Washington Support Office

National Park Service
U.S. Department of Interior

Zion National Park

Acadia National Park


Glacier Bay National Park

NPS National Transit Inventory and Performance Report, 2019

NPS National Transit Inventory and Performance Report
Executive Summary

2019

Yellowstone National Park

This is a summary of the 2019 National Park Service Transit Inventory and Performance Report. This effort:

1. Identifies NPS transit systems across the country,
2. Tracks the operational performance (e.g. boardings) of each system, and
3. Inventories NPS and non-NPS owned transit vehicles and vessels, and collects detailed vehicle information.

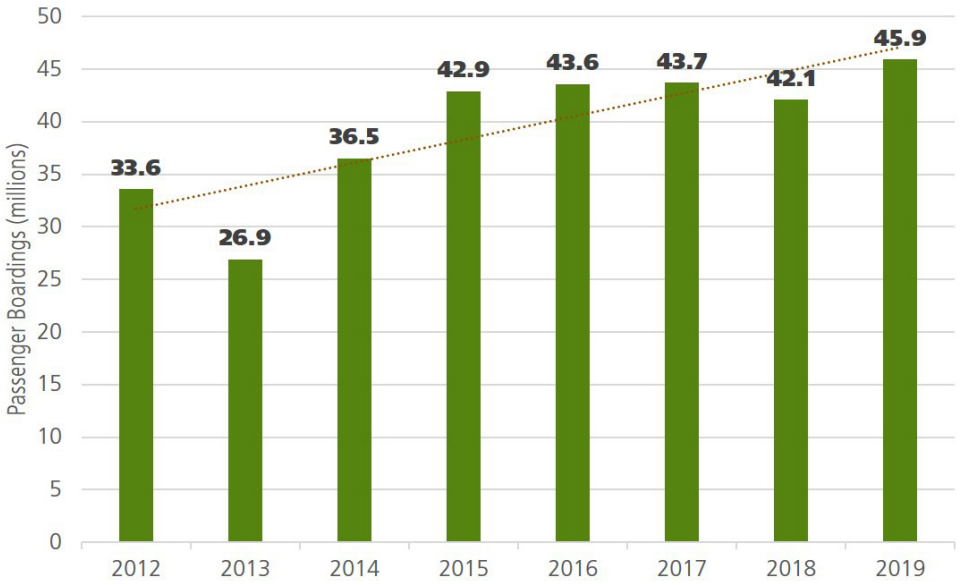
45.9 Million
Passenger Boadings

9% Increase in Boardings

60 Parks Represented

95 Transit Systems

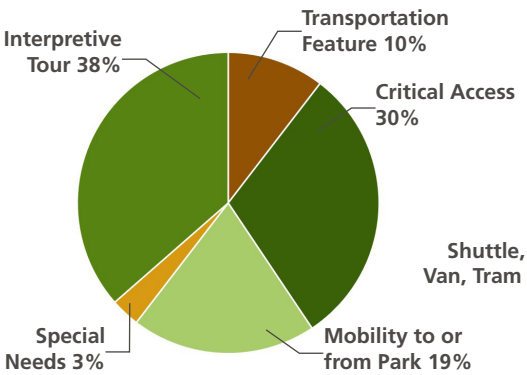
835 Vehicles & Vessels



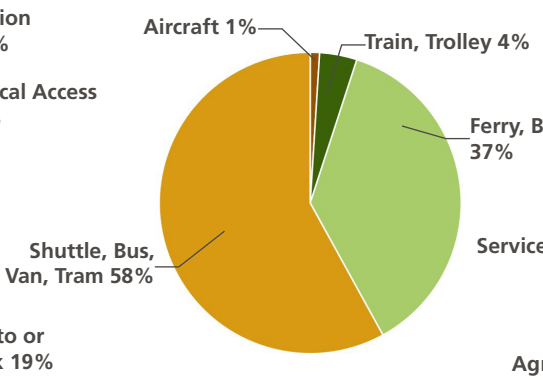
Of the 95 transit systems, the top ten transit systems accounted for 84% of the 45.9 million passenger boardings in 2019. The systems with over a million boardings are located at Ellis Island/ Statue of Liberty National Monuments, Grand Canyon National Park, Zion National Park, National Mall and Monuments, Yosemite National Park, Alcatraz Island in Golden Gate National Recreation Area, and Pearl Harbor National Memorial. The top parks list has remained relatively stable over time.

NPS owns and operates 21 systems and owns the fleet for 40% of the systems. NPS operated systems account for 637,112 passenger boardings, about 1% of total boardings.

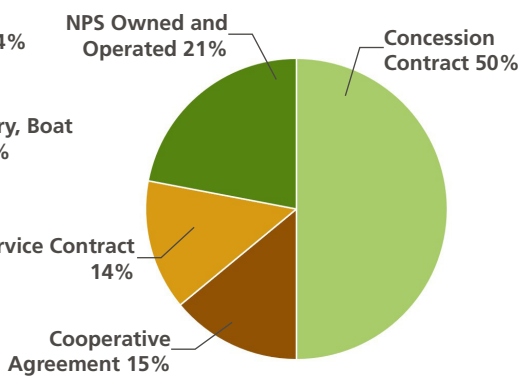
Purpose
(by % of transit systems)



Mode
(by % of transit systems)



Business Model
(by % of transit systems)



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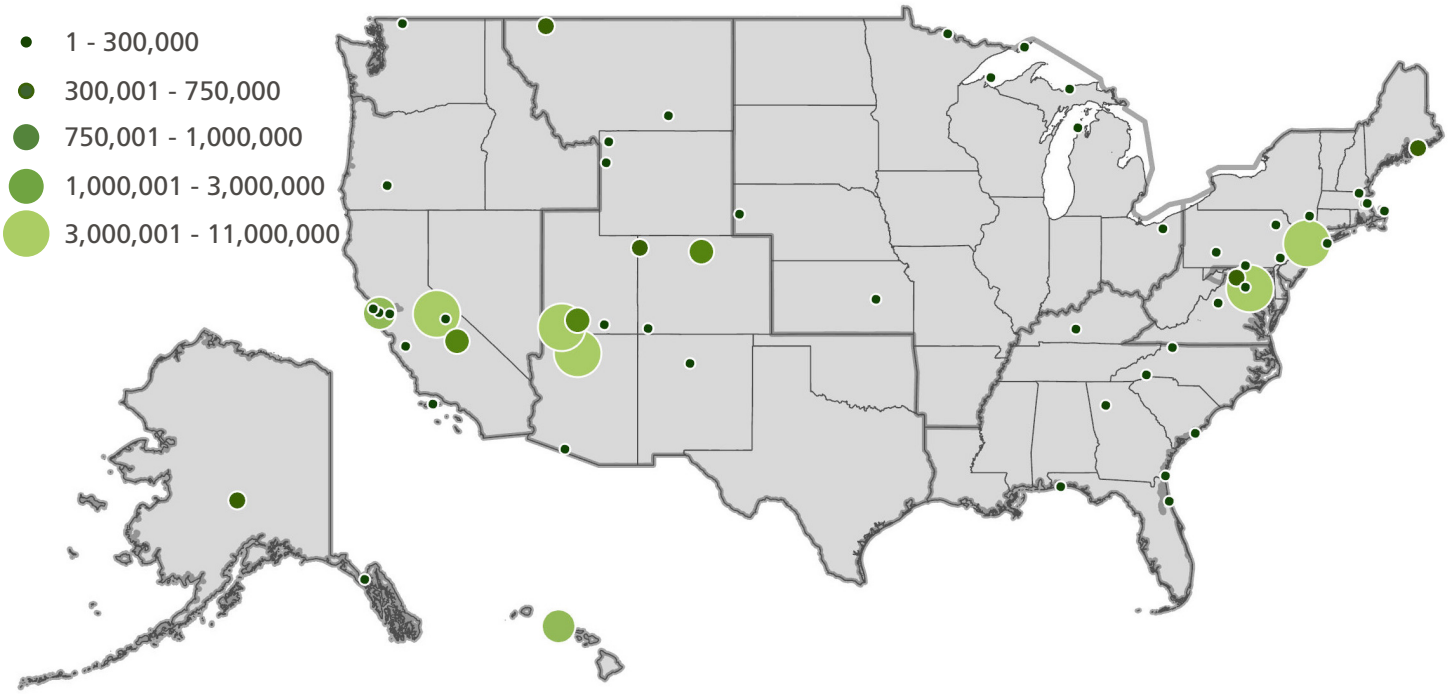
48% of NPS-owned transit vehicles operate on alternative fuel, while 17% of non-NPS-owned vehicles operate on alternative fuel.

NPS Transit systems generally operate by seasonal visitation trends. 53% of the transit systems operate 3 to 6 months of the year, while approximately 34% of the NPS transit systems operate year-round. Additionally, 12% of systems operate 7 to 10 months of the year.

Passenger Boardings by Park



Performance Measures

Visitor Experience

The majority of the NPS-owned transit system vehicles and vessels are accessible for people with mobility impairments. 67% of NPS-owned vehicles are accessible to people with mobility impairments (e.g. require wheelchair lift).

Operations

NPS partners with the private sector to provide the majority of transit services. Non-NPS entities operate 78% of NPS transit systems, which account for 99% of passenger boardings service-wide. NPS owns and operates the remaining 22% of transit systems, which account for the remaining 1% of passenger boardings.

Environmental Impact

NPS transit systems mitigate vehicle emissions. The net CO_2 emissions savings of the 762 transit vehicles and vessels evaluated (excluding planes, rail, snowcoaches, and vehicles with incomplete data) was equivalent to removing 16.8 million personal vehicle trips, and 483 million passenger vehicle miles from the road.

Asset Management

NPS-owned shuttle/bus/van/tram vehicles have an estimated $139.3 million **in recapitalization needs between 2019 and 2031.** Parks with estimated transit vehicle replacement costs over $5 million during the next ten years include Acadia National Park, Grand Canyon National Park, Isle Royale National Park, Yosemite National Park, and Zion National Park.

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Introduction

The *2019 National Park Service (NPS) Transit Inventory and Performance Report* communicates the servicewide outcomes and status of NPS transit systems. This comprehensive listing has been compiled annually in this format since 2012 and covers surface, waterborne, and airborne systems. The inventory establishes a working definition of NPS transit systems for the purpose of this document; helps the National Park Service comply with 23 United States Code (USC) 203(c)[1], which requires "a comprehensive national inventory of public Federal lands transportation facilities;" and fulfills other internal needs.

The 2019 inventory is meant to assist the National Park Service in the following:

- Measure NPS transit performance.
- Capture asset management and operational information not tracked in current NPS systems of record.
- Integrate transit data with NPS systems of record, including asset management data in the Financial and Business Management System for NPS-owned vehicles.
- Inform the *National Long Range Transportation Plan*, regional long range transportation plans, and the Capital Investment Strategy by providing key transit statistics, which can also be used to track progress towards goals.
- Comply with Executive Order 13693, which requires federal agencies to measure, manage, and reduce greenhouse gas emissions.
- Communicate program information and projected vehicle recapitalization needs.

Updates in the 2019 Inventory

The transit inventory report assists in the development of transit performance measures. These measures align with the NPS Alternative Transportation Program (ATP) goal areas (appendix B). This year includes information on safety and traffic accidents identified during the inventory data collection as part of the operations performance measures.

In 2018, the National Park Service realigned the seven legacy regions into the Department of the Interior's 12 new unified regional boundaries. This report groups the unified regions to reflect how they are internally managed with the following naming conventions:

- Interior Region 1 (IR 1) (formerly Northeast Region)
- Interior Region 1 – National Capital Area (IR 1-NCA) (formerly National Capital Region)
- Interior Region 2 – South Atlantic Group (IR 2-SAG) (formerly Southeast Region)
- Interior Regions 3, 4, and 5 (IR 3, 4, and 5) (formerly Midwest Region)
- Interior Regions 6, 7, and 8 (IR 6, 7, and 8) (formerly Intermountain Region)
- Interior Regions 8 (Southern California and Southern Nevada), 9, 10, and 12 (IR 8, 9, 10, and 12) (formerly Pacific West Region)
- Interior Region 11 (IR 11) (formerly Alaska Region)

As part of the reporting, the National Park Service developed an online reporting tool using Microsoft Power BI that compiles the inventory data into a coherent and interactive report. The national transit inventory and performance report will continue to be updated annually so that transit managers can gain insight to transit trends over time. All NPS users can access the report at

[1] 23 USC 203 Federal lands transportation program: https://www.gpo.gov/fdsys/pkg/USCODE-2014-title23/pdf/USCODE-2014-title23-chap2-sec203.pdf.

http://inpdscov1ssrs01/pbi/powerbi/Transportation/NTI/National%20Transit%20Inventory%20and%20Performance%20Report.

Data Collection and Methodology

Each year, the same definition of NPS transit systems is used to ensure consistent data collection across the nation and over time. Only parks with systems that meet each of the following three criteria listed below are included in this effort (see appendix C for more information).

1. Moves people by motorized vehicle on a regularly scheduled service.[2]
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 agreements are not included); or is NPS owned and operated.[3]
3. All routes and services at a given park that are operated under the same business model by the same operator are considered a single NPS transit system.

The 2019 NPS transit inventory is limited to systems in which the National Park Service either has a direct financial stake or has committed resources to develop a formal contract or agreement.

Most systems tend to collect information on a calendar year cycle (January through December), therefore the following information was collected for the 2019 calendar year:

- Transit system name and description
- Passenger boardings
- Business model
- System purpose
- System type/mode
- System level safety and traffic data
- Vehicle information including fuel type, capacity, service miles, engines, horsepower, accessibility, and age (individual vehicle information for NPS-owned vehicles and vessels, and system-level information for non-NPS vehicles and vessels)
- Vehicle information that is mandatory in the NPS Financial and Business Management System
- Owner and operator type (National Park Service or non-National Park Service) and contact information
- Operating schedule
- Participation of a local transit agency in the service
- Safety metrics (accident occurrence and property damage)

For the 2019 inventory, 60 parks provided information primarily using a new online form, or through email. Some parks reported incomplete information because they do not track the requested service information, or they could not provide the information before the end of the data collection period. Specific to the 2019 inventory data collection process, some parks reported that they were unable to collect data from concessioners due to the COVID-19 pandemic.

Appendix D includes a full list of surveyed transit systems by region.

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[2] This includes services with a posted schedule and standard operating seasons/days of week/hours. Services that 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.

[3] This report does not distinguish between a memorandum of understanding, memorandum of agreement, or cooperative agreement. All are recorded as "cooperative agreement."

Inventory Results

Detailed findings of the 2019 inventory are presented in the Vehicle Inventory Statistics, System Characteristics, and Passenger Boardings sections below.

Vehicles Inventory Statistics

Table 1 summarizes the differences in key results of the NPS transit inventories over the last 5 years.

Table 1: NPS transit systems changes between inventories (2015 to 2019)
Note: NPS=National Park Service.
Source: 2015–2019 National Park Service transit inventory data

Key Findings	2015	2016[4]	2017	2018	2019
Number of systems	127	100	99	95	95
Number of parks represented	64	64	65	60	60
Passenger boardings (millions)	42.9	43.6	43.7	42.1	45.9
• Excluding 10 highest ridership systems	7.2	7.0	7.0	7.0	7.1
Number of vehicles	1,022	843	873	976	835
• NPS-owned vehicles	275	278	262	281	236
• Non-NPS vehicles	747	565	611	695	599
Systems operated by Local Transit Agency	13	13	13	9	9

There were no new systems added to the inventory in 2019. The following four systems had previously operated but did not operate in 2019 and are not accounted for in this inventory report: Badger Pass-Glacier Point Shuttle (Yosemite National Park [YOSE]), Ferry Service (Dry Tortugas National Park [DRTO]), North Rim Hiker Shuttle (Grand Canyon National Park [GRCA]), and Tuolumne Shuttle (YOSE). There are a total of 95 systems in the 2019 inventory.

There were approximately 3.8 million more total boardings in 2019 compared to 2018, representing a 9.1% increase. The increase in boardings surpasses the 2.9% increase in visitation across the entire national park system from 2018 to 2019, indicating the popularity of transit in national parks. Several parks noted they are now more accurately capturing their boardings, so annual variability may be attributable to changing methods implemented for the 2019 inventory.

Four parks experienced increases from roughly double to nearly ten times as many boardings as in 2018.[5]

[4] The list of systems in 2016 were reevaluated to ensure that all of the systems met the definition of transit used for the report. As a result, 28 systems included in 2015 were removed from the 2016 report, contributing to the overall reduction in the number of systems between 2015 and 2016.

[5] The parks experiencing the largest boardings increases this year include DC Circulator (National Mall and Memorial Parks [NAMA] – 1,019% increase), Ferry (Gulf Islands National Seashore [GUIS] – 394% increase), Winter Ski Shuttle (YOSE – 232% increase), and Sharp Top Mountain Shuttle (Blue Ridge Parkway [BLRI] – 109% increase).

System Characteristics

The 2019 inventory identified 95 discrete transit systems in 60 NPS parks. Figures 1 and 2 place these systems in the context of the primary system purpose, mode, and business model. Results for system characteristics in 2019 are similar to the results reported in 2018.

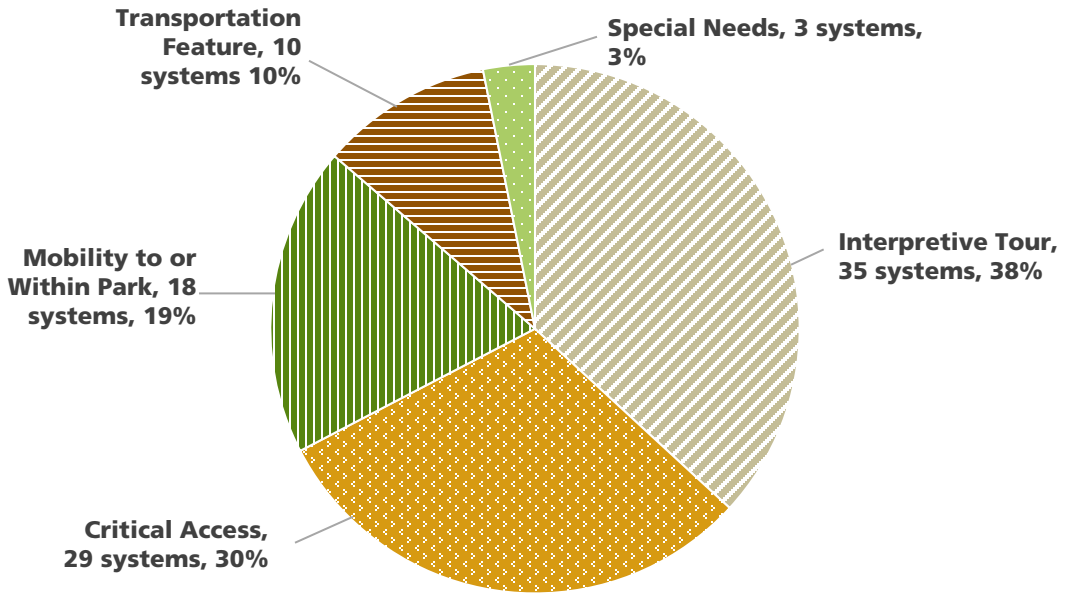
System Purpose

Park staff categorized each of their transit systems into one of the five following primary purposes (figure 1):

- 35 systems are guided **interpretive tours.**
- 29 systems provide **critical access** to an NPS park or site that is not readily accessible to the public due to geographic constraints, park resource management decisions, or parking lot congestion.
- 18 systems provide **mobility to or within a park** as a supplement to private automobile access.
- 10 systems are considered a **transportation feature** (a primary attraction of the park).
- 3 systems are primarily designed to meet the accessibility needs of visitors with **special needs**.

Figure 1: Systems by primary purpose

Note: (N=95 systems)
Source: 2019 National Park Service transit inventory data



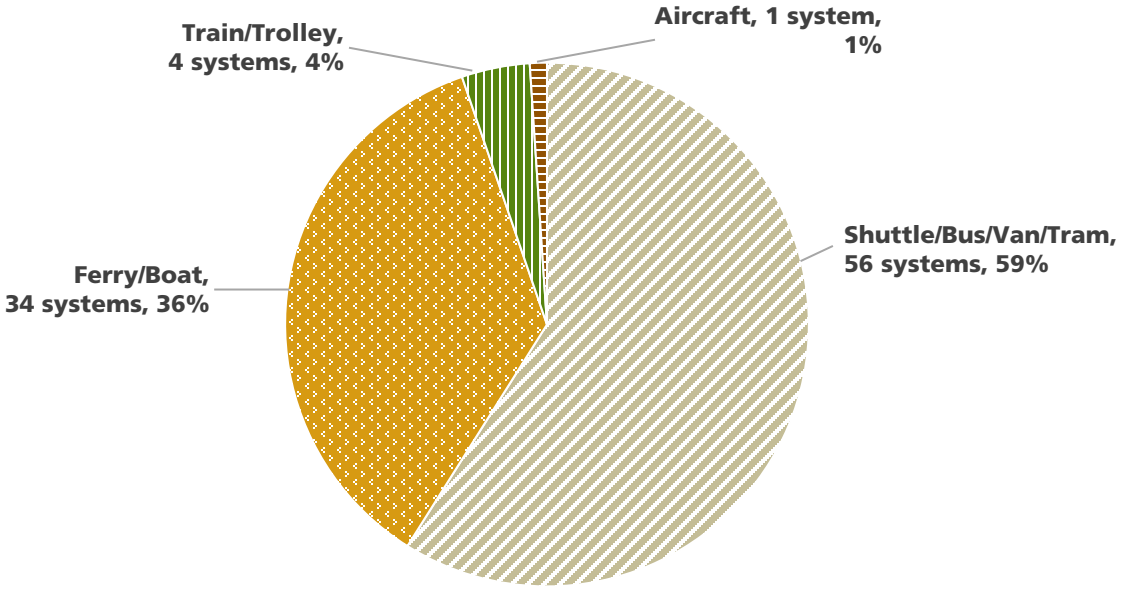
Mode

The 2019 transit inventory identified four modes operating in NPS transit systems. The majority of the transit systems are shuttle/bus/van/tram systems (59%), followed by ferry/boat (36%), train/trolley (4%), and plane (1%) (figure 2).

Figure 2: Systems by vehicle mode

Note: N=95 systems

Source: 2019 National Park Service transit inventory data



Business Models

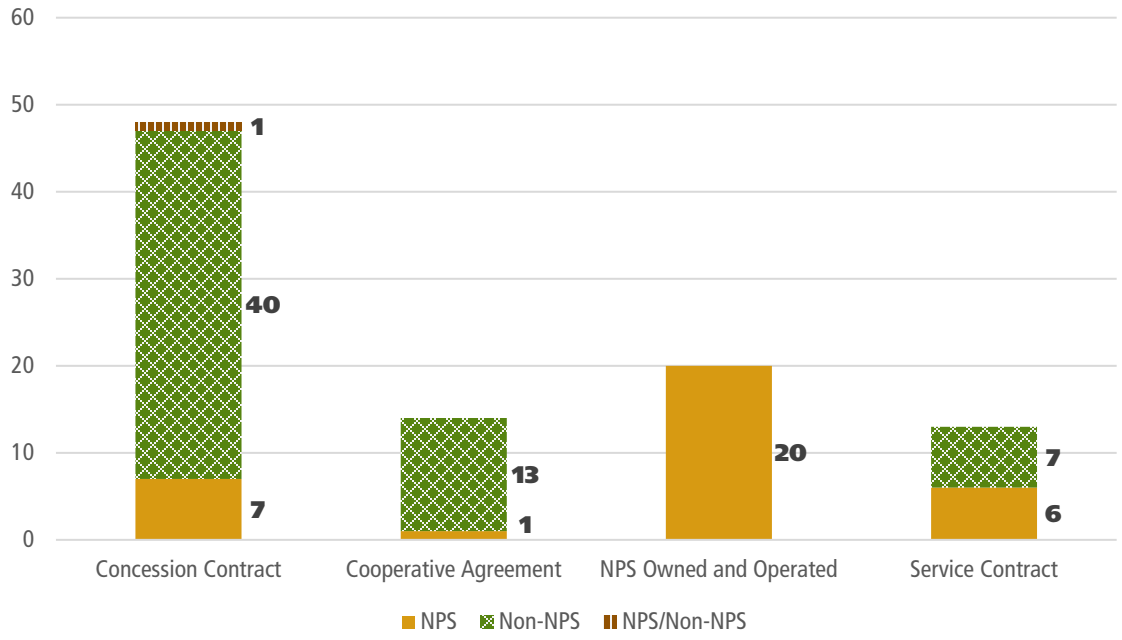
There are four types of business models under which NPS transit systems operate (table 2, figure 3).

- **Concession Contracts**: In 2019, most of the transit systems (48) operated through concession contracts in which a private concessioner pays the National Park Service a franchise fee to operate inside a park. Seven concession contract systems used vehicle fleets owned by the National Park Service.
- **Service Contracts**: Transit systems primarily owned and operated by a private firm used service contracts. In 2019, thirteen transit systems operated under a service contract. Six service contract systems used vehicle fleets owned by the National Park Service.
- **Cooperative Agreements**: Fourteen transit systems operated under a cooperative agreement in 2019. All cooperative agreement systems used vehicle fleets not owned by the National Park Service.
- **NPS Owned and Operated**: In 2019, the National Park Service owned vehicle fleets for 34 systems, and operated 20 of those systems. These owned-and-operated systems tend to be small and provided critical access to a park or park site, were interpretive tours, provided service for special needs visitors, or were not easily provided by a private operator.

Table 2: Systems by primary purpose
Notes: N=95 systems; NPS=National Park Service.
Source: 2019 NPS transit inventory data.

System	Concession Contract	Cooperative Agreement	NPS Owned and Operated	Service Contract
Critical Access	13	2	7	7
Interpretive Tour	25	4	6	0
Mobility to or within the Park	4	7	3	4
Special Needs	0	0	3	0
Transportation Feature	6	1	1	2
Total	48	14	21	13

Figure 2: Fleet system ownership by business model
Source: 2019 NPS transit inventory data.



Passenger Boardings

In 2019, there were 45.9 million passenger boardings across all NPS transit systems.[6] If the 95 reporting systems were considered one enterprise and compared to public transit agencies across the country, its boardings would be comparable to transit systems in San Jose, California.[7] Excluding concession contracts and cooperative agreements, NPS owned and operated systems and service contract systems reported 18 million trips (39.8% of total boardings) in 2019.

Parks use various methodologies to count boardings. Most systems indirectly record passenger boardings through ticket sales (19 million) and manual counts (18.4 million). Estimated, automated, and other counter methodologies account for the remaining approximately 8.5 million passenger boardings.

Table 3: Count methodology
Source: 2019 NPS transit inventory data

Count Methodology	Number of Systems	Passenger Boardings
Ticket Sales	48	19,068,702
Manual	38	18,410,964
Estimated	4	5,379,596
Other	3	1,682,887
Automatic	2	1,421,108

Approximately 84% (38.8 million) of boardings on NPS transit systems in 2019 are attributable to ten systems (table 3). Passenger boardings increased for six of these systems. The DC Circulator (National Mall and Memorial Parks [NAMA]) is new to the top-ten list, replacing the Big Bus Tours in Washington, DC (NAMA).

[6] A "passenger boarding" or "unlinked trip" occurs each time a passenger boards a vehicle. This is an industry-standard measure used in the Federal Transit Administration's National Transit Database.

[7] Federal Transit Administration National Transit Database, 2018 data (https://www.transit.dot.gov/ntd/data-product/2018-annual-database-uza-sums).

Table 4: Passenger boardings for the ten highest use transit systems
Source: 2019 NPS transit inventory data

Rank	Park	System Name	2019 Boardings	Business Model	System Purpose
1	STLI/ELIS	Statue of Liberty Ferries	10,370,679	Concession Contract	Critical Access
2	GRCA	South Rim Shuttle Service	7,644,231	Service Contract	Mobility to or within Park
3	ZION	Zion Canyon Shuttle	6,777,100	Service Contract	Critical Access
4	NAMA	DC Circulator	5,565,092	Cooperative Agreement	Transportation Feature
5	YOSE	Yosemite Valley Shuttle	3,161,758	Concession Contract	Mobility to or within Park
6	GOGA	Alcatraz Cruises Ferry	1,680,553	Concession Contract	Critical Access
7	PERL[8]	USS Arizona Memorial Tour	1,133,784	Cooperative Agreement	Interpretive Tour
8	SEKI	Giant Forest Shuttle	940,164	Cooperative Agreement	Critical Access
9	BRCA	Bryce Canyon Shuttle and Rainbow Point Shuttle	774,010	Service Contract	Mobility to or within Park
10	ROMO	Bear Lake and Moraine Park Shuttle and Hiker Shuttle to Estes Park	764,423	Service Contract	Mobility to or within Park

Notes: BRCA=Bryce Canyon National Park; ELIS=Ellis Island; GOGA=Golden Gate National Recreation Area; GRCA=Grand Canyon National Park; NAMA=National Mall and Memorial Parks; NPS=National Park Service; PERL=Pearl Harbor National Memorial; ROMO=Rocky Mountain National Park; SEKI=Sequoia and Kings Canyon National Parks; STLI=Statue of Liberty National Monument; YOSE=Yosemite National Park; ZION=Zion National Park.

High-ridership shuttle systems are typically provided via service contracts, concession contracts, and cooperative agreements. A greater proportion of the water-based systems are provided through concession contracts and either provide critical access to parks and park sites or serve as interpretive tours.

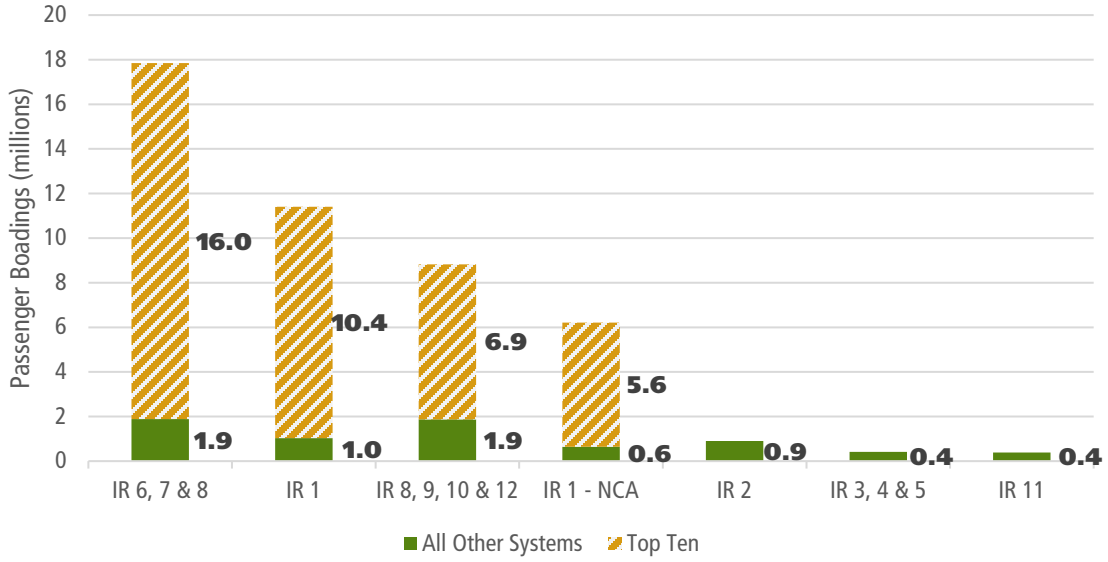
The National Park Service continued to partner with nine local transit agencies in 2019; those partnerships accounted for 7.9 million passenger boardings in that year. Passenger boardings among NPS owned and operated systems (21 systems) accounted for 637,112 passenger boardings. Most of these systems provide either critical access to a site or an interpretive experience for visitors.

Interior Regions 6, 7, and 8 and Interior Region 1 each reported more than 10 million passenger boardings in 2019, exceeding other regions. Interior Region 1 – National Capital Area and Interior Regions 8, 9, 10, and 12 each reported more than 5 million passenger boardings. However, if the ten highest use systems are excluded, each region ranged from 387,889 to 1,889,183 passenger boardings in 2019 (figure 3).

[8] In 2019, World War II Valor in the Pacific National Monument (VALR) changed its name to Pearl Harbor National Memorial (PERL).

Figure 3: Passenger boardings by National Park Service region

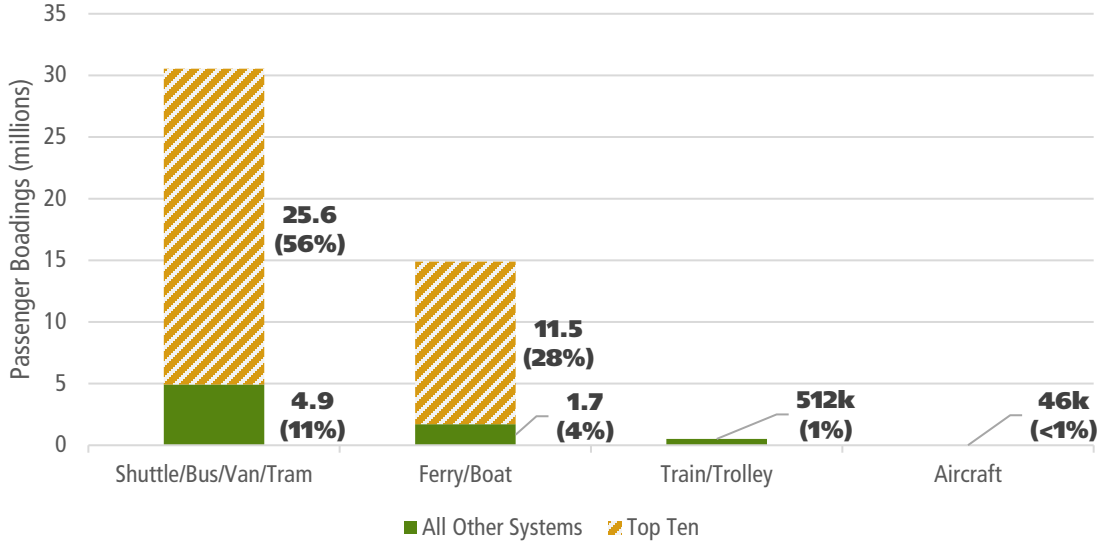
Notes: N=95 systems; IR=Interior Region; NCA=National Capital Area; NPS=National Park Service.
Source: 2019 NPS transit inventory data.



Two-thirds (67%) of passenger boardings were in systems that use shuttles, buses, vans, or trams, and just under one-third (32%) were in water-based systems that use boats and ferries. Trains, trolleys, and aircraft accounted for only about 1.2% of all passenger boardings (figure 5).

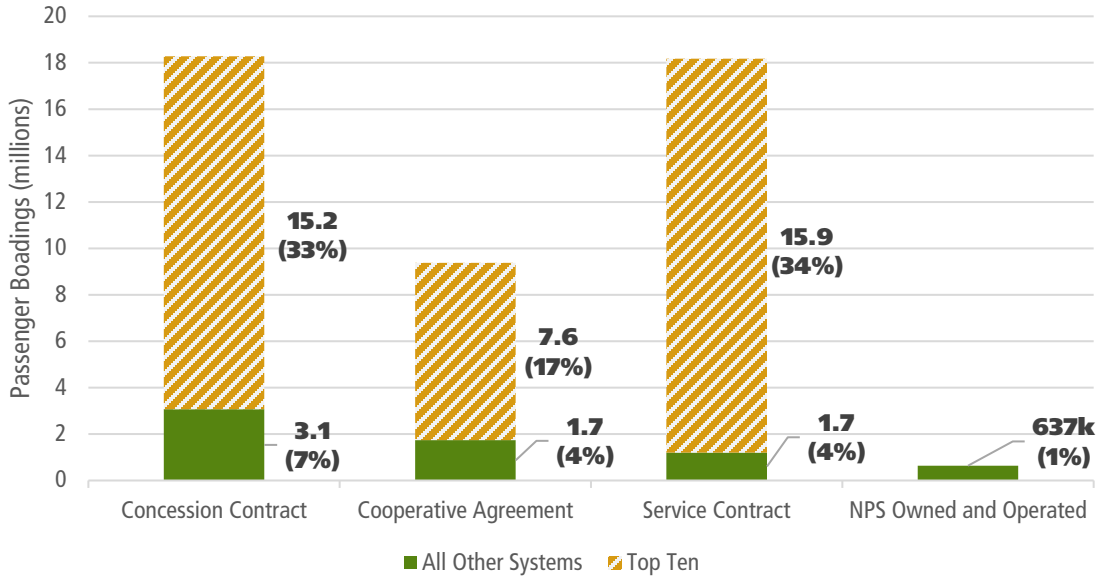
Figure 4: Passenger boardings by mode

Note: N=95 systems.
Source: 2019 National Park Service transit inventory data.



Less than half of passenger boardings (40%) took place on systems operated using concession contracts. Service contracts carried 38% of passenger boardings and 21% used cooperative agreements. NPS owned and operated systems carried 1% of boardings (see figure 6). Excluding the 10 highest use systems, concession contracts accounted for the most boardings (7%), followed closely by cooperative agreements (4%) and services contracts (4%).

Figure 5: Passenger boardings by business model
Notes: N=95 systems; NPS=National Park Service.
Source: 2019 NPS transit inventory data.



Vehicles and Vessels

Vehicle Fleets
In 2019, half of the transit systems (48 systems, or 50.5%) operated under concession contracts, of which 7 used fleets owned exclusively by the National Park Service. These are among the 35 total systems owned or co-owned by the National Park Service. The National Park Service owned and operated 20 of the transit systems (21.5%); these tend to be small and provided critical access, interpretive tours, or mobility to or within the park in ways not easily provided by a private operator. Systems managed through cooperative agreements account for 14 of the systems (14.7%); all except one system of these used vehicle fleets not owned by the National Park Service. The remaining 13 transit systems (13.7%) operate under service contracts; of these, 6 use vehicle fleets owned by the National Park Service,[9] including the large systems at GRCA and Zion National Park (ZION).

The 2019 active NPS-owned fleet had 236 reported vehicles, a net change of 48 vehicles. Two systems that operated did not report NPS vehicle statistics for 2019: Coastguard Beach Shuttle and Green River Ferry.

[9] The six systems operating NPS-owned vehicles under a service contract are: Adams Trolley, Grand Canyon South Rim Shuttle, Harpers Ferry Shuttle Transport, Kennesaw Mountain Shuttle Bus, Yosemite Mariposa Grove Transportation Service, and Zion Canyon Shuttle.

In 2018, these systems represented 17 vehicles. Two systems that did not operate in 2019 reported 7 vehicles in 2018 (Badger Pass-Glacier Point Shuttle and Tuolumne Shuttle).

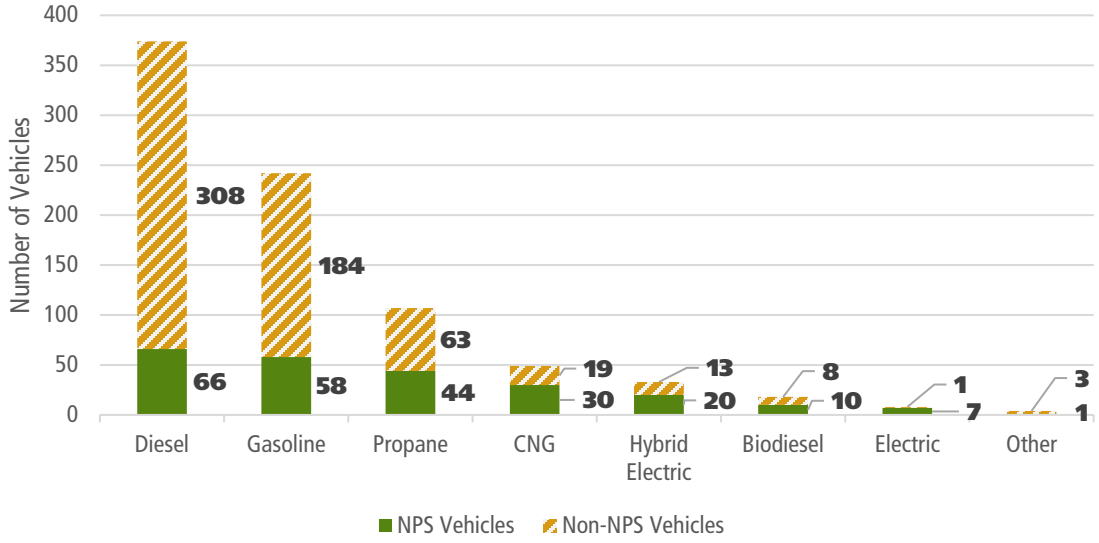
The 2019 active non-NPS-owned fleet had 599 reported vehicles, a net change of 95 vehicles. Nine systems that operated did not report NPS vehicle statistics for 2019: Boston Light Tour (BOHA), Hiker Shuttle (GLAC), HAFE Shuttle Transport, Mariposa Grove Transportation Service (YOSE), Pictured Rock Cruises, Thompson Island Ferry (BOHA), Tram Tours and Hiker Shuttle (GLAC), Winter Ski Shuttle (YOSE), and YARTS (YOSE). It was reported that contractors and concessioners were not able to provide vehicle data due to reasons related to COVID-19. In 2018, these systems represented 57 vehicles. For a detailed analysis of the change in reported fleet see appendix E.

In 2019, 20 systems (16 non-NPS and 4 NPS) used vehicles with capacity for no more than ten passengers, and 36 systems (27 Non-NPS and 9 NPS Systems) used vehicles with capacities over 40 passengers.

Servicewide, transit fleets operate on both conventional and alternative fuels.[10] In 2019, the NPS-owned fleet had 236 reported active vehicles, of which 47% use alternative fuels. The non-NPS-owned fleet was larger with 599 vehicles, of which 17% use alternative fuels. Of the combined fleet's 835 vehicles, 26% percent use alternative fuels (table 4, figure 7).

Figure 6: Number of vehicles by fuel type

Notes: N=830 vehicles and vessels; CNG=compressed natural gas; NPS=National Park Service.
Source: 2019 NPS transit inventory data.



Fleet	Diesel	Gasoline	Propane	CNG	Hybrid Electric	Biodiesel	Electric	Other	Total
NPS Owned	66	58	44	30	20	10	7	1	236
Non-NPS Owned	308	184	63	19	13	8	1	3	599
Total	369	242	107	49	33	18	8	4	835

[10]Alternative fuels include electric and hybrid-electric systems, as well as propane, compressed natural gas (CNG), and biodiesel.

Average Age of Vehicles by Vehicle Type

All 236 NPS vehicles and 414 non-NPS vehicles provided vehicle age data. The age analysis excludes the 33 Red Bus Tour vehicles (Glacier National Park [GLAC]), which have been retrofitted using the original 1936 exteriors and newer chassis, and the vehicles where age was not reported. Given these parameters, the age analysis includes 617 vehicles (74% of reported vehicles).

Of the vehicles that reported, 36% of transit vehicles in the parks (297 vehicles) have been in service for less than 10 years (figure 8). A larger overall proportion of newer non-NPS vehicles suggests that older vehicles have been retired at a higher rate in recent years.

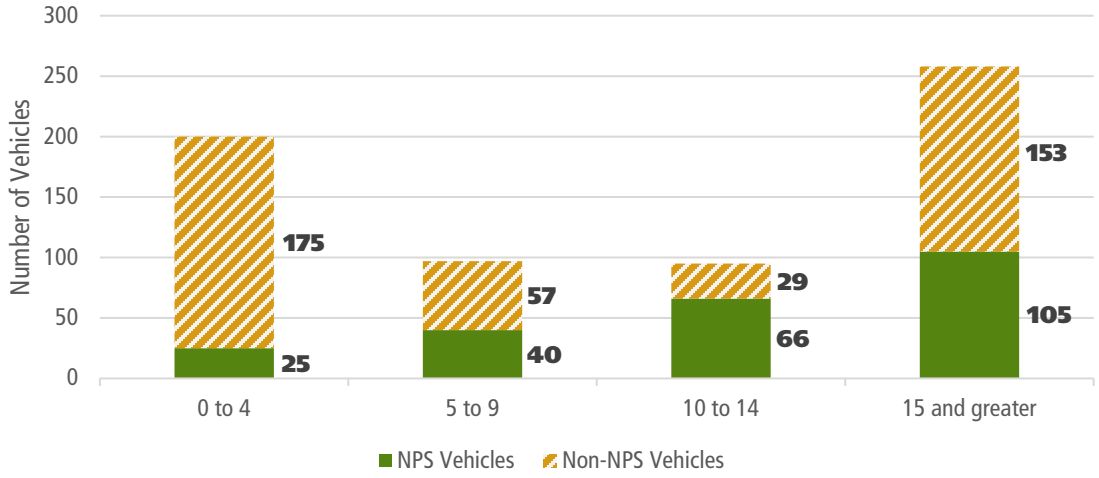
Of the reporting NPS-owned fleet, 68% are at least 10 years old, putting them in the latter portion of their service lives; only 12% are less than five years old. The skew towards older vehicles suggests that NPS-owned vehicles need replacing in the next 10 years and that parks must invest in the maintenance of their owned vehicles to extend the service life.

By contrast, the non-NPS fleet is decidedly newer. Of those reporting, nearly 56% of non-NPS vehicles have operated for less than 10 years and 42% for less than 5 years. The proportion of vehicles over 15 years old has increased to 37% while the proportion of vehicles that are 10 to 14 years old has decreased to 7%. This indicates that some vehicles have hit the 15-year mark and suggest that concessionaires have continued to replace older vehicles, which may reflect contract language requiring vehicles to be within a certain age range.

Nevertheless, transit vehicles operating in the parks are not used in the same way as urban transit vehicles. Park transit vehicles are typically not used for the entire year, nor are they used as intensively as vehicles operated in an urban environment. As a result, they may be in service for considerably longer lifespans, and recapitalization estimates should rely on park-specific estimates that depend on their specific use (see the Asset Management section and appendix F).

Figure 7: All vehicles by age class (years)

Notes: N=617 vehicles and vessels;[11] NPS=National Park Service.
Source: 2019 NPS transit inventory data.



[11] This N excludes the 33 Red Bus Tour vehicles (GLAC), which have been retrofitted using the original 1936 exteriors and newer chassis. It also excludes the vehicles where age was not reported.

Performance Measures

The NPS Alternative Transportation Program seeks to use meaningful, reliable data. The objective is to use measurable, applicable, and achievable performance measures and metrics to guide and support decision making and management of NPS transit systems.

The performance measures below are split into the following sections, which correspond to ATP goals and the NPS National Long Range Transportation Plan: visitor experience, operations, environmental impact, and asset management. The ATP program goals are included in appendix B.

Visitor Experience

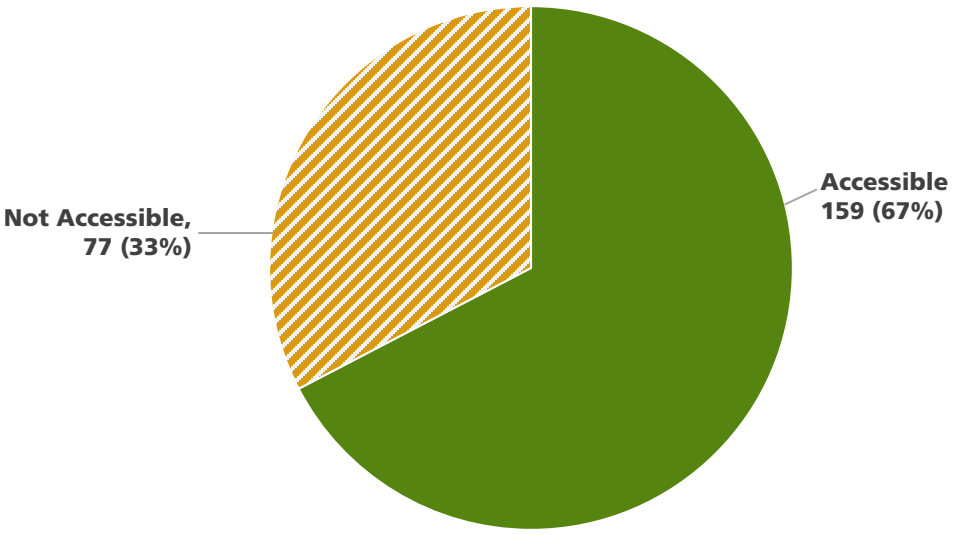
This performance area addresses how park transportation systems enhance the visitor experience. For 2019, the visitor experience performance measure includes accessibility for mobility-impaired park visitors.

Accessibility for Visitors with Disabilities

In 2019, the majority of NPS-owned transit vehicles and vessels (67%, 159 vehicles) are accessible for people with mobility impairments (figure 8). This proportion is stable from 2018. Of the 29 parks with NPS-owned vehicles or vessels, 7 have no vehicles or vessels that are accessible; this number reduced from 8 in 2018.

Figure 8: Accessibility of NPS-owned transit vehicles

Notes: N=236 vehicles and vessels; NPS=National Park Service.
Source: 2019 NPS transit inventory data.



Operations

This section evaluates the operational performance of the NPS transit systems by measuring the annual percent change in boardings over the last 5 years. In 2018, the reduced number of boardings may be attributed to a more-intense-than-usual hurricane season and the 2018 government shutdown, along with impacts from nonreporting parks.

Year-to-Year Trends in Boardings

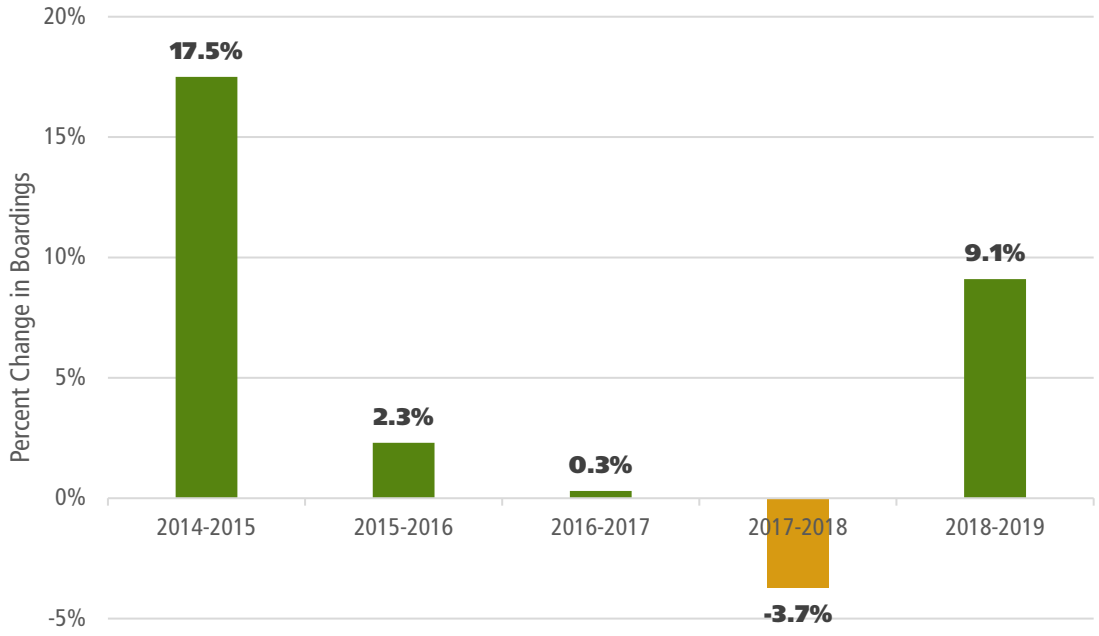
Figure 9 shows the percent change in boardings from 2014 to 2019. In 2016, the list of systems was reevaluated by applying the definition of transit from appendix C. The result was the removal of several systems, that were under commercial use agreements (CUAs), from the inventory. The removal of the CUA systems influenced the reported change in boardings between 2015 and 2016.

Although absolute boardings continued to increase in most of the prior several years (table 1), the percent increase declined, and in 2018 the absolute ridership dipped slightly. Since the first inventory, parks have acquired more sophisticated methods for counting system boardings and have refined their boardings estimates over time. A less volatile rate of change may simply indicate an improvement in the reliability of more recent estimates.

In 2019, the absolute ridership increased, and the percent increase was higher than it has been since the 2014-2015 inventory. This increase may be attributed to high reporting rates within the typical top fifteen systems with largest boarding totals, a continuous year of service without major closures, and an overall increase in national park visitation.

Figure 9: Percent change in boardings from 2014 to 2019

Source: 2014-2019 National Park Service transit inventory data.



Service Schedule

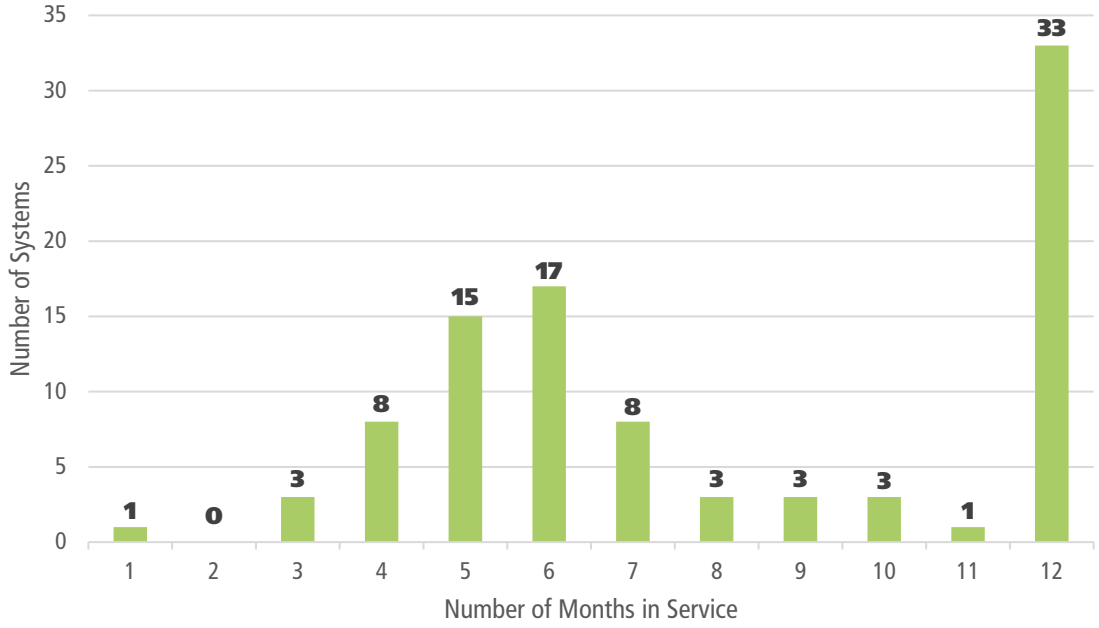
The 2019 inventory analyzed the reported service schedules to understand the general calendar spread of NPS transit systems. Although most seasonal service dates ranged primarily over the summer and into early autumn (June to October), very few operate in the winter (December to February), with 35% of systems (33 systems) operating year-round (figure 10). The most common peak service months are July and August, with shoulder peak seasons extending May through September. Some parks report peak seasons begin as early as January and end as late as October. Peak season is defined as the period when the scheduled transit service is operating at its greatest frequency.

Systems operating year-round are among those with the highest annual ridership, representing 69% of total boardings. Of the 33 systems that operate year-round, 11 provide critical access and 6 provide mobility within the park. The next most common service period is 6 months out of the year, followed by systems that are in service for 5 months. Generally, transit systems extended their service duration in 2019.

Transit systems in colder climates tend to operate for shorter seasons than those in warmer areas. For example, systems in Interior Region 11 (Alaska) operate through September. Conversely, many of the year-round systems are in the southern and western parts of the country where the climates are milder. The wide range of climates encompassed by Interior Regions 8, 9, 10, and 12—from Yosemite to Hawaii—leads to a wide range of schedules.

Figure 10: Distribution of service duration by number of months

Note: N=95 systems.
Source: 2019 National Park Service transit inventory data.



Safety

The 2019 inventory included several new questions regarding safety at the system level. Visitor and workforce safety are among the highest NPS priorities, and transportation is a significant source of risk to the safety of NPS transportation system users. Collecting safety and crash information for transit systems informs the *NPS National Long Range Transportation Plan's* transportation safety program.[12]

In 2019, five NPS transit systems reported a traffic accident; of those, four had passengers on board during the accident (table 5). None of those crashes resulted in an injury or fatality nor involved pedestrians or bicyclists. Three resulted in property damage and three were a result of driver error.

- **Scranton Limited and Live Steam Excursions (Steamtown National Historic Site [STEA]).** The Baldwin #26 derailed when it ran a switch in the Steamtown yard. There was approximately $10,000 in damage to the locomotive. The locomotive was out of service for 2 weeks.
- **Rim Drive Trolley Tour (Crater Lake National Park [CRLA]).** Minor damage to the trolley when a wheel left the pavement and hit a rock due to congested traffic conditions.
- **Zion Canyon Shuttle** (ZION): Minor accidents required little to no down time.
- **South Rim Shuttle Service** (GRCA).
- **Bryce Canyon Shuttle and Rainbow Point Shuttle** (BRCA): A driver who was subsequently dismissed failed to carefully maneuver through a T-intersection. A motorist had rolled forward just past the stop bar and large vehicles were parked in regular parking spots near a shuttle stop. Another incident occurred when a drowsy park visitor rear-ended a park bus that was parked in the line of traffic.

Table 5: Response to Safety and Operational Questions

Source: 2019 National Park Service transit inventory data.

Park	System Name	Passengers on Board	Injuries or Fatalities	Bicycles or Pedestrians	Accident Occurred on Route	Result of Driver Error	Real Property Damaged
STEA	Scranton Limited and Live Steam Excursions	No	No	No	No	No	$10,000
CRLA	Rim Drive Trolley Tour	Yes	No	No	No	Yes	No
ZION	Zion Canyon Shuttle	Yes	No	No	Yes	No	$8,571
GRCA	South Rim Shuttle Service	Yes	No	No	Yes	Yes	No
BRCA	Bryce Canyon Shuttle and Rainbow Point Shuttle	Yes	No	No	Yes	Yes	Yes

Notes: BRCA=Bryce Canyon National Park; CRLA=Crater Lake National Park; GRCA=Grand Canyon National Park; STEA=Steamtown National Historic Site; ZION=Zion National Park.

[12] The National Long Range Transportation Plan discusses safety goals and performance metrics.

Environmental Impact

Since 2017, the transit inventory uses the U.S. Environmental Protection Agency's (EPA) Motor Vehicle Emissions Simulator (MOVES) for estimating emissions by NPS transit vehicles.[13] The Motor Vehicle Emissions Simulator is a state-of-the-science emissions modeling software that uses preloaded measurement data to estimate emissions rates for different vehicle types, model years, fuel types, and road types across several Clean Air Act criteria pollutants "from the bottom-up" for both on- and off-road vehicles, including waterborne vessels. MOVES software is also the regulatory standard for emissions inventory analyses under the Clean Air Act and related legislation.[14] MOVES software bases emissions estimates on observations of actual vehicle operations.

This section describes the results of the 2019 emissions analysis with respect to carbon dioxide (CO_2). The results for the other criteria pollutants—nitrogen oxides (NOx), volatile organic compounds (VOCs), and particulate matter—as well as a detailed description of the analysis methodology, are presented in appendix E. In addition to a significant increase in emitting activity (i.e., vehicle miles traveled (VMT)), the 2019 system inventory differs from inventories used to generate prior years' emissions reports. Some systems were captured in the 2018 inventory, but not in 2019, and vice versa. Some parks did not report vehicle data because of difficulties related to COVID-19. Thus, the 2019 results may differ from 2018. As was true with the introduction of other methodologies to the transit inventory, this will stabilize over the next few years.

Annual CO_2 Emissions

Figure 12 shows the results of MOVES CO_2 emissions modeling for NPS transit systems, aggregated to the regional level and split by ownership. Across all regions, NPS transit fleets emitted just over 33,000 metric tons of CO_2 in 2019. Regions 8, 9, 10 and 12 emitted the greatest amount of CO_2, with a large number of transit systems in each region and many operating in rural and hilly areas. In contrast, a substantial part of the National Capital Area's transit systems operations occur on relatively flat urban streets. Table 6 shows the distribution of vehicles, miles traveled, and associated CO_2 emissions.

Table 6: Distribution of miles and CO_2 emissions by vehicle ownership

Notes: N=762[15] vehicles and vessels
Source: 2019 NPS transit inventory data.

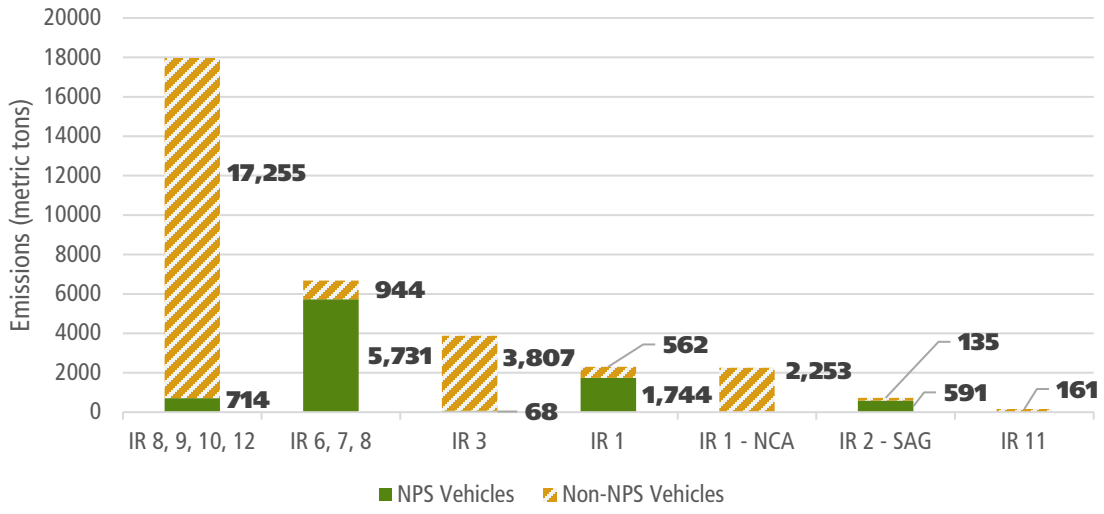
Ownership	Vehicles (number)	Vehicles (percent)	Miles Traveled	Miles (percent)	CO_2 (metric tons)	CO_2 (percent)
NPS Owned	235	31%	8,108,886	70%	8,826.5	26%
Non-NPS Owned	527	69%	3,558,096	30%	25,117	74%
Total:	762	100%	11,666,981	100%	33,963	100%

[13] This national transit inventory uses version MOVES2014b, which includes updates published in August 2018.

[14] "Official Release of the MOVES2014 Motor Vehicle Emissions Model for SIPs and Transportation Conformity." Federal Register 79:194 (October 7, 2014) p. 60343. Available from the Government Publishing Office at: https://www.gpo.gov/fdsys/pkg/FR-2014-10-07/pdf/2014-23258.pdf.

[15] Due to data gaps, an N of 654 vehicles is used for the emissions analysis. In addition to excluding vehicles with missing data, snow coach, aircraft, and rail operations are not analyzed in the emissions analysis.

Figure 11: Annual CO_2 emissions
Source: 2019 NPS transit inventory data.



Diverted Passenger Vehicle Trips and CO_2 Emissions Avoided

The benefits of using transit include

- reduction of the number of vehicle trips in parks,
- congestion relief on park roads by carrying more people per square foot of road space,
- elimination of associated fuel-inefficient driving behaviors like extended idling and stop-and-go,
- potential to influence how visitors spend their time in the park, and
- removal of long lines of cars from viewsheds.

Servicewide, an estimated 16.8 million private vehicle trips were eliminated in 2019 with a reduction in of 266 million metric tons of CO_2 emissions.; without transit service, this would have meant an additional 483 million miles driven in private vehicles. NPS transit systems emitted 33,963 metric tons of CO_2 in 2019. As stated previously, regions with high transit use and more boardings divert more personal vehicles from the road.

Removing private vehicle trips from park roads has a positive effect on the visitor experience. With fewer vehicles, there is less waiting in traffic, less frustration finding a place to park, and less noise in natural places where cars are foreign objects. Transit offers more efficient ways for visitors to move within a national park and, in some cases, allows travel between national parks (e.g., the connective service between sites at Home of Franklin D. Roosevelt National Historic Site, (HOFR), Eleanor Roosevelt National Historic Site (ELRO), and Vanderbilt Mansion National Historic Site (VAMA). Transit also helps minimize impacts on protected resources.

Asset Management

Performance measurement for assets helps support the long-term financial viability of the NPS transit systems through tracking the age of NPS vehicle fleets and estimating fleet recapitalization costs. In this context, "vehicles" refers only to on-road motorized vehicles and excludes nonroad transportation, such as ferries, locomotives, snow coaches, and aircraft. Any of those described in table 6 are shown only for reference and were not analyzed for recapitalization estimates.

Average Age of NPS Vehicles

Table 7 reports the aggregate average age for NPS-owned transit vehicles servicewide. The average age of each NPS vehicle type is below the service life for most vehicle types, but most categories include vehicles older than their typical lifespan. In the case of medium-duty shuttles, the average age exceeds the service life. It is worth noting that 44 vehicles will exceed their service life in the next 3 years; of these, 27 are heavy-duty shuttles. On average, heavy- and medium-duty transit buses are the newest vehicles in the NPS-owned fleet.

Table 7: Vehicle age for NPS transit vehicle types

Notes: N=236 vehicles and vessels; N/A=not applicable.
Source: 2019 National Park Service transit inventory data.

Vehicle Type	Average Age	Number of Vehicles	Service Life (Years)	Number of Vehicles Beyond Service Life
6-12 Pax Electric Tram	9	2	11	0
Passenger Van	8.5	2	10	0
Light-Duty Shuttle	10	49	15	4
Medium-Duty Shuttle	15.8	49	15	30
Heavy-Duty Shuttle	12	75	15	8
Medium-Duty Transit [16]	2	1	18	0
Heavy-Duty Transit	7	6	18	0
Ferry/Boat	22.3	13	N/A	5
Train/Streetcar	52	5	N/A	3
School Bus	11	2	18	0
Total:	-	236	-	50

[16] The GLAC Red Bus Tours vehicles were excluded from this category, as they have been extensively retrofitted during their 80+ years in service.

Estimated Vehicle Recapitalization Needs
Estimates of NPS vehicle replacement needs begin with vehicle ages, along with the standard replacement costs and service life assumptions shown in appendix F.[17] Each park is responsible for determining when a vehicle needs to be replaced, which is dependent on funding availability and other factors. Service life is highly dependent on vehicle use, in addition to vehicle age; therefore, more detailed information is needed before determining if a vehicle is truly due for replacement.

Based on an analysis using the methodology outlined in appendix F, the National Park Service is facing a large fleet replacement need over the next 10 years and an estimated $139.3 million in NPS-owned transit vehicle capital costs. This includes fleet replacements for legacy transit systems at Acadia National Park (ACAD), ZION, YOSE, and GRCA. Projected costs are calculated in 2019 dollars and may vary from year to year as vehicles from different systems are replaced or rehabilitated to extend their service life.

Next Steps

In its eighth year, the inventory continues to provide essential information on NPS transit systems at the park, regional, and national levels. This effort allows stakeholders to understand the basic characteristics of NPS transit systems, including how many visitors are served, the number and types of transit systems, vehicle service life and fuel types, the business models under which these systems operate, and performance measures (including emissions).

The transit inventory collects annual operational information to supplement other data initiatives that focus on NPS fixed real property assets. This effort provides a consistent platform to efficiently gather information that can be compared through time and enable the National Park Service to examine disparate transit systems as a whole and evaluate their benefits and impacts. As visitation at national parks increases, transit systems remain important assets for reducing resource impacts from personal vehicles while improving access and enhancing the visitor experience.

The following lessons will be incorporated to improve future transit data calls:

- **Coordinate with relevant NPS stakeholders.** Continue coordination to share data and identify ways the transit data can be used to support program missions, goals, and outcomes across the National Park Service. Consider stronger coordination with concessions and service contracts to include data requirements in new contracts.
- **Create new and/or refine existing data elements.** Continue to refine the number of fields in the data call, adding or removing data fields, as necessary, to gather only necessary information while limiting the burden of data collection on the park staff.
- **Improve the data collection online tool.** The online data collection tool moved to the Microsoft PowerApps platform this year. Most parks reported improved ease of use, however, access to the web application and simplifying the user interface remain a priority. The new data collection process has allowed for creation of interactive reports using PowerBI, which eased analysis of the transit data. The transition also opens opportunities to incorporate data from the transit inventory into the Alternative Transportation Service Lifecycle Asset Management (ATSLAM) dashboard and to connect to Financial and Business Management System.
- **Continue to expand performance measures analysis.** Continue including additional performance measures to track progress of NPS transit systems over time and include in this report. Collaborate with other NPS planning efforts to provide measurable data. Shift safety questions to a quantitative input.

[17] The service life assumptions used to estimate the recapitalization needs and costs were updated in 2015 to reflect more current cost estimates for the transit vehicles, and to reflect the way NPS transit vehicles are used. In addition, please note that the 2017 analysis used "unconstrained" cost assumptions unique to that year, and as a result cannot be compared to other years.

- **Communicate benefit and impact of NPS transit systems to visitors.** Consider communicating to visitors how their choice to use transit has a positive impact on park resources through reducing congestion and emissions from private vehicles. The positive impacts of transit use could be communicated in a variety of ways, such as consistent signage throughout the national park system, through social media, or on the NPS website.
- **Consider multimodal connections to transit.** The transit inventory could be expanded to include connections to multiuse trails. Considering opportunities for bicycling and walking in national parks, and connections to transit, could give a better picture of the opportunities for exploring national parks without using a private vehicle.
- **Update the Recapitalization Analysis.** This year, the recapitalization analysis used real data from parks to create a baseline recapitalization plan. This baseline recapitalization effort will better inform future inventory and analysis efforts. Use real data from parks, Project Management Information System statements, and Parks Transportation Allocation and Tracking System (PTATS) to update cost assumptions on a per vehicle (attached to vehicle identification numbers), per system basis. Consider including recapitalization questions in the inventory data collection process.
- **Revisit Transit Definition** (appendix C) to reflect new laws and regulations.

Appendix

Appendix A – Acknowledgments

The National Park Service (NPS) would like to thank the numerous NPS transit system contacts who graciously provided their time, knowledge, and guidance in the development of this inventory and new web application.

Special thanks to each park and park contact who provided data for the 2019 inventory year. A list of each park contact is included in appendix D.

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Acadia National Park

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Interior Region 3, 4 and 5
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Midwest Region

Chris Amidon
Isle Royale National Park

Interior Regions 6, 7, and 8
Michael Madej
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Zion National Park

Interior Regions 8, 9, 10, and 12
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Appendix B – National Park Service Alternative Transportation Program (ATP) Goals and Objectives

GOAL: Cultivate improvements in transportation connectivity, convenience, and safety for visitors and workforce.

OUTCOME: Access to, from, and within national parks is convenient, safe, and well-connected via appropriate and integrated transportation solutions.

- Develop transportation options that meet the diverse needs of park visitors and NPS workforce.
- Connect and enhance existing transportation options.
- Minimize injuries, fatalities, and crashes associated with all modes of transportation.
- Participate in local, regional, and statewide transportation planning processes to ensure appropriate integration of National Park Service transportation infrastructure, systems, and services.

GOAL: Provide quality transportation experiences that enhance park visits.

OUTCOME: NPS transportation systems contribute to the positive experience of park visitors.

- Improve visitor access to appropriate destinations.
- Use transportation to educate and inform visitors about park resources and services.
- Reduce disruptions to the visitor experience related to vehicle traffic congestion.
- Design and adapt transportation systems to complement each park's unique context and mission.

GOAL: Demonstrate leadership in environmentally-responsible transportation.

OUTCOME: The National Park Service is recognized as a leader in environmentally-responsible transportation.

- Prioritize investments and operations that reduce vehicle emissions, noise and light pollution, traffic congestion, and unendorsed parking.
- Educate park visitors and workforce about the environmental benefits of transportation options within and beyond park boundaries.
- Contribute to NPS and park greenhouse gas emissions reduction goals.
- Implement proven green transportation innovations and best practices where appropriate.

GOAL: Ensure the long-term financial viability of NPS transportation infrastructure, systems, and services.

OUTCOME: Funding is adequate to maintain transportation infrastructure, operate transportation systems, and manage transportation services now and into the foreseeable future

- Consider the full range of business models and associated lifecycle costs (direct and indirect) before making investments.
- Increase the flexibility of funding mechanisms to better support transportation options.
- Right-size and maintain needed transportation assets and services in a state of good repair.

- Develop transportation options with reciprocal benefits for NPS and gateway communities which can be collaboratively funded and/or operated.
- Seek to enhance or develop partnerships with public, private, and philanthropic organizations that are aligned with the NPS mission.

GOAL: Manage the transportation program based on meaningful, reliable data.

OUTCOME: The National Park Service demonstrates accountability in the management of transportation resources.

- Use measurable, applicable, and achievable performance measures and metrics to guide and support decision-making and management of the transportation program.
- Invest in and maintain data that supports performance measures aligned with program goals.
- Continually evaluate transportation options to ensure they meet program goals, and adjust operations to optimize system performance.

Appendix C – Definition of Transit

The National Park Service (NPS) Alternative Transportation Program (ATP) developed a definition for an "NPS transit system" prior to conducting the 2012 transit inventory. Only parks with systems that met each of these three criteria listed below were considered for the inventory:

1. Moves people by motorized vehicle on a regularly scheduled service.[18]
2. Operates under one of the following business models: concession contract; service contract; partner agreement including memorandum of understanding, memorandum of agreement, or cooperative agreement (commercial use agreements are not included); or is NPS owned and operated.[19]
3. All routes and services at a given park 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 coordinators and the Federal Lands Highway Program Service-wide Maintenance Advisory Committee. In response to challenges encountered during the course of the inventory, small changes were made to the original draft definition to improve clarity. The definition was uniformly applied to all potential systems to determine whether or not each should be included in the inventory.

The NPS ATP investigated several potential criteria that stemmed from existing ATP documents, 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***."

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 agreement (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 agreements are not included); or NPS owned and operated systems."*** The NPS ATP used "cooperative agreement" as

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[18] This includes services with a posted schedule that have standard operating seasons/days of week/hours. Services that 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.

[19] For the purposes of this inventory, no distinction was drawn between a memorandum of understanding, memorandum of agreement, or cooperative agreement. All were recorded as "cooperative agreement."

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 agreements 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 that the services are operated in accordance with NPS policies and requirements. There are hundreds of CUAs servicewide that provide visitors tours and transportation. Collecting and reporting information on all of these systems could be burdensome to parks 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 Vehicle Miles Traveled (VMT): 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: 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: There is 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 servicewide 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 parks 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 park are considered a single transit system***."

Once developed, the pilot definition was shared individually with the Transportation Program Coordinators 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 Servicewide 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 D – 2019 NPS National Inventory System List

Interior Region 1

Park Code	System Name	Vehicle Type	2019 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
ACAD	Island Explorer & Bicycle Express	Shuttle/Bus/Van/Tram	647,098	Non-NPS	Cooperative Agreement	Mobility to or within Park	John Kelly
ADAM	Adams trolley	Shuttle/Bus/Van/Tram	60,359	NPS	Service Contract	Critical Access	Kevin Kelly
BOHA	Boston Light Tour	Boat/Ferry	Not reported (2018: 874)	Non-NPS	Cooperative Agreement	Interpretive Tour	Beth Jackendoff
BOHA	Public Ferry System	Boat/Ferry	Not reported	-	-	-	Beth Jackendoff
BOHA	Thompson Island Ferry	Boat/Ferry	Not reported (2018: 24,781)	Non-NPS	Cooperative Agreement	Mobility to or within Park	Beth Jackendoff
CACO	Coastguard Beach Shuttle	Shuttle/Bus/Van/Tram	Not reported (2018: 73,000)	NPS	NPS Owned and Operated	Critical Access	Karst Hoogeboom
EISE	EISE shuttle	Shuttle/Bus/Van/Tram	47,277	Non-NPS	Concession Contract	Critical Access	Ahna Wilson
FIIS	Sailors Haven Ferry	Boat/Ferry	41,016	Non-NPS	Concession Contract	Critical Access	Jason Pristupa
FIIS	Watch Hill Ferry	Boat/Ferry	18,850	Non-NPS	Concession Contract	Critical Access	Jason Pristupa
HOFR/ ELRO/ VAMA	FDR Tram	Shuttle/Bus/Van/Tram	3,750	NPS	NPS Owned and Operated	Special Needs	Dave Bullock
HOFR/ ELRO/ VAMA	Roosevelt Ride	Shuttle/Bus/Van/Tram	1,750	NPS	NPS Owned and Operated	Mobility to or within Park	Dave Bullock
HOFR/ ELRO/ VAMA	Val-Kill Tram	Shuttle/Bus/Van/Tram	5,730	NPS	NPS Owned and Operated	Special Needs	Dave Bullock
JOFL/ ALPO	Lakebed Tours	Shuttle/Bus/Van/Tram	411	NPS	NPS Owned and Operated	Interpretive Tour	Doug Bosley
LOWE	Canal Tours	Boat/Ferry	14,285	NPS	NPS Owned and Operated	Interpretive Tour	Michael Curran
LOWE	LOWE Historic Trolley	Train/ Trolley	58,565	NPS	NPS Owned and Operated	Mobility to or within Park	Michael Curran
SHEN	Rapidan Camp bus	Shuttle/Bus/Van/Tram	1,460	NPS	NPS Owned and Operated	Interpretive Tour	Tim Taglauer
STEA	Scranton Limited & Live Steam Excursions	Train/ Trolley	22,689	NPS	NPS Owned and Operated	Interpretive Tour	Jessica Weinman
STLI/ ELIS	Statue of Liberty Ferries	Boat/Ferry	10,370,679	Non-NPS	Concession Contract	Critical Access	Ben Hanslin
VAFO	History of Valley Forge Trolley Tour	Shuttle/Bus/Van/Tram	11,133	Non-NPS	Cooperative Agreement	Interpretive Tour	Pamela Zesotarski

Interior Region 1 – National Capital Area

Park Code	System Name	Vehicle Type	2019 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
HAFE	HAFE shuttle transport	Shuttle/Bus/Van/Tram	380,425	NPS	Service Contract	Critical Access	Larry Moore
NAMA	Big Bus Tours Washington DC	Shuttle/Bus/Van/Tram	260,808	Non-NPS	Concession Contract	Interpretive Tour	Karl Gallo
NAMA	DC Circulator	Shuttle/Bus/Van/Tram	5,565,092	Non-NPS	Cooperative Agreement	Transportation Feature	Eliza Voigt/ David Koch
WOTR	Fairfax Connectors Wolf Trap Express	Shuttle/Bus/Van/Tram	3,668	Non-NPS	Service Contract	Mobility to or within Park	Janette Lemons

Interior Region 2 – South Atlantic Group

Park Code	System Name	Vehicle Type	2019 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
BLRI	Sharp Top Mountain Shuttle	Shuttle/Bus/Van/Tram	8,562	Non-NPS	Concession Contract	Transportation Feature	Shawn Cloutier
CALO	Ferry service	Ferry/Boat	88,951	Non-NPS	Concession Contract	Critical Access	Katherine Cusinberry
CARL	Electric Shuttle	Shuttle/Bus/Van/Tram	4,671	NPS	NPS Owned and Operated	Special Needs	Sarah Perschall
CUIS	Ferry service	Ferry/Boat	82,590	Non-NPS	Concession Contract	Critical Access	Jill Hamilton-Anderson
CUIS	Land and Legacies Tour	Shuttle/Bus/Van/Tram	4,388	NPS	Concession Contract	Interpretive Tour	Jill Hamilton-Anderson
FOMA/CASA	Ferry service	Ferry/Boat	103,920	NPS	NPS Owned and Operated	Critical Access	Andrew Rich
FOSU	Ferry service	Ferry/Boat	295,588	Non-NPS	Concession Contract	Critical Access	Michelle Haas
GUIS	Ferry service	Ferry/Boat	54,641	NPS	Concession Contract	Transportation Feature	Richard Devenney
GUIS	Ship Island Ferry	Ferry/Boat	40,332	Non-NPS	Concession Contract	Transportation Feature	Richard Devenney
KEMO	Shuttle Bus	Shuttle/Bus/Van/Tram	4,747	NPS	Service Contract	Transportation Feature	Anthony Winegar
MACA	Cave Tours Bus Shuttle	Shuttle/Bus/Van/Tram	179,519	NPS/Non-NPS	Concession Contract	Interpretive Tour	Steve Kovar
MACA	Green River Ferry	Ferry/Boat	36,900	NPS	NPS Owned and Operated	Transportation Feature	Steve Kovar

Interior Regions 3, 4, and 5

Park Code	System Name	Vehicle Type	2019 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
APIS	Excursion Boat	Boat/Ferry	40,000	Non-NPS	Concession Contract	Interpretive Tour	Teri Gage
CUVA	Cuyahoga Valley Scenic Railroad	Trolley/ Train	149,193	Non-NPS	Cooperative Agreement	Mobility to or Within Park	Jennifer Vasarhelyi
ISRO	MV Isle Royale Queen IV	Boat/Ferry	12,026	Non-NPS	Concession Contract	Critical Access	Chris Amidon
ISRO	MV Ranger III	Boat/Ferry	4,405	NPS	NPS Owned and Operated	Critical Access	Chris Amidon
ISRO	MV Sandy tour	Boat/Ferry	5,358	Non-NPS	Concession Contract	Interpretive Tour	Chris Amidon
ISRO	MV Voyageur II and Sea Hunter III	Boat/Ferry	10,856	Non-NPS	Concession Contract	Critical Access	Chris Amidon
ISRO	Royale Air Service Inc. float plane	Plane	4,594	Non-NPS	Concession Contract	Critical Access	Chris Amidon
PIRO	Pictured Rocks Cruises	Boat/Ferry	170,227	Non-NPS	Concession Contract	Interpretive Tour	Joseph Hughes
SCBL	SCBL free shuttle service	Shuttle/Bus/Van/Tram	1,874	NPS	NPS Owned and Operated	Mobility to or within Park	Justin Cawiezel
SLBE	Manitou Island Transit	Boat/Ferry	9,991	Non-NPS	Concession Contract	Transportation Feature	Phil Akers
TAPR	TAPR bus tour	Shuttle/Bus/Van/Tram	5,013	NPS	NPS Owned and Operated	Interpretive Tour	Heather Brown
VOYA	VOYA tour boat	Boat/Ferry	4,007	NPS	NPS Owned and Operated	Interpretive Tour	Tawnya Schoewe

Interior Regions 6, 7, and 8

Park Code	System Name	Vehicle Type	2019 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
BAND	Bandelier National Monument Shuttle	Shuttle/Bus/Van/Tram	112,564	Non-NPS	Service Contract	Mobility to or within Park	Dennis Milligan
BRCA	Bryce Canyon Shuttle and Rainbow Point Shuttle	Shuttle/Bus/Van/Tram	774,010	Non-NPS	Service Contract	Mobility to or within Park	Kevin Poe
DINO	Tram transit	Shuttle/Bus/Van/Tram	504,000	Non-NPS	Service Contract	Critical Access	Jeffrey Pate
GLAC	Glacier Park Boat Company -interpretive boat tours	Boat/Ferry	91,284	Non-NPS	Concession Contract	Interpretive Tour	Jennifer Evans
GLAC	Hiker Shuttle	Shuttle/Bus/Van/Tram	4,637	NPS	Cooperative Agreement	Mobility to or within Park	Patrick Glynn

Park Code	System Name	Vehicle Type	2019 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
GLAC	Red Bus Tours	Shuttle/Bus/Van/Tram	54,562	NPS	Concession Contract	Interpretive Tour	Jennifer Evans
GLAC	Sprinter Shuttles & Optima Shuttles	Shuttle/Bus/Van/Tram	256,623	NPS	NPS Owned and Operated	Mobility to or within Park	Patrick Glynn
GLAC	Sun Tours	Shuttle/Bus/Van/Tram	5,722	Non-NPS	Concession Contract	Interpretive Tour	Jennifer Evans
GLCA	Antelope Point	Boat/Ferry	18,518	Non-NPS	Concession Contract	Interpretive Tour	James Hickman
GLCA	Boat tours	Boat/Ferry	103,976	Non-NPS	Concession Contract	Interpretive Tour	James Hickman
GLCA	Flatwater tour	Boat/Ferry	36,234	Non-NPS	Concession Contract	Interpretive Tour	James Hickman
GLCA	SR276 passenger ferry	Boat/Ferry	1,581	Non-NPS	Service Contract	Transportation Feature	James Hickman
GRCA	Grand Canyon Railway	Trolley/ Train	281,564	Non-NPS	Concession Contract	Mobility to or within Park	Pamela Edwards
GRCA	South Rim Bus Tours	Shuttle/Bus/Van/Tram	110,111	Non-NPS	Concession Contract	Interpretive Tour	Pamela Edwards
GRCA	South Rim Shuttle Service	Shuttle/Bus/Van/Tram	7,644,231	NPS	Service Contract	Mobility to or within Park	Pamela Edwards
GRTE	Jenny Lake Shuttle Boat	Boat/Ferry	207,047	Non-NPS	Concession Contract	Mobility to or within Park	Katy Canetta
LIBI	LIBI bus tours	Shuttle/Bus/Van/Tram	6,300	Non-NPS	Concession Contract	Interpretive Tour	Ken Woody
MEVE	Long House Trailhead tram and Half-day ranger guided	Shuttle/Bus/Van/Tram	10,101	Non-NPS	Concession Contract	Interpretive Tour	Allan Loy
ORPI	Ajo Mountain Drive tour	Shuttle/Bus/Van/Tram	376	NPS	NPS Owned and Operated	Critical Access	Cynthia Sequanna
ROMO	Bear Lake & Moraine Park shuttle, Hiker Shuttle to Estes Park	Shuttle/Bus/Van/Tram	764,423	Non-NPS	Service Contract	Mobility to or within Park	John Hannon
YELL	Historic Yellow Bus tours	Shuttle/Bus/Van/Tram	12,303	NPS	Concession Contract	Interpretive Tour	Willie Burkhart/ Rob Love
YELL	Xanterra Parks & Resorts interpretive bus tours	Shuttle/Bus/Van/Tram	14,230	Non-NPS	Concession Contract	Interpretive Tour	Willie Burkhart/Rob Love
YELL	Xanterra Parks & Resorts interpretive snowcoaches tours	Shuttle/Bus/Van/Tram	12,550	Non-NPS	Concession Contract	Interpretive Tour	Willie Burkhart/Rob Love
YELL	YELL boat	Boat/Ferry	16,477	Non-NPS	Concession Contract	Interpretive Tour	Willie Burkhardt/ Rob Love
YELL	YELL Snow Coach Contracts	Shuttle/Bus/Van/Tram	28,423	Non-NPS	Concession Contract	Interpretive Tour	Willie Burkhardt

Park Code	System Name	Vehicle Type	2019 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
ZION	Zion Canyon Shuttle	Shuttle/Bus/Van/Tram	6,777,100	NPS	Service Contract	Critical Access	Jennifer Staroska

Interior Regions 8 (Southern California and Southern Nevada), 9, 10, and 12

Park Code	System Name	Vehicle Type	2019 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
CHIS	Island Packers	Boat/Ferry	158,570	Non-NPS	Concession Contract	Critical Access	John Hansen
CRLA	Crater Lake Boat Tour	Boat/Ferry	12,382	Non-NPS	Concession Contract	Interpretive Tour	Sean Denniston
CRLA	Rim Drive Trolley Tour	Shuttle/Bus/Van/Tram	10,477	Non-NPS	Concession Contract	Interpretive Tour	Sean Denniston
DEPO	Reds Meadow Shuttle Bus	Shuttle/Bus/Van/Tram	66,791	Non-NPS	Cooperative Agreement	Critical Access	Deanna Dulen
EUON	NPS Shuttle	Shuttle/Bus/Van/Tram	4,936	NPS	NPS Owned and Operated	Critical Access	Tom Leatherman
GOGA/ ALCA	Alcatraz Cruises ferry	Boat/Ferry	1,680,553	Non-NPS	Concession Contract	Critical Access	Alice Young
MUWO	Muir Woods Shuttle	Shuttle/Bus/Van/Tram	143,123	Non-NPS	Cooperative Agreement	Mobility to or within Park	Darren Brown
NOCA/ LACH	Rainbow Falls Tours	Shuttle/Bus/Van/Tram	15,701	NPS	Concession Contract	Interpretive Tour	Annelise Lesmeister
NOCA/ ROLA	Ross Lake Hiker Shuttle	Shuttle/Bus/Van/Tram	313	Non-NPS	Concession Contract	Transportation Feature	Annelise Lesmeister
PERL	Ford Island Tour	Shuttle/Bus/Van/Tram	580,054	Non-NPS	Cooperative Agreement	Interpretive Tour	Daniel Brown
PERL	USS Arizona Memorial Tour	Boat/Ferry	1,133,784	Non-NPS	Cooperative Agreement	Interpretive Tour	Daniel Brown
PINN	Pinnacle Shuttle	Shuttle/Bus/Van/Tram	28,110	NPS	NPS Owned and Operated	Mobility to or within Park	Mark Donahue
PORE	Headlands Shuttle	Shuttle/Bus/Van/Tram	1,163	Non-NPS	Service Contract	Critical Access	Brannon Ketcham
SEKI	Gateway Shuttle	Shuttle/Bus/Van/Tram	12,350	Non-NPS	Cooperative Agreement	Mobility to or within Park	Andrew Carl
SEKI	Giant Forest Shuttle	Shuttle/Bus/Van/Tram	964,164	Non-NPS	Cooperative Agreement	Critical Access	Andrew Carl
YOSE	Mariposa Grove Transportation Service	Shuttle/Bus/Van/Tram	640,686	NPS	Service Contract	Critical Access	Jim Donovan
YOSE	Tram Tours and Hiker Shuttle	Shuttle/Bus/Van/Tram	92,741	Non-NPS	Concession Contract	Interpretive Tour	Jim Donovan
YOSE	Winter Ski Shuttle	Shuttle/Bus/Van/Tram	4,569	Non-NPS	Concession Contract	Mobility to or within Park	Jim Donovan
YOSE	YARTS	Shuttle/Bus/Van/Tram	102,143	Non-NPS	Cooperative Agreement	Mobility to or within Park	Jim Donovan
YOSE	Yosemite Valley Shuttle	Shuttle/Bus/Van/Tram	3,161,758	NPS	Concession Contract	Mobility to or within Park	Jim Donovan

Interior Region 11 – Alaska

Park Code	System Name	Vehicle Type	2019 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
DENA	Bus Tours and Shuttle Service	Shuttle/Bus/Van/Tram	377,097	Non-NPS	Concession Contract	Critical Access	Jim LeBel
GLBA	Airport Shuttle	Shuttle/Bus/Van/Tram	4,200	Non-NPS	Concession Contract	Transportation Feature	Melanie Berg
GLBA	Day boat tour	Boat/Ferry	6,592	Non-NPS	Concession Contract	Interpretive Tour	Melanie Berg

Appendix E – Change in Reported Vehicles

Table 8: Changes in Active Reported NPS Fleet

Sources: 2018 and 2019 NPS transit inventory data.

Park	System Name	2018 Reported NPS Vehicles	2019 Reported NPS Vehicles	Difference
CACO	Coastguard Beach Shuttle	15	0	-15
YELL	YELL Snow Coaches*	12	0	-12
GRCA	South Rim Shuttle Service	35	30	-5
MEVE	Long House Trailhead Tram and Half-Day Ranger Guided*	3	0	-3
YOSE	Yosemite Valley Shuttle	18	15	-3
CUIS	Land and Legacies Tour	3	1	-2
FOMA	FOMA Ferry Service	4	2	-2
ORPI	Ajo Mountain Drive Tour	4	2	-2
CARL	Electric Shuttle	2	1	-1
MACA	Green River Ferry	1	0	-1
PINN	Pinnacle Shuttle	3	2	-1
NOCA	Rainbow Falls Tours	3	4	+1
GUIS	GUIS Ferry Service	0	2	+2
HAFE	HAFE Shuttle Transport	9	11	+2
GLAC	Sprinter Shuttles and Optima Shuttles	34	37	+3
GLAC	Hiker Shuttle	0	5	+5
YOSE	Mariposa Grove Transportation Service	0	6	+6
YOSE	Badger Pass-Glacier Point Shuttle	4	DNO	-4
YOSE	Tuolumne Shuttle	0	DNO	-3

*The Longhouse Trailhead Tram, Half-Day Ranger Guided Tour, and YELL Snow Coaches only reported non-NPS vehicles for 2019.

Notes: CACO=Cape Cod National Seashore; CARL=Carl Sandburg Home National Historic Site; CUIS=Cumberland Island National Seashore; DNO=Did Not Operate; FOMA=Fort Matanzas National Monument; GLAC=Glacier National Park; GRCA=Grand Canyon National Park; GUIS=Gulf Islands National Seashore; HAFE=Harpers Ferry National Historic Park; MACA=Mammoth Cave National Park; MEVE=Mesa Verde National Park; NOCA=North Cascades National Park; NPS=National Park Service; ORPI=Organ Pipe Cactus National Monument; PINN=Pinnacles National Park; YELL=Yellowstone National Park; YOSE=Yosemite National Park.

Table 9: Changes in Active Reported Non-National Park Service Fleet

Sources: 2018 and 2019 NPS transit inventory data.

Park	System Name	2018 Reported Non-NPS Vehicles	2019 Reported Non-NPS Vehicles	Difference
GLCA	Flatwater Tour	42	21	-21
YOSE	YARTS	17	0	-17
YOSE	Winter Ski Shuttle	9	0	-9
EISE	EISE Shuttle	10	2	-8
GLAC	Hiker Shuttle	6	0	-6
PIRO	Pictured Rocks Cruises	4	0	-4
YOSE	Tram Tours and Hiker Shuttle	4	0	-4
YELL	Xanterra Parks and Resorts Interpretive Bus Tours	22	19	-3
CUIS	CUIS Ferry Service	4	1	-3
MACA	Cave Tours Bus Shuttle	7	4	-3
NAMA	Big Bus Tours Washington DC	30	27	-3
YELL	YELL Snow Coaches	57	55	-2
CUVA	Cuyahoga Valley Scenic Railroad	4	2	-2
GRCA	Grand Canyon Railway	14	12	-2

BOHA	Boston Light Tour	1	0	-1
BOHA	Thompson Island Ferry	1	0	-1
CALO	CALO Ferry Service	7	6	-1
FIIS	Sailors Haven Ferry	1	0	-1
GLBA	Airport Shuttle	3	2	-1
GLCA	Boat Tours	6	5	-1
YOSE	Mariposa Grove Transportation Service	1	0	-1
ISRO	Royale Air Service Inc. Float Plane	2	3	+1
SEKI	Gateway Shuttle	7	8	+1
GLAC	Red Bus Tours		2	+2
GLAC	Sun Tours	11	13	+2
GOGA	Alcatraz Cruises Ferry	5	7	+2
ROMO	Rocky Mountain National Park Visitor Shuttle	12	14	+2
EVER	Shark Valley Tram Tour	7	DNO	-7
GRCA	North Rim Hiker Shuttle	3	DNO	-3
DRTO	Key West Seaplane Adventures	2	DNO	-2
DRTO	DRTO Ferry Service	1	DNO	-1

Notes: BOHA=Boston Harbor Islands National Recreation Area; CALO=Cape Lookout National Seashore; CUIS=Cumberland Island National Seashore; CUVA=Cuyahoga Valley National Park; DNO=Did Not Operate; DRTO=Dry Tortugas National Park; EISE=Eisenhower National Historic Site; EVER=Everglades National Park; FIIS=Fire Island National Seashore; GLAC=Glacier National Park; GLBA=Glacier Bay National Park and Preserve; GLCA=Glen Canyon National Recreation Area; GOGA=Golden Gate National Recreation Area; GRCA=Grand Canyon National Park; ISRO=Isle Royale National Park; MACA=Mammoth Cave National Park; NA=not applicable; NAMA=National Mall and Memorial Parks; NPS=National Park Service; PIRO=Pictured Rocks National Lakeshore; ROMO=Rocky Mountain National Park; SEKI=Sequoia and Kings Canyon National Parks; YELL=Yellowstone National Park; YOSE=Yosemite National Park.

Appendix F – 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. The assumptions below provided the basis for the recapitalization analysis, which was also validated by regional staff to reflect variations in timelines, vehicle types purchased, and growth in vehicle fleets. These assumptions were updated for the 2015 inventory, from previous inventories,[20] to reflect the usage and operating characteristics of NPS vehicles (table 10 and table 11). In order to provide a more accurate replacement cost estimate, 2015-dollar amounts were inflated to reflect 2019 dollars. NPS vehicles are not used in the same way that city transit vehicles are; they are typically not used for the entire year and are not used as intensively as transit vehicles in an urban environment. Vehicle cost estimates were mostly taken from the General Service Administration's AutoChoice Database.

Table 10: Vehicle replacement costs (in 2019 dollars) and expected life for non-electric vehicles

Notes: CNG=compressed natural gas; N/A=not applicable.
Source: Transit standards[21] updated to reflect NPS typical usage and operating characteristics

Vehicle Type	Gas/Diesel/ Biodiesel/ Propane Replacement Cost	Gas/Diesel/ Biodiesel/ Propane Expected Life (Years)	CNG Replacement Cost	CNG Expected Life (Years)
Passenger Van	$35,640	10	N/A	N/A
Light-Duty Shuttle	$115,560	15	$130,140	10
Medium-Duty Shuttle	$158,760	15	$166,320	10
Heavy-Duty Shuttle	$158,760	15	$170,640	10
Medium-Duty Transit	$297,000	18	$356,400	20
Heavy-Duty Transit	$475,200	18	$516,240	20
School Bus	$136,620	18	N/A	N/A
6-12 Pax Electric Tram	N/A	11	N/A	11

[20] The 2014 inventory used replacement costs and expected life assumptions based on the Federal Transit Administration: Useful Life of Transit Buses and Vans – April 2007.

[21] Ibid.

Table 11: Vehicle replacement costs (in 2019 dollars) and expected life for electric vehicles
Notes: N/A=not applicable.
Source: Transit standards[22] updated to reflect NPS typical usage and operating characteristics

Vehicle Type	Electric-Hybrid Replacement Cost	Electric-Hybrid Expected Life (Years)	Electric Replacement Cost	Electric Expected Life (Years)
Passenger Van	N/A	10	$108,000	10
Light-Duty Shuttle	$146,880	15	$426,600	15
Medium-Duty Shuttle	$356,400	15	N/A	15
Heavy-Duty Shuttle	$380,160	15	N/A	15
Medium-Duty Transit	$534,600	18	$540,000	18
Heavy-Duty Transit	$653,400	18	$810,000	18
School Bus	N/A	18	N/A	18
6-12 Pax Electric Tram	$21,600	11	N/A	11

A major recapitalization baselining effort was undertaken as part of the 2019 transit inventory. The NPS vehicle data was exported from the inventory to determine a calculated replacement year based on the life expectancy and age of each vehicle. From there, Parks Transportation Allocation and Tracking System (PTATS) and Project Management Information System (PMIS) was reviewed for planned replacement and/or refurbishment projects (tables 12 and 13). Regional coordinators reviewed the plan and consulted on the draft recapitalization plan presented in this report.

The major takeaway from this effort was that the estimated costs were not accurate for NPS replacement and recapitalization planning. The 2020 inventory should collect more accurate data on planned replacement year, costs, and associated PMIS numbers to further inform the recapitalization analysis.

[22] The 2014 Inventory used Replacement costs and expected life assumptions based on the Federal Transit Administration: Useful Life of Transit Buses and Vans – April 2007.

Table 12: Recapitalization Totals by Year

Sources: Estimated recapitalization needs based on transit inventory data, transit standards, Project Management Information System, Parks Transportation Allocation and Tracking System, and region and park input.

Year	Total Vehicles	Cost
2020	9	$1,290,760
2021	39	$12,331,920
2022	57	$39,243,920
2023	27	$53,827,440
2024	29	$14,304,120
2025	9	$1,592,160
2026	24	$11,969,960
2027	3	$697,680
2028	2	$231,120
2029	0	$0
2030	8	$2,968,590
2031	30	$4,676,400
Total:	**269**	**$139,260,670**

Table 13: Recapitalization Costs by Park and Year

Sources: Estimated recapitalization needs based on transit inventory data, transit standards, Project Management Information System, Parks Transportation Allocation and Tracking System, and region and park input.

Unit	Type	Estimated Replacement Cost	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	10-Year Total	10-Year Total Cost (2019 dollars)
ACAD	Light-Duty Shuttle	$115,560												1	1	$115,560
ACAD	Medium-Duty Shuttle	$158,760	3	4	4	4	4							28	47	$7,461,720
ACAD	Passenger Van	$35,640	2		2										4	$142,560
ADAM	Heavy-Duty Shuttle	$350,000	2	1											3	$1,050,000
CACO	Light-Duty Shuttle	$115,560													0	$0
CACO	Tram/Cart	$204,750		4											4	$819,000
CARL	Medium-Duty Shuttle	$209,000							1						1	$209,000
EUON	Light-Duty Shuttle	$115,560						1			2			1	4	$462,240
FOMA	Ferry/Boat	$162,240			1	1									2	$324,480
GLAC	Heavy-Duty Shuttle	$356,400													0	$0
GLAC	Light-Duty Shuttle	$80,000		6	5		3	3	3						20	$1,600,000
GLAC	Light-Duty Shuttle	$80,000													0	$0
GLAC	Light-Duty Shuttle	$117,000													0	$0
GRCA	Heavy-Duty Shuttle	$600,000			4		10		10						24	$14,400,000
GRCA	Heavy-Duty Shuttle - Refurb	$185,000		10	5	5	6								26	$4,810,000
GUIS	Light Duty Trams (new system)														0	$0
HAFE	Heavy-Duty Shuttle	$456,245											6		6	$2,737,470
HAFE	Heavy-Duty Shuttle - mid-life rebuild	$150,000		3	3										6	$900,000
HAFE	Light-Duty Shuttle (cut-away shuttle)	$115,560			1										1	$115,560
HOFR	Light-Duty Shuttle	$115,560											2		2	$231,120
HOFR	Medium-Duty Shuttle	$356,400													0	$0
HOFR	Tram/Cart	$21,600	2		1										3	$64,800
HOFR	Passenger Van	$35,640		1												
ISRO	Ferry/Boat	$40,000,000				1									1	$40,000,000
JOFL	Passenger Van	$35,640		1		1									2	$71,280
KEMO	Heavy-Duty Shuttle	$158,760				1		1							2	$317,520

Unit	Type	Estimated Replacement Cost	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	10-Year Total	10-Year Total Cost (2019 dollars)
MACA	Heavy-Duty Shuttle	$158,760						2		2					4	$635,040
MACA	Ferry/Boat														0	$0
MEVE	Tram/Cart	$21,600				3									3	$64,800
NOCA	Medium-Duty Shuttle	$158,760		3			1								4	$635,040
ORPI	Light-Duty Shuttle	$115,560													0	$0
PINN	Medium-Duty Shuttle	$158,760			2										2	$317,520
SCBL	Medium-Duty Shuttle	$158,760			1										1	$158,760
SHEN	Medium-Duty Shuttle	$158,760													0	$0
SHEN	Passenger Van	$35,640				1									1	$35,640
TAPR	School Bus	$125,000				2									2	$250,000
YELL	Heavy-Duty Shuttle	$158,760			9										9	$14,28,840
YOSE	Heavy-Duty Bus	$810,000							4						4	$3,240,000
YOSE	Heavy-Duty Shuttle	$380,160		2	2	2	2	2	6	1					17	$6,462,720
ZION	Medium-Duty Shuttle	$1,800,000		3	13	6	3								25	$45,000,000

Appendix G – Air Quality and Emissions

Since 2017, the transit inventory uses an updated methodology to analyze the air quality and emissions impacts of National Park Service (NPS) transit systems. The analysis uses the US Environmental Protection Agency's (EPA) Motor Vehicle Emissions Simulator (MOVES) for estimating emissions by NPS transit vehicles. The Motor Vehicle Emissions Simulator is a state-of-the-science emissions modeling software that estimates airborne emissions from various on-road vehicles across vehicle types at very fine scales. MOVES software uses years of direct measurements inventorying the ways different vehicles, fuel types, road types (e.g., urban versus rural, highways versus local streets), and emission processes (e.g., running, starting, idling) contribute to air pollution. This process allows MOVES software to then model emissions from similar vehicles. MOVES software also performs similar analyses for vehicles operating off road, such as waterborne vessels.

Since MOVES software is the EPA's regulatory standard for emissions analysis, NPS units may use the results to engage directly with other local, state, and national air quality initiatives, as well as make informed programmatic decisions that improve resource management and visitor experience in the parks. For a discussion of the differences between the methods used in years prior to 2017, please see the 2017 NPS Transit Inventory and Performance Report.[23]

Pollutants
The following pollutants are included in the 2019 air quality analysis:

Carbon Dioxide (CO_2) [24]

Carbon dioxide is a colorless gas produced through chemical combustion, including burning fuels to power automobiles and homes. Typically, gasoline combustion emits more carbon dioxide than other fuels.

Nitrogen Oxides (NOx) and Volatile Organic Compounds (VOCs)

Nitrogen oxides (NO_x) are a collection of gaseous molecules containing one nitrogen atom and a number of oxygen atoms. As with the other pollutants described here, fuel combustion emits nitrogen oxides. While upper-atmospheric nitrogen oxides can actually counteract the warming effects of greenhouse gases, ground-level NO_x molecules react with other airborne chemicals to become particles that can cause respiratory conditions in humans. [25]

Volatile organic compounds are a broad category of organic molecules that evaporate at very low temperatures. Flammable solvents like paint thinners and some household cleaners, as well as other aromatics including vehicular fuels, all contain volatile organic compounds. State, local, and federal institutions tightly regulate volatile organic compounds as they are easily absorbed into human tissue and can have harmful health effects.[26]

Nitrogen oxides and volatile organic compounds can together form ozone (O_3), a highly reactive gas. Stratospheric ozone, high up in Earth's atmosphere, deflects harmful solar radiation away from

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[23]The 2017 national transit inventory may be accessed at https://rosap.ntl.bts.gov/view/dot/37306

[24] IPCC 2013, "Climate Change: The Phyiscal Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change."

[25] US Environmental Protection Agency, "NO_x: How Nitrogen Oxides Affect the Way We Live and Breathe."

[26] Ibid.

Earth's surface. However, nitrogen oxides and volatile organic compounds interacting at the surface produce ground ozone, causing a variety of negative health effects. Ground-level ozone can also severely harm plants and wildlife, and because ozone can travel long distances by wind, rural areas may experience high exposure even with little O_3 production.[27]

Carbon Monoxide (CO) [28]

Carbon monoxide (CO) is a colorless and odorless gas released through burning fossil fuels, though the emissions quantities vary by fuel type. In large quantities, carbon monoxide can be extremely dangerous for animals and humans because it inhibits the absorption of oxygen into the bloodstream. While CO toxicity is ordinarily only a concern indoors, where such quantities easily accumulate, the elderly and those with certain cardiovascular are at risk of serious health impacts at higher outdoor concentrations. This often occurs at hot outdoor locations in the presence of numerous running motors, such as parking lots in summer.

Particulate Matter (PM) [29]

Particulate matter (PM) encompasses solid and liquid particles emitted into the air, including dust, soot, and aerosolized chemicals. Particulate matter can come from construction sites, roadway wear as tires and heavy vehicles move over them, and burning fuels. Diesel fuel combustion generally emits more particulate matter than other fuels, and driving over unpaved surfaces can emit PM10 particles. Two categories of particulate matter concerning regulatory analyses of air quality include those with negative impacts on respiratory health—inhalable particles 10 micrometers and smaller (PM10)—as well as those 2.5 micrometers and smaller (PM2.5). Exposure to particulate matter can cause and aggravate respiratory conditions such as asthma; this is especially true of PM10 particles. PM2.5 particles are a major contributor to smog, which both obscures views and damages natural resources.

Results

In addition to a significant increase in emitting activity (i.e., vehicle miles traveled; VMT), the 2019 system inventory differs from inventories used to generate prior years' emissions reports. Some systems were captured in the 2018 inventory, but not in 2019, and vice versa. Thus, the 2019 results may differ from 2018. As was true with the introduction of other methodologies to the national transit inventory, this will stabilize over the next few years.

Diverted Passenger Vehicle Trips and CO_2 Emissions Avoided

Though transit still contributes to emissions, the presence of transit has a net positive effect on air quality, as well as the visitor experience because transit use reduces the number of vehicle trips in parks. Transit buses carry more people per square foot of road space, relieving congestion on park roads and eliminating associated fuel-inefficient driving behaviors like extended idling and stop-and-go. In addition to the air quality benefits of burning less fuel per passenger transported, increasing transit use influences how visitors spend their time in the park and removes long lines of cars from viewsheds.

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[27] US Environmental Protection Agency, "Basic Information about Ozone | Ozone Pollution | US EPA."

[28] US Environmental Protection Agency, "Basic Information about Carbon Monoxide (CO) Outdoor Air Pollution | Carbon Monoxide (CO) Pollution in Outdoor Air | US EPA."

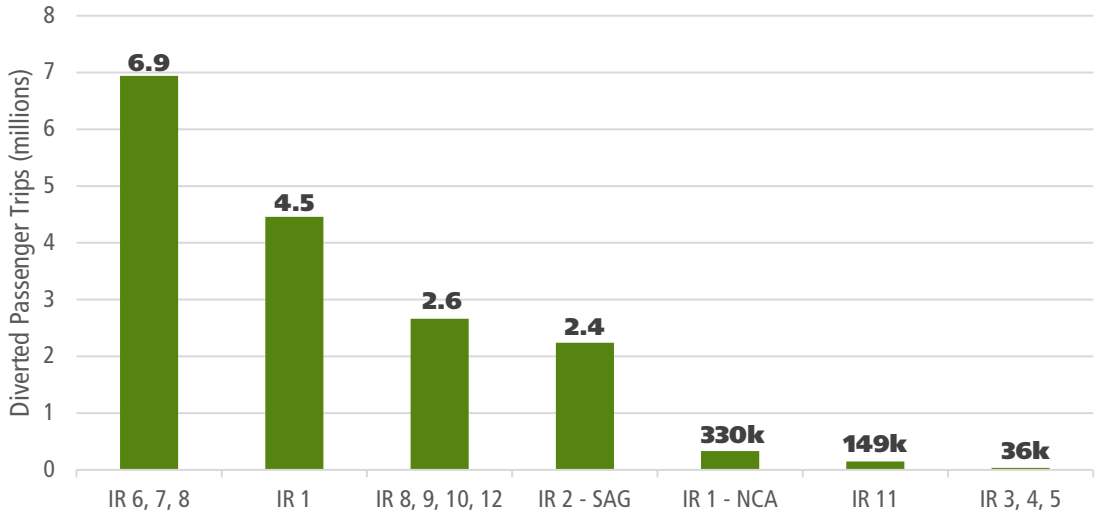
[29] Ibid.

Figure 12 shows the estimated number of vehicle trips eliminated as a result of the presence of transit service in each region. In 2019, NPS transit services eliminated an estimated 16.8 million passenger vehicle trips, resulting in a decrease in 483 million miles driven and reduced carbon dioxide emissions by over 266 million metric tons. Regions with high transit use and more boardings divert more personal vehicles from the road.

Passenger vehicle diversion is calculated by dividing the total number of passenger boardings by 2.6, the assumed average occupancy of visitors' personal vehicles. Emissions avoided are calculated by first determining the avoided vehicle miles traveled, and then multiplying by a light-duty vehicle emissions factor for a given pollutant (it is assumed that the passenger vehicles use conventional gasoline fuel).

$$Emissions\ Avoided = EF_p * \frac{\left(\frac{total\ transit\ VMT}{total\ transit\ runs}\right) * total\ transit\ boardings}{2.6\ occupants\ per\ vehicle}$$

Figure 12: Vehicle trips (in millions) avoided as a result of NPS transit systems
Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service.
Source: 2019 NPS transit inventory data.



Interior Region	IR 6, 7, 8	IR 1	IR 8, 9, 10, 12	IR 2	IR 1 – NCA	IR 11	IR 3, 4, 5
Diverted Passenger Vehicle Trips	6,939,600	4,458,512	2,663,275	2,240,731	330,518	149,188	35,973

Criteria Pollutant Emissions Inventories

The following details the emissions inventories for criteria pollutants and precursors across the fleet operating in national parks. As shown in the following charts, vehicle fuel and terrain type influence the emissions results. Diesel contributes a different pollution profile than alternative fuels, buses contribute differently than cars, heavy-duty ferries pollute differently than automobiles, and heavy engine loads on unpaved surfaces require more fuel. However, fewer vehicles burning fuel in the park has a net positive effect on local air quality.

Figure 13 shows the results of MOVES carbon dioxide emissions modeling for 2019 NPS transit system activity, aggregated to the regional level. The results are also split by ownership. Across all regions, NPS transit fleets emitted under 34,000 metric tons of carbon dioxide in 2019.

Figure 13: NPS transit system carbon dioxide emissions
Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service.
Source: 2019 NPS transit inventory data.

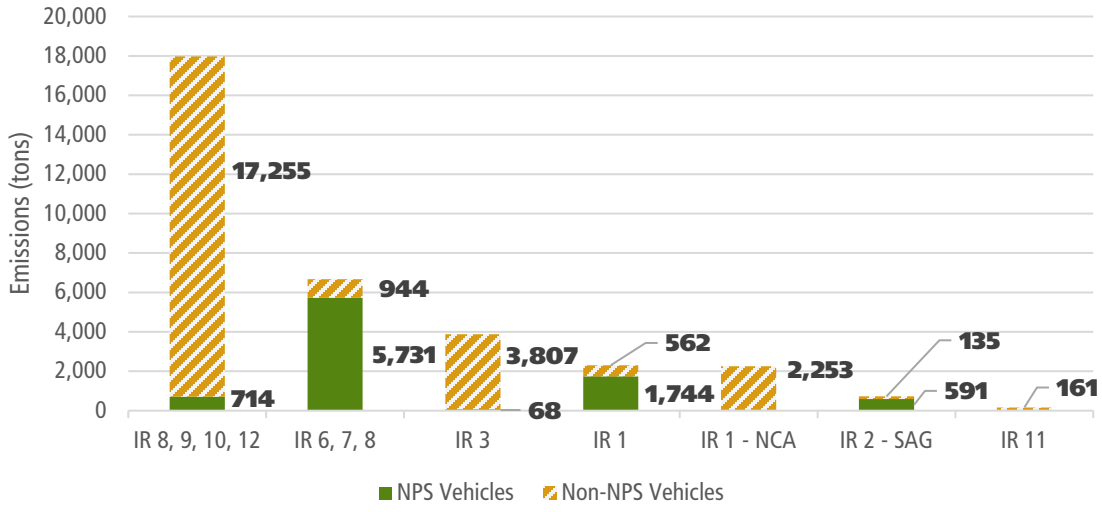


Figure 14 shows the results of MOVES nitrogen oxide emissions modeling for 2019 NPS transit system activity, split by ownership. Across all regions, NPS transit fleets emitted 35.7 metric tons of nitrogen oxide in 2019.

Figure 14: NPS transit system nitrogen oxide emissions

Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service.
Source: 2019 NPS transit inventory data.

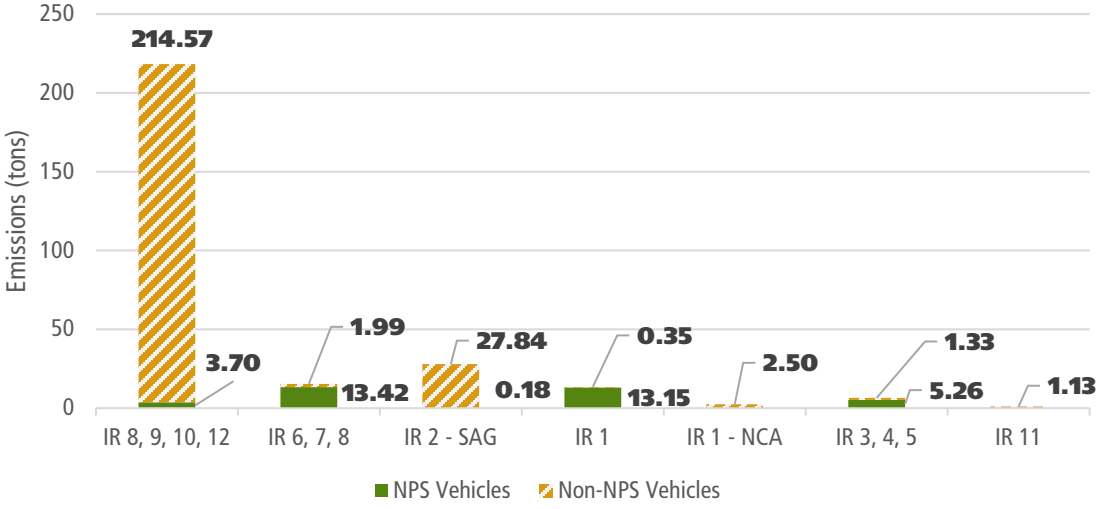
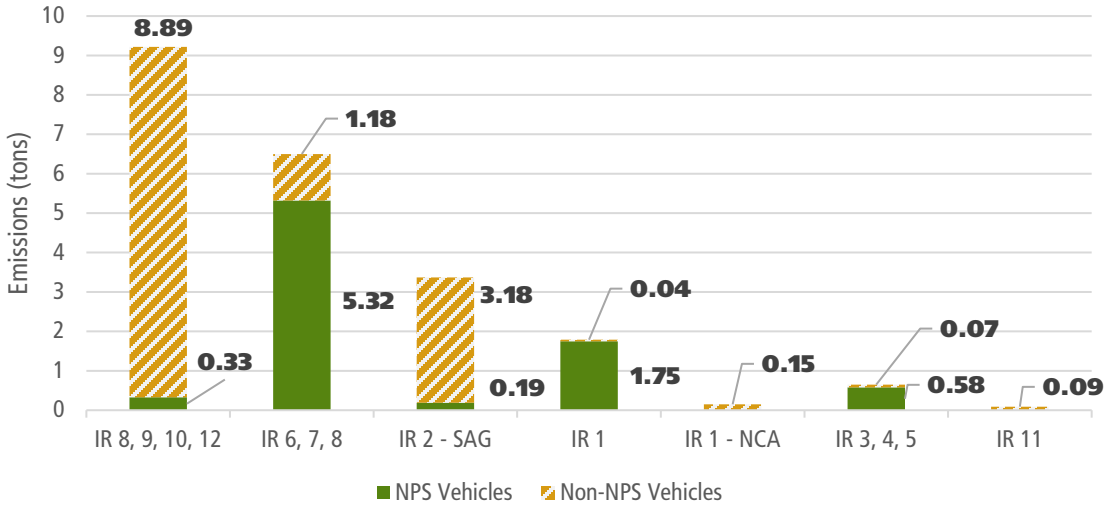


Figure 15 shows the results of MOVES VOC emissions modeling for 2019 NPS transit system activity, split by ownership. Across all regions, NPS transit fleets emitted just over 8 metric tons of volatile organic compounds in 2019. Volatile organic compounds combine with other airborne compounds, including nitrogen oxides, to produce ozone and smog. National Park Service owned vehicles in regions 6, 7, and 8 emitted the highest amounts of volatile organic compounds, as this region has a substantial proportion of vehicles powered by propane and marine diesel. This is also true of the non-NPS fleet in regions 8, 9, 10, and 12. Propane combustion becomes less chemically efficient at high altitudes (i.e., where there is less oxygen) and can therefore leave behind additional volatile organic compounds as well as carbon dioxide.[30]

Figure 15: NPS transit system volatile organic compound emissions
Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service.
Source: 2019 NPS transit inventory data.

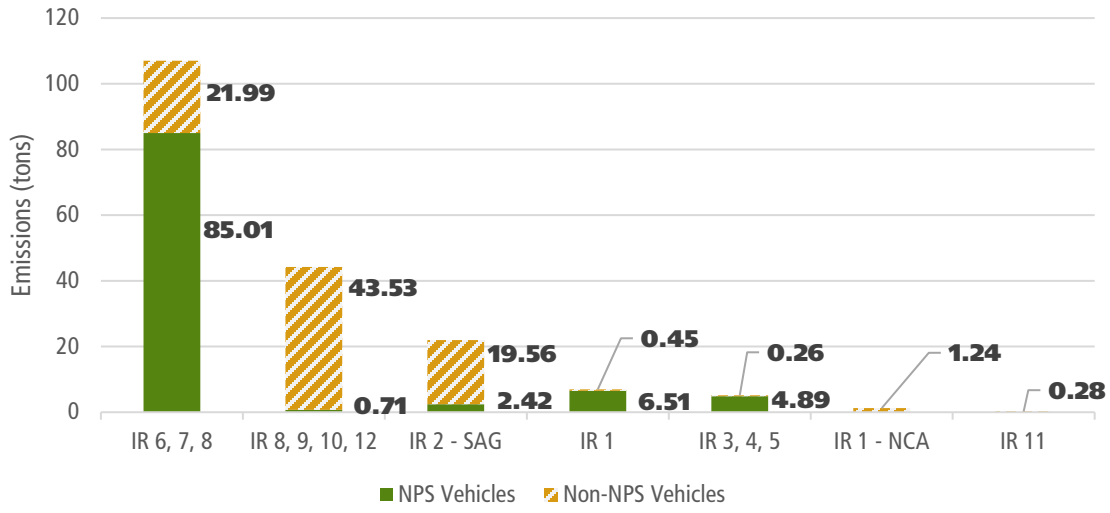


[30] S. McAllister et al., "Chapter 2: Thermodynamics of Combustion". *Fundamentals of Combustion Processes*, Springer (2011).

Figure 16 shows the results of MOVES CO emissions modeling for 2019 NPS transit system activity, split by ownership. Across all regions, NPS transit fleets emitted approximately 100 metric tons of CO in 2019. The Grand Canyon's heavy use of CNG-fueled buses contributes significantly to regions high relative CO emissions. These buses emit substantially more carbon monoxide than conventional fuels, but approximately 50% less nitrogen oxide. As nitrogen oxides are an ozone precursor, the latter characteristic makes CNG-fueled vehicles ideal for minimizing smog—a key consideration in parks with long-distance viewsheds. In addition, the Intermountain Region operates a large number of propane-powered transit vehicles at higher altitudes. Without enough oxygen, inefficient propane combustion can leave behind carbon monoxide.

Figure 16: NPS transit system carbon monoxide emissions

Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service.
Source: 2019 NPS transit inventory data.



For PM emissions, ferries burning marine diesel and buses fueled by propane contribute significantly more than those powered by other fuels. Several parks in the regions 8, 9, 10, and 12 are exclusively marine transit fleets, and the Ellis Island ferry fleet contributes most of the region 1's PM emissions. In addition, the ferries at Glen Canyon National Recreation Area and the propane bus fleet at Zion National Park increase regions 6, 7, and 8's emissions in this category.

Figure 17 shows the results of MOVES $PM_{2.5}$ emissions modeling for 2019 NPS transit system activity, split by ownership. Across all regions, NPS transit fleets emitted about 1.2 metric tons of $PM_{2.5}$ in 2019. Breathing air with high levels of $PM_{2.5}$ can result in adverse health impacts, including increased risk of cardiovascular disease and asthma.

Figure 17: NPS transit system $PM_{2.5}$ emissions

Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service.
Source: 2019 NPS transit inventory data.

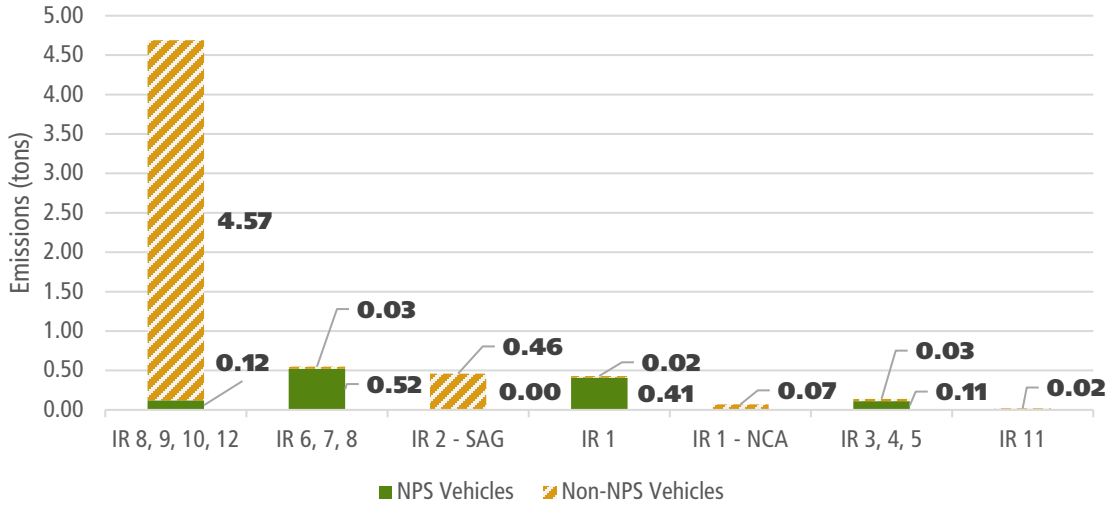


Figure 18 shows the results of MOVES PM_{10} emissions modeling for 2019 NPS transit system activity, split by ownership. Across all regions, NPS transit fleets emitted just under 2 metric tons of PM_{10} in 2019. Some regions (e.g., regions 6, 7, 8, 9, 10, and 12) produce more PM_{10} than $PM_{2.5}$ in part due to transit systems operating on unpaved roads, which can result in release of larger particles as fugitive dust.

Figure 18: NPS transit system PM_{10} emissions

Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service.
Source: 2019 NPS transit inventory data.