Coast and Flamingo Boat Tours	103,172	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	William Gordon
GLAC	IMR	Sun Tours	2,695	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Jan Knox
GLAC	IMR	Red Bus Tours	51,856	Shuttle / Bus / Van / Tram	Concession Contract	NPS	Jan Knox
GLAC	IMR	Glacier Park Boat Company - interpretive boat tours	69,461	Boat / Ferry	Concession Contract	Non-NPS	Jan Knox
GLBA	AKR	Day boat tour	6,339	Boat / Ferry	Concession Contract	Non-NPS	Melanie Berg

Park Code	NPS Region	System Name	2013 Passenger Boardings	System Vehicle Type	Agreement Type	Vehicle Ownership	NPS Contact
GLCA	IMR	Boat tours	10,917	Boat / Ferry	Concession Contract	Non-NPS	Julie Drugatz
GLCA	IMR	Flatwater tour	44,260	Boat / Ferry	Concession Contract	Non-NPS	Julie Drugatz
GRCA	IMR	South Rim Bus Tours	82,430	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Pamela Edwards
ISRO	MWR	MV Sandy tour	2,706	Boat / Ferry	Concession Contract	Non-NPS	Richard Moore
JOFL / ALPO	NER	Lakebed Tours	7,191	Shuttle / Bus / Van / Tram	NPS Owned & Operated	NPS	Keith Newlin
LIBI	IMR	LIBI bus tours	6,000	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Ken Woody
LOWE	NER	Canal Tours	13,124	Boat / Ferry	NPS Owned & Operated	NPS	Christina Briggs
NAMA	NCR	Open Top/ Big Bus	96,760	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Dick Swihart
NOCA / LACH	PWR	Rainbow Falls Tours	4,160	Shuttle / Bus / Van / Tram	Concession Contract	NPS	Annelise Lesmeister
ORPI	IMR	Ajo Mountain Drive Tour	619	Shuttle / Bus / Van / Tram	NPS Owned & Operated	NPS	Sue Walker
PIRO	MWR	Pictured Rocks Cruises	99,091	Boat / Ferry	Concession Contract	Non-NPS	Bill Smith
TAPR	MWR	TAPR bus tour	1,176	Shuttle / Bus / Van / Tram	NPS Owned & Operated	NPS	Heather Brown
VAFO	NER	History of Valley Forge Trolley Tour	29,634	Shuttle / Bus / Van / Tram	Cooperative Agreement	Non-NPS	Deirdre Gibson
VALR	PWR	Ford Island Tour	306,257	Shuttle / Bus / Van / Tram	Service Contract	Non-NPS	Paul DePrey
VOYA	MWR	VOYA tour boat	1,640	Boat / Ferry	NPS Owned & Operated	NPS	Chuck Remus
YELL	IMR	Triangle C Ranch (Contract YELL 304)	355	Snowcoach	Concession Contract	Non-NPS	Dale Reinhart
YELL	IMR	Scenic Safaris (JDOR 015)	754	Snowcoach	Concession Contract	Non-NPS	Dale Reinhart
YELL	IMR	Backcountry Adventures (YELL 402)	878	Snowcoach	Concession Contract	Non-NPS	Dale Reinhart
YELL	IMR	Togwotee Snowmobile Adventures (JDOR 003)	1,610	Snowcoach	Concession Contract	Non-NPS	Dale Reinhart
YELL	IMR	Yellowstone Expeditions (YELL 300)	1,645	Snowcoach	Concession Contract	Non-NPS	Dale Reinhart

Park Code	NPS Region	System Name	2013 Passenger Boardings	System Vehicle Type	Agreement Type	Vehicle Ownership	NPS Contact
YELL	IMR	Yellowstone Snowcoach Tours (YELL 301)	2,681	Snowcoach	Concession Contract	Non-NPS	Dale Reinhart
YELL	IMR	Buffalo Bus Touring (YELL 306, 307, 308)	5,121	Snowcoach	Concession Contract	Non-NPS	Dale Reinhart
YELL	IMR	Yellowstone Alpen Guides (YELL 303)	5,675	Snowcoach	Concession Contract	Non-NPS	Dale Reinhart
YELL	IMR	See Yellowstone Tours (YELL 302)	6,746	Snowcoach	Concession Contract	Non-NPS	Dale Reinhart
YELL	IMR	Historic Yellow Bus tours	9,467	Shuttle / Bus / Van / Tram	Concession Contract	NPS	Dale Reinhart
YELL	IMR	Xanterra Parks & Resorts interpretive bus tours	10,939	Shuttle / Bus / Van / Tram	Concession Contract	NPS/Non-NPS	Dale Reinhart
YELL	IMR	YELL snow coaches	11,447	Snowcoach	Concession Contract	NPS/Non-NPS	Dale Reinhart
YELL	IMR	YELL boat	17,777	Boat / Ferry	Concession Contract	Non-NPS	Dale Reinhart
YELL	IMR	Xanterra Parks & Resorts interpretive snowcoaches tours	0	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Dale Reinhart
YELL	IMR	Yellowstone Snowcoach Tours (YELL 305)	0	Snowcoach	Concession Contract	Non-NPS	Dale Reinhart
YOSE	PWR	Big Trees Tram Tour (Mariposa Grove Tram)	48,938	Shuttle / Bus / Van / Tram	Concession Contract	NPS	Marvin Mann
YOSE	PWR	Tram Tours and Hiker Shuttle	134,876	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Marvin Mann

Mobility to or Within a Park

Park Code	NPS Region	System Name	2013 Passenger Boardings	System Vehicle Type	Agreement Type	Vehicle Ownership	NPS Contact
ACAD	NER	Island Explorer & Bicycle Express	423,998	Shuttle / Bus / Van / Tram	Cooperative Agreement	Non-NPS	Len Bobinchock
BRCA	IMR	Bryce Canyon Shuttle and Rainbow Point Shuttle	391,166	Shuttle / Bus / Van / Tram	Service Contract	Non-NPS	Daniel Cloud
CUVA	MWR	Cuyahoga Valley Scenic Railroad	186,270	Train / Trolley	Cooperative Agreement	Non-NPS	Jennifer McMahon
DENA	AKR	Air taxi 1	786	Plane	Concession Contract	Non-NPS	Jim LeBel
DENA	AKR	Bus system	338,602	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Jim LeBel
DENA	AKR	Air taxi 3	6,997	Plane	Concession Contract	Non-NPS	Jim LeBel
DENA	AKR	Air taxi 5	8,129	Plane	Concession Contract	Non-NPS	Jim LeBel
GLAC	IMR	Hiker Shuttle	4,416	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Jan Knox
GLAC	IMR	Sprinter Shuttles & Optima Shuttles	150,622	Shuttle / Bus / Van / Tram	Cooperative Agreement	NPS	Jim Foster
GLBA	AKR	Airport Shuttle	6,346	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Melanie Berg
GRCA	IMR	North Rim Hiker Shuttle	700	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Pamela Edwards
GRCA	IMR	South Rim Shuttle Bus Service (Hiker's express, Tusayan Pilot program)	6,135,279	Shuttle / Bus / Van / Tram	Service Contract	NPS	Pamela Edwards
GRTE	IMR	Jenny Lake Shuttle Boat	156,642	Boat / Ferry	Concession Contract	Non-NPS	Donna Sisson
KATM	AKR	Float plane 5	320	Plane	Concession Contract	Non-NPS	Lisa Fox
KATM	AKR	Float plane 1	720	Plane	Concession Contract	Non-NPS	Lisa Fox
KATM	AKR	Float plane 2	720	Plane	Concession Contract	Non-NPS	Lisa Fox
KATM	AKR	Float plane 3	720	Plane	Concession Contract	Non-NPS	Lisa Fox

Park Code	NPS Region	System Name	2013 Passenger Boardings	System Vehicle Type	Agreement Type	Vehicle Ownership	NPS Contact
KATM	AKR	Float plane 7	720	Plane	Concession Contract	Non-NPS	Lisa Fox
KATM	AKR	KATM bus tours	720	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Lisa Fox
KATM	AKR	Float plane 4	920	Plane	Concession Contract	Non-NPS	Lisa Fox
KATM	AKR	Float plane 6	2,833	Plane	Concession Contract	Non-NPS	Lisa Fox
MABI	NER	Full Circle Trolley	1,510	Shuttle / Bus / Van / Tram	Cooperative Agreement	Non-NPS	Christina Marts
MUWO	PWR	Muir Woods Shuttle	77,486	Shuttle / Bus / Van / Tram	Cooperative Agreement	Non-NPS	Nancy Hornor
NOCA / ROLA	PWR	Ross Lake Hiker Shuttle	0	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Annelise Lesmeister
PORE	PWR	Headlands Shuttle	31,132	Shuttle / Bus / Van / Tram	Service Contract	Non-NPS	John Dell'Osso
ROMO	IMR	Bear Lake & Moraine Park shuttle, Hiker Shuttle to Estes Park	333,497	Shuttle / Bus / Van / Tram	Service Contract	Non-NPS	John Hannon
SCBL	MWR	SCBL free shuttle service	1,659	Shuttle / Bus / Van / Tram	NPS Owned & Operated	NPS	Tom Schaff
SEKI	PWR	Gateway Shuttle	7,779	Shuttle / Bus / Van / Tram	Cooperative Agreement	Non-NPS	Colleen Bathe
WOTR	NCR	Fairfax Connector's Wolf Trap Express	13,000	Shuttle / Bus / Van / Tram	Service Contract	Non-NPS	Ken Ferrari
YOSE	PWR	Badger Pass Winter Shuttle	6,257	Shuttle / Bus / Van / Tram	Concession Contract	Non-NPS	Marvin Mann
YOSE	PWR	Tuolumne Shuttle	28,574	Shuttle / Bus / Van / Tram	Concession Contract	NPS	Marvin Mann
YOSE	PWR	YARTS	87,289	Shuttle / Bus / Van / Tram	Cooperative Agreement	Non-NPS	Marvin Mann
YOSE	PWR	Mariposa Grove Shuttle	376,402	Shuttle / Bus / Van / Tram	Concession Contract	NPS	Marvin Mann
YOSE	PWR	Yosemite Valley Shuttle	3,140,520	Shuttle / Bus / Van / Tram	Concession Contract	NPS	Marvin Mann

Special Needs

Park Code	NPS Region	System Name	2013 Passenger Boardings	System Vehicle Type	Agreement Type	Vehicle Ownership	NPS Contact
CARL	SER	Electric Shuttle	5,227	Shuttle / Bus / Van / Tram	NPS Owned & Operated	NPS	Sarah Perschall
HOFR / ELRO / VAMA	NER	Val-Kill Tram	9,206	Shuttle / Bus / Van / Tram	NPS Owned & Operated	NPS	Scott Rector
HOFR / ELRO / VAMA	NER	FDR Tram	16,909	Shuttle / Bus / Van / Tram	NPS Owned & Operated	NPS	Scott Rector

Transportation Feature

Park Code	NPS Region	System Name	2013 Passenger Boardings	System Vehicle Type	Agreement Type	Vehicle Ownership	NPS Contact
GLCA	IMR	SR276 passenger ferry	5,210	Boat / Ferry	Service Contract	Non-NPS	Julie Drugatz
GRCA	IMR	Grand Canyon Railway	130,191	Train/Trolley	Concession Contract	Non-NPS	Pamela Edwards
LOWE	NER	LOWE Historic Trolley	55,866	Train/Trolley	NPS Owned & Operated	NPS	Christina Briggs
STEA	NER	Scranton Limited & Live Steam Excursions	52,192	Train/Trolley	NPS Owned & Operated	NPS	Mark Birtel

Appendix D – CO2 Emissions Methodology

To calculate annual GHG emissions avoided using a range of vehicle occupancy scenarios for shuttle systems (40, 50, 60, and 75 percent) for 38 systems that met the following criteria:

- Shuttle/van/bus vehicle type
- Non-electric
- Park-provided service miles and vehicle capacity

Under each of the vehicle occupancy scenarios, the study team divided transit vehicle occupancy by the NPS average visitor vehicle occupancy of 2.6 to estimate passenger vehicle trips avoided.

$$\frac{\text{Transit Vehicle Occupancy}}{\text{Average Visitor Vehicle Occupancy}} = \text{Passenger Vehicle Trips Avoided}$$

This team then multiplied passenger vehicle trips avoided by the number of service miles for each shuttle system to estimate avoided passenger mileage.

$$\text{Passenger Vehicle Trips Avoided} \times \text{Service Miles} = \text{Avoided Passenger Mileage}$$

Then the team calculated fuel consumption for transit vehicles using the following assumptions:

- Fuel Economy assumptions^{*}:
 - 12 passenger, full-size passenger van = 14 MPG
 - 15 passenger, full-size passenger van = 14 MPG
 - 28 passenger bus = 5 MPG
 - 30 passenger, 30-40 ft., heavy duty bus = 5 MPG
 - 40 passenger 40 ft., heavy-duty bus = 4 MPG
 - 54 passenger school bus = 7 MPG
 - CNG heavy-duty transit bus = 3 MPDGE[†]
- CO₂ Emissions by Fuel Type (grams/gallon)[‡]:
 - Propane = 5,740
 - Gasoline (E10) = 8,020
 - Natural Gas = 7,905
 - Diesel = 10,150
 - Biodiesel (B20) = 8,120

The following formula was used to calculate transit vehicle fuel consumption:

$$\frac{\text{Transit Vehicle Service Miles}}{\text{Estimated Fuel Economy}} = \text{Transit Vehicle Fuel Consumption}$$

The team also calculated the avoided fuel consumption using the average on-road fuel economy for passenger vehicles in the U.S. (25.7 miles per gallon).[‡]

^{*} Department of the Interior – Bus Lifecycle Cost Modeling. <http://www.volpe.dot.gov/transportation-planning/public-lands/department-interior-bus-and-ferry-lifecycle-cost-modeling>

[†] http://www.catf.us/resources/publications/files/20120227-Diesel_vs_CNG_FINAL_MJBA.pdf

[‡] <http://www.eia.gov/oiaf/1605/coefficients.html>

$$\frac{\textit{Avoided Passenger Mileage}}{\textit{Estimated Fuel Economy}} = \textit{Avoided Fuel Consumption from Private Vehicles}$$

The study team then multiplied the fuel consumption figures by the CO₂ emissions coefficients provided by the U.S. Energy Information Administration and subtracted transit emissions from avoided private emissions to arrive at an estimate for net CO₂ emissions avoided.

$$\textit{Transit Vehicle Fuel Consumption} \times \textit{Emissions Coefficient} = \textit{Estimated Transit Emissions}$$

$$\begin{aligned} \textit{Avoided Fuel Consumption from Private Vehicles} \times \textit{Emissions Coefficient} \\ = \textit{Gross Emissions Avoided} \end{aligned}$$

$$\textit{Gross Emissions Avoided} - \textit{Estimate Transit Emissions} = \textit{Estimated Net Emissions Avoided}$$

¹ U.S. Energy Information Administration. Annual Energy Outlook 2014. http://www.eia.gov/forecasts/aeo/er/executive_summary.cfm, table A7

Appendix E – Vehicle Replacement Assumptions

Uniform vehicle replacement costs and expected service lives were used to provide servicewide consistency in estimates of vehicle age, remaining service life, and recapitalization costs.

Assumptions	Gas/Diesel Vehicle		Electric/Biodiesel/CNG	
	Replacement Cost	Expected Life	Replacement Cost	Expected Life
12 pax van	\$27,500	8		8
15 pax van	\$27,500	8		8
28 pax bus	\$200,000	10	\$200,000	10
40 pax bus	\$300,000	12	\$500,000	12
54 pax bus	\$110,000	12		12
52 pax heavy trolley	\$120,000	12		
8 pax electric tram			\$10,000	8
12 pax electric tram			\$50,000	12
Truck/tractor	\$75,000	12		
12 pax electric golf cart			\$17,495	8

*Replacement costs and expected life assumptions are based on the Federal Transit Administration: Useful Life of Transit Buses and Vans – April 2007 (http://www.fta.dot.gov/documents/Useful_Life_of_Buses_Final_Report_4-26-07_rv1.pdf) but adjusted to account for presumed lower wear and tear on transit vehicles in a public lands context compared to more traditional urban contexts.

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