Washington Support Office

National Park Service
U.S. Department of Interior

Acadia National Park


Channel Island National Park

Dry Tortugas National Park

NPS National Transit Inventory and Performance Report, 2022

NPS National Transit Inventory and Performance Report

Executive Summary

2022

Rocky Mountain National Park

This is a summary of the 2022 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.

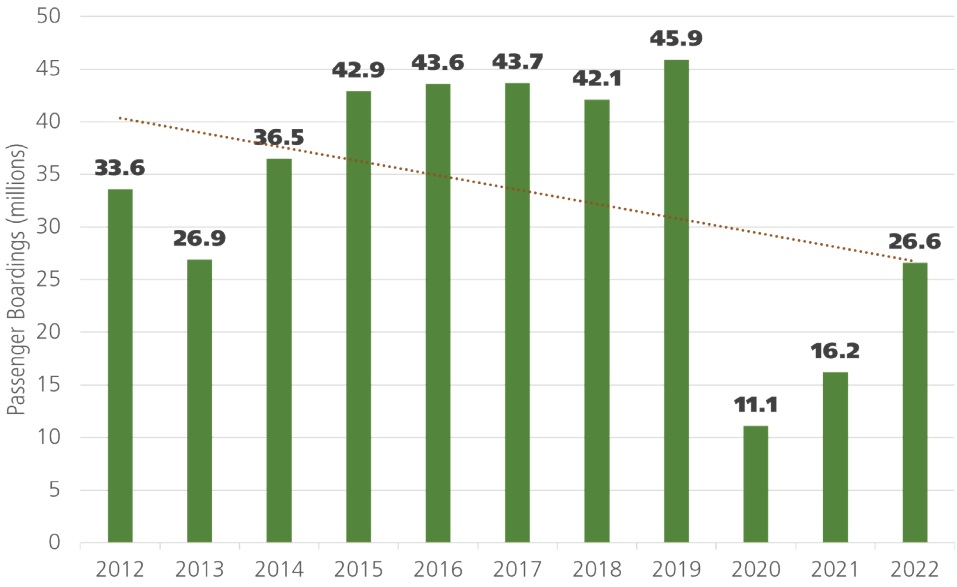
26.6 Million
Passenger Boadings

81 Systems Operated

52 Parks Represented

790 Vehicles & Vessels

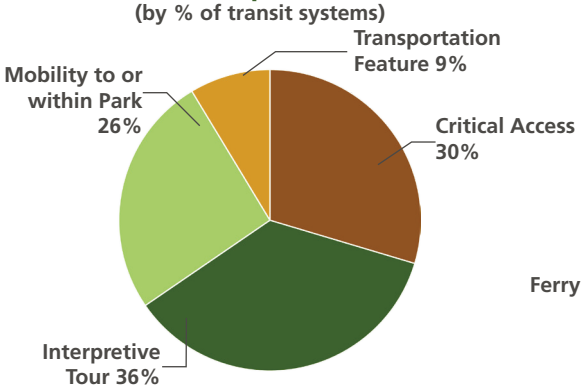
*Reflects systems that operated during the fiscal year 2022 only



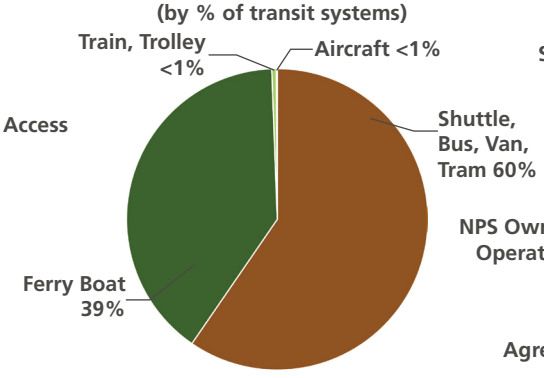
Of the 81 transit systems that operated, the top 10 transit systems accounted for 82% of the passenger boardings in 2022. The systems with over a million boardings are located at Statue of Liberty National Monument, Zion National Park, Grand Canyon National Park, Alcatraz (Golden Gate National Park), the National Mall Area, and Yosemite National Park.

The National Park Service owns vehicle fleets for 20 systems and operated 15 of those systems in 2022. NPS-operated systems account for 594,369 passenger boardings—about 2% of total boardings.

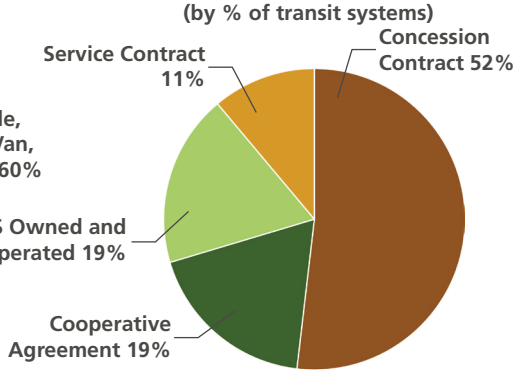
Purpose
(by % of transit systems)



Mode
(by % of transit systems)



Business Model
(by % of transit systems)



NPS National Transit Inventory and Performance Report
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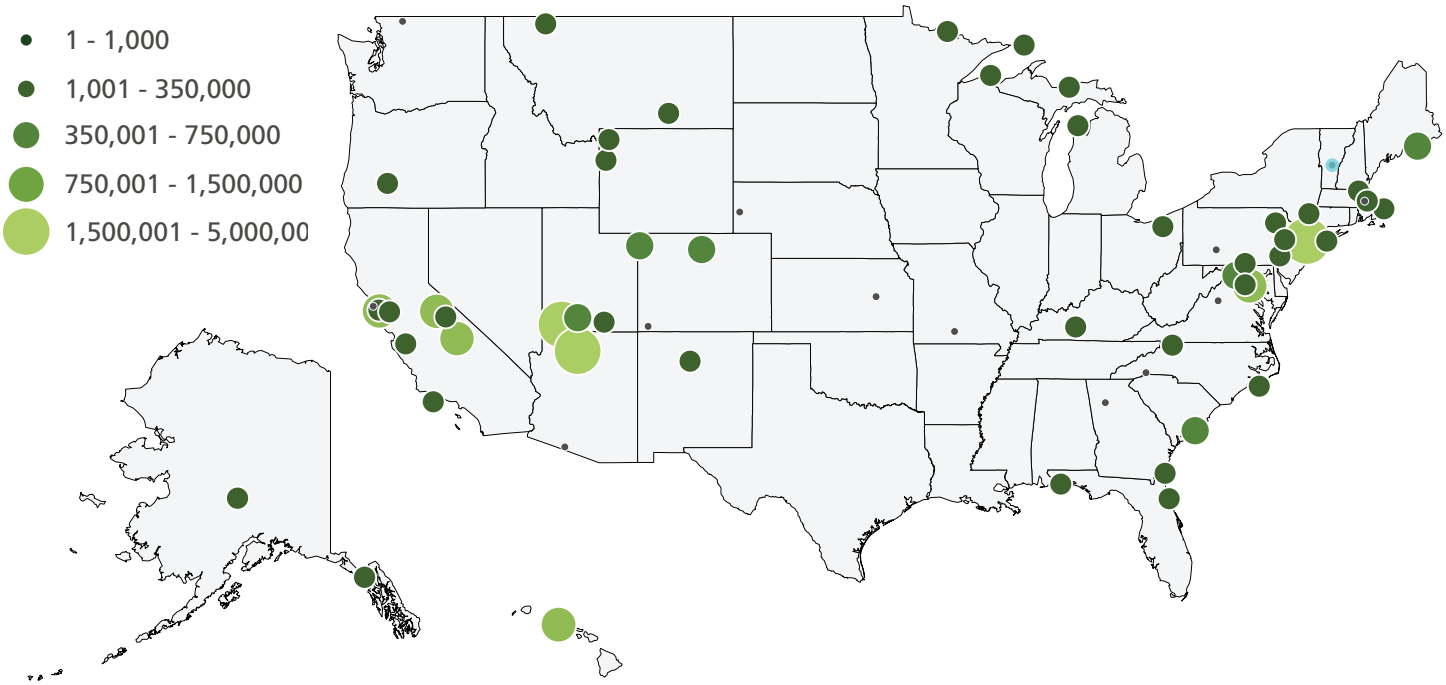
45% of NPS-owned transit vehicles operate on alternative fuel, while 19% of non-NPS-owned vehicles operate on alternative fuel.

81 NPS transit systems operated in fiscal year 2022. Of those, 53 operated for six months or more and of those, 26 operated year-round.

Passenger Boarding



Performance Measures

Visitor Experience

The majority of the NPS-owned transit system vehicles and vessels are accessible for people with mobility impairments. In 2022, 59% of NPS-owned vehicles are accessible to people with mobility impairments (e.g., require a wheelchair lift).

Operations

The National Park Service partners with the private sector to provide the majority of transit services. Non-NPS entities operate 76% of NPS transit systems, which account for 98% of passenger boardings servicewide. The National Park Service owns and operates the remaining 24% of transit systems, which account for the remaining 2% of passenger boardings.

Environmental Impact

National Park Service transit systems mitigate vehicle emissions. The net CO_2 emissions savings of the 820 transit vehicles and vessels evaluated (excluding planes, rail, snowcoaches, and vehicles with incomplete data or that did not operate) was equivalent to removing 10.2 million personal vehicle trips and 618 million passenger vehicle miles from the road.

Asset Management

National Park Service-owned vehicles and vessels have an estimated $151 million in recapitalization needs between 2023 and 2032. Parks with estimated transit vehicle replacement costs over $5 million during the next five years include Acadia National Park, Grand Canyon National Park, Harpers Ferry National Historical Park, Isle Royale National Park, and Yosemite National Park.

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Island Explorer, Acadia National Park. Photo: NPS (upper)
Island Packers, Channel Islands National Park. Photo: NPS (lower left)
Dry Tortugas Ferry, Dry Tortugas National Park. Photo: NPS (lower right)

Executive Summary Photo:
Visitor Shuttle, Rocky Mountain National Park. Photo: NPS

As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our parks and historic places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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Introduction

The *2022 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 2022 inventory is meant to assist the National Park Service with 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 Annual Accomplishments Report by providing key transit statistics, which can also be used to track progress towards goals.
- Comply with Executive Order 14057, "Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability," with a goal of 100% zero-emission vehicle acquisitions by 2035.
- Communicate program information and projected vehicle recapitalization needs.

[1] 23 USC 203 Federal Lands Transportation Program: https://www.gpo.gov/fdsys/pkg/USCODE-2014-title23/pdf/USCODE-2014-title23-chap2-sec203.pdf.

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. The NPS transit systems move people by motorized vehicle on a regularly scheduled service.[2]
2. The NPS transit systems operate 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 2022 NPS transit inventory is limited to systems in which the National Park Service has either a direct financial stake or committed resources to develop a formal contract or agreement.

The following information was collected for the 2022 fiscal year:

- transit system name and description
- passenger boardings
- business model
- system purpose
- system type/mode
- system level safety metrics (accident occurrence and property damage)
- vehicle information including fuel type, capacity, service miles, engines, horsepower, accessibility, and age
- owner and operator type (National Park Service or non-National Park Service) and contact information
- operating schedule

[2] This criterion includes services with a posted schedule and standard operating seasons/days of week/hours. Services that do not operate on a fixed route—charter services for individual groups or services that 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."

- participation of a local transit agency in the service
- operational status (operated, did not operate)[4]

For the 2022 inventory, 63 parks provided information on their transit systems. Some parks report 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. For the purposes of this report, 81 of 101 identified transit systems operated in fiscal year 2022. Nonoperating transit systems and associated vehicles have not been included unless specifically stated.

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

Inventory Results

Detailed findings of the 2022 inventory are presented in the Vehicle Inventory Statistics, System Characteristics, and Passenger Boardings sections below.

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

Table 1: NPS transit systems changes between inventories (2018 to 2022)
Note: NPS=National Park Service
Source: 2018–2022 NPS transit inventory data

Key Findings	2018	2019	2020	2021	2022
Total Number of Systems	95	95	96	97	101
• Number of Systems that Operated	95	95	66	63	81
Number of Parks Represented	60	60	49	62	63
Passenger Boardings (millions)	42.1	45.9	11.1	16.2	26.6
• Excluding 10 Highest Ridership Systems	7.0	7.1	1.1	2.3	4.7
Number of Vehicles				865	874
• NPS-Owned Vehicles	976	835	673	269	274
• NPS-Owned Vehicles that Operated	281	236	149	215	244
• Non-NPS Vehicles	695	599	524	596	600
• Non-NPS Vehicles that Operated				508	546
Systems Operated by Local Transit Agency	9	9	3	5	5[5]

[4] Systems that did not operate but intend to operate in the future remained part of the inventory.

[5] The DC Circulator, Giant Forest Shuttle, Fairfax Connections Wolf Trap Express, Hiker Shuttle (Delaware Water Gap National Recreation Area), and Shuttle Transport (Harper's Ferry) are the five systems that were operated by a local transit authority.

The Ford Island Bus Tour at Pearl Harbor National Memorial and Full Circle Trolley at Marsh-Billings-Rockefeller National Historical Park are the two systems added in 2022.[6] Additionally, four systems returned to the inventory and two systems are no longer operating. In the NPS 2022 inventory, there are a total of 101 systems: 81 operated in some capacity, and 20 systems did not operate. Nonoperational systems listed the COVID-19 pandemic, driver availability, permitting, and other issues as the reasons they did not operate.

Passenger boardings increased by 10.5 million (39%), reflecting increased transit system operations, visitation, and public use of transit systems. Visitation across the national park system increased 5%; 312 million recreation visits were recorded in 2022 compared to 297 million recreation visits in 2021.[7] The increase in boardings indicates that visitors are less likely to self-isolate because of COVID-19 and are returning to transit system use, if available.

System Characteristics

The 2022 inventory identified 81 operating systems in 52 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 2022 are similar to the results reported in 2021.

System Purpose

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

- 29 systems are guided **interpretive tours**.
- 24 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.
- 21 systems provide **mobility to or within a park** as a supplement to private automobile access.
- 7 systems are considered a **transportation feature** (a primary attraction of the park).
- None of the systems that operated are primarily designed to meet the accessibility needs of a visitor with **special needs**.

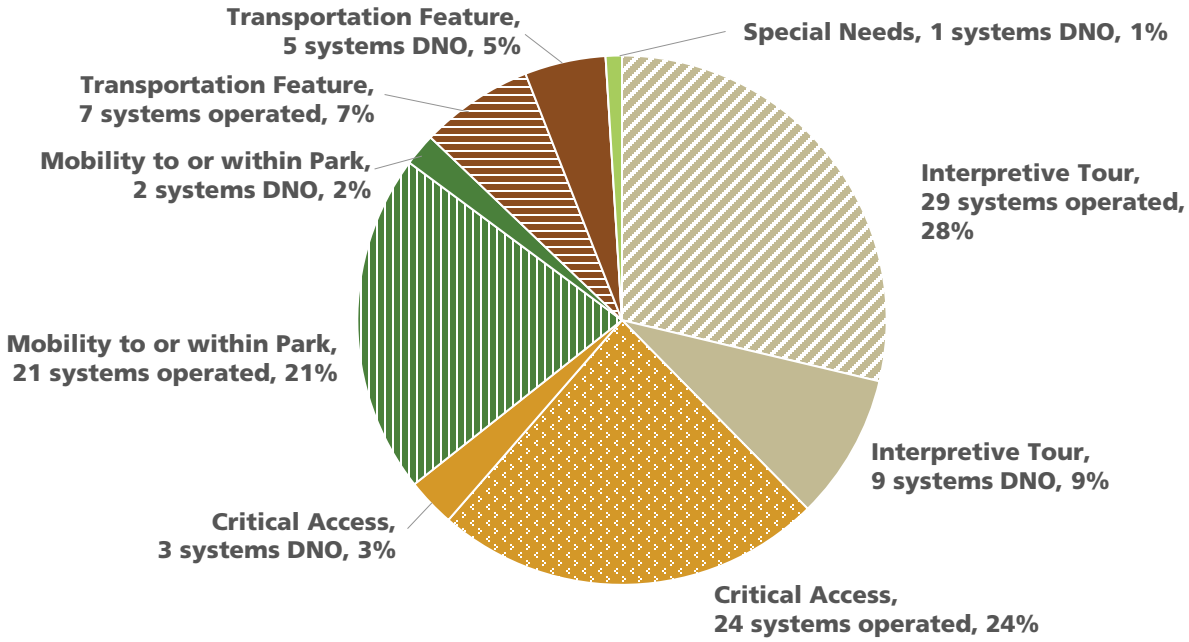
[6] The four systems that returned to the inventory include: Concession Shuttle (North Cascades National Park), Ferry Service (Dry Tortugas National Park, Fort Pickens Tram Service (Gulf Island National Seashore); systems no longer operating: Ajo Mountain Drive Tour (Organ Pipe Cactus National Monument) and Roosevelt Ride (Home of Franklin D. Roosevelt National Historic Site).

[7] In 2022, the National Park Service received 312 million recreation visits, up 15 million visits (5%) from 2021. While not as high as 2018 and 2019 (318 million and 327 million recreation visits, respectively), servicewide visitation has essentially recovered to pre-pandemic levels. The year 2022 is very much like years immediately before the NPS centennial in 2016 and is only 6% lower than that all-time record year.

Figure 1: Systems by primary purpose

Note: N=101 systems; DNO=did not operate

Source: 2022 NPS transit inventory data

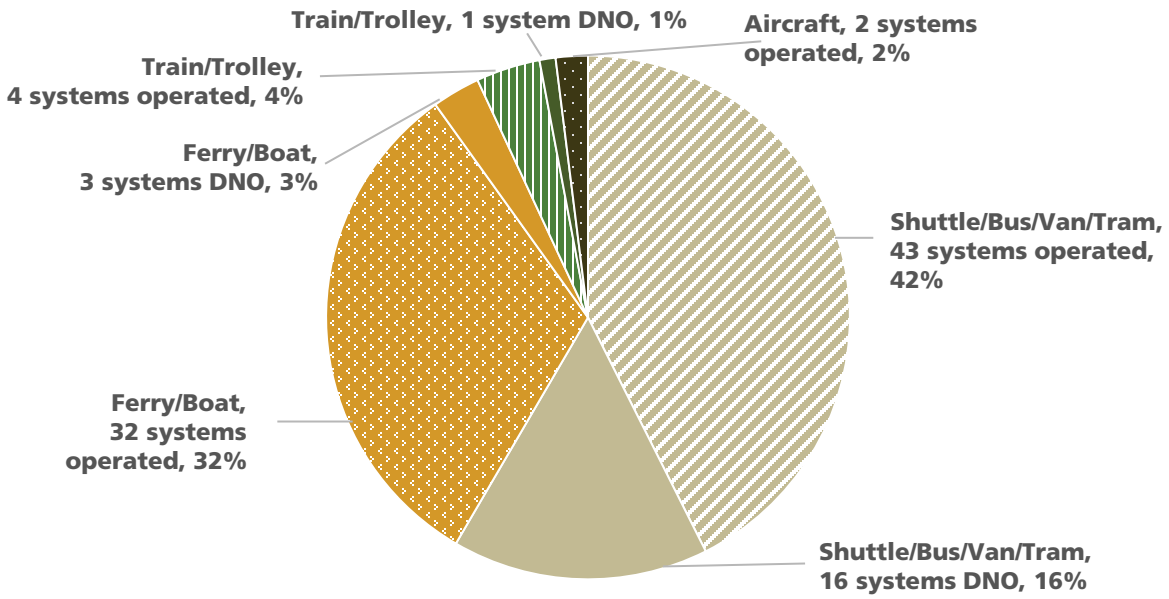


Mode

The 2022 transit inventory identified four modes operating in NPS transit systems. Most of the transit systems are shuttle/bus/van/tram systems (43 systems, 43%), followed by ferry/boat (32 systems, 32%), train/trolley (4 systems, 4%), and plane (2 systems, 2%) (figure 2).

Figure 2: Systems by vehicle mode

Note: N=101 systems; DNO=did not operate
Source: 2022 NPS transit inventory data



Business Models

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

- **Concession Contracts:** In 2022, 42 of the transit systems operated through concession contracts in which a private concessioner pays the National Park Service a franchise fee to operate inside a park. Five concession contract systems used vehicle fleets exclusively owned by the National Park Service. Two systems have a mixed ownership fleet.
- **Service Contracts:** Transit systems that are owned and/or operated by a private firm use service contracts. In 2022, nine transit systems operated under a service contract. Out of the nine service contract systems, four service contract systems used vehicle fleets owned by the National Park Service.

- **Cooperative Agreements:**[8] Fifteen transit systems operated under an agreement in 2022. None of those systems are owned by the National Park Service.
- **NPS Owned and Operated:** In 2022, the National Park Service owned vehicle fleets for 20 systems and operated 15 of those systems.[9] These owned-and-operated systems tend to be small and provided critical access to a park or park site, were interpretive tours, or provided service for special needs.

Table 2: Systems by primary purpose

Notes: N=101 systems; DNO=did not operate; NPS=National Park Service
Source: 2022 NPS transit inventory data

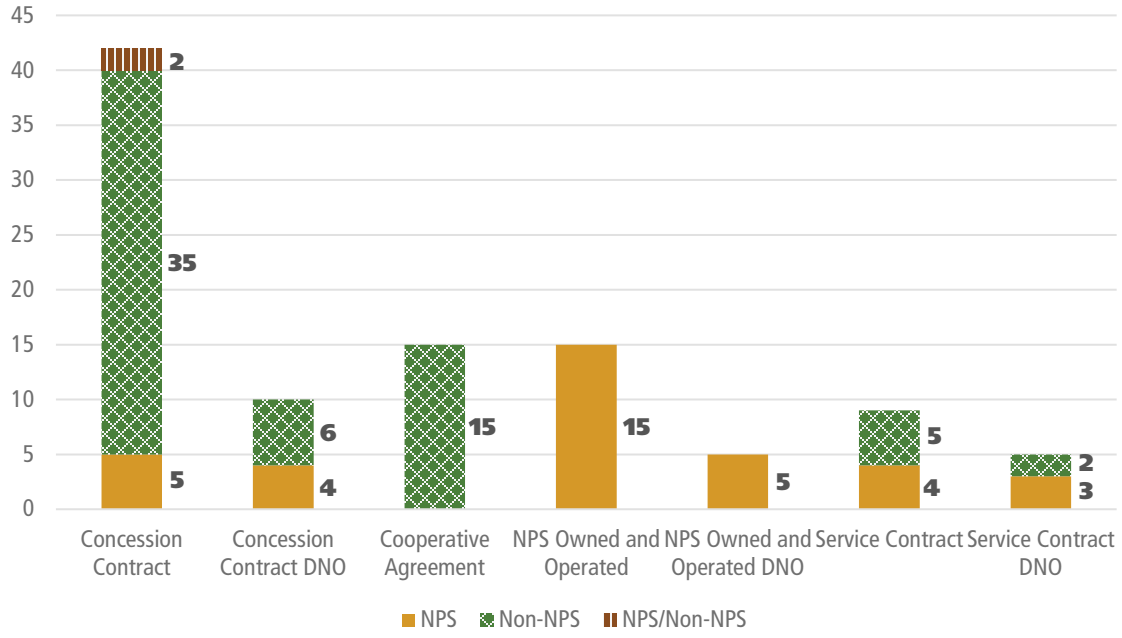
System Purpose	Concession Contract		Cooperative Agreement		NPS Owned and Operated		Service Contract		Total	
Critical Access	12	1 DNO	4	0	5	0	3	2 DNO	**24**	**3 DNO**
Interpretive Tour	21	6 DNO	4	0	3	3 DNO	1	0	**29**	**9 DNO**
Mobility to or within Park	4	1 DNO	6	0	6	1 DNO	5	0	**21**	**2 DNO**
Special Needs	0	0	0	0	0	1 DNO	0	0	**0**	**1 DNO**
Transportation Feature	5	2 DNO	1	0	1	0	0	3 DNO	**7**	**5 DNO**
Total	**42**	**10 DNO**	**15**	**0**	**15**	**5 DNO**	**9**	**5 DNO**	**81**	**20 DNO**

[8] The National Park Service Alternative Transportation Program uses "cooperative agreement" as a general term, encompassing all qualifying partner agreements (memorandum of understanding, memorandum of agreement, and cooperative agreement).

[9] The National Park Service maintained ownership of vehicle fleets for 36 systems in 2022. Twelve systems with NPS-owned vehicle fleets were idle in 2022.

Figure 3: Fleet system ownership by business model

Source: 2022 NPS transit inventory data



Passenger Boardings

In 2022, over 26.6 million passenger boardings occurred across all NPS transit systems.[10] If the 81 operating systems were considered one enterprise and compared to public transit agencies across the country, its boardings would be comparable to transit systems in Minneapolis, Minnesota.[11] Excluding concession contracts and cooperative agreements, NPS-owned and operated systems and service contract systems reported 11.5 million trips (43% of total boardings) in 2022.

Parks use various methodologies to count boardings. Most systems indirectly record passenger boardings through ticket sales (10.1 million) and manual counts (8.5 million). Estimated, automated, and other counter methodologies account for the remaining approximately 8 million passenger boardings.

[10] 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.

[11] "Public Transit Ridership Report Third Quarter 2022." American Public Transportation Association. November 22, 2022. Retrieved February 7, 2023. https://www.apta.com/wp-content/uploads/2022-Q4-Ridership-APTA.pdf.

Table 3: Count methodology

Source: 2022 NPS transit inventory data

Count Methodology	Number of Systems	Passenger Boardings
Ticket Sales	41	10,141,488
Manual	29	8,535,240
Automatic	6	6,366,313
Estimated	3	1,411,324
Other	2	190,500

Approximately 82% (21,973,922 million) of boardings on NPS transit systems in 2022 are attributable to 10 systems (table 4). Two systems from the 2021 top 10 list did not make the top 10 list in 2022.[12] The Giant Forest Shuttle (Sequoia & Kings Canyon National Parks) and Island Explorer & Bicycle Express (Acadia National Park) are new to the top 10 list in 2021. Boardings increased in 2021 for eight of the 10 top 10 systems.

Table 4: Passenger boardings for the 10 highest-use transit systems

Source: 2022 NPS transit inventory data

Rank	Park	System Name	2022 Boardings	Business Model	System Purpose
1	STLI	Statue of Liberty Ferries	6,993,087	Concession Contract	Critical Access
2	ZION	Zion Shuttle	4,383,151	Service Contract	Critical Access
3	GRCA	South Rim Shuttle Service	4,348,518	Service Contract	Mobility to or within Park
4	GOGA	Alcatraz Cruises Ferry	1,327,939	Concession Contract	Critical Access
5	NAMA	DC Circulator	1,201,986	Cooperative Agreement	Transportation feature
6	YOSE	Yosemite Valley Shuttle	1,015,082	Concession Contract	Mobility to or within Park
7	PERL	USS Arizona Memorial Tour	766,055	Cooperative Agreement	Interpretative Tour
8	SEKI	Giant Forest Shuttle	733,477	Cooperative Agreement	Critical Access
9	ROMO	Rocky Mountain National Park Visitor Shuttle	618,464	Service Contract	Mobility to or within Park
10	BRCA	Bryce Canyon Shuttle and Rainbow Point Shuttle	586,163	Service Contract	Mobility to or within Park

Notes: BRCA=Bryce Canyon National Park; 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 & Kings Canyon National Parks; STLI=Statue of Liberty National Monument; YOSE=Yosemite National Park; ZION=Zion National Park

[12] The Grand Canyon Railway (Grand Canyon National Park) and Island Explorer & Bicycle Express (Acadia National Park) were not in the top 10 list in 2022.

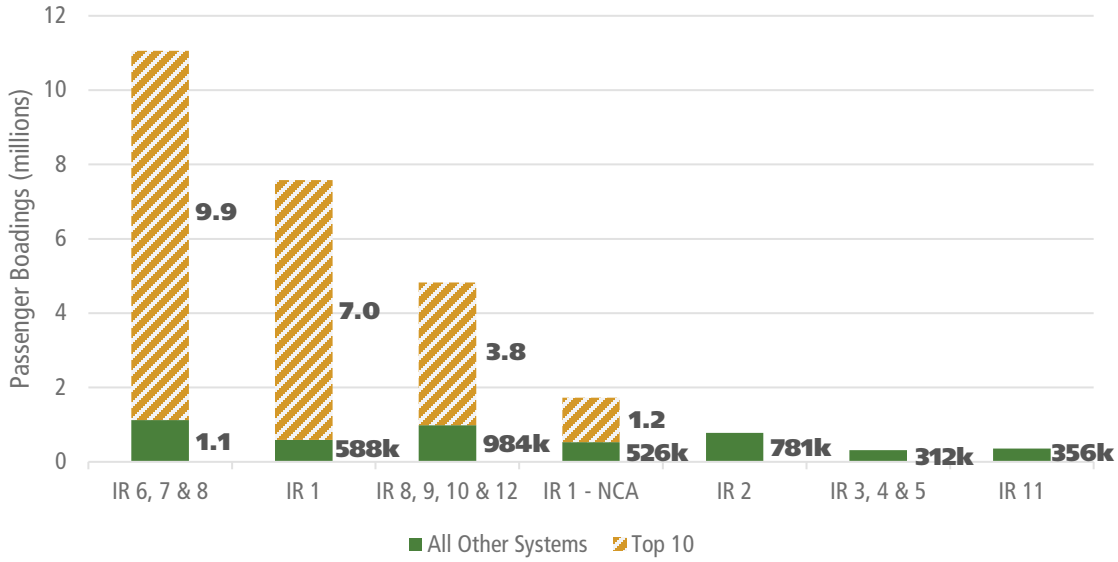
High-ridership shuttle systems are typically provided via service contracts, concession contracts, and cooperative agreements. A greater proportion of the water-based systems are provided through concession contracts and either provide critical access to parks and park sites or serve as interpretive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

The National Park Service partnered with five local transit agencies in 2022 those partnerships accounted for just 2 million passenger boardings in that year.[13] Passenger boardings among NPS-owned and operated systems (15 systems) accounted for 594,369 passenger boardings.

Interior Regions 6, 7, and 8 and Interior Region 1 each reported more than 5 million passenger boardings in 2022, exceeding other regions. Interior Region 1 – National Capital Area and Interior Regions 8, 9, 10, and 11 reported more than 1 million passenger boardings. However, if the 10 highest-use systems are excluded, each region ranged from 312,000 to 1.1 million passenger boardings in 2022 (figure 4).

Figure 4: Passenger boardings by NPS region

Notes: N=81 systems; IR=Interior Region; NCA=National Capital Area; NPS=National Park Service
Source: 2022 NPS transit inventory data

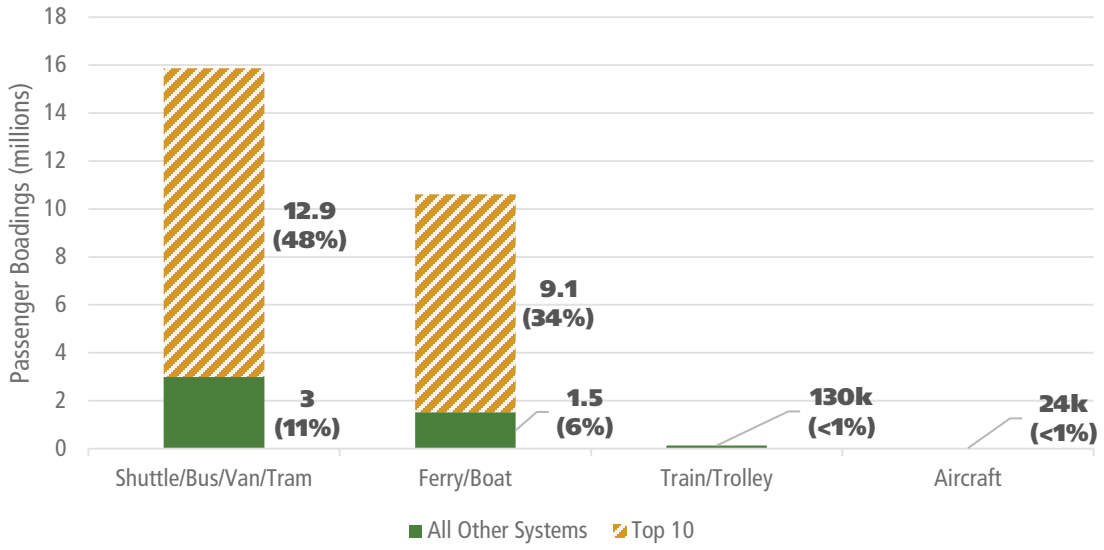


[13] The DC Circulator, Giant Forest Shuttle, Fairfax Connections Wolf Trap Express, Hiker Shuttle (Delaware Water Gap National Recreation Area), and Shuttle Transport (Harper's Ferry) are the five systems that were operated by a local transit authority.

Over half (59%) of passenger boardings were in systems that use shuttles, buses, vans, or trams, and 40 were in water-based systems that use boats and ferries. Trains, trolleys, and aircraft accounted for only less than 1% of all passenger boardings (figure 5).

Figure 5: Passenger boardings by mode

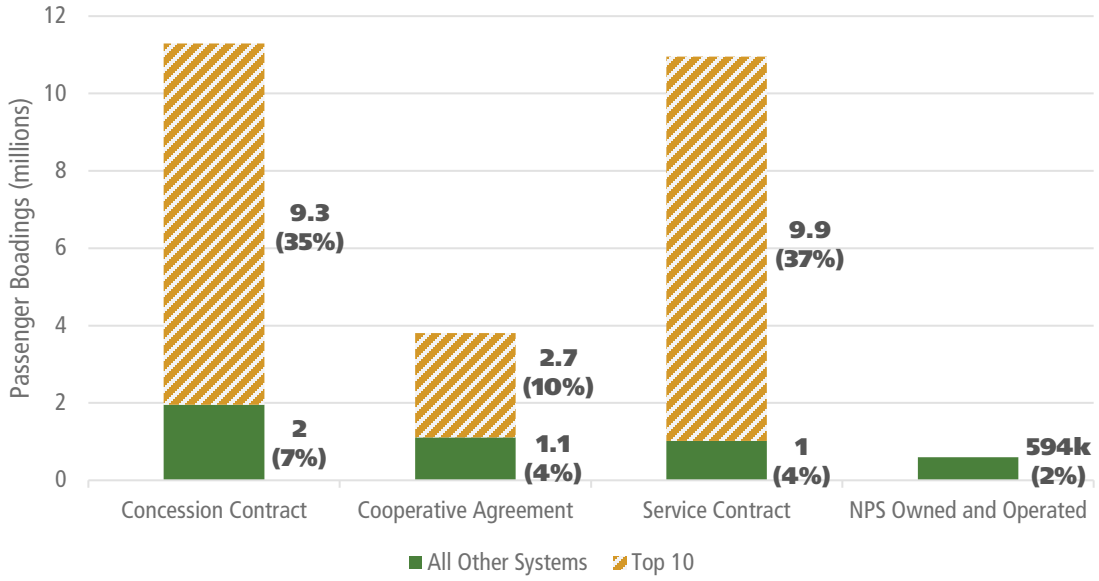
Note: N=81 systems
Source: 2022 NPS transit inventory data



Less than half of passenger boardings (42%) took place on systems operated using concession contracts. Service contracts carried 41% of passenger boardings and 14% used cooperative agreements. NPS-owned and operated systems carried 2% of boardings (see figure 6). Excluding the 10 highest-use systems, concession contracts accounted for the most boardings (7%), followed by cooperative agreements (4%), services contracts (4%) and NPS-owned and operated (2%).

Figure 6: Passenger boardings by business model

Notes: N=81 systems; NPS=National Park Service
Source: 2022 NPS transit inventory data



Vehicles and Vessels

Vehicle Fleets

Including operating and nonoperating systems, over half of the transit systems (52 systems, or 51.4%) were under concession contracts, of which 9 used fleets owned by the National Park Service and 2 used fleets of mixed ownership (both NPS owned and non-NPS owned). The National Park Service owned and operated 20 transit systems (19.8%); 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 15 of the systems (14.8%). The remaining 14 transit systems (13.8%) operate under service contracts; of these, most use vehicle fleets owned by the National Park Service, including the large systems at Grand Canyon National Park and Zion National Parks.

For the operating fleet reporting in 2022:

- NPS owned:
    - 24 operating systems used National Park Service owned fleets; 12 systems with NPS-owned fleets did not operate.
    - 274 vehicles were reported to the inventory. Of those, 244 vehicles operated 30 and vehicles did not operate. Of the operating systems with NPS-owned fleets, 2 systems had a capacity for no more than 10 passengers, 11 systems had capacity for 11–20 passengers, 10 systems had capacity for 21–40 passengers, and 5 systems had capacities over 40 passengers. Nineteen vehicles did not report capacity.
- Non-NPS owned:
    - 55 systems had non-NPS-owned and 2 mixed-ownership fleets.
    - 600 vehicles were reported to the inventory. Of those, 546 vehicles operated, and 54 vehicles did not operate. Of the operating systems with non-NPS-owned or mixed-ownership fleets, 10 systems had a capacity for no more than 10 passengers, 12 systems have capacity for 11–20 passengers, 14 systems have capacity for 21–40 passengers, and 34 systems had capacities over 40 passengers. Note: Some systems have varying capacity and may be counted twice.

Figure 7: Number of vehicles by fuel type

Notes: N=790 active vehicles and vessels; CNG=compressed natural gas; NPS=National Park Service
Source: 2022 NPS transit inventory data

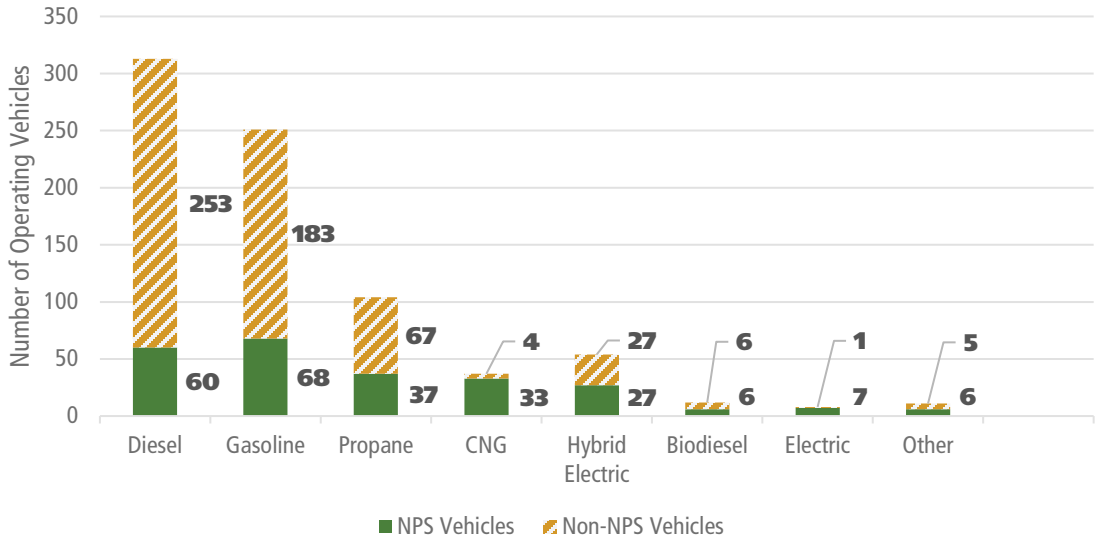


Table 5: Number of vehicles that operated in 2022 by fuel type

Notes: N=790 active vehicles and vessels; CNG=compressed natural gas
Source: 2022 NPS transit inventory data

Fuel Type	NPS Owned	Non-NPS Owned	Total
Diesel	60	253	**313**
Gasoline	68	183	**251**
Propane	37	67	**104**
CNG	33	4	**37**
Hybrid Electric	27	27	**54**
Biodiesel	6	6	**12**
Electric	7	1	**8**
Other	6	5	**11**
Total	**244**	**546**	**790**
% Alt Fuel	**45%**	**19%**	**27%**

Age of Vehicles

Vehicle age data was provided by 274 NPS-owned vehicles and 478 non-NPS-owned vehicles. The age analysis excludes the 33 Red Bus Tour vehicles (Glacier National Park), which have been retrofitted using the original 1936 exteriors and newer chassis. Given these parameters, the age analysis includes 719 vehicles (82% of reported vehicles).

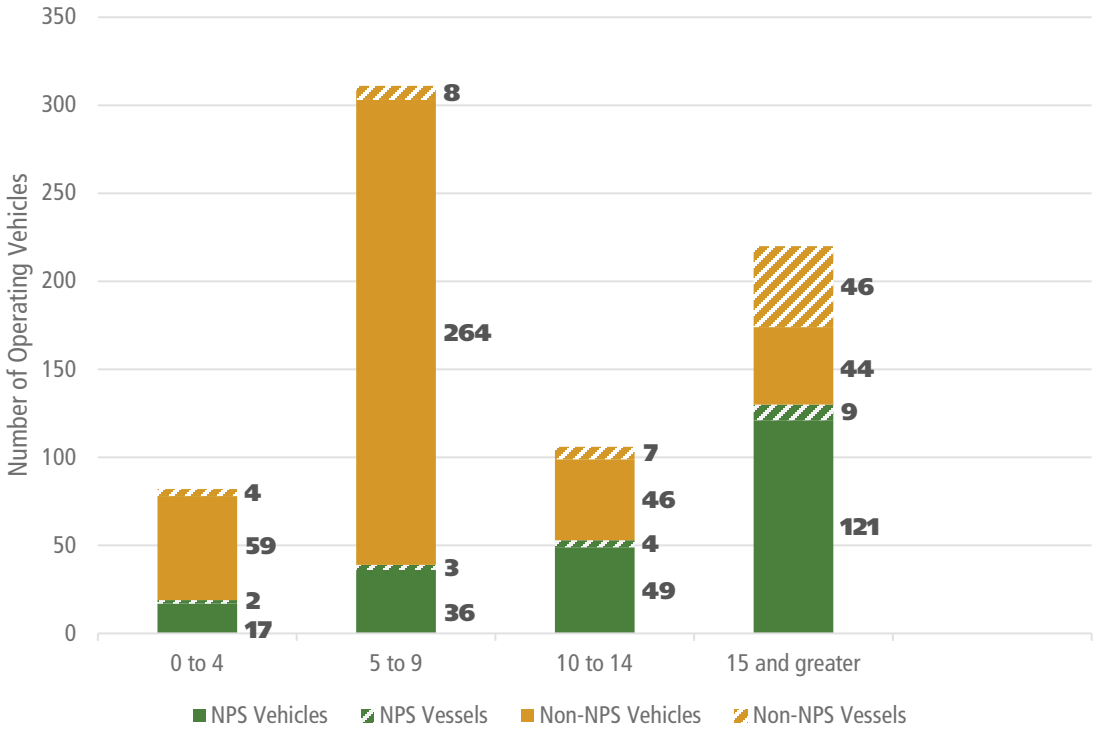
Table 6: Vehicle ownership by age class

Note: N=719 vehicles and vessels
Source: 2022 NPS transit inventory data

Vehicle Ownership	0 to 4 Years Old	5 to 9 Years Old	10 to 14 Years Old	15 Years and Older	Total
National Park Service	19 7.9%	39 16.2%	53 22.0%	130 53.9%	241
Non-National Park Service	63 13.2%	272 56.9%	53 11.1%	90 18.8%	478
Total	82 11.4%	311 43.3%	106 14.7%	220 30.6%	719

Figure 8: All vehicles by age class (years)

Notes: N=719 vehicles and vessels; NPS=National Park Service
Source: 2022 NPS transit inventory data



The non-NPS fleet is decidedly newer. A larger overall proportion of newer non-NPS vehicles suggests that older vehicles have been retired at a higher rate in recent years. The replacement of older vehicles may reflect contract language requiring vehicles to be within a certain age range.

Seventy-six percent of the active NPS-owned fleet is 10 years or older and puts many of the vehicles in the latter portion of their service lives. In previous years, more than 80% of the NPS fleet was 10 years or older. While vehicle replacements have occurred, there is still a need for vehicle replacements in the next 10 years. In addition, parks must invest in the maintenance of older vehicles to not only keep them operating but extend their service life.

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).

Vessels

The National Park Service had 33 operating systems that use ferries or boats: 11 are for critical access to park sites, 14 are for interpretive tours, 5 are transportation features, and 3 provide mobility to or within the park. The National Park Service owns 18 of these vessels, and there are 96 non-NPS owned ferries or boats that operated in 2022. Vessels typically have a life cycle of 40–50 years.

- Gulf Islands National Seashore purchased two ferries in 2017 using funds from the Gulf oil spill. In 2019, 2020, and 2022, operations were impacted by several tropical storms, hurricane, and repair efforts. In early 2022, the dock at Pensacola Beach was damaged again, this time by a construction crane, making it unusable from April through August 2022. Only sunset cruises and minimal ferry service between Pensacola and the beach occurred in 2022.
- Fort Matanzas National Monument replaced a boat in 2022 and plans to order a second replacement boat in fiscal year 2023.
- The Ranger III at Isle Royale National Park is over 60 years old and has outlived its useful service life. A value analysis completed in 2019 indicates the need for a new Ranger IV at a cost of $40–$60 million. Currently, the park began phase I to develop detailed design and costs based on identified performance measures.

Performance Measures

The NPS Alternative Transportation Program (ATP) 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 that correspond to ATP goals and the NPS National Long Range Transportation Plan:[14] visitor experience, operations, environmental impact, and asset management. The ATP goals are included in appendix B.

Visitor Experience

This performance area addresses how park transportation systems enhance the visitor experience. For 2022, the visitor experience performance measure includes accessibility for mobility-impaired park visitors.

[14] The long-range transportation plan can be accessed at https://parkplanning.nps.gov/document.cfm?parkID=551&documentID=82749.

Accessibility for Visitors with Disabilities

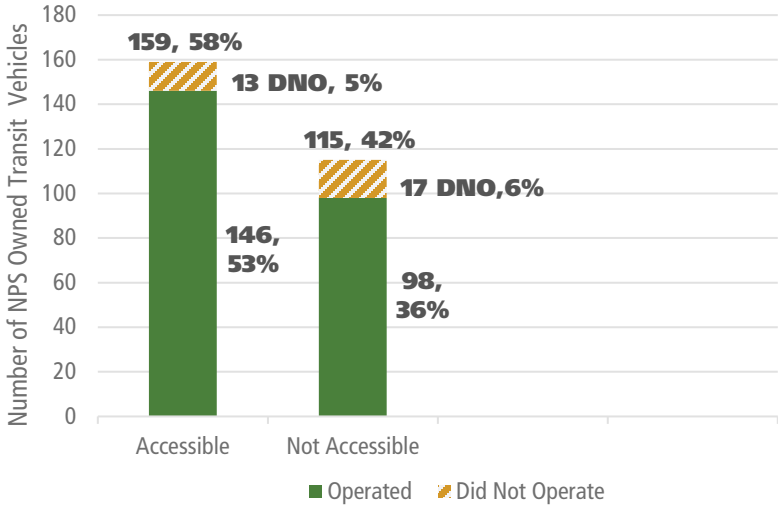
In 2022, 59.84% of 244 operating, NPS-owned vehicles and vessels were accessible for people with mobility impairments (figure 9). This number is a decrease of 5% from 2021; however, an additional 21 vehicles and vessels operated in 2022. Overall, 58% of the 274 NPS-owned vehicles and vessels are accessible.

Of the 81 operating systems with NPS-owned vehicles or vessels, 17 did not report having vehicles or vessels that are accessible. These systems include Canal Tours (Lowell National Historical Park), Cape Cod Coastguard Beach Shuttle (Cape Cod National Seashore), Franklin D. Roosevelt Tram (Home of Franklin D Roosevelt National Historic Site), Full Circle Trolley (Marsh-Billings-Rockefeller National Historical Park), Hiker Shuttle (Glacier National Park), Green River Ferry (Mammoth Cave National Park), Historic Yellow Bus Tours (Yellowstone National Park), Mariposa Grove Transportation Service (Yosemite National Park), MV Ranger III (Isle Royale National Park), NPS Shuttle (Eugene O'Neil National Historic Site), Red Bus Tours (Glacier National Park), Scranton Limited & Live Steam Excursions (Steamtown National Historic Site), Harpers Ferry Shuttle Transport (Harpers Ferry National Historical Park), Voyagers Boat Tour (Voyageurs National Park), Xanterra Parks and Resorts Bus Tour (Yellowstone National Park), Snow Coaches (Yellowstone National Park), and Zion Shuttle (Zion National Park). That number increases from 17 to 26 systems when including the systems that did not operate in 2022: Akers Ferry (Ozark National Scenic Riverways), Cave Tours Bus Shuttle (Mammoth Cave National Park), Fort Pickens Tram Service (Gulf Islands National Seashore), Lakebed Tours (Johnstown Flood National Memorial), Land and Legacies Tour (Cumberland Island National Seashore), Rapidan Camp Bus (Shenandoah National Park, Tallgrass Bus Tours (Tall Grass Prairies National Preserve), and the Val-Kill Tram (Home of Franklin D Roosevelt National Historic Site).

Figure 9: Accessibility of NPS-owned transit vehicles (entire fleet)

Notes: N=274 vehicles and vessels; DNO=did not operate; NPS=National Park Service

Source: 2022 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 five 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. In 2020 and 2021, the reduced number of boardings is attributed to park closures and limited or no transit system operations due to the COVID-19 pandemic.

Year-to-Year Trends in Boardings

Figure 10 shows the percent change in boardings from 2018 to 2022. Absolute boardings dipped slightly in 2018 due to the government shutdown and an active hurricane season that caused many temporary park shutdowns and reached an all-time high in 2019. Due to the pandemic, ridership declined dramatically in 2020 but has shown steady increases in 2021 and 2022, as more systems come back online and visitors feel more comfortable riding transit. However, not all systems have returned or are fully operational, and the assumption is some visitors are still reluctant to get on a crowded transit vehicle. Across the nation, transit ridership rates have not recovered to pre-pandemic levels, and post-pandemic recovery continues to be slow.

In 2022, the National Park Service received 312 million recreation visits, up 15 million visits (5%) from 2021. While not as high as 2018 and 2019, servicewide visitation has essentially recovered to pre-pandemic levels. Visitation in 2022 is similar to the years immediately before the NPS centennial in 2016 and is only 6% lower than the record year (331 million visitors in 2016). Overall, 12 parks set new visitation records in 2022, none of which have transit systems.

Figure 10: Percent change in boardings from 2018 to 2022

Source: 2018–2022 NPS transit inventory data

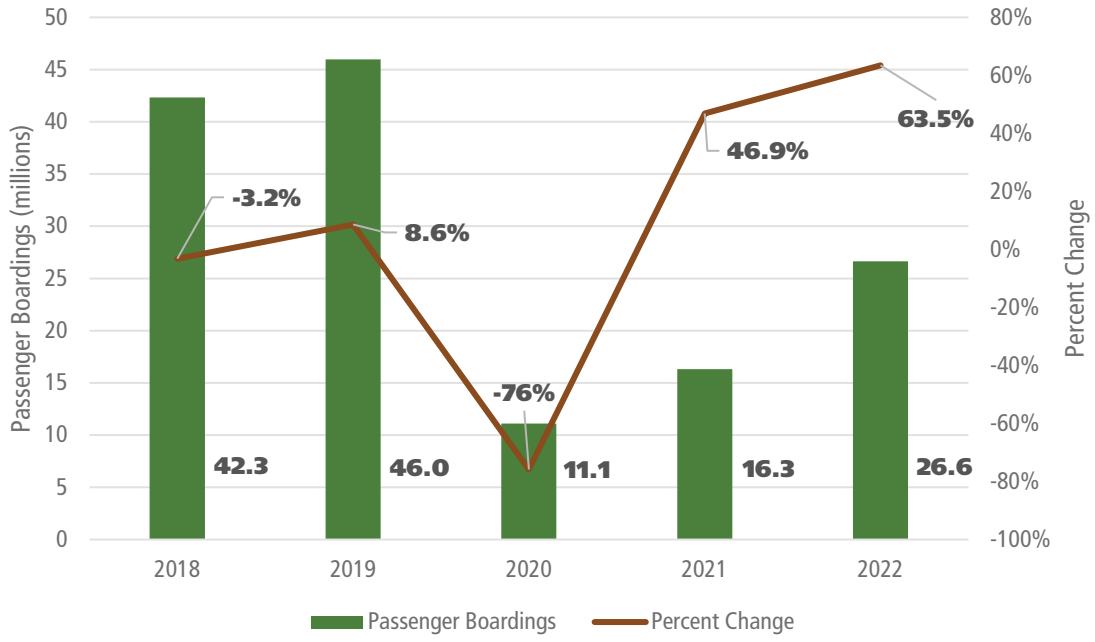


Table 7: Comparison of systems and boardings from 2018 to 2022

Source: 2018–2022 NPS transit inventory data

Metrics	2018	2019	2020	2021	2022
Number of Systems in Inventory (% change from previous year)	95 -4%	97 2.1%	96 -1%	97 1%	101 4.1%
Number of Systems Operating (% change from previous year)	95 -4%	97 2.1%	66 -32%%	63 -4.5%	81 28.6%
Number of Systems New to Inventory	0	2	1	1	4
Boardings (% change from previous year)	42,320,594 -3.2%	45,967,894 8.6%	11,098,633 -75.9%	16,300,849 46.9%	26,644,865 63.5%

Service Schedule

The 2022 inventory analyzed the reported service schedules of the 81 operating systems 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 32% of systems (26 systems) operating year-round (figure 11).

Peak season is defined as the period when the scheduled transit service is operating at its greatest frequency. The most common peak season months are July and August, with shoulder peak seasons extending May through September. For year-round systems, many parks report peak seasons beginning as early as March and extending into September.

Systems operating year-round are among those with the highest annual ridership, representing 66% of total boardings. Of the 26 systems that operated year-round, 7 provide critical access, 10 are interpretive tours, 7 provide mobility within the park, and 2 are transportation features. The next most common service period is 6 months out of the year (14 systems), followed by systems that are in service for 5 months (13 systems each).

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 11: Distribution of service duration by number of months

Note: N=81 systems

Source: 2022 NPS transit inventory data

Safety

The 2022 inventory included 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 goals and performance metrics.

In 2022, the number of NPS transit systems that reported traffic accidents increased from three parks (13 accidents) to six parks (14 accidents). The number of affected systems doubled from 2021, while the number of accidents remained stable since doubling from 2020 to 2021. Of the accidents reported in 2022, two had passengers on board during the accident (table 8), compared to one in 2021. Similar to 2021, none of these accidents resulted in an injury or fatality, although one did involve a bicyclist. Five systems reported minor vehicle damage, and two systems had multiple accidents with varying level of damage. At least two systems reported accidents due to driver error and two systems reported an accident due to the error of others.

- **Harpers Ferry Shuttle Transport:** A bus hit a sign at the visitor center bus loop. The bus was out of service for two weeks.
- **Franklin D. Roosevelt Tram Tour:** The tram was damaged on the passenger side when the employee driving the tram mistakenly struck the side of a building to avoid an obstruction, causing damage to both the tram and the building. No one was injured.
- **South Rim Shuttle Service:** The shuttles experienced eight incidents during the year; four occurred on route. None of the accidents were the error of the shuttle driver, and there were no injuries reported in any of the accidents. Some minor costs for repairs to buses were needed.
- **Voyager Boat Tour:** Two incidents occurred with two of the vessels, putting them out of service, one for two days and one for one week. Both accidents were caused by ships striking rocks on route; no passenger injuries were reported.
- **Yosemite Valley Shuttle:** The system reported two minor accidents. The first incident involved a visitor's private vehicle, and the other contact with a metal-framed sign.
- **Zion Shuttle:** A minor incident involved an inexperience cyclist using an e-bike who crossed yellow line, colliding with front corner of bus trailer.

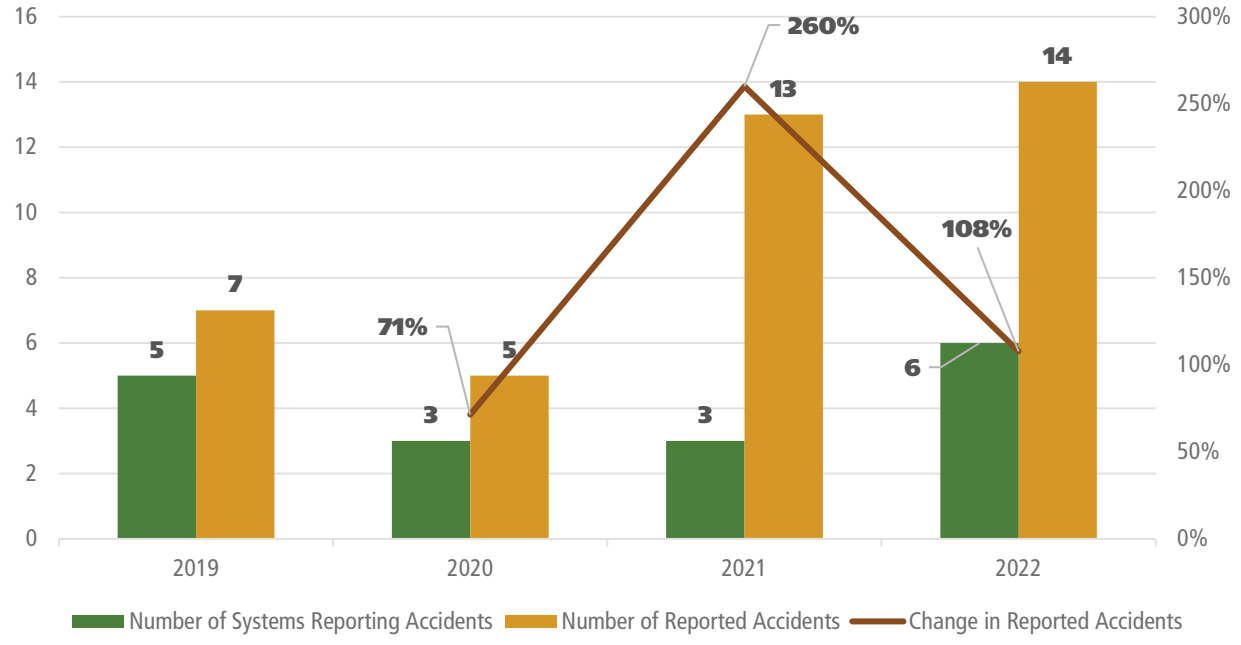
Table 8: Response to safety and operational questions

Note: HAFE=Harpers Ferry; HOFR=Home of Franklin D. Roosevelt National Historic Site; GRAC=Grand Canyon National Park; VOYA=Voyageurs National Park; YOSE=Yosemite National Park; ZION=Zion National Park
Source: 2022 NPS transit inventory data

Park	System Name	Number of Accidents	Passengers on Board	Injuries or Fatalities	Bicycles or Pedestrians	Accident Occurred on Route	Result of Driver Error	Real Property Damaged
HAFE	Harpers Ferry Shuttle Transport	1	No	No	No	Yes	Yes	Yes
HOFR	FDR Tram Tour	1	No	No	No	No	No	Yes
GRCA	South Rim Shuttle Service	8	Yes	No	No	Yes	No	Yes
VOYA	Voyager Tour Boat	2	Yes	No	No	Yes	No	Yes
YOSE	Yosemite Valley Shuttle	2	No	No	No	No	Yes	Yes
ZION	Zion Shuttle	1	No	No	Yes	No	No	No

Figure 12: Year-to-year comparison of reported accidents

Source: 2019–2022 NPS transit inventory data



Environmental Impact

Since 2017, the transit inventory uses the US Environmental Protection Agency's Motor Vehicle Emissions Simulator (MOVES) for estimating NPS transit vehicle emissions.[15] 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.[16] MOVES software bases emissions estimates on observations of actual vehicle operations.

This section describes the results of the 2022 emissions analysis with respect to carbon dioxide (CO_2). The results for the other criteria pollutants—nitrogen oxides, volatile organic compound, and particulate matter—as well as a detailed description of the analysis methodology, are presented in appendix E.

The COVID-19 pandemic had a significant impact on passenger vehicle miles traveled and transit system operation in parks in 2020 and 2021. However, transit system activity started to rebound in 2022. Vehicle miles traveled across all regions increased 385% from 2021 and 601% from 2020 levels. The increased emissions level is directly related to the number of operational systems and increased operations of systems nationwide.

Table 9: Comparison of emission results

Source: 2020–2022 NPS transit inventory data

Metrics	2020	2021	2022	Change 2022 vs. 2021 (percent)	Change 2022 vs. 2020 (percent)
Number of Operating Systems	66	63	81	29%	23%
Count of Vehicles	913	803	817	2%	-11%
Miles Traveled	3,408,710	4,925,288	19,953,523	305%	485%
Ferry Hours	19,735	38,409	43,857	14%	122%
Carbon Dioxide Emissions	12,873.50	22,491	54,291.98	141%	322%

[15] This national transit inventory uses version MOVES 3.0.3, which was released in January 2022.

[16] "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.

Annual CO_2 Emissions

Figure 13 shows the results of MOVES carbon dioxide emissions modeling for transit systems, aggregated to the regional level and split by ownership. Across all regions, NPS-owned transit fleets emitted just over 24,163 metric tons of CO_2 in 2022. Interior Regions 8, 9, 10 and 12 experienced the highest number of ferry miles, resulting in the highest non-NPS-owned vehicles CO_2 emissions. Interior Regions 6, 7, and 8 have the overall highest amount of vehicle miles traveled, which results in the highest CO_2 emissions.

Table 10: Distribution of miles and CO_2 emissions by vehicle ownership

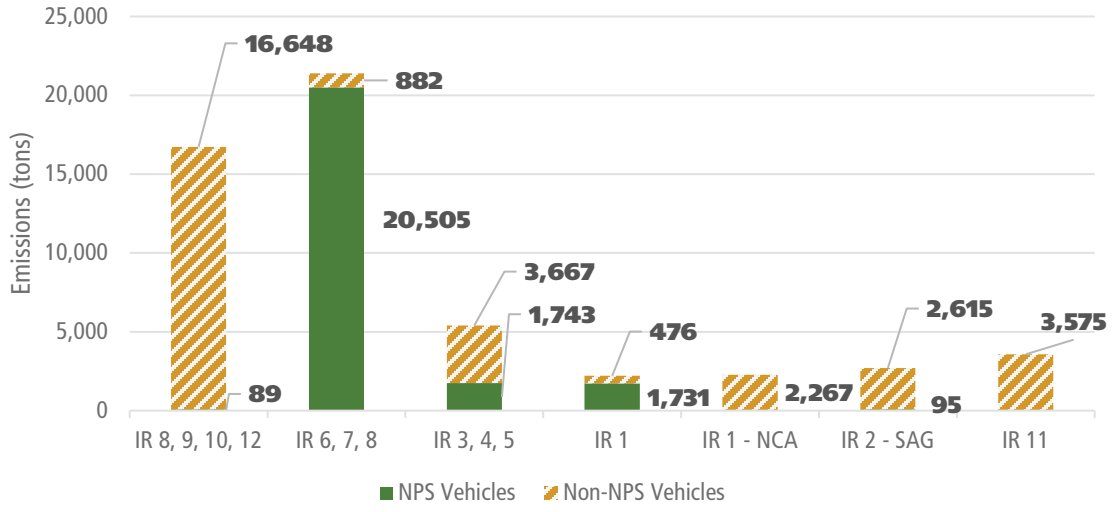
Source: 2022 NPS transit inventory data

Ownership	Vehicles (number)	Vehicles (percent)	Miles Traveled	Miles (percent)	CO_2 (metric tons)	CO_2 (percent)
NPS Owned	274	35%	3,771,613	19%	24,163.30	44%
Non-NPS Owned	546	65%	16,181,910	81%	17,924.57	56%
Total	**820**	**100%**	**19,953,523**	**100%**	**42,087.87**	**100%**

Figure 13: Annual CO_2 emissions

Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service

Source: 2022 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 10.2 million private vehicle trips were eliminated in 2022, double the diverted passenger vehicle trips estimated in 2021, and a reduction of nearly 231,655 metric tons of CO_2 emissions; without transit service, there would have been an additional 618 million miles driven in private vehicles. As stated previously, regions with high transit use and more boardings divert more personal vehicles from the road.

Asset Management

Performance measurement for assets helps support the long-term financial viability of the transit systems through tracking the age of NPS-owned 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 9 are shown only for reference and were not analyzed for recapitalization estimates.

Average Age of NPS Vehicles

Table 11 reports the aggregate average age for NPS-owned transit vehicles servicewide and includes all NPS-owned vehicles regardless of whether they operated or not in 2022. The average age of each NPS vehicle type is below the service life for most vehicle types, but many categories include vehicles older than their typical lifespan. In the case of medium-duty transit, the average age is the anticipated service life. Notably, 65 vehicles will exceed their service life in next five years; of these, 50 are heavy-duty transit or medium-duty shuttles. On average, heavy- and medium-duty shuttle buses are the newest vehicles in the NPS-owned fleet, which is reflective of the fleet replacements occurring at Glacier, Grand Canyon, Yosemite, and Zion National Parks.

Table 11: Vehicle age for NPS transit vehicle types[17]

Notes: N=241 vehicles and vessels;[18] N/A=not applicable
Source: 2022 NPS transit inventory data

Vehicle Type	Average Age	Number of Vehicles	Service Life (years)	Number of Vehicles Beyond Service Life*	Number of Vehicles Exceeding Service Life in Next 10 Years*
Tram/Golfcart	6	12	11	2	10
Passenger Van	14	21	10	18	3
Light-Duty Shuttle	12	20	15	5	14
Medium-Duty Shuttle	12	41	15	16	23
Medium-Duty Transit	19	34	18	24	8
Heavy-Duty Transit	13	68	18	23	30
Ferry/Boat	26	18	N/A	N/A	0
Train/Streetcar	55	5	N/A	N/A	0
School Bus	17	7	18	1	6
Snowmobile/Snow Coach	54	12	N/A	N/A	0
Van	9	3	10	3	0
Total	**–**	**241**	**–**	**92**	**94**

*Number of vehicles beyond service life in the next 10 years is a total of 186 vehicles. This includes 92 vehicles that are operating beyond their estimated service life in 2022 and 94 vehicles exceeding service life in the next 1–10 years (2023–2032). These columns are calculated using the vehicle's age and estimated service life.

Transition to Electric Vehicles and Estimated Vehicle Recapitalization Needs

Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad," requires federal agencies to establish a plan that will enable government motor vehicle fleets to transition to clean and-zero emission vehicles. Additionally, Executive Order 14057, "Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability," establishes a goal of 100% zero-emission light-duty vehicle acquisitions by 2027 and 100% zero-emission vehicle acquisitions by 2035.

The transition to electric vehicles will occur when a vehicle needs to be replaced. Estimates of NPS-owned vehicle replacement needs begin with vehicle ages, along with the associated replacement costs and service life assumptions shown in appendix F. 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;

[17] The 2020 recategorization of the NPS fleet vehicles resulted in new categories and shifting vehicles to more appropriate vehicle type categories compared to past inventories. See appendix F for more information.

[18] The Glacier National Park Red Bus Tours vehicles were excluded from this analysis, as they have been extensively retrofitted during their 80-plus years in service.

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 of 228 vehicles over the next 10 years and an estimated $187 million in NPS-owned transit vehicle capital costs.[19] These fleet replacements include legacy transit systems at Acadia, Yosemite, and Grand Canyon National Parks. The 10-year estimated cost does not include the ongoing fleet replacement at Zion National Park or electric vehicle service equipment and other infrastructure upgrades to accommodate transitioning to electric vehicles. Projected costs and escalation are calculated based on 2022 dollars and may vary from year to year as vehicles from different systems are replaced or rehabilitated to extend their service life.

Next Steps

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 enables 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:

- **Continued Coordination with Relevant NPS Stakeholders:** Continue sharing data and identifying 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 in 2019. A limitation of this tool is that it is restricted

[19] The estimated vehicle replacement costs assume an eligible Green Fleet vehicle base model cost. Often, purchase price exceeds the base model cost because of selected vehicle options. In addition, costs do not include electric vehicle charging equipment and associated infrastructure needs.

to NPS users only, and concessioners are not able to access the tool. The option for concessioners to submit their data via spreadsheet was provided again for 2022. The interactive web report was also updated for 2022, and the online report includes all historic NTI data. The National Park Service anticipates updating the data collection tool and data storage for performance enhancements for the 2023 data collection.

- **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 and collaborate with the transportation safety program manager for reporting.
- **Communicate the 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 transportation trails.[20] 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.
- **Coordinate with the Vehicle Health Index to Refine Recapitalization Analysis and Anticipated Service Life:** Developed from industry standard approaches to fleet condition assessment, the Vehicle Health Index (VHI) provides a data-driven approach to understanding fleet condition across the National Park Service's portfolio of fleet assets. The Vehicle Health Index consists of a series of rapid-visual and diagnostic tests, scored 0–10, for each subcomponent of a vehicle (e.g., engine, drivetrain, interior) to generate a "Total Vehicle Score," the official VHI metric. Data collected from VHI assessments will enhance existing asset management practices by providing consistent, point-in-time assessments of fleet condition. The assessment will inform both the expected service life for vehicles on public lands and the recapitalization analysis.

[20] **NPS definition of a "transportation trail":** Multimodal trail that accommodates pedestrians and/or bicycles and connects to a larger transportation system, including land- and water-based transit and/or regional trail systems or direct connections to a community (not solely recreational trails).

- **Explore Count Methodology Standardization:** Eighty-five percent of boardings are attributed to 10 systems. Understand the count methodology for these 10 systems and develop standardization in count methodology. Consider developing standard operating procedures/business practices for the remaining types of count methodologies or consider automating manual counts, where appropriate.

Appendixes

Appendix A – Acknowledgments

The National Park Service 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 2021 inventory year. A list of each park contact is included in appendix D.

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Appendix B – National Park Service Alternative Transportation Program 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 NPS 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.
- Rightsize and maintain needed transportation assets and services in a state of good repair.
- Develop transportation options with reciprocal benefits for NPS and gateway communities that 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 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 the three criteria listed below were considered for the inventory:

1. Moves people by motorized vehicle on a regularly scheduled service.[21]
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.[22]
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 Servicewide 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 each should be included in the inventory.

The NPS Alternative Transportation Program 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 information, the NPS Alternative Transportation Program proposed the following criterion: "***moves people by motorized vehicle on a regularly scheduled service***."

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[21] This criterion 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.

[22] 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."

Is important to the NPS mission: The importance of transit systems to fulfilling the NPS mission is a core tenet of the Alternative Transportation Program, 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 National Park Service has a financial stake or has a formal contract or agreement in place, the answer seems clear: because the National Park Service has made an effort to provide the service, the service is assumed to be important to the mission. Other services, particularly those that operate under a commercial use agreement (CUA), are not as clearly essential to the mission. Thus, the NPS Alternative Transportation Program 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 Alternative Transportation Program used "cooperative agreement" as a general term, encompassing all qualifying partner agreements (memorandum of understanding, memorandum of agreement, and cooperative agreement).

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

Commercial use agreements were not included because these services are owned and operated by private operators, and the National Park Service only provides oversight to ensure that the services are operated in accordance with NPS policies and requirements. Hundreds of commercial use agreement exist servicewide that provide visitors tours and transportation. Collecting and reporting information on all 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 commercial use agreement is important versus nonessential to the NPS mission? This effort found only one subcategory of commercial use agreement that could be considered objective: services that provide sole access to an NPS resource. Second, should the National Park Service represent as its own services for which it has no role in the acquisition, operations, or maintenance activities? Even for commercial use agreements that provide sole access, this effort suggests not. This determination is not to suggest that the service is not important to the National Park Service but rather to acknowledge that the service is not the responsibility of the National Park Service—in other words, the service 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 vehicle miles traveled 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 Alternative Transportation Program 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 the National Park Service having a financial stake. Thus, this criterion would not contribute toward a simple, clear definition.

Tours versus transportation: A distinction exists 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 Alternative Transportation Program sought not to prioritize one over the other. Although in daily life a transportation trip (often thought to be mandatory—e.g., to the grocery store) might be more important than a tour trip (often thought to be discretionary—e.g., 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 Alternative Transportation Program 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 investigation, the NPS Alternative Transportation Program 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 – 2022 NPS National Inventory System List

Interior Region 1

Park Code	System Name	Vehicle Type	2022 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
ACAD	Island Explorer & Bicycle Express	Shuttle/Bus/ Van/Tram	414,808	Non-NPS	Cooperative Agreement	Mobility to or within Park	John Kelly
ADAM	Adams Trolley	Shuttle/Bus/ Van/Tram	Did Not Operate	NPS	Service Contract	Critical Access	Kevin Kelly
BOHA	Boston Light Tour	Ferry/Boat	1,190	Non-NPS	Cooperative Agreement	Interpretive Tour	John Curwen
BOHA	Thompson Island Ferry	Ferry/Boat	2,906	NPS	Concession Contract	Mobility to or within Park	John Curwen
CACO	Coastguard Beach Shuttle	Shuttle/Bus/ Van/Tram	53,988	NPS	NPS owned and operated	Critical Access	John DeFoe
DEWA	DEWA Hiker Shuttle	Shuttle/Bus/ Van/Tram	5,434	Non-NPS	Cooperative Agreement	Critical Access	Jennifer Kavanaugh
EISE	EISE Shuttle	Shuttle/Bus/ Van/Tram	9,945	Non-NPS	Concession Contract	Critical Access	Jana Friesen McCabe
FIIS	Sailors Haven Ferry	Ferry/Boat	34,206	Non-NPS	Concession Contract	Critical Access	Jason Pristupa
FIIS	Watch Hill Ferry	Ferry/Boat	17,164	Non-NPS	Concession Contract	Critical Access	Jason Pristupa
HOFR	FDR Tram	Shuttle/Bus/ Van/Tram	5,254	NPS	NPS Owned and Operated	Mobility to or within Park	Adam Millington
HOFR	Val-Kill Tram	Shuttle/Bus/ Van/Tram	Did Not Operate	NPS	NPS Owned and Operated	Mobility to or within Park	Adam MIllington
JOFL	Lakebed Tours	Shuttle/Bus/ Van/Tram	Did Not Operate	NPS	NPS Owned and Operated	Interpretive Tour	Douglas Bosley
LOWE	Canal Tours	Ferry/Boat	5,308	NPS	NPS Owned and Operated	Interpretive Tour	Micheasl Curran
LOWE	LOWE Historic Trolley	Train/Trolley	17,838	NPS	NPS Owned and Operated	Mobility to or within Park	Michael Curran
MABI	Full Circle Trolley	Train/Trolley	200	NPs	NPS Owned and Operated	Critical Access	Christina Martts
SHEN	Rapidan Camp Bus	Shuttle/Bus/ Van/Tram	Did Not Operate	NPS	NPS Owned and Operated	Interpretive Tour	Tim Taglauer
STEA	Scranton Limited & Live Steam Excursions	Train/Trolley	12,300	NPS	NPS Owned and Operated	Interpretive Tour	Garrett Lisak
STLI	Statue of Liberty Ferries	Ferry/Boat	6,993,087	Non-NPS	Concession Contract	Critical Access	Ben Hanslin
VAFO	History of Valley Forge Trolley Tour	Shuttle/Bus/ Van/Tram	7,697	Non-NPS	Cooperative Agreement	Interpretive Tour	Pamela Zesotarski

Interior Region 1 – National Capital Area

Park Code	System Name	Vehicle Type	2022 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
HAFE	HAFE Shuttle Transport	Shuttle/Bus/ Van/Tram	356,826	NPS	Service Contract	Mobility to or within Park	Larry Moore
NAMA	Big Bus Tours Washington DC	Shuttle/Bus/ Van/Tram	167,097	Non-NPS	Concession Contract	Interpretive Tour	Karl Gallo
NAMA	DC Circulator	Shuttle/Bus/ Van/Tram	1,201,986	Non-NPS	Cooperative Agreement	Transportation Feature	Yue Li
WOTR	Fairfax Connectors Wolf Trap Express	Shuttle/Bus/ Van/Tram	2,663	Non-NPS	Service Contract	Mobility to or within Park	Janette Lemons

Interior Region 2 – South Atlantic Group

Park Code	System Name	Vehicle Type	2022 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
BLRI	Sharp Top Mountain Shuttle	Shuttle/Bus/ Van/Tram	5,138	Non-NPS	Concession Contract	Transportation feature	Gail Fox
CALO	CALO Ferry Service	Ferry/Boat	97,484	Non-NPS	Concession Contract	Critical Access	Katherine Cusinberry
CARL	Electric Shuttle	Shuttle/Bus/ Van/Tram	Did Not Operate	NPS	NPS Owned and Operated	Special Needs	Sarah Perschall
CUIS	CUIS Ferry Service	Ferry/Boat	Did Not Operate	Non-NPS	Concession Contract	Critical Access	Chad Gray
CUIS	Land and Legacies Tour	Shuttle/Bus/ Van/Tram	Did Not Operate	NPS	Concession Contract	Interpretive Tour	Chad Gray
DRTO	DRTO Ferry Service	Ferry/Boat	59,782	Non-NPS	Concession Contract	Critical Access	Emily Sweet
DRTO	Key West Seaplane Adventures	Aircraft	16,554	NPS	Concession Contract	Interpretive Tour	Emily Sweet
FOMA	FOMA Ferry Service	Ferry/Boat	71,464	NPS	NPS Owned and Operated	Critical Access	Andrew Rich
FOSU	FOSU Ferry Service	Ferry/Boat	284,380	Non-NPS	Concession Contract	Critical Access	Michelle Haas
GUIS	Ship Island Ferry	Ferry/Boat	44,240	Non-NPS	Concession Contract	Transportation Feature	Richard Devenney
GUIS	Fort Pickens Tram Service	Shuttle/Bus/ Van/Tram	Did Not Operate	NPS	Service Contract	Transportation Feature	Richard Devenney
GUIS	GUIS Ferry Service	Ferry/Boat	13,289	NPS	Concession Contract	Transportation Feature	Richard Devenney
KEMO	KEMO Shuttle Bus	Shuttle/Bus/ Van/Tram	Did Not Operate	NPS	Service Contract	Transportation Feature	Ladrick Downie

Park Code	System Name	Vehicle Type	2022 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
MACA	Cave Tours Bus Shuttle	Shuttle/Bus/ Van/Tram	Did Not Operate	NPS	Concession Contract	Interpretive Tour	Steve Kovar
MACA	Green River Ferry	Ferry/Boat	189,310	NPS	NPS Owned and Operated	Transportation Feature	Steve Kovar

Interior Regions 3, 4, and 5

Park Code	System Name	Vehicle Type	2022 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
APIS	Excursion boat	Ferry/Boat	47,069	Non-NPS	Concession Contract	Interpretive Tour	Elizabeth Lowthian
CUVA	Cuyahoga Valley Scenic Railroad	Train/Trolley	100,481	Non-NPS	Cooperative Agreement	Mobility to or within Park	Jennifer Vasarhelyi
ISRO	MV Isle Royale Queen IV	Ferry/Boat	13,608	Non-NPS	Concession Contract	Critical Access	Chris Amidon
ISRO	MV Voyageur II and Sea Hunter III	Ferry/Boat	10,196	Non-NPS	Concession Contract	Critical Access	Chris Amidon
ISRO	Royale Air Service Inc. float plane	Aircraft	8,334	Non-NPS	Concession Contract	Critical Access	Chris Amidon
ISRO	MV Sandy Tour	Ferry/Boat	2,172	Non-NPS	Concession Contract	Interpretive Tour	Chris Amidon
ISRO	MV Ranger III	Ferry/Boat	4,803	NPS	NPS Owned and Operated	Critical Access	Chris Amidon
OZAR	Akers Ferry	Ferry/Boat	Did Not Operate	NPS	Concession Contract	Transportation Feature	Peggy Tarrence
PIRO	Pictured Rocks Cruises	Ferry/Boat	103,543	Non-NPS	Concession Contract	Interpretive Tour	Joseph Hughes
SCBL	SCBL Free Shuttle Service	Shuttle/Bus/ Van/Tram	15	NPS	NPS Owned and Operated	Mobility to or within Park	Justin Cawiezel
SLBE	Manitou Island Transit	Ferry/Boat	10,690	Non-NPS	Concession Contract	Transportation Feature	Phil Akers
TAPR	TAPR Bus Tours	Shuttle/Bus/ Van/Tram	Did Not Operate	NPS	NPS Owned and Operated	Interpretive Tour	Heather Brown
VOYA	VOYA Tour Boat	Ferry/Boat	11,390	NPS	NPS Owned and Operated	Interpretive Tour	Tawnya Schoewe

Interior Regions 6, 7, and 8

Park Code	System Name	Vehicle Type	2022 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
BAND	Bandelier National Monument	Shuttle/Bus/ Van/Tram	70,295	Non-NPS	Service Contract	Critical Access	Dennis Milligan
BRCA	Bryce Canyon Shuttle and Rainbow Point Shuttle	Shuttle/Bus/ Van/Tram	586,163	Non-NPS	Service Contract	Mobility to or within Park	Kevin Poe
DINO	Tram Transit	Shuttle/Bus/ Van/Tram	350,668	Non-NPS	Service Contract	Critical Access	Dan Johnson
GLAC	Glacier Park Boat Company interpretive boat tours	Ferry/Boat	120,676	Non-NPS	Concession Contract	Interpretive Tour	Hayley Bahr
GLAC	Sun Tours	Shuttle/Bus/ Van/Tram	6,363	Non-NPS	Concession Contract	Interpretive Tour	Hayley Bahr
GLAC	Red Bus Tours	Shuttle/Bus/ Van/Tram	46,288	NPS	Concession Contract	Interpretive Tour	Hayley Bahr
GLAC	GLAC Hiker Shuttle	Shuttle/Bus/ Van/Tram	3,007	NPS	Concession Contract	Mobility to or within Park	Patrick Glynn
GLAC	Visitor Transportation System	Shuttle/Bus/ Van/Tram	165,631	NPS	NPS Owned and Operated	Mobility to or within Park	Patrick Glynn
GLCA	Antelope Point	Ferry/Boat	19,962	Non-NPS	Concession Contract	Interpretive Tour	Gregory Owen
GLCA	Boat Tours	Ferry/Boat	3,031	Non-NPS	Concession Contract	Interpretive Tour	Gregory Owen
GLCA	Flatwater Tour	Ferry/Boat	12,878	Non-NPS	Concession Contract	Interpretive Tour	Gregory Owen
GLCA	SR276 Passenger Ferry	Ferry/Boat	Did Not Operate	Non-NPS	Service Contract	Transportation Feature	Gregory Owen
GRCA	South Rim Bus Tours	Shuttle/Bus/ Van/Tram	Did Not Operate	Non-NPS	Concession Contract	Interpretive Tour	Franklin Dunfree
GRCA	Grand Canyon Railway	Train/Trolley	Did Not Operate	Non-NPS	Concession Contract	Mobility to or within Park	Franklin Dunfree
GRCA	South Rim Shuttle Service	Shuttle/Bus/ Van/Tram	4,348,518	NPS	Service Contract	Mobility to or within Park	Franklin Dunfree
GRTE	Jenny Lake Shuttle Boat	Ferry/Boat	238,920	Non-NPS	Concession Contract	Mobility to or within Park	Patrick C Mcgaugh
LIBI	LIBI Bus Tours	Shuttle/Bus/ Van/Tram	5,650	Non-NPS	Concession Contract	Interpretive Tour	Scott Hill
MEVE	Long House Trailhead tram and Half-day ranger guided	Shuttle/Bus/ Van/Tram	Did Not Operate	NPS; Non-NPS	Concession Contract	Interpretive Tour	Allan P Loy
ROMO	Rocky Mountain National Park Visitor Shuttle	Shuttle/Bus/ Van/Tram	618,464	Non-NPS	Service Contract	Mobility to or within Park	John P Hannon

Park Code	System Name	Vehicle Type	2022 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
YELL	Xanterra Parks & Resorts interpretive snowcoaches tours	Shuttle/Bus/ Van/Tram	15,034	Non-NPS	Concession Contract	Interpretive Tour	Matthew Mankowski
YELL	Historic Yellow Bus Tours	Shuttle/Bus/ Van/Tram	9,294	NPS	Concession Contract	Interpretive Tour	Matthew Mankowski
YELL	YELL Boat	Ferry/Boat	16,676	NPS	Concession Contract	Interpretive Tour	Matthew Mankowski
YELL	Xanterra Parks & Resorts interpretive bus tours	Shuttle/Bus/ Van/Tram	8,826	NPS	Concession Contract	Interpretive Tour	Matthew Mankowski
YELL	YELL Snow Coaches	Shuttle/Bus/ Van/Tram	28,195	NPS; Non-NPS	Concession Contract	Interpretive Tour	Matthew Mankowski
ZION	Zion Shuttle	Shuttle/Bus/ Van/Tram	4,383,151	NPS	Service Contract	Critical Access	Lisa Ogden

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

Park Code	System Name	Vehicle Type	2022 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
CHIS	Island Packers	Ferry/Boat	80,223	Non-NPS	Concession Contract	Critical Access	John Hansen
CRLA	Crater Lake Boat Tour	Ferry/Boat	2,429	Non-NPS	Concession Contract	Interpretive Tour	Sean Denniston
CRLA	Rim Drive Trolley Tour	Shuttle/Bus/ Van/Tram	9,824	Non-NPS	Concession Contract	Interpretive Tour	Sean Denniston
DEPO	Reds Meadow Shuttle Bus	Shuttle/Bus/ Van/Tram	54,013	Non-NPS	Cooperative Agreement	Critical Access	Kevin Killian
EUON	NPS Shuttle	Shuttle/Bus/ Van/Tram	1,386	NPS	NPS Owned and Operated	Critical Access	Thomas Leatherman
GOGA/ ALCA	Alcatraz Cruises Ferry	Ferry/Boat	1,327,939	Non-NPS	Concession Contract	Critical Access	Alice Young
MUWO	Muir Woods Shuttle	Shuttle/Bus/ Van/Tram	75,310	Non-NPS	Cooperative Agreement	Mobility to Or Within Park	Darren Brown
NOCA/ LACH	Concession Shuttle	Shuttle/Bus/ Van/Tram	Did Not Operate	Non-NPS	Concession Contract	Non-NPS	Annelise Lesmeister
NOCA/ ROLA	Rainbow Falls Tours	Shuttle/Bus/ Van/Tram	Did Not Operate	NPS	Concession Contract	Interpretive Tour	Annelise Lesmeister
NOCA/ ROLA	Ross Lake Hiker Shuttle	Ferry/Boat	Did Not Operate	Non-NPS	Concession Contract	Transportation Feature	Annelise Lesmeister
PERL	Ford Island Bus Tour	Shuttle/Bus/ Van/Tram	1,542	Non-NPS	Service Contract	Interpretive Tour	Daniel Brown
PERL	Missouri/PHAM Shuttle	Shuttle/Bus/ Van/Tram	294,601	Non-NPS	Cooperative Agreement	Interpretive Tour	Daniel Brown
PERL	USS Arizona Memorial Tour	Ferry/Boat	766,055	Non-NPS	Cooperative Agreement	Interpretive Tour	Daniel Brown

Park Code	System Name	Vehicle Type	2022 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
PINN	Pinnacle Shuttle	Shuttle/Bus/ Van/Tram	52,475	NPS	NPS Owned and Operated	Mobility to or within Park	James Dukich
PORE	Headlands Shuttle	Shuttle/Bus/ Van/Tram	Did Not Operate	Non-NPS	Critical Access	Service Contract	Brannon Ketcham
SEKI	Giant Forest Shuttle	Shuttle/Bus/ Van/Tram	733,477	Non-NPS	Cooperative Agreement	Critical Access	Joshua Handel
SEKI	Gateway Shuttle	Shuttle/Bus/ Van/Tram	7,438	Non-NPS	Cooperative Agreement	Mobility to or within Park	Joshua Handel
YOSE	Tram Tours and Hiker Shuttle	Shuttle/Bus/ Van/Tram	28,053	Non-NPS	Concession Contract	Interpretive Tour	Jim Donovan
YOSE	Winter Ski Shuttle	Shuttle/Bus/ Van/Tram	419	Non-NPS	Concession Contract	Mobility to or within Park	Jim Donovan
YOSE	YARTS: Yosemite Area Regional Transportation System	Shuttle/Bus/ Van/Tram	71,603	Non-NPS	Cooperative Agreement	Mobility to or within Park	Jim Donovan
YOSE	Mariposa Grove Transportation Service	Shuttle/Bus/ Van/Tram	305,458	NPS	Service Contract	Critical Access	Jim Donovan
YOSE	Yosemite Valley Shuttle	Shuttle/Bus/ Van/Tram	1,015,082	NPS	Concession Contract	Mobility to or within Park	Jim Donovan

Interior Region 11 – Alaska

Park Code	System Name	Vehicle Type	2022 Passenger Boardings	Vehicle Ownership	Agreement Type	Purpose	NPS Contact Name
DENA	Bus Tours and Shuttle Service	Shuttle/Bus/ Van/Tram	340,258	Non-NPS	Concession Contract	Critical Access	Jim LeBel
GLBA	Day Boat Tour	Ferry/Boat	6,969	Non-NPS	Concession Contract	Interpretive Tour	Melanie Berg
GLBA	Airport Shuttle	Shuttle/Bus/ Van/Tram	8,782	Non-NPS	Concession Contract	Transportation Feature	Melanie Berg

Table 12: Recategorization of vehicle types

Note: Includes all fleet data regardless of 2022 active operational status
Sources: 2021 and 2022 NPS transit inventory data

Vehicle Type	2021 Vehicles	2022 Vehicles	Difference
Ferry/Boat	**118**	**106**	**-12**
NPS Owned	16	18	2
Non-NPS Owned	102	88	-14
Van/SUV/Sedan	**15**	**18**	**3**
NPS Owned	2	3	1
Non-NPS Owned	13	15	2
Passenger Van	**125**	**121**	**-4**
NPS Owned	31	21	-10
Non-NPS Owned	94	100	6
Light-Duty Shuttle	**35**	**42**	**7**
NPS Owned	13	20	7
Non-NPS Owned	22	22	0
Medium-Duty Shuttle	**93**	**106**	**13**
NPS Owned	71	74	3
Non-NPS Owned	22	32	10
Medium-Duty Transit (Bus)	**80**	**78**	**-2**
NPS Owned	36	34	-2
Non-NPS Owned	44	44	0
Heavy-Duty Transit (Bus)	**226**	**216**	**-10**
NPS Owned	66	68	2
Non-NPS Owned	160	148	-12
School Bus	**115**	**119**	**4**
NPS Owned	7	7	0
Non-NPS Owned	108	112	4
Snowmobile/Snow coach	**12**	**20**	**8**
NPS Owned	12	12	0
Non-NPS Owned	0	8	8
Tram/Golfcart	**21**	**24**	**3**
NPS Owned	10	12	2
Non-NPS Owned	11	12	1
Train/Trolley/Streetcar	**21**	**22**	**1**
NPS Owned	5	5	0
Non-NPS Owned	16	17	1
Aircraft	**3**	**2**	**-1**
NPS Owned	0	0	0
Non-NPS Owned	3	**2**	**-1**
Total	**864**	**874**	**10**
NPS Owned	269	274	5
Non-NPS Owned	595	600	5

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[23] to reflect the usage and operating characteristics of NPS vehicles (tables 10 and 11). National Park Service vehicles are not used in the same way that city transit vehicles are used; 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.

In January 2022, the National Park Service requested an updated expected service life for vehicles on public lands and a discussion on shuttle bus versus transit bus configurations from the Volpe Center (US Department of Transportation).

Shuttle Bus versus Transit Bus Configurations and Expected Service Life

The on-road vehicle types common to the NPS transit systems are passenger vehicles, passenger vans, light- and medium-duty shuttle buses, medium- and heavy-duty transit buses, and school buses. Table 11 shows common transit vehicle types and essential information on size, cost, and life expectancy. The general information and delineations between categories discussed below are generic descriptions for vehicle type classification.

A key distinction among light- and medium-duty buses are the "shuttle" versus "transit" configuration.

Shuttle Bus Configuration

A shuttle bus is built of a mass-produced "stripped chassis" or "cutaway" platform that is derived from a domestic truck or van chassis (such as Dodge, Ford, General Motors). These chassis include a cab, powertrain, frame, suspension, wheels, brakes, and driveline but do not have a typical truck or van body built over the back of the frame. Instead, a specialty manufacturer will build a shuttle bus passenger compartment on the stripped chassis. Shuttle buses are sometimes referred to as "high floor buses" or "cutaways" due to having the passenger compartment built on top of the stripped chassis.

The raised passenger compartment requires steps to enter and exit, and accessibility compliance is commonly achieved with a wheelchair lift at the back of the vehicle. The shuttle bus typically has a shorter rated life expectancy than an equivalent capacity transit

[23] 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.

bus option. However, the shuttle bus options are less expensive to build and buy, offering an economical choice for transit systems.

Transit Bus Configuration

The transit bus is built as a dedicated platform by the vehicle manufacturer for transit operations. Typical manufacturers include Build Your Dream, El Dorado, Gillig, Bluebird, New Flyer, NA Bus Industries, and Proterra. The frame, engine, drivetrain, suspension, brakes, and other Significant components, like the frame, engine, drivetrain, suspension, and brakes, and detail components, like doors and electronics, are built to a more robust standard to survive operations in urban, continuous transit environments.

The frame and chassis are more costly to build due to their lower volume,[24] dedicated design, robust construction, and a "low floor" configuration. The lower floor provides access to the vehicle for most uses, and most vehicles have a deployable accessible ramp. As a result of their construction, transit buses are nearly twice as expensive as an equivalently sized shuttle bus. However, transit buses have a longer rated life expectancy and can survive harder more continuous use.

Some vehicles may cross boundaries between categories. For example, some passenger vans are built with a transit chassis, and configurations and smaller "light-duty" shuttle-bus categories are built with transit-style features and even dedicated chassis for battery-electric options.

Battery-Electric Buses

Given the new nature of battery-electric configurations in shuttle bus and transit bus applications, there remain critical unknowns as they pertain to long-term performance, durability, reliability or "uptime," and their expected life. Electric vehicle manufacturers promise lower maintenance requirements and longer life expectancies than an internal combustion engine-powered vehicle.

However, battery-electric transit buses have only become available within the past decade, and most in operation are yet to reach their rated lifespans. Foothill Transit has operated battery-electric buses since 2010, partnering with the National Renewable Energy Laboratory to evaluate the performance of their buses, for which a final report was published in 2021.[25] Unfortunately, the transit operator has contacted the Federal Transit Administration requesting to retire several buses early due to costly repairs and poor reliability, stating their buses were not able to achieve their rated life of 12-years.[26]

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[24] Lower production volumes compared to commercial trucks.

[25] https://www.nrel.gov/docs/fy21osti/80022.pdf.

[26] https://www.dailybulletin.com/2021/07/22/with-50-of-its-buses-inoperable-foothill-transit-searches-for-a-way-to-fix-its-fleet/.

Given the uncertainties surrounding component replacement costs and the long-term durability of battery-electric buses, their expected life in public lands applications is equivalent to their rated lifespan. A longer life expectancy for public lands use is not anticipated at this time, as it is often achieved with traditionally fueled vehicles.

Table 13: Summary of vehicles on public lands

Notes: CNG=compressed natural gas; N/A=not applicable
Source: Transit standards[27] updated to reflect NPS typical usage and operating characteristics

Vehicle Type	Purchase Cost	Rated Life	Expected Life in Public Lands (years)	Capacity	Fuels
Electric/Small Tram	$25,000 – $35,000	N/A	3–5	6–12	Electric (battery), Gas Small Engine
Passenger Van, Car, Truck, SUV	$25,000 – $85,000	5 years 100,000 miles	5–10 (gas/diesel) 5–7 (electric)	6–15	Diesel, Gas, Electric
Light-Duty Shuttle	$75,000 – $120,000	7 years 200,000 miles	7–10 (gas/diesel hybrid) 7 (electric)	12–28	Diesel, Gas, Hybrid,
Light-Duty Low-Floor	$400,000 – $475,000	7 years 200,000 miles (anticipated)	8–10* (electric) *8-year warranty on bus and batteries	25–31	Electric
Medium-Duty Shuttle	$100,000 – $175,000	7 years 200,000 miles	7–10 (gas/diesel hybrid) 7 (electric)	28–36	Diesel, Gas, Hybrid
Medium-Duty Transit	$200,000 – $300,000	10 years 350,000 miles	15–20 (Diesel, Gas, Propane)	28–40	Diesel, Gas, Hybrid
Heavy Duty Transit	$475,000 – $1,200,000	12 years 500,000 miles	20+ (Diesel, CNG, Hybrid) 12 (electric)	35–45	CNG, Diesel, Hybrid, Electric

[27] Ibid.

Concurrently, a review of vehicle costs on the General Services Administration was completed to look for current actual costs of vehicles. A comparison with Volpe's findings was completed, and the conservative life expectancies and costs were used in the national transit inventory and are included in the below tables.

Table 14: Vehicle replacement costs (in 2021 dollars) and expected life for nonelectric vehicles

Notes: CNG=compressed natural gas; N/A=not applicable
Source: Transit standards[28] 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, Car, Truck, and SUV	$35,640	5–10	N/A	N/A
Light-Duty Shuttle	$110,000	7–10	$115,000	10
Medium-Duty Shuttle	$150,000	7–10	$150,000	10
Medium-Duty Transit	$350,000	15–20	$350,000	20
Heavy-Duty Transit	$500,000	20+	$1,250,000	20
School Bus	$150,000	15–20	N/A	N/A
Tram/Golf Cart	N/A	3–5	N/A	11

[28] Ibid.

Table 15: Vehicle replacement costs (in 2021 dollars) and expected life for electric vehicles

Note: N/A=not applicable
Source: Transit standards[29] 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[30] (years)
Passenger Van, Car, Truck, and SUV	$25,000 – $85,000	5–7	$110,000	10
Light-Duty Shuttle	$150,000	7	$225,000	12
Medium-Duty Shuttle	$500,000	7	$700,000	12
Medium-Duty Transit	$700,000	15	$1,000,000	12
Heavy-Duty Transit	$1,250,000	12	$1,250,000	12
School Bus	N/A	8–10	$500,000	12
Tram/Golf Cart	$25,000 – $35,0000	3–5	$25,000 – $35,0000	11

A major recapitalization baselining effort was undertaken as part of the 2019 transit inventory. The National Park Service 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, the Parks Transportation Allocation and Tracking System and Project Management Information System 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.

[29] 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.

[30] The batteries will need to be replaced prior to the end of the expected life.

Table 16: 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
2023	42	$70,050,528.63
2024	36	$15,271,556.93
2025	34	$17,964,160.47
2026	21	$22,563,090.94
2027	20	$18,516,914.26
2028	16	$14,218,771.50
2029	15	$9,614,773.97
2030	17	$7,092,882.85
2031	5	$2,301,720.48
2032	11	$9,402,112.19
2033	11	$15,072,220.34
Total	**228**	**$202,068,732.56**

Appendix G – Air Quality and Emissions

Since 2017, the transit inventory has used an updated methodology to analyze the air quality and greenhouse gas impacts of NPS transit systems. The analysis uses the US Environmental Protection Agency's Motor Vehicle Emissions Simulator (MOVES) for estimating emissions by transit vehicles.[31] MOVES is a state-of-the-science emissions modeling software that estimates airborne emissions from various on-road vehicles across several vehicle types at very fine scales. MOVES uses years of direct measurements to account for how different vehicles, fuel types, road types (e.g., urban versus rural, highways versus local streets), and emission processes (e.g., running, starting, and idling) contribute to air pollution. This process allows MOVES to calculate emissions from both on-road vehicles, such as transit buses, and off-road vehicles, such as waterborne vessels and trams. Emissions from ferries, boats, and trams were estimated by using similar on-road engines in MOVES. The latest version of MOVES, MOVES 3.1, was released in November 2022.

Since MOVES is the Environmental Protection Agency'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 emissions modeling methods used in years prior to 2017, please see the *NPS Transit Inventory and Performance Report 2017*.[32]

Pollutants

The following pollutants are included in the 2022 air quality analysis:

Carbon Dioxide (CO_2) [33]

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 (NO_x) and Volatile Organic Compounds

Nitrogen oxides are a collection of gaseous molecules containing one nitrogen atom and several oxygen atoms. As with the other pollutants described here, fuel combustion emits nitrogen oxides. While upper-atmospheric nitrogen oxides can counteract the warming

[31] Latest version of MOVES: https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves.

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

[33] Intergovernmental Panel on Climate Chante (IPCC) 2021, "Climate Change: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change."

effects of greenhouse gases, ground-level NO_x molecules react with other airborne chemicals to become particles that can cause respiratory conditions in humans.[34]

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.[35]

Nitrogen oxides and volatile organic compounds are precursors to ozone (O_3), a highly reactive gas. Stratospheric ozone forms the protective ozone layer, which deflects harmful solar radiation away from Earth's surface. However, nitrogen oxides and volatile organic compounds interact at the surface and 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.[36]

Carbon Monoxide (CO) [37]

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) [38]

Particulate matter (PM) encompasses solid and liquid particles emitted into the air, including dust, soot, and aerosolized chemicals. 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 (PM_{10})—as well as those 2.5 micrometers and smaller ($PM_{2.5}$). Particulate matter can come from

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[34] US Environmental Protection Agency, "NO_x: How Nitrogen Oxides Affect the Way We Live and Breathe." September 1998

[35] Ibid.

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

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

[38] Ibid.

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 PM_{10} particles. Exposure to particulate matter can cause and aggravate respiratory conditions such as asthma; this is especially true of PM_{10} particles. $PM_{2.5}$ particles are a major contributor to smog, which both obscures views and damages natural resources.

Results

The COVID-19 pandemic had a significant impact on passenger vehicle miles traveled and transit system operation in parks in 2020 and 2021. However, transit system activity started to rebound in 2022. Vehicle miles traveled across all regions increased 385% from 2021 and 601% from 2020 levels. The increased emissions level is directly related to the number of operational systems and increased operations of systems nationwide.

Table 17 shows transit system vehicle miles traveled and ferry hours by region in 2022. The sections below describe passenger vehicle trips avoided because of transit use, as well as individual pollutant emissions from transit system fleets by region.

Table 17: Total transit system vehicle miles traveled and ferry hours by region

Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service

Interior Region	Vehicle Miles Traveled	Ferry Hours
Regions 6, 7, 8	15,700,776	5,706
Region 1 – National Capital Area	1,359,101	0
Regions 3, 4, 5	59,515	14,168
Region 2	192,969	13,861
Region 11	562,814	824
Region 1	1,586,755	1,276
Regions 8, 9, 10, 12	491,593	8,022
Total	**19,953,523**	**43,857**

Diverted Passenger Vehicle Trips and CO_2 Emissions Avoided

Although transit systems contribute to emissions, transit in NPS units typically has a net positive effect on air quality, as well as the visitor experience. Transit use reduces the number of vehicle trips in parks—for example, transit buses carry more people per square foot of road space, relieving congestion on park roads and eliminating associated fuel-inefficient driving behaviors, such as extended idling and stop-and-go. In addition to the air quality benefits of reduced fuel use per visitor, expanded transit use influences how visitors spend their time in the park and removes long lines of cars from viewsheds.

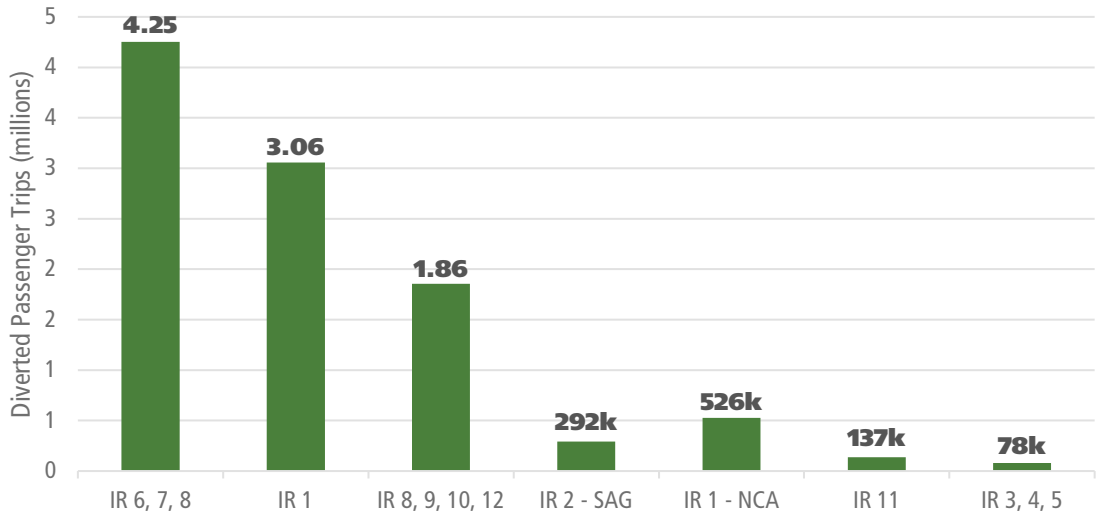
Figure 14 shows the estimated number of vehicle trips eliminated because of transit use in each region. The number of passenger vehicle trips diverted is calculated by dividing the total number of passenger boardings by the average occupancy of visitors' personal vehicles (assumed to be 2.6). Emissions avoided are calculated as the vehicle miles traveled avoided multiplied by a passenger vehicle emissions factor (EF_p) for a given pollutant, assuming that the passenger vehicles use conventional gasoline fuel.[39]

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

National Park Service transit services eliminated an estimated 10.2 million passenger vehicle trips in 2022, which equates to 617 million fewer miles driven and a reduction in carbon dioxide emissions of 213,656 metric tons.[40] Interior Regions with higher transit use and more boardings, namely Region 1 and Regions 6, 7 and 8, experience more personal vehicles diverted from the road. Figure 15 shows the carbon dioxide emissions avoided per region.[41]

Figure 14: Vehicle trips (in millions) avoided because of NPS transit systems

Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service
Source: 2021 NPS transit inventory data



[39] Total transit VMT is calculated as the on-road VMT only, while total transit runs includes runs for all vehicle types.

[40] Transit systems helped divert nearly 44,000 metric tons of CO_2 in 2020 and 177,000 metric tons in 2019.

[41] The average vehicle miles traveled per run across all regions was used to calculate region-specific CO_2 emissions avoided.

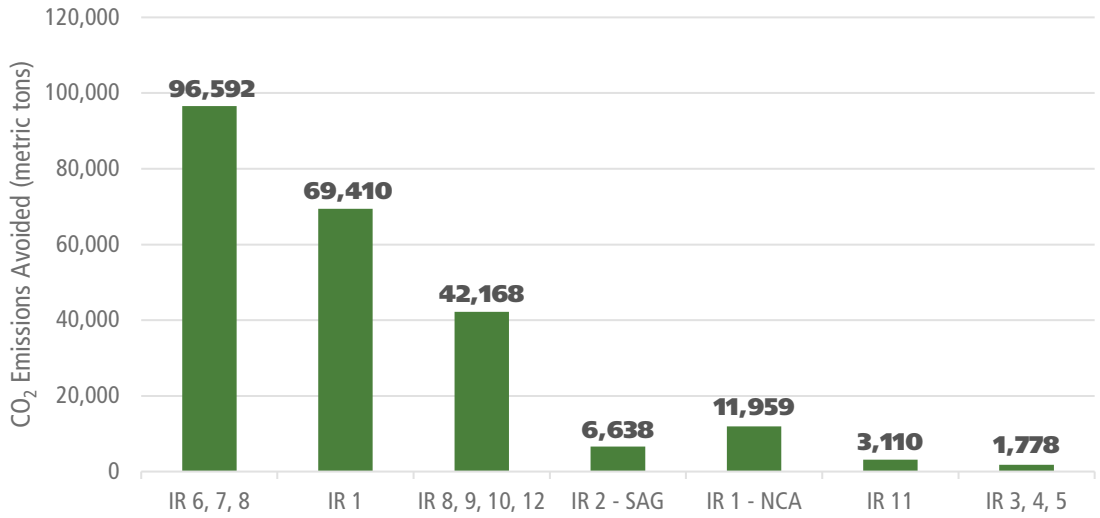
Table 18: Diverted passenger trips and CO_2 emissions avoided

Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service

	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	4,252,958	3,056,135	1,856,664	292,288	526,570	136,927	78,264
CO_2 Emissions Avoided (metric tons)	96,592	69,410	42,168	6,638	11,959	3,110	1,778

Figure 15: Carbon dioxide emissions avoided (in metric tons) per regions

Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service
Source: 2022 NPS transit inventory data



Criteria Pollutant Emissions Inventories

The following section details the emissions inventories for criteria pollutants and their precursors across the fleets operating in national parks. Vehicle fuel type and terrain type were observed to influence the emissions results. Diesel use results in 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 and generate more road dust from brake and tire wear compared to paved roads. However, fewer vehicles burning fuel has a net positive effect on local air quality in national parks.

Table 19: Comparison of emission results

Source: 2020–2022 NPS transit inventory data

Metrics	2020	2021	2022	Change 2022 vs. 2021 (percent)	Change 2022 vs. 2020 (percent)
Number of Operating Systems	66	63	81	29%	23%
Count of Vehicles	913	803	817	2%	-11%
Miles Traveled	3,408,710	4,925,288	19,953,523	305%	485%
Ferry Hours	19,735	38,409	43,857	14%	122%
Carbon Dioxide Emissions	12,873.50	22,491	54,291.98	141%	322%
Nitrogen Oxide Emissions	90.18	187.68	319.8	70%	255%
Volatile Organic Compound Emissions	8.10	20.60	35.40	72%	337%
Carbon Monoxide Emissions	91.18	183.27	370.10	102%	306%
Particulate Matter 2.5	1.79	3.81	6.26	64%	250%
Particulate Matter 10	2.13	4.29	8.08	88%	279%

Figure 16 shows the results of MOVES carbon dioxide (CO_2) emissions modeling for 2022 NPS transit system activity, aggregated to the regional level. The results are also split by ownership (NPS versus non-NPS systems). Across all regions, NPS transit fleets emitted 24,163 metric tons of CO_2 in 2022. Interior Regions 6, 7, and 8 have the highest vehicle miles traveled of all the regions, thus resulting in high CO_2 emissions. However, Interior Regions 8, 9, 10, and 12 have the highest CO_2 emissions, due to a high proportion of ferries using marine diesel, which produces more CO_2 than the diesel used in on-road vehicles. In comparing CO_2 emitted by transit systems versus CO_2 emissions from passenger vehicles avoided due to transit use, there is a total net reduction in CO_2 of 11,959 metric tons across all regions.

Figure 16: NPS transit system carbon dioxide emissions

Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service
Source: 2022 NPS transit inventory data

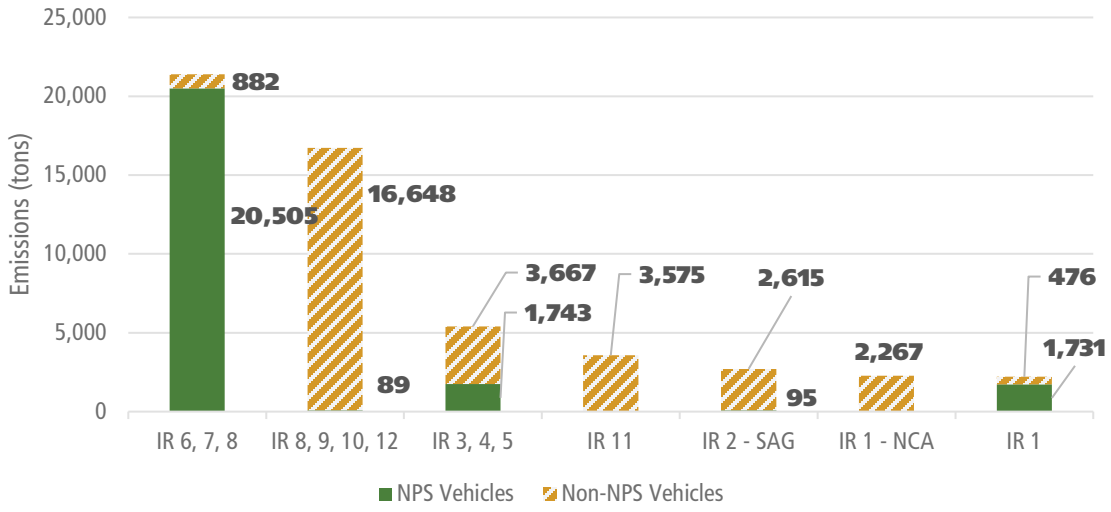


Figure 17 shows the results of MOVES nitrous oxide (NO_x) emissions modeling for 2022 NPS transit system activity, split by ownership. Across all regions, NPS transit fleets emitted 93 metric tons of NO_x in 2022. Like the CO_2 emissions, Interior Regions 8, 9, 10 and 12 (Pacific West Region) have high NO_x emissions, due to the large number of ferries operating in the region, while Interior Regions 7, 8, and 9 have the highest NO_x emissions, due to the region having highest overall vehicles miles traveled.

Figure 17: NPS transit system nitrogen oxide emissions

Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service
Source: 2022 NPS transit inventory data

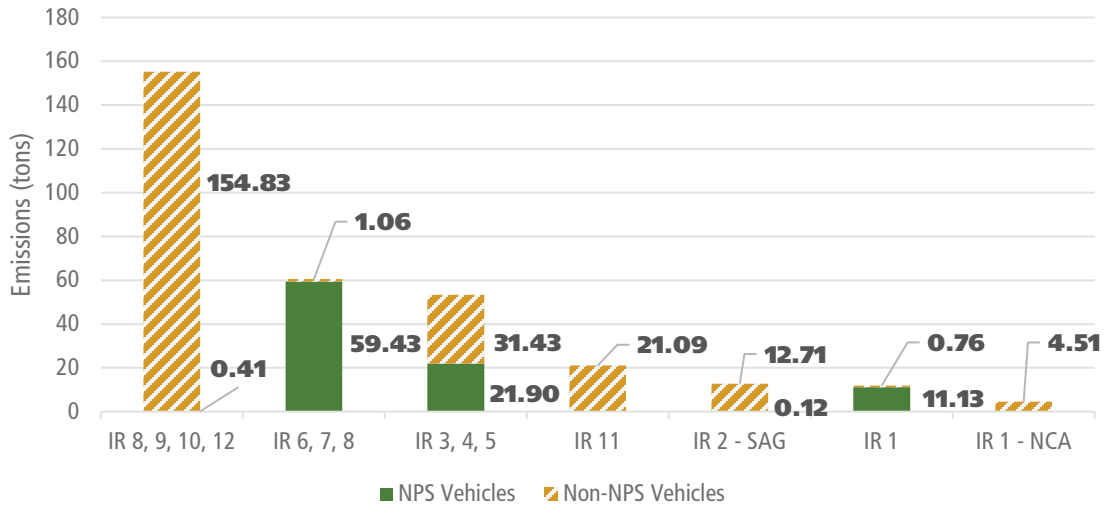


Figure 18 shows the results of MOVES volatile organic compound emissions modeling for 2022 NPS transit system activity, split by vehicle ownership. Across all regions, NPS transit fleets emitted 10.3 metric tons of volatile organic compounds in 2022. Volatile organic compounds combine with other airborne compounds, including NO_x, to produce ozone and photochemical smog.

The NPS fleet in Interior Region 2 emits the highest amounts of volatile organic compounds, as this region has a substantial proportion of vehicles powered by marine diesel and propane. Similarly, the non-NPS fleet in Interior Regions 8, 9, 10 and 12 consists of a large proportion of ferries and boats powered by marine diesel. The heavy use of propane-fueled vehicles in the Interior Regions 6, 7 and 8 NPS-owned fleet, as well as the decreased efficiency of propane combustion at higher altitudes, where there is less oxygen, results in greater volatile organic compounds.

Figure 18: NPS transit system volatile organic compound emissions

Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service
Source: 2022 NPS transit inventory data

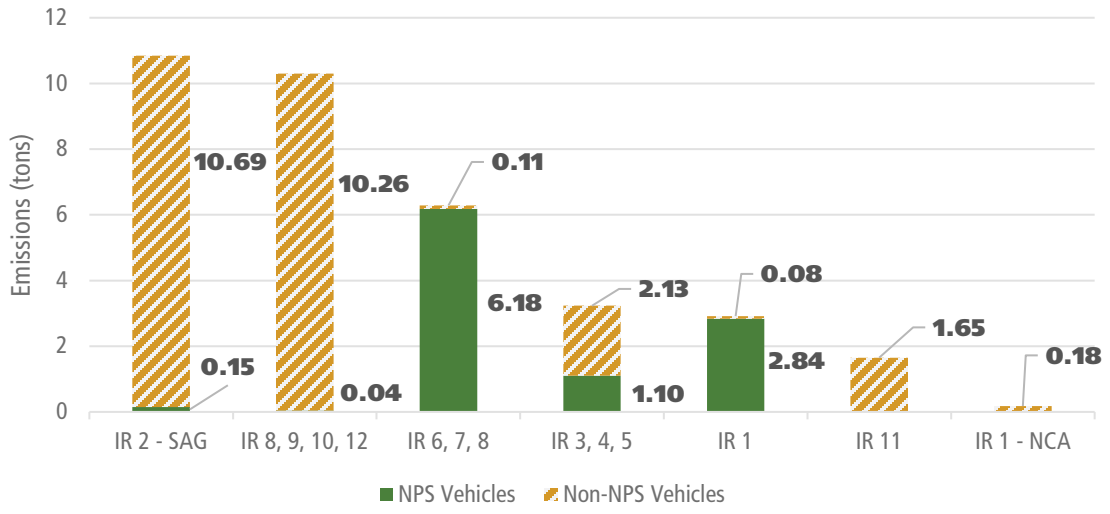


Figure 19 shows the results of MOVES carbon monoxide (CO) emissions modeling for 2022 NPS transit system activity, split by vehicle ownership. Across all regions, NPS transit fleets emitted approximately 180 metric tons of carbon monoxide in 2022. The Grand Canyon's heavy use of compressed natural gas (CNG)-fueled buses and shuttles contributes significantly to Interior Region 6, 7 and 8's high relative carbon monoxide emissions. Compressed natural gas buses emit substantially more carbon monoxide than conventional fuels but 50% less NO_x. Since NO_x is an ozone precursor, CNG-fueled vehicles are ideal for minimizing smog—a key consideration in parks with long-distance viewsheds. The large number of propane-powered transit vehicles operated at higher altitudes in Interior Regions 6, 7 and 8 also contributes to increased carbon monoxide emissions.

Figure 19: NPS transit system carbon monoxide emissions

Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service
Source: 2022 NPS transit inventory data

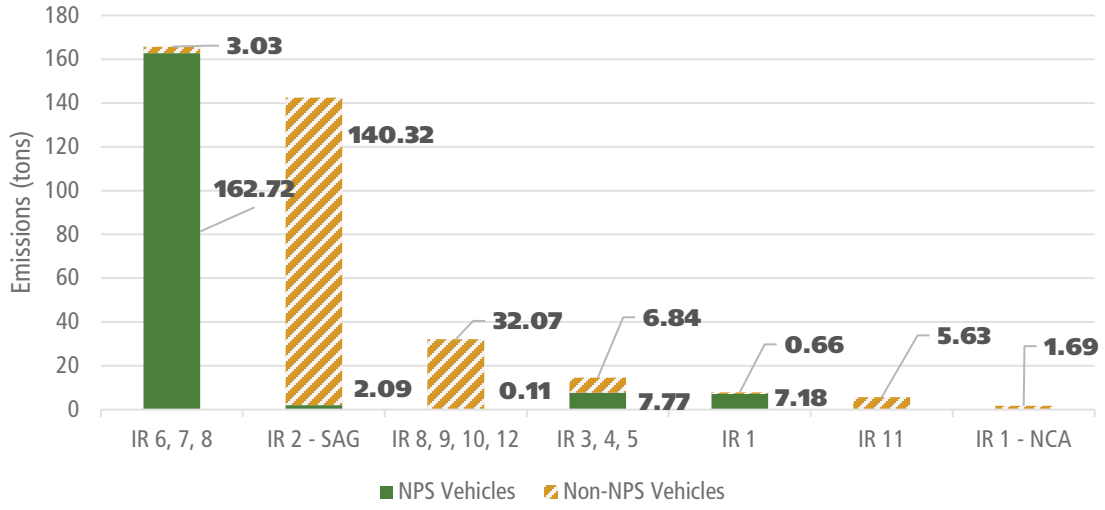


Figure 20 shows the results of MOVES $PM_{2.5}$ emissions modeling for 2022 NPS transit system activity, split by ownership. Across all regions, NPS transit fleets emitted approximately 1.8 metric tons of $PM_{2.5}$ in 2022. Breathing air with high levels of $PM_{2.5}$ can result in adverse health impacts, including increased risk of cardiovascular disease and asthma.

Ferries that run on marine diesel, as well as buses fueled by propane, emit significantly more particulate matter than vehicles powered by other fuels. Several parks in Interior Regions 8, 9, 10, and 12 include exclusively marine transit fleets, and the Pictured Rocks Cruises ferry fleet contributes the majority of the Interior Region 3, 4, and 5 $PM_{2.5}$ emissions. In Interior Regions 6, 7, and 8, ferries at Glen Canyon and Grant Teton and the propane bus fleet at Zion increase $PM_{2.5}$ emissions in this region.

Figure 20: NPS transit system $PM_{2.5}$ emissions

Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service
Source: 2022 NPS transit inventory data

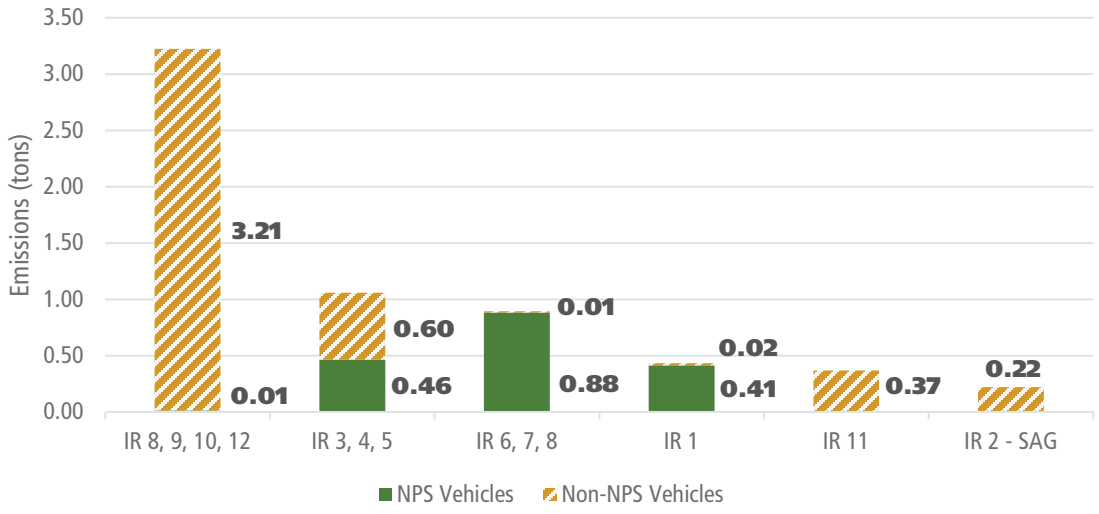
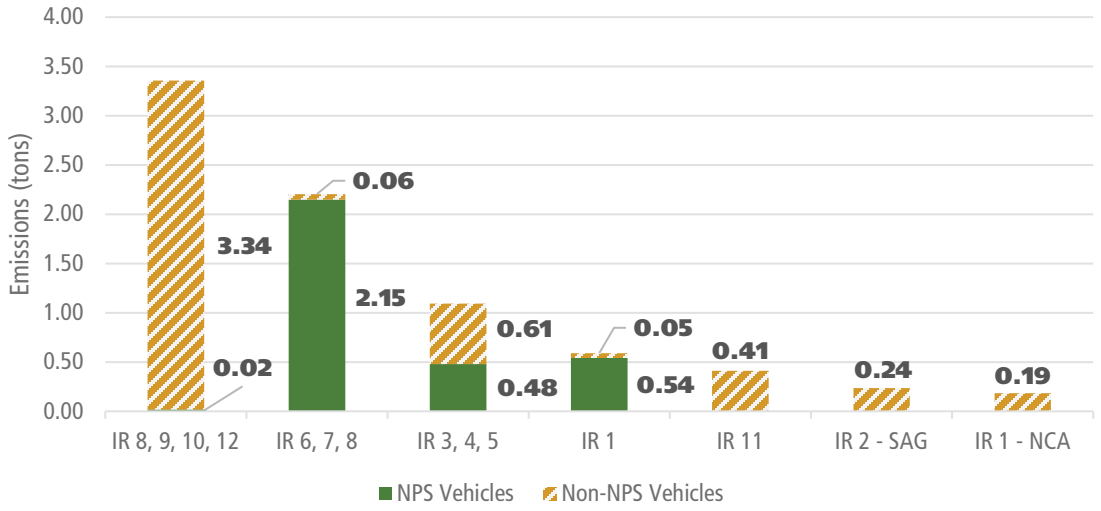


Figure 21 shows the results of MOVES PM_{10} emissions modeling for 2022 NPS transit system activity, split by ownership. Across all regions, NPS transit fleets emitted about 3.2 metric tons of PM_{10} in 2022. Some regions produce more PM_{10} than $PM_{2.5}$, in part due to transit systems operating on unpaved roads, which can result in release of larger particles as fugitive dust.

Figure 21: NPS transit system PM_{10} emissions

Notes: IR=Interior Region; NCA=National Capital Area; NPS=National Park Service
Source: 2022 NPS transit inventory data



Across all pollutant types, the majority of emissions came from non-NPS vehicles rather than NPS vehicles. Additionally, Interior Regions 6, 7 and 8 and Interior Regions 8, 9, 10 and 12 generally had the highest emissions compared to the other regions. CO_2 emissions were far greater than any of the other pollutants on the basis of mass, which is consistent with the Environmental Protection Agency's 2017 National Emissions Inventory.[42] Nonetheless, emissions from NPS vehicles in 2021 had a minimal impact on the national inventory. In particular, volatile organic compounds, $PM_{2.5}$, and PM_{10} emissions from NPS vehicles were negligible compared to any other sector and major emitting source in the national emissions inventory (e.g., agriculture, power generation).

[42] US Environmental Protection Agency. 2017 National Emissions Inventory Data: https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data.

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