



## *Pacific West Region*

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# *Long Range Transportation Plan*

*A 20-year plan for guiding transportation infrastructure management and investment in the Pacific West Region*

**2015 - 2035**  
PWRO JUNE 2015



# Pacific West Region Long Range Transportation Plan June 2015

## Prepared by

Justin De Santis, Transportation Program Manager, Pacific West Region

## Acknowledgements

Dianne Croal, Alternative Transportation Program Manager, Pacific West Region

Dave Kruse, Chief, Facility Management, Pacific West Region

Bill Eshbaugh, Pavement Management System Manager, FHWA/Eastern Federal Lands Highway Division

Yohannes Mesfin, Structural Engineer, FHWA/Eastern Federal Lands Highway Division

Quinn Nguyen, Bridge Management Team Leader, FHWA/Eastern Federal Lands Highway Division

Tom Ronay, FMP Coordinator, Pacific West Region

Edited by Suzanne Brinkley, Partnerships Program, Pacific West Region

*Cover photo: Northeast side of Mount Rainier, with the Sunrise Road providing access to the subalpine meadows of Yakima Park (photo by John Chao)*

*Back photo: Bridge over Halstead Meadow, Sequoia National Park (photo by NPS)*

*Cover design: Brad Phillips, Park Planning and Environmental Compliance, Pacific West Region*



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## Executive Summary

This plan identifies existing and future transportation needs for national parks in the Pacific West Region (PWR) through the year 2035. Significant gaps are expected between projected funding and estimated needs, in particular for preventive maintenance and operations, rehabilitation of roadways and parking areas, and recapitalization of transit vehicles. Insufficient past funding has left transportation infrastructure in need of extensive repairs and major investments just to maintain existing facilities and levels of service. Very few major capital investments or new construction projects have been built in recent years to either add new roadway capacity or provide for new transit service connections, despite increasing congestion problems at a number of park sites. Ninety-nine percent of the cost for work identified in PWR's current transportation project priority lists is for maintenance, repair or recapitalization of existing roadway, parking and transit assets, as opposed to new construction or new service.

By 2035 the total gap between projected annual funding (\$132 million) and estimated annual needs (\$194 million) for the Pacific West Region will be \$62 million. Implementation of the Capital Investment Strategy (CIS) will help to lengthen the service life for transportation assets that are identified as high priority, and keep annual maintenance requirements in balance by matching the core asset portfolio to the amount of operational funds available. Roadway rehabilitation is the largest element of the transportation program that is projected to be underfunded. However, there are other important future needs that won't be fully met, which include

- efforts to proactively address climate change impacts to facilities;
- implementing environmentally beneficial facility improvements such as providing for better fish passage and reducing wildlife-vehicle collisions;
- providing maintenance for future, as yet un-built capital projects;
- providing for transit recapitalization;
- adopting evolving communication technologies to relieve transportation congestion problems;
- providing for accessibility to comply with the *Architectural Barriers Act* standards;
- rehabilitating aging and dilapidated roadway features on historic roads and bridges; and
- removal of facilities that are decommissioned either due to lack of funding for operation and regular maintenance, or susceptibility to frequent, recurring damage from floods, landslides or rising seawaters.

This document offers a fiscally constrained plan aimed at maintaining safe and enjoyable visitor access to essential experiences in PWR parks. The investment strategy focuses on high priority assets for rehabilitation and preservation, and is aligned with the CIS for reinvesting in assets that superintendents have committed adequate operational and annual maintenance dollars. The current gap between funding and identified need will grow mainly as a result of steady increases in deferred maintenance, as calculated if there is no increase in PWR's purchasing capacity for rehabilitation and regular maintenance. Even with full investment in bridge and pavement preservation programs, roadway conditions will continue to decline as inevitable aging and deterioration outpaces the

financial capacity to rehabilitate all the facilities for which there is a need. Costs for transit operations and recapitalization of vehicles may also pose a challenge for managers at some parks.

Maintaining access and providing for visitor enjoyment under these conditions will depend on several key strategies:

- Priority will remain on functional class one and two roadways.
- Recapitalization will be focused on assets in CIS optimizer bands one and two.
- Prioritization for funding will go to projects that serve visitor areas and activities that are closely linked to the park's purpose and can't be substituted at another location within the park.
- Capital investments/new construction will be very limited in order to conserve funds for repairs to existing facilities.
- Roads, parking areas and transit systems may need to be removed or downsized in order to bring inventory in line with budgets.
- With regard to global climate change, careful consideration, including life-cycle cost analysis, must be made before major reinvestment in transportation facilities. This is especially applicable to those facilities that are vulnerable to increasingly severe or frequent storm damage or sea-level rise.



# Pacific West Region National Park Service U.S. Department of the Interior



Produced by the Pacific West Region GIS Program

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**Table 1: List of the Pacific West Region Parks**

<b>Park Alpha</b>	<b>Park Name</b>	<b>State/Territory</b>
ALKA	Ala Kahakai National Historic Trail	HI
AMME	American Memorial National Park	NMI
BIHO	Big Hole National Battlefield	WY
CABR	Cabrillo National Monument	CA
CECH	Cesar E. Chavez National Monument	CA
CHIS	Channel Islands National Park	CA
CIRO	City of Rocks National Reserve	ID
CRLA	Crater Lake National Park	OR
CRMO	Craters of the Moon National Monument & Preserve	ID
DEPO	Devils Postpile National Monument	CA
DEVA	Death Valley National Park	CA
EBLA	Ebey's Landing National Historical Reserve	WA
EUON	Eugene O'Neill National Historic Site	CA
FOPO	Fort Point National Historic Site	CA
FOVA	Fort Vancouver National Historic Site	WA
GOGA	Golden Gate National Recreation Area	CA
GRBA	Great Basin National Park	NV
HAFO	Hagerman Fossil Beds National Monument	ID
HALE	Haleakala National Park	HI
HAVO	Hawaii Volcanoes National Park	HI
JODA	John Day Fossil Beds National Monument	OR
JOMU	John Muir National Historic Site	CA
JOTR	Joshua Tree National Park	CA
JUBA	Juan Bautista de Anza National Historic Trail	CA
KAHO	Kaloko-Honokohau National Historic Park	HI
KALA	Kalaupapa National Historic Park	HI
KLSE	Klondike Gold Rush National Historic Park – Seattle Unit	WA
LABE	Lava Beds National Monument	CA
LAME	Lake Mead National Recreation Area	NV
LARO	Lake Roosevelt National Recreation Area	WA
LAVO	Lassen Volcanic National Park	CA
LEWI	Lewis and Clark National Historic Park	WA
MANZ	Manzanar National Historic Site	CA
MIIN	Minidoka Internment National Monument	ID
MOJA	Mojave National Reserve	CA
MORA	Mount Rainier National Park	WA
MUWO	Muir Woods National Monument	CA

<b>Park Alpha</b>	<b>Park Name</b>	<b>State/Territory</b>
NEPE	Nez Perce National Historic Park	ID
NOCA	North Cascades National Parks Complex	WA
NPSA	National Park of American Samoa	AS
OLYM	Olympic National Park	WA
ORCA	Oregon Caves National Monument	OR
PARA	Grand Canyon-Parashant National Monument	AZ
PINN	Pinnacles National Monument	CA
PORE	Point Reyes National Seashore	CA
PRSF	Presidio of San Francisco	CA
PUHE	Pu'ukohola Heiau National Historic Site	HI
PUHO	P'uohonua O Honaunau National Historic Park	HI
REDW	Redwood National & State Parks	CA
RORI	Rosie the Riveter National Historic Park	CA
SAFR	San Francisco Maritime National Historic Park	CA
SAJH	San Juan Island National Historic Site	WA
SAMO	Santa Monica Mountains National Recreation Area	CA
SEKI	Sequoia and Kings Canyon National Parks	CA
TUSK	Tule Springs Fossil Beds National Monument	NV
VALR	World War II Valor in the Pacific National Monument	HI
WAPA	War in the Pacific National Historic Park	GU
WHIS	Whiskeytown National Recreation Area	CA
WHMI	Whitman Mission National Historic Site	WA
YOSE	Yosemite National Park	CA



# Pacific West Region Long Range Transportation Plan

## Introduction and Background

Federal legislation requires all federal land management agencies to conduct long range transportation planning in a manner consistent with current statewide and metropolitan-scale transportation planning (23 U.S. Code § 201(c)). This Long Range Transportation Plan (LRTP) is intended to provide an overall strategy for the next 20 years of transportation investment in the Pacific West Region of the National Park Service. The plan describes how the transportation program can best help to improve the visitors' park experience, protect our treasured resources, and provide sustainable access to a more diverse and growing populace.

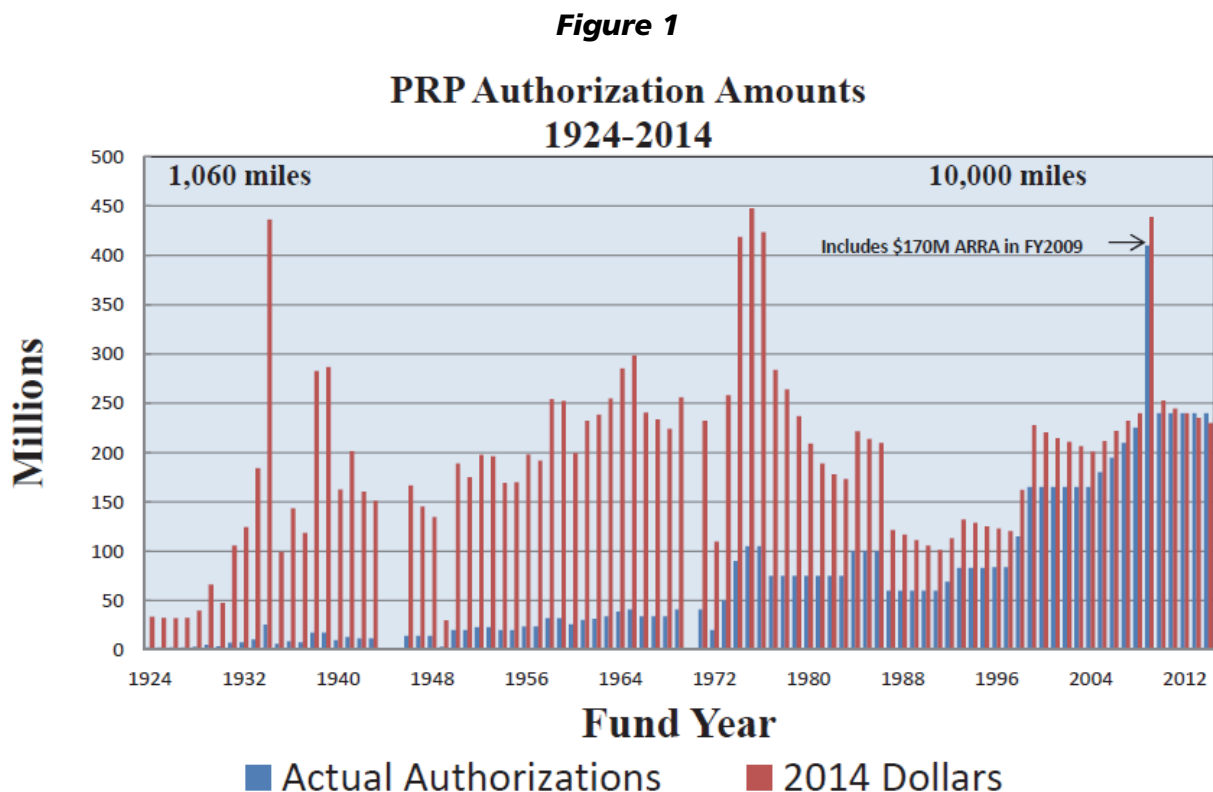
The Pacific West Region (PWR) extends across 106 degrees of longitude, encompassing a network of 61 national parks from eastern Nevada to Guam and Saipan on the other side of the International Date Line. There are more than 1,400 miles of paved roadways, 2,000 miles of unpaved roads, and 24 alternative transportation systems. This plan has been prepared to establish clear objectives for the future management of these transportation assets, with the primary goal of sustaining or improving visitor access without harming park resources, or placing an undue financial burden on either park operating budgets or facility repair and improvement programs. As has been the case for the past several decades, parks in PWR are generally managing transportation assets within the existing "footprint", forgoing new facility projects in favor of maintaining and reinvesting in existing facilities. This is being done both out of financial necessity and the desire to minimize impacts to resources.

### **Funding History**

The primary source of funds for NPS transportation has come through programs established by the various federal highway funding authorizations that have been passed by Congress since 1982, codified under Title 23 of the U.S. Code. Before that time, funds for park roads came from a variety of authorizations which collectively funded the creation of the basic network of roads which exists today. From 1982 to 2012, the program was called the Park Roads and Parkway Program (PRP). The current highway funding legislation eliminated the term and uses the more generic Federal Lands Transportation Program, or FLTP.

Servicewide program funding levels have varied over the years, but after a fairly rapid expansion in the years leading up to WWII, have remained relatively flat in real dollars to the present day. (See *figure 1 PRP Authorization Amounts* for annual *servicewide* authorization amounts for NPS roads and transportation since 1924). There were, however, only 152 park units in 1945 compared to 408 units today. Funding levels for the program have grown steadily from \$60 million annually in the late 1980's and early 1990's, to the current level of \$240 million annually, where the program funding has remained since 2009. The increase in authorization amounts has been offset by inflation, the substantial increase in the size of the National Park System and by the corresponding

amount of roadway and other transportation infrastructure under NPS management.



The earliest years of the park road program concentrated on new road construction and improvements to primitive roads to accommodate automobiles. As the park system expanded and existing roads began to age, the need to maintain and rehabilitate existing roads grew, placing a strain on budgets. The authorization of the Park Roads and Parkways Program in 1982 brought regular funding for park transportation needs, but the program lacked centralized structure and direction. Most of the funding was directed toward 4R-type widening and reconstruction projects, with little going towards more basic, but necessary, 3R-type rehabilitation of aging pavements, bridges and drainage structures (see Glossary for definitions of 3R and 4R). It was not until 2001 that 3R/4R funding categories were established on a servicewide basis, allowing for budgeting of minimum levels of investment in badly needed 3R-type projects. Current NPS policy requires that no more than 20% of a Region’s program be allocated to 4R-type projects, leaving the majority of program funds for rehabilitation and preservation treatments. NPS continues to make progress in maximizing benefits from authorized funding, through the implementation of sound asset management practices and application of quantitative methods in project prioritization.

Despite transportation program funding increases from 2005 to 2009, overall roadway conditions in PWR parks have continued a slow but steady decline. Alternative transportation systems, most of which use these same roadways, have also been underfunded and often rely on special grants from the Federal Transit Administration, parks’ Recreation Fee or base funding programs to remain in operation. Of the \$240

million authorized to NPS for transportation each year, NPS receives about \$215 million net (2013 dollars) after Congressional lop-offs and takedowns. A regional allocation formula, based on factors such as average roadway condition, miles of road and amount of bridge area, determines the allocation of approximately \$51 million annually to PWR. Approximately \$48 million of these funds are spent on Category I Road Rehabilitation and Reconstruction and \$3 million is spent on Category III Alternative Transportation. PWR has no Category II Parkways.

With the passage of *MAP-21* in 2012 came the elimination of several discretionary programs, such as Public Lands Highway Discretionary that have been a perennial source of funds for NPS transportation projects, averaging about \$3 million annually for PWR. *MAP-21* also eliminated the Transportation in Parks Program (TRIP), the Federal Transit Administration program that provided approximately \$3 million annually for PWR alternative transportation projects. The Federal Lands Access Program is a new funding program but was created expressly for transportation assets owned by state and local governments and will not directly affect the condition or service capabilities of NPS-owned assets. The overall effect of the legislative changes has been a reduction of \$6 million annually for transportation projects in PWR.

### **Planning Context: Other NPS Long Range Transportation Planning Efforts**

In addition to this and other Regional LRTP's, the National Park Service has recently developed a National Long Range Transportation Plan (2015) that contains large scale trends, servicewide baseline data, management objectives and program performance measures. Likewise, a small number of units within the NPS system have embarked on unit-level transportation plans, such as Golden Gate NRA (GOGA) in the Pacific West Region. The GOGA LRTP (2015) assesses current and future transportation challenges, prioritizes investments to address these challenges, and includes implementation and monitoring plans to guide future specific actions and decision making. Long Range Transportation Plans are not anticipated to be needed for every park; the regional plan will provide a sufficient planning framework for guiding transportation infrastructure management and investment for most park units.

This plan builds upon the National LRTP by providing additional details specific to the Pacific West Region. It outlines the PWR's:

- Transportation asset portfolio and conditions
- Historical and future transportation program funding levels
- Overall challenges and specific needs
- Resource and fiscal context for determining project priorities
- Key findings and strategies for maintaining access through 2035

This plan is not intended to present a case for funding needs unique to the Pacific West Region. Transportation and other facility maintenance programs within the National Park Service are funded at the national level, and it is the National LRTP that most appropriately describes the overall financial need. This plan identifies funding gaps PWR faces, and recommends strategies for maximizing visitor benefit and resource protection with limited funds.

Transportation planning is specifically exempted from the National Environmental Policy Act of 1969 under 23 U.S.C. 134(q) and 23 U.S.C. 135 (k). 23 U.S.C. 134(q) reads as follows

(23 U.S.C. 135 (k) similar):

*“Continuation of Current Review Practice. - Since plans and TIPs described in this section are subject to a reasonable opportunity for public comment, since individual projects included in plans and TIPs are subject to review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.), and since decisions by the Secretary concerning plans and TIPs described in this section have not been reviewed under that Act as of January 1, 1997, any decision by the Secretary concerning a plan or TIP described in this section shall not be considered to be a Federal action subject to review under that Act.”*

However, the public will have ample opportunities to provide input on specific proposed projects through the process used to evaluate and assess projects under NEPA. All projects that include federal funding, such as FLTP projects, must comply with the NEPA process. The NEPA process requires public outreach at several stages: project scoping (to present the proposed project and identify potential issues), public review of the draft environmental document (environmental assessment or environmental impact statement), and public review of the final environmental impact statement. Additional public involvement opportunities are often provided, such as public meetings at various stages of project development.

## Transportation Goals and Objectives

The Pacific West Region’s primary transportation goal is to provide sustainable, safe and enjoyable access to the key visitor destinations within the parks. These experiences are defined in park enabling legislation, foundation statements and general management plans. Sustainable access means transportation facilities and services are maintained within available budgets, and that park scenery, natural resources and historic properties are not harmed or diminished.

**Objective #1: Manage transportation assets to keep primary park roads and transportation systems in good condition.** To make transportation systems viable into the future, they must be financially sustainable. The total cost of facility ownership must be carefully considered when making any capital investment or re-investment decisions. In some instances, this may mean focusing investment on the critical transportation network and eliminating some facilities, in order to make it possible to properly maintain the facilities that provide access to the visitor destinations that are fundamental to the park purpose.

**Objective #2: Provide multiple modes of access so that connections within parks and to surrounding communities are facilitated.** These modes include transit (typically shuttle bus or ferry), bicycle paths, and pedestrian links. Some key park destinations within PWR do not have road access, such as the *USS Arizona* Memorial and the Channel Islands, and must be accessed by ferry boat. Other parks within urbanized areas such as Golden Gate NRA are served by an existing network of transit systems. Visitors to these parks can benefit if services are better coordinated with park arrival points or transportation links.



# The Pacific West Region Transportation Portfolio

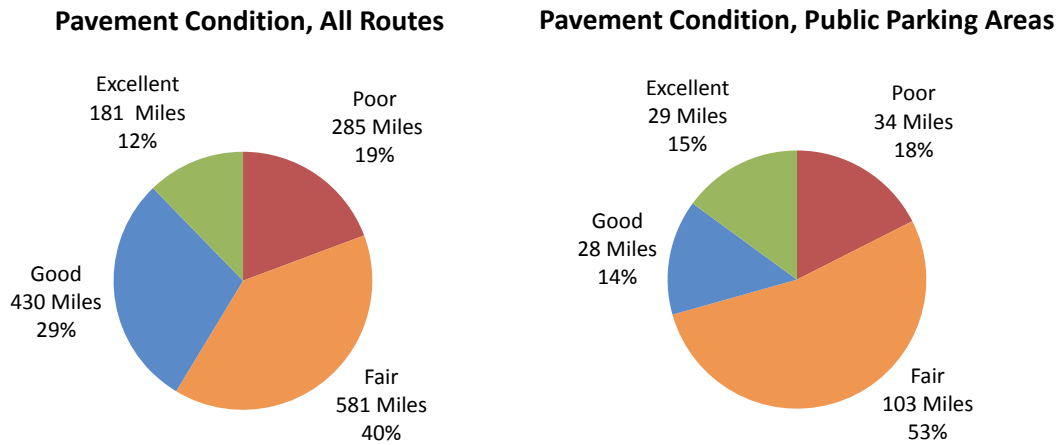
The Pacific West Region maintains approximately 1,475 miles of paved roadway and 24.7 million square feet of paved parking (over 70,000 spaces, or the equivalent of 212 miles of two-lane road), with a replacement value of over \$5.2 billion. Roadways range from heavily used, well-known park roads like the Generals Highway in Sequoia National Park and the Valley Loop Road in Yosemite National Park, to small campground loops and park administrative roads. The region's approximately 56 million annual visitors enjoy a wide variety of park experiences and programs, but must contend with transportation facilities that overall are in only fair condition. The costs of maintaining the PWR transportation portfolio at its current size have left the region with a growing backlog of deferred maintenance on its transportation assets, currently estimated at more than \$1.5 billion.

However, the number and extent of assets is growing and may be expected to continue to do so. In 2014, NPS assumed full ownership of 163 miles of paved road at Mojave National Preserve, from rights-of-way previously claimed by the County of San Bernardino. Similar transfers have the potential to occur at other parks on state and local rights-of-way within park boundaries such as at SR 146 in Pinnacles NP, John F. Kennedy Memorial Drive at Whiskeytown NRA and Sir Francis Drake Boulevard in Point Reyes NS. Like NPS, local jurisdictions are struggling to maintain their own roadway networks due to lack of adequate funding, and increasingly see the benefit of reducing their inventory. NPS may not be able to refuse transfer of a road that is unilaterally abandoned. Within its own inventory, NPS will need to determine which roads, parking areas and transit systems can be removed or downsized in order to bring its inventory in line with its budget.

## Roadways

NPS currently assesses the condition of its paved roadways through the Federal Highway Administration (FHWA) Road Inventory Program, which uses automated and manual techniques to measure pavement distress. (Other roadway features such as curbs, culverts, signage, and guardrails, are not assessed as part of this effort. However the deferred maintenance needs for these features are included in the overall calculations and are based on analysis of prior roadway rehabilitation contracts over the past two decades. The subtotal for deferred maintenance on features other than pavements amounts to about 35% of the total figure.) The current average condition of pavement on PWR's roadways is 75 on a 100-point scale, or *fair* within the four rating levels of poor/fair/good/excellent. This rating is based on analysis of pavement condition measurements, such as cracking, rutting, and pothole frequency and is generally used as a measurement of overall roadway condition in addition to other features such as guard walls, storm drainage features, signage and other appurtenances. Nineteen percent of PWR's paved road miles are rated in poor condition and 12% are rated in excellent condition.

**Figure 2: Pavement Condition**



Source: 2011 Pavement Condition Report, Highway Pavement Management Application Report 2013-NPS-01, Eastern Federal Lands Highway Division. Note: parking area quantities are indicated in equivalent route miles, for a typical 22'-wide road, or One Route Mile = 22' x 5,280 LF/Mile = 116,160 SF.

Pavement condition assessments are done approximately every three years as part of the Road Inventory Program, administered jointly by the NPS and the Federal Highway Administration.

### Functional Classifications of Park Roads

The routes which make up a park road system are grouped into the following categories:

- Class 1 Principal Park Road/Rural Parkway (Public Roads) - Roads which constitute the main access route, circulatory tour, or thoroughfare for park visitors. Route Numbers 1 - 99. Rural parkways (e.g. Natchez Trace) are numbered 1 - 9. State Routes Inventoried for Park. Route Numbers 5000-5999.
- Class 2 Connector Park Road (Public Roads) - Roads which provide access within a park to areas of scenic, scientific, recreational or cultural interest, such as overlooks, campgrounds, etc. Route Numbers 100-199.
- Class 3 Special Purpose Park Road (Public Roads) - Roads which provide circulation within public areas, such as campgrounds, picnic areas, visitor center complexes, concessionaire facilities, etc. These roads generally serve low-speed traffic and are often designed for one-way circulation. Route Numbers 200-299.
- Class 4 Primitive Park Roads (Public Roads) - Roads which provide circulation through remote areas and/or access to primitive campgrounds and undeveloped areas. These roads frequently have no minimum design standards and their use may be limited to specially equipped vehicles. Route Numbers 200-299. Functional Classes 3 and 4 have the same route numbers because, historically, they were numbered similarly.
- Class 5 Administrative Access Road (Administrative Roads) - All public roads intended for access to administrative developments or structures such as park offices, employee quarters, or utility areas. Route Numbers 400-499.

- Class 6 Restricted Road (Administrative Roads) - All roads normally closed to the public, including patrol roads, truck trails, and other similar roads. Route Numbers 400-499. Note: Functional Classes 5 and 6 have the same route numbers because historically they were numbered similarly and often there is little distinction between these routes. For example, because utility areas and employee housing are often closed to the public, this restriction would result in classification of FC 6 rather than FC 5.
- Class 7 Urban Parkway (Urban Parkways and City Streets) - These facilities serve high volumes of park and non-park related traffic and are restricted, limited-access facilities in an urban area. This category of roads primarily encompasses the major parkways which serve as gateways to our nation's capital. Other major park roads or portions thereof, however, may be included in this category. Route Numbers 1-9.
- Class 8 City Streets (Urban Parkways and City Streets) - City streets are usually extensions of the adjoining street system that are owned and maintained by the National Park Service. The construction and/or reconstruction should conform to accepted local engineering practice and local conditions. Route Numbers 600-699.

## **Parking**

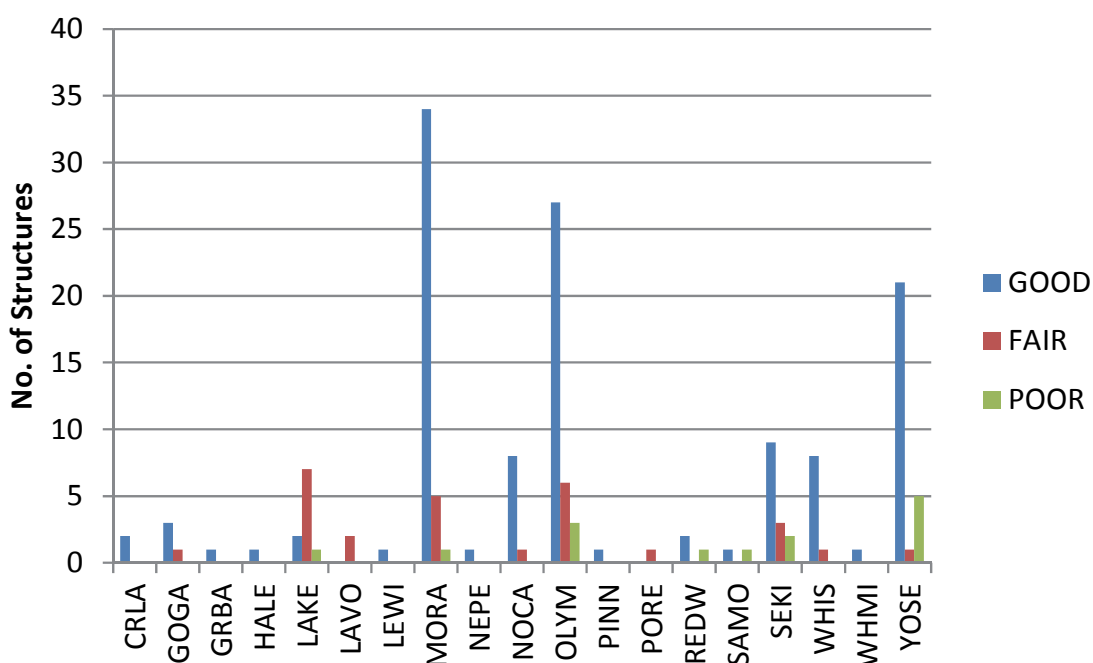
Most visitors typically arrive by private automobile (and a lesser number by tour or charter bus) and then proceed on foot to park destinations. Parking capacity and the condition of parking lots are problematic in parks of all sizes, especially in the most heavily visited areas. The condition of paved parking areas is worse than roadways, a consequence of investment decisions aimed at preserving safe and enjoyable access along the busiest park roadways. Seventy-one percent of PWR's parking areas are in either poor or fair condition. Deteriorated pavement in parking areas contributes to trip/fall accidents (and resultant tort claims and payments), poses accessibility challenges to visitors with mobility impairments, and adds strain on annual maintenance budgets with increased needs for pothole repair, clearing of drainage structures, and sweeping of storm runoff sediment. Parking areas are also among the most congested and accident-prone facilities in the region's portfolio.

## **Bridges and Tunnels**

The Federal Highway Administration Bridge Inspection Program (BIP) inspects all NPS vehicle bridges and tunnels every two years, as required by law. The current BIP estimate of deferred maintenance needs for PWR bridges and tunnels totals \$38 million, but does not include cost adjustments for constructability complications or traffic control, which historically have added approximately 85% more cost; a more realistic estimate of the total deferred maintenance need is closer to \$70 million. BIP assigns a "priority of improvement" rating to each structure, with the worst structures receiving a rating of "A" (Critical – structure in danger of collapse) to "D" (Minor – generally in good condition). The majority of cost associated with bridge needs in PWR consist of bridges with the rating "C" (Moderate – structure requires substantial repairs to prevent a serious deficiency or unsafe condition). One structure at Yosemite NP is rated A/Critical, and is closed. Three more bridges at Olympic NP, Point Reyes NS, and Yosemite NP and one tunnel at Golden Gate NRA are rated as priority "B" (Major – structure is seriously deficient or presents a safety hazard). The Golden Gate tunnel and the Olympic bridge are closed, and the other

bridges have weight restrictions in effect, as recommended by FHWA.

**Figure 3: Distribution and Condition of PWR Bridges and Tunnels**



Source: 2014 PWR Bridge Condition Analysis, Eastern Federal Lands Highway Division

### Alternative Transportation Systems

This category includes any vehicular means of transportation other than private vehicles that provides visitors access. There are currently 24 alternative transportation systems throughout 13 park units in the Pacific West Region (see table 3 below). NPS owns and operates two of these systems (at Eugene O’Neill NHS and Pinnacles NP); another four systems are owned by NPS, but are operated under concession or transit service contracts (one at North Cascades NP and three at Yosemite NP). Six of these systems provide the only means of access to the park, or to a key visitor use area within the park such as the Alcatraz Island ferry. Of the remaining systems, ten provide shuttle bus service to areas where there is inadequate parking availability for private vehicles. A breakdown of PWR systems by primary purpose is shown below:

**Table 2: Alternative Transportation Systems-Primary Purpose**

Vehicle Type	Number of Annual Boardings (2012)	Number of Systems	Primary Purpose					
			Only Mode of Access	Parking Congestion Relief	Tour	Hiker Shuttle	Gateway Community Connections	Visitor Convenience
Shuttle/Bus/Van/Tram	5,490,522	19	2	9	2	2	2	2
Boat/Ferry	4,592,719	4	3		1			
Airplane	3,364	1	1					
<b>Total:</b>	<b>10,086,605</b>	<b>24</b>	<b>6</b>	<b>9</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>

Source: 2012 Draft NPS Transit Inventory, Volpe Center

Operating costs comprise about two thirds of the total cost of these systems. Parks are limited in how much they can charge users, and rarely collect enough revenue to cover costs. This is consistent with most public transit systems throughout the U.S.; fare receipts alone are insufficient to completely fund operating costs. Current NPS policy limits on entrance fees make it difficult or impossible to levy additional transportation fees to cover shortfalls. Even without such limits, many users would likely refuse to pay fees high enough to cover the true cost of some of these systems, and would opt not to complete their visit. In response, parks often use Operation of the National Park Service (ONPS) funds and Recreation Fee funds to cover costs, leaving less funds from these sources for other pressing needs. NPS is currently working with the Department of Transportation and the Volpe National Transportation Systems Center to identify additional funding opportunities for NPS transit systems.

Recapitalization of systems, i.e. the purchase of replacement buses, is often not within the normal budgets of parks, large or small, and they must look to special programs for funds. Some of these costs have been funded by the FLTP Category III/Alternative Transportation Program, and through special grant programs such as Transit in Parks Program (TRIP). (See Appendix 2 for details on the history of TRIP grant awards in PWR.) Since MAP-21 eliminated TRIP, however, no equivalent program has been authorized to replace it. NPS has had some recent limited success with obtaining grants through the Congestion Mitigation and Air Quality (CMAQ) Improvement Program, which is managed by the Federal-aid Office of the Federal Highway Administration and distributed through State Departments of Transportation to local Metropolitan Planning Organizations. Over the course of the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)*, and its extensions from 2005 to 2012, PWR received an average of \$3 million annually through TRIP. NPS policy that does not allow Recreation Fee funds to be “banked” from one year to the next limits parks’ ability to make large recapitalization purchases. The 24 systems are described below.

**Table 3: PWR Alternative Transportation Systems**

Park	System Name	System Description	# Unlinked Trips*	Vehicle Type	Owner	Operator	Agreement Type
CHIS	Channel Islands Aviation	Public air transportation is available year-round to Santa Rosa Island only. Flights depart from Camarillo.	3,364	Fixed-wing aircraft	Non-NPS	Non-NPS	Concessions Contract
CHIS	Island Packers	Boat travel from Ventura and Channel Islands Harbors to all of the islands.	50,645	Boat/Ferry	Non-NPS	Non-NPS	Concessions Contract
CRLA	Crater Lake Boat Tour	Ranger guided boat tours offered on Crater Lake.	20,580	Boat/Ferry	Non-NPS	Non-NPS	Concessions Contract
CRLA	Rim Drive Trolley Tour	Ranger guided trolley tours circle Crater Lake along Crater	8,023	Shuttle/Bus /Van/Tram	Non-NPS	Non-NPS	Concessions Contract

Park	System Name	System Description	# Unlinked Trips*	Vehicle Type	Owner	Operator	Agreement Type
		Rim Drive.					
DEPO	Reds Meadow Shuttle Bus	From late June to early September day-use visitors to the Devils Postpile/Reds Meadow area must ride the shuttle bus. Managed in cooperation with the U.S. Forest Service/Operated by Eastern Sierra Transit. Visitors pay fare to ride shuttle (NPS does not collect fares here).	60,000	Shuttle/Bus /Van/Tram	Non-NPS	Non-NPS	Cooperative Agreement
EUON	NPS Shuttle	Shuttle runs 5 days a week and must be taken to access the historic site (from Danville). Reservations required. Access by private vehicle is not available to EUON. Vehicle is shared with POCH/RORI/JOMU.	2,542	Shuttle/Bus /Van/Tram	NPS	NPS	NPS Owned & Operated
GOGA	PresidiGo	The Presidio Trust in partnership with Golden Gate NRA offers a shuttle (clean fuel buses) within the Presidio 7 days a week, and from downtown on weekdays.	Not Available	Shuttle/Bus /Van/Tram	Non-NPS	Non-NPS	Cooperative Agreement
GOGA	Alcatraz Cruises ferry	For fee ferry cruise offers transportation to Alcatraz Island. Electric tram is also provided from ferry dock to prison for persons with mobility disabilities.	3,061,494	Boat/Ferry	Non-NPS	Non-NPS	Concessions Contract
MORA	Paradise Shuttle	Shuttle runs from late June to mid-September along the Nisqually corridor. [Not currently in operation due to lack of funding]	39,834	Shuttle/Bus /Van/Tram	Non-NPS	Non-NPS	Service Contract

Park	System Name	System Description	# Unlinked Trips*	Vehicle Type	Owner	Operator	Agreement Type
MUWO	Muir Woods Shuttle	Muir Woods Shuttle from Highway 101 is funded by Marin Transit & NPS	Not Available	Shuttle/Bus /Van/Tram	Non-NPS	Non-NPS	Cooperative Agreement
NOCA	Stehekin Shuttle	For fee shuttle offered at Stehekin almost year-round, originating at the Landing and traveling 9 miles up the valley road into North Cascades NP. Only means of access to Stehekin is by passenger ferry boat or hiking trail.	16,304	Shuttle/Bus /Van/Tram	NPS	Non-NPS	Concessions Contract
NOCA	Ross Lake Hiker Shuttle	Ross Lake Resort Concession operates a small boat to transport visitors for a fee along lakeshore to and from hiking trails.	300	Shuttle/Bus /Van/Tram	Non-NPS	Non-NPS	Concessions Contract
PINN	Pinnacle Shuttle	A free visitor shuttle service for the east district is available on weekends during the peak season.	19,992	Shuttle/Bus /Van/Tram	NPS	NPS	NPS Owned & Operated
PORE	Headlands Winter Shuttle	Bus service to the Lighthouse and Chimney Rock for whale-watching on weekends and holidays. Service is provided throughout the winter from Drakes Beach (road closed to private vehicles).	26,946	Shuttle/Bus /Van/Tram	Non-NPS	Non-NPS	Service Contract
SEKI	Gateway Shuttle	Shuttle service links the City of Visalia, the Ash Mountain park entrance, gateway communities and the Giant Forest Museum within the park.	9,528	Shuttle/Bus /Van/Tram	Non-NPS	Non-NPS	Cooperative Agreement
SEKI	Giant Forest Shuttle	Four routes serve major destinations in the Giant Forest area of the park.	1,439,534	Shuttle/Bus /Van/Tram	Non-NPS	Non-NPS	Cooperative Agreement

Park	System Name	System Description	# Unlinked Trips*	Vehicle Type	Owner	Operator	Agreement Type
VALR	Ford Island Tour	Shuttle bus service is available between USS Arizona Visitor Center and Ford Island sites, which include the USS Oklahoma Memorial and USS Missouri Memorial.	Not Available	Shuttle/Bus /Van/Tram	Non-NPS	Non-NPS	Service Contract
VALR	USS Arizona Memorial Tour	The Navy operates a five boat tour "fleet" between the Pearl Harbor Visitor Center Halawa Stream Dock and the USS Arizona Memorial in conjunction with NPS. Tickets are available by on-line reservation for a small convenience fee or are available for free on a first-come, first-served basis for scheduled tours to the memorial.	1,460,000	Boat/Ferry	Non-NPS	Non-NPS	Cooperative Agreement
YOSE	Badger Pass Winter Shuttle	For fee Badger Pass Winter Shuttle transports visitors from Yosemite Valley to the Badger Pass Ski Area within Yosemite where Nordic and Alpine skiing and show-shoeing is available.	8,404	Shuttle/Bus /Van/Tram	Non-NPS	Non-NPS	Concessions Contract
YOSE	Mariposa Grove Shuttle	Shuttle transports visitors from South Entrance and Wawona to Mariposa Grove during the summer season only. Funded by Recreation Fee or Transportation Fees starting in 2017. No shuttle service is scheduled in 2015 or 2016 due to construction activity).	372,438	Shuttle/Bus /Van/Tram	NPS	Non-NPS	Service Contract



Park	System Name	System Description	# Unlinked Trips*	Vehicle Type	Owner	Operator	Agreement Type
YOSE	Visitor Tours and Hiker Shuttle	For fee transportation and tour services - Yosemite Valley Tram Tour (by open-air trams); Glacier Point Tour (by motor coach), Grand Tour to Glacier Point, Wawona and Mariposa Grove (by motor coach); and Hiker's Shuttle for hikers accessing the high country including Tuolumne Meadows (by motor coach).	125,980	Shuttle/Bus /Van/Tram	Non-NPS	Non-NPS	Concessions Contract
YOSE	Tuolumne Shuttle	Seasonal summer shuttle servicing the Tioga Road corridor between Tuolumne Meadows and Olmstead Point to the west and Tioga Pass to the east. Funded by Recreation and Transportation Fees.	29,092	Shuttle/Bus /Van/Tram	NPS	Non-NPS	Service Contract
YOSE	YARTS	Regularly scheduled transit service between gateway communities and Yosemite Valley (by motor coach). Year round service on Hwy 140 with expanded service during the peak summer season.	100,290	Shuttle/Bus /Van/Tram	Non-NPS	Non-NPS	Cooperative Agreement
YOSE	Yosemite Valley Shuttle	Year-round shuttle service in Yosemite Valley. Funded by Concession Add-On Fees.	3,175,039	Shuttle/Bus /Van/Tram	NPS	Non-NPS	Concessions Contract

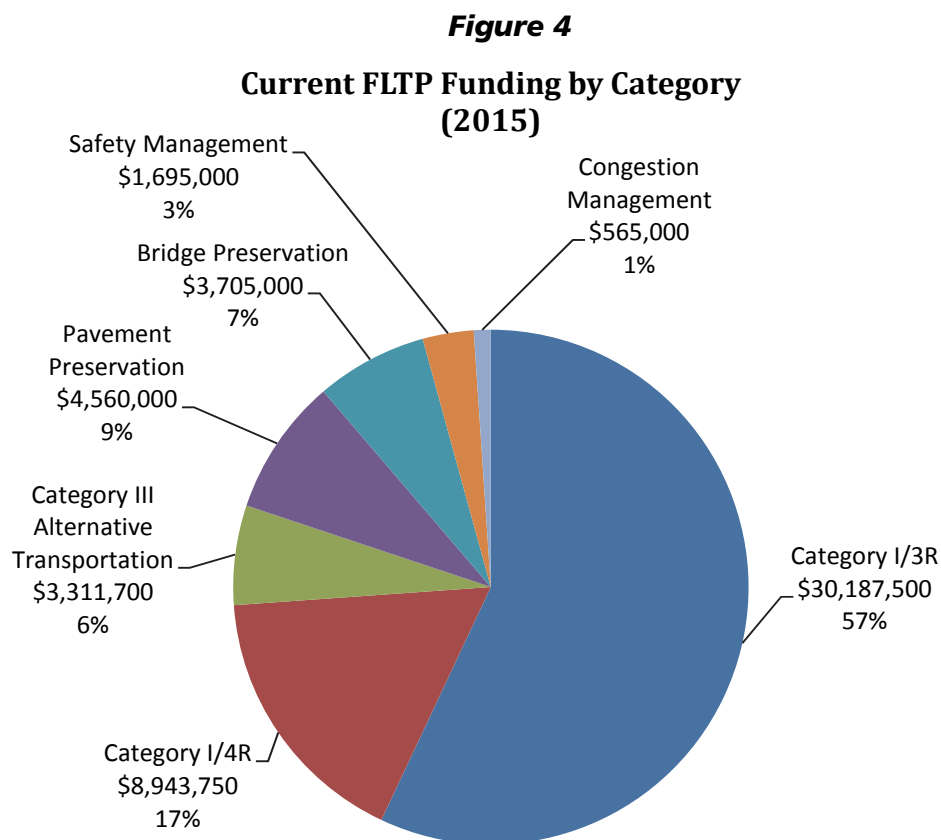
*\*Unlinked trips equal the total number of passengers who board public transit vehicles. A passenger is counted each time he/she boards a revenue vehicle even though the boarding may be the result of a transfer from another route to complete the same one-way journey. Where linked or unlinked is not designated, unlinked is assumed.*

Total cost of facility ownership (TCFO) is not well understood for many of these systems. Future financial planning efforts are needed to accurately program funding, for both operating and recapitalization expenditures. The Facility Planning Program, in concert with the Volpe National Transportation Systems Center, is currently conducting a multi-phased analysis of NPS-funded Alternative Transportation Systems (ATS) across the Service.

Funds for future system expenditures will likely come from multiple programs, meaning park managers will need to incorporate these systems in their own park asset management plans, as well as coordinate needs with the regional facility program managers.

## The PWR Transportation Program

The majority of the regionally managed transportation program work is funded through the FLTP, and the majority of PWR's transportation spending goes towards rehabilitation or reconstruction of roads and bridges. Most of the engineering and contract administration for road projects is performed by the Central and Western Federal Lands Highway Divisions within FHWA. According to NPS policy, no more than 20% of Category I FLTP funds can be spent on reconstruction/realignment work (also known as "4R" work) so that the majority of funding can be used for repair or preventive maintenance for existing transportation facilities (also known as "3R" work). The breakdown of FLTP funding in gross dollars including planning, design and construction management is shown below.



Source: PWR FLTP multiyear programs, 2014

Notes: The Regular Cyclic Maintenance program contributes \$6 million annually towards pavement preservation contracts (managed by FHWA) and another \$1.5 million annually towards restriping, sign replacements, roadside ditch reconditioning, and replenishing aggregate on unpaved roads. Bridge preservation funding levels have averaged

approximately \$2 million annually, but the higher amount indicated above reflects 2014 recommendations from FHWA Federal Lands Highway Bridge Division.

### **Project Evaluation and Program Prioritization**

In 2012 PWR updated the Pacific West Region Directive (PW-036) *Federal Lands Highway Program (FLHP) Park Roads and Parkways (PRP) Project Prioritization*. Both FLHP and PRP have since been discontinued and replaced by the FLTP. This directive still effectively applies and outlines the processes for developing and rating Category I transportation projects. Category I funding is provided through the FLTP, and relies on the Federal Highway Administration's engineering expertise to support the NPS in the construction, reconstruction, and rehabilitation of the PRP system. The 2012 Directive, along with the *Park Roads and Parkways Program Handbook, Guidelines for Program Implementation, January 2008*, provides park managers with revised guidelines and procedures for submitting their park's Category I project priorities under FLTP. The 2012 Directive also specifies rating criteria for project prioritization; the Category I criteria are as follows:

1. **Protects visitor and employee health and safety:** Will the proposed project reduce or eliminate serious risks to the traveling public (motorists, bicyclists, and pedestrians) and employees working and or traveling in the road corridor?
2. **Protects government investment:** To what extent would this project protect the integrity of the existing transportation infrastructure (e.g., roadway, bridge, tunnel, transit system, etc.)?
3. **Improves operational efficiency:** To what extent would this project repair or significantly improve essential operational facilities and/or infrastructure? How effectively will the proposed project decrease operational and maintenance costs?
4. **Improves visitor services:** Will the proposed project maintain visitor access or improve visitor access? What is the significance of the visitor experience served by this facility?
5. **Protects or restores natural or cultural resources:** Will the proposed project directly mitigate or eliminate a specific threat to resources, (e.g., by removing, relocating or modifying existing development)?
6. **Provide cost-effective, environmentally responsible, and otherwise beneficial development for the national park system:** What other benefits or advantages to the park, the national park system, or other entities would result from completion of the proposed project? What benefits or advantages would the project provide to partners, neighbors, communities, or other entities?
7. **Cost Sharing and Donated Funds** Does the project involve cost sharing, donations, and other partnerships?

As indicated in the Directive, approximately every four years, the Regional office will request submittal of updated park project priorities for Category I, as part of the Servicewide Comprehensive Call. After the Regional Priority Setting Committee ranks the projects for Category I, the Regional Transportation Program Manager then assembles

final Regional 3R and 4R priority lists for review by the Regional Leadership Council and approval by the Regional Director. Once approved, the lists are incorporated into a five-year program of projects that is updated annually.

The Region's Category III transportation projects (planning, implementation and improvement of alternative transportation systems serving park units) are evaluated separately from Category I projects but have similar rating criteria. In addition to transit, Category III (ATP) includes ferry and multi-use trail connections to the park's transportation system. Category III transportation projects can also include data collection and analysis, value engineering, visitor use assessments, vehicle technology analysis, purchase or lease of rolling stock or watercraft, intelligent transportation systems (ITS), and financial analysis and reporting. Category III evaluation criteria for planning and design/implementation projects are summarized below:

### **Category III Planning Criteria**

1. Demonstration of Need
2. Planning Strategy/Process
3. Visitor Experience and Resource Benefits
4. Financial Sustainability
5. Facility Condition (benefit to the Facility Condition Index)

### **Category III Design and Implementation Criteria**

1. Demonstration of Project Need
2. Visitor Experience (Improvements to Visitor Experience, Access and Safety)
3. Cost Effectiveness (Financial Planning and Sustainability)
4. Resource Protection
5. Deferred Maintenance (Improvement to Facility Condition)

Similar to Category I, Category III projects are rated by the Regional Priority Setting Committee. The Alternative Transportation Program Manager assembles the final Regional priority list for review by the Regional Leadership Council and approval by the Regional Director; once approved, the list is incorporated into a five-year program of projects that is updated annually.

### **3R Road Rehabilitation**

All roads and bridges eventually reach the end of service life and need to be rehabilitated or replaced. According to FHWA's Highway Pavement Management Application (HPMA), which uses detailed pavement condition data collected by the Road Inventory Program (RIP) to model future conditions, PWR has over 770 miles of paved roadway that are in need of rehabilitation at an estimated cost of \$1.1 billion. The HPMA recommendations are based on measurements of pavement ruts, cracks, and ride roughness. The presence of ruts or alligator-pattern cracking often indicates the need for more expensive repairs, such as full reconstruction of the roadway section. A rough ride can indicate the presence of deeper problems, such as embankment slumps or even landslides. Program history shows that pavement and structural section repairs for road projects average about 65% of the total net construction costs; the remaining costs address necessary repairs to drainage structures, embankments, sidewalks, guard rails, retaining walls, and other roadway appurtenances.

#### **4R Reconstruction/Realignment**

Even without any attempt to expand roadway capacity or mileage, some amount of 4R work will remain necessary indefinitely. Most bridge replacements, which all eventually come due, qualify as 4R reconstruction. Additionally, many park roadways were constructed in the early 1900's, as the automobile became more widely available to the average American household. The modern interstate highway system connecting urban and remote areas had not yet been built. As a result, many roads in and around parks were built for small volumes of traffic, with no expectation that they would ever carry thousands of vehicles per day or accommodate larger vehicles such as intercity buses and recreational vehicles. When these roads reach the end of their practical service life, they require rehabilitation to provide another 25 to 40 years of use under modern traffic volumes, serving in many cases, much larger and heavier vehicles. Most state and county roads outside park boundaries have been upgraded to meet modern traffic demands, but many park roads have not. When these roads need to be rehabilitated, they often cannot be simply repaved to match their existing paved footprint, as they are too narrow. Many park roads in PWR are built in steep terrain, and lie on narrow benches that have been cut into hillsides; for old narrow roads, these benches need to be widened in order to meet current design standards for park roads carrying today's traffic volumes.

The potential for impacts to park resources and scenery can be high. Realizing this, NPS landscape architects and engineers collaborated shortly after the creation of the Park Roads and Parkways Program in 1982 to develop design standards appropriate for park settings which were documented in NPS Park Road Standards and approved in 1984. This document provides detailed guidance on providing safe passage for roadway users, while still preserving the park aesthetic and allowing for the flexibility to redesign roads that respect the terrain and blend into the landscape. Historic roadways and the landscapes they traverse are treated with care so that the effects of maintenance and repairs do not diminish their value or integrity. Road widening is accomplished by cutting inboard slopes, filling outboard slopes, and building retaining walls. Areas disturbed by reconstruction are revegetated with native plants and protected from future erosion.

#### **Bridges**

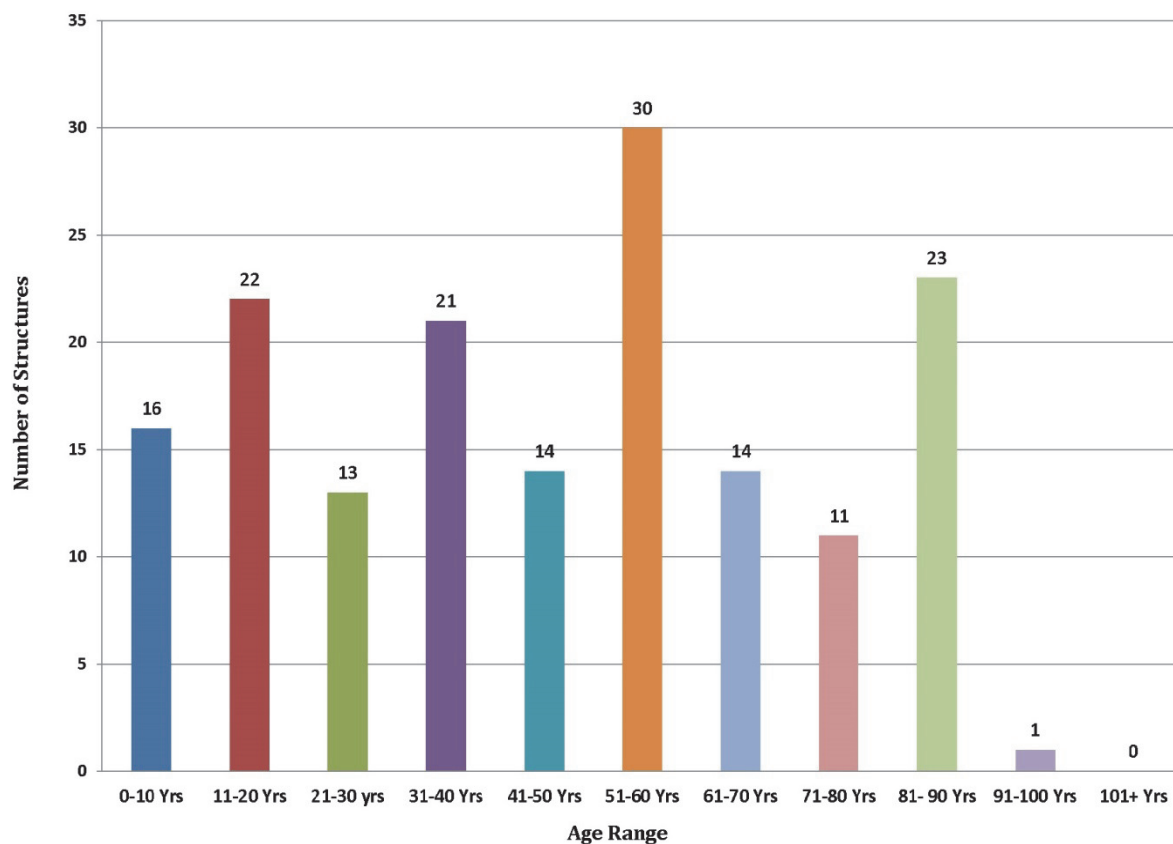
Of the 190 bridges and tunnels identified in PWR, 130 carry principal and connector park roadways (functional classes one and two). Bridge replacements usually fall within the 4R work-type, but can be classified as 3R for smaller bridges that can be replaced for less than \$1.5 million (net construction). Bridge replacement in the 21<sup>st</sup> century can be very expensive. Current environmental and traffic safety standards often require replacements to be significantly longer and wider than older bridges. Square foot costs for replacement, including environmental mitigations, can exceed \$400/SF and run as high as \$600/SF. For example, a 175 ft. bridge in Kings Canyon was replaced with a 280 ft.-long bridge, at a cost of \$5.4 million (net construction, 2010 dollars). PWR annually invests approximately \$2.5 million of Category I FLTP funds in preserving bridges on principal and connector park roadways (functional classes one and two).

Total bridge deck area in PWR is 539,812 SF. Excluding annual and cyclic maintenance costs, the *average* yearly capital cost of bridge ownership in PWR for all functional class roadways, can be roughly calculated as:

$$539,812 \text{ SF bridge area} \times \$500/\text{SF} \times 1 \text{ replacement}/75 \text{ years} = \$3,600,000/\text{year}$$

However, PWR is not spending \$3,600,000 annually on bridge replacements. Many of the bridges still have significant service life remaining, and the service of aging bridges can be extended cost effectively with some strategic investments in repairs. Analyses prepared by Eastern Federal Lands Highway Division (EFLHD) in 2014 predict that PWR will be able to defer replacement for most, if not all, of these older bridges through 2035, by making repairs, rehabilitating components, and for lower priority bridges, reducing load limits. After 2035, the financial burden related to bridge replacements that can no longer be deferred will likely increase significantly. In the meantime, many lower functional class bridges (not on primary park routes) may not compete well for repair or replacement funds from FLTP and will require funding from other NPS facility programs such as Repair/Rehabilitation and Recreation Fee.

**Figure 5**  
Age of Structures, PWR

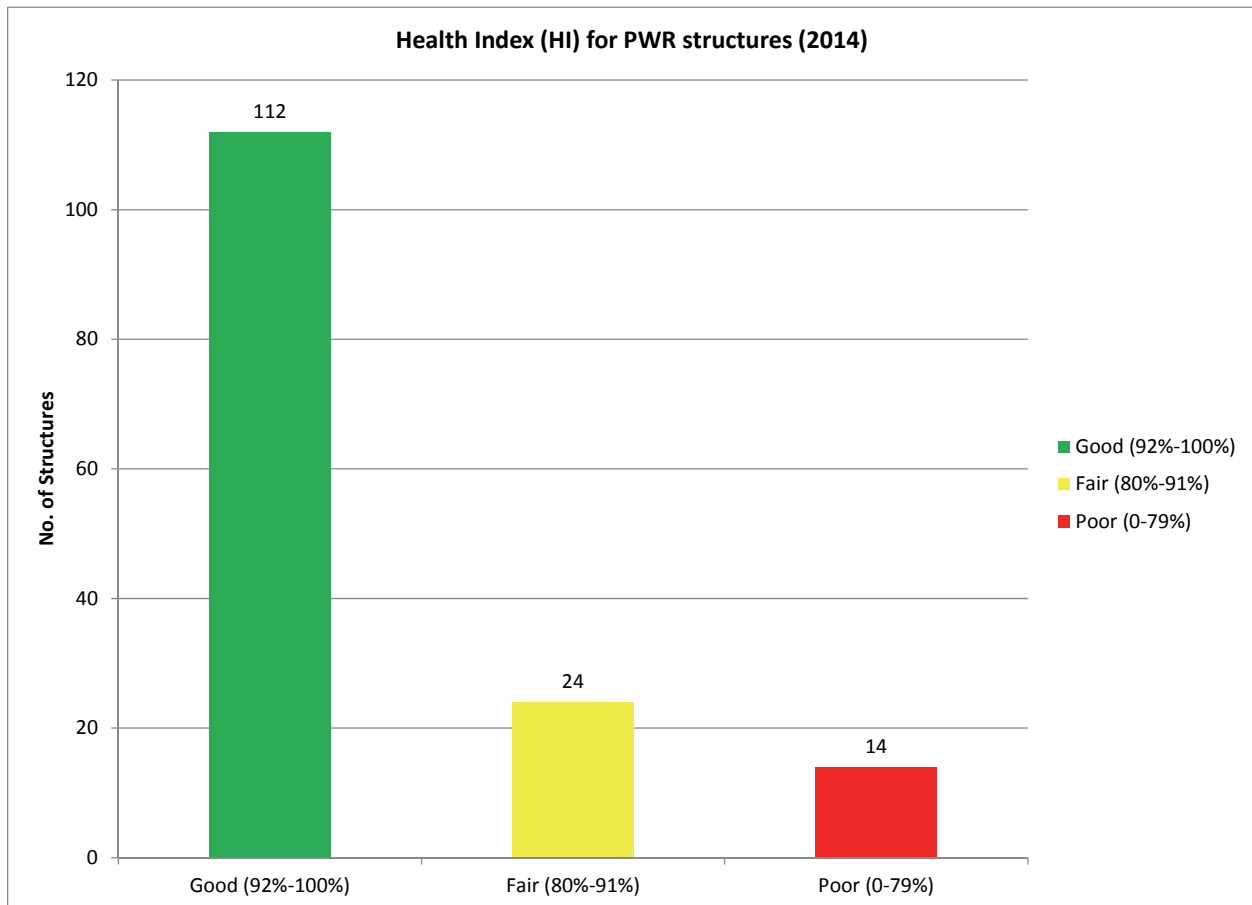


Source: PWR Bridge Condition Analysis, Eastern Federal Lands Highway Division, 2014

In order to develop an optimal plan for extending service life and reducing near-term recapitalization needs, EFLHD performed an analysis using the *Pontis* bridge management program, and provided the following assessments and recommendations (*Pontis* is the software program FHWA uses in organizing bridge data and analyzing engineering and economic factors to make recommendations for maintaining, improving, and replacing structures).

The current condition of the 150 PWR bridges on roads of functional classes 1-5 is indicated below. Condition is indicated by the Health Index (HI), a bridge performance measure based on the condition of the various bridge elements. The Health Index is computed as the ratio of remaining value of the bridge structure to the initial value of the structure.

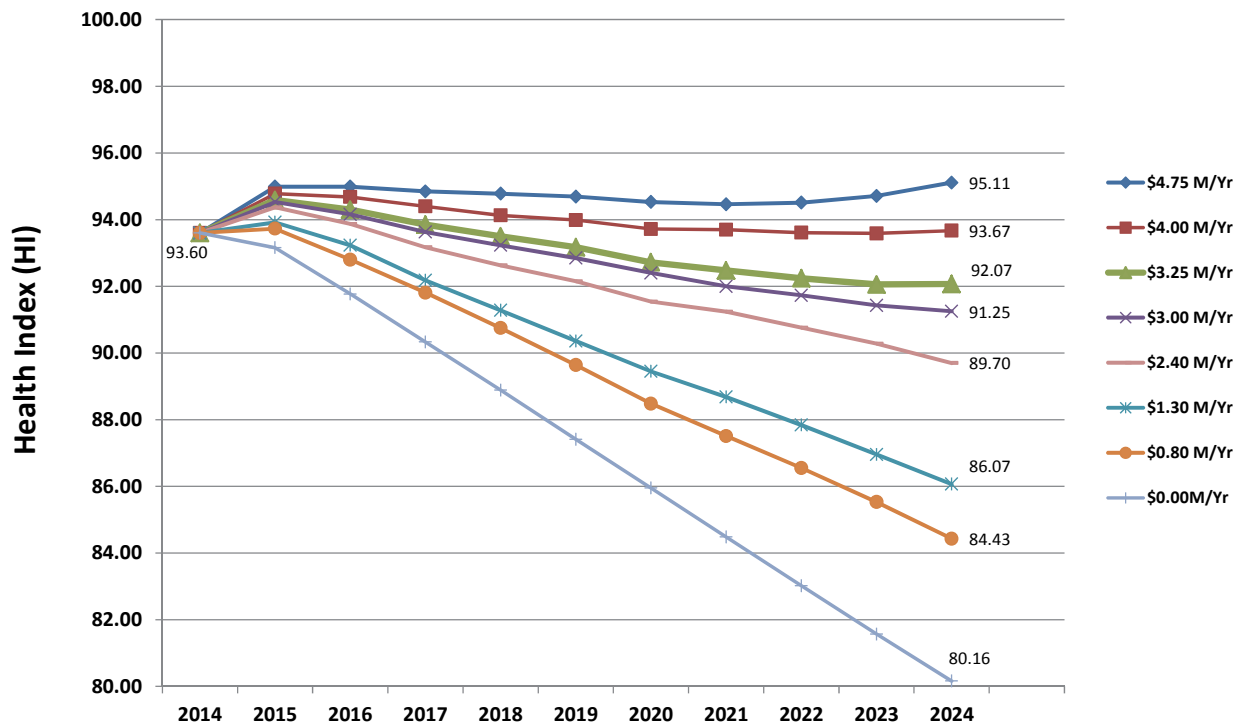
**Figure 6: Health Index of PWR Bridges**



Source: PWR Bridge Condition Analysis, Eastern Federal Lands Highway Division, 2014

The following analyses were done to estimate the optimum investment levels to maintain the HI at the national average level of 92% for the period from 2015 to 2024.

**Figure 7**  
**Cost to Attain Health Index for NPS Roadway Class 1 & 2 of PWR Bridges (2014)**

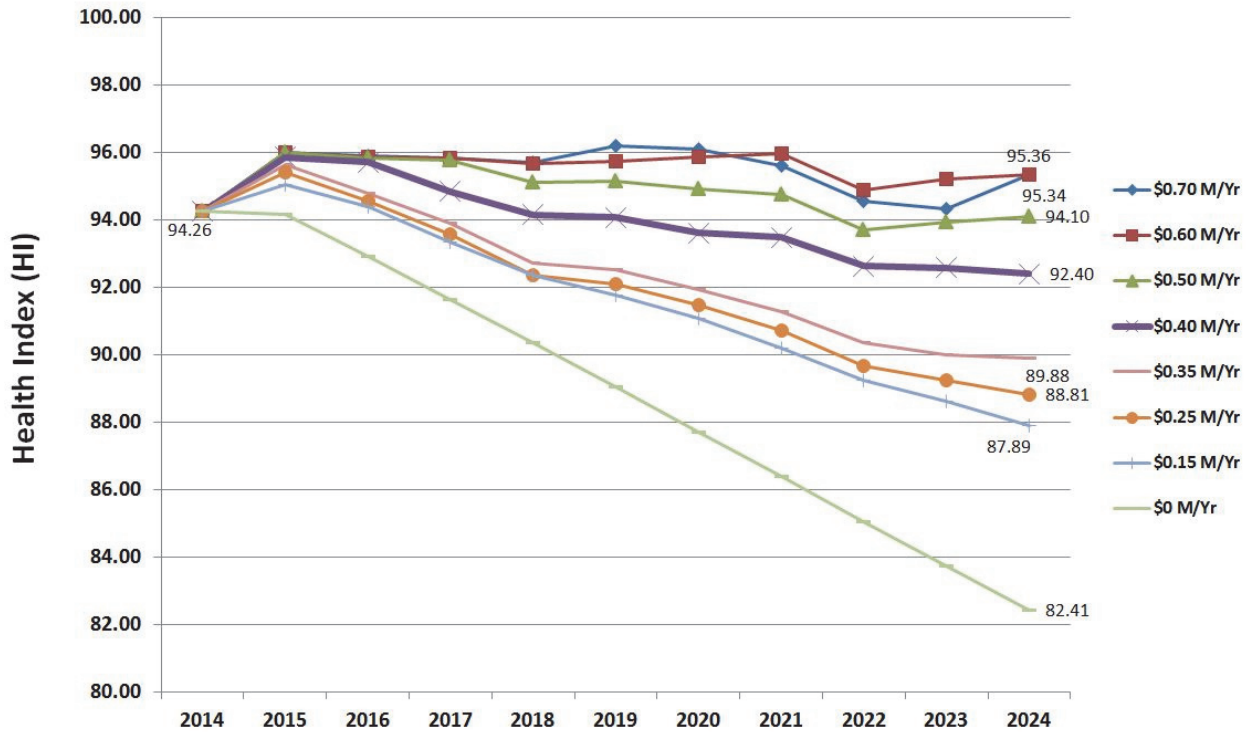


Source: PWR Bridge Condition Analysis, Eastern Federal Lands Highway Division, 2014

From the forecast analysis performed for 118 bridges and culverts carrying roads of functional classes 1 and 2, an investment level of \$3.25 million annually for 10 years was recommended to maintain HI at the national level.



**Figure 8**  
**Cost to Attain Health Index for NPS Roadway Class 3, 4, & 5 of**  
**PWR Bridges (2014)**



Source: PWR Bridge Condition Analysis, Eastern Federal Lands Highway Division, 2014

From the forecast analysis performed for 32 bridges and large culverts carrying roads of functional classes 3, 4, and 5, an investment level of \$400,000 annually for 10 years was recommended to maintain HI at the national level. The projected HI rating for \$400,000 investment level is estimated at 92.40 for the year 2024.

PWR needs to invest an average of \$3.65 million annually in preserving and rehabilitating bridges on roads of functional classes 1 through 5 in order to maintain them at the same condition level as the current national average.

**Management Systems**

MAP-21 contains specific language for Federal land management agencies that receive transportation funding through the Act:

*“The Secretary [of Transportation] and the Secretary of each appropriate Federal land management agency shall, to the extent appropriate, implement safety, bridge, pavement, and congestion management systems for facilities funded under the tribal transportation program and the Federal lands transportation program in support of asset management.”*

Since 2008, PWR has had pavement and bridge management systems in place, and began

implementing specific safety and congestion management systems in 2013 to comply with the MAP-21 requirement.

### **Pavement Preservation**

PWR's primary capital investment among transportation assets is pavement, the majority of which is asphalt concrete comprised primarily of crushed aggregate and asphalt binder. PWR has implemented a cyclic pavement preservation program in an effort to slow the deterioration of asphalt pavement, which is subject to oxidation, freeze-thaw and mechanical wear.. Typical treatments include crack sealing, chip-sealing, micro-sealing and limited patching. Depending on traffic loads, climate, subgrade conditions and whether the road is subjected to frequent snow plowing, repeated preservation treatments can extend the life of an existing asphalt pavement by 20 years or more. Pavement must, however, still be in fairly good condition to benefit from treatment. Sealing a road that already exhibits "alligator" pattern cracking is of little value, except in cases where there are well-drained subgrades, dry climate, little freeze-thaw action and low volumes of traffic. Approximately 60% of PWR's road miles can still benefit from preservation treatments.

Average 2013 costs per mile (two-lane road) for micro- and chip-seal treatments are about \$85,000; treatments can be expected to last approximately seven to ten years. Rehabilitation costs, by comparison, average about \$750,000 per mile (2013 dollars). PWR invests about \$6 million annually from its Regular Cyclic Maintenance Program (RCM), and another \$4 million annually from the Federal Lands Transportation Program on pavement preservation. Preliminary and construction engineering require about 11% of total costs, leaving approximately \$9 million annually for net construction. This spending rate, as of 2013, is sufficient to keep all of PWR's paved roads that are still in a condition to benefit, on an eight to ten year cycle for treatments. The 2011 Pavements Report from FHWA indicated that 674 of PWR's 1,400 miles of paved road were suitable for preservation treatments. Based on field observations from 2008 to 2013 in implementing the regional pavement preservation program, it is estimated that an additional 15% of the paved roadway inventory, or about 210 miles, is also in suitably good condition for effective preservation treatments.

$$(674 + 210 \text{ Miles}) \times \$85,000/\text{Mile} \times 1 \text{ Treatment}/8 \text{ year avg. cycle} = \$9,393,000/\text{year}$$

This investment needs to be maintained indefinitely into the future, and potentially increased if funding levels allow for improvements to pavement conditions. As pavement service life is extended, the need for major rehabilitation of park roadways is deferred and the overall cost to own and operate the roadways is reduced. While in the near-term PWR may be less able to afford badly needed rehabilitation of some road segments, in the long-term the investment in pavement preservation will pay dividends: good pavements will be kept in good condition longer reducing the need for pavement replacement, increasing chances for making progress on improving the system's overall condition. Ultimately, FLTP and other facility program funding levels will determine whether system condition improvements will be possible.

### **Bridge and Tunnel Preservation**

The Pacific West Region has 178 bridges and 12 tunnels, many of which are on primary park roads serving millions of visitors annually. These facilities provide important links

through steep terrain, and across washes, creeks, ephemeral streams and large rivers. Through the Bridge Inventory Program, FHWA assesses the condition of every vehicular bridge and tunnel in the inventory and provides recommendations and estimates on needed maintenance and repairs. PWR currently allocates approximately \$2.5 million annually (gross) out of its FLTP towards design and implementation of preservation work. Pacific West Region parks currently spend little project funds for roadway bridges out of other NPS programs such as Recreation Fee and Repair/Rehabilitation. Typical work includes abutment and pier scour protection, deck sealing, structural steel painting, and tunnel-lining patching and sealing. Similar type work is packaged together, sometimes across multiple parks within a focused geographic area, in order to maximize efficiency with contractor mobilization and construction engineering.

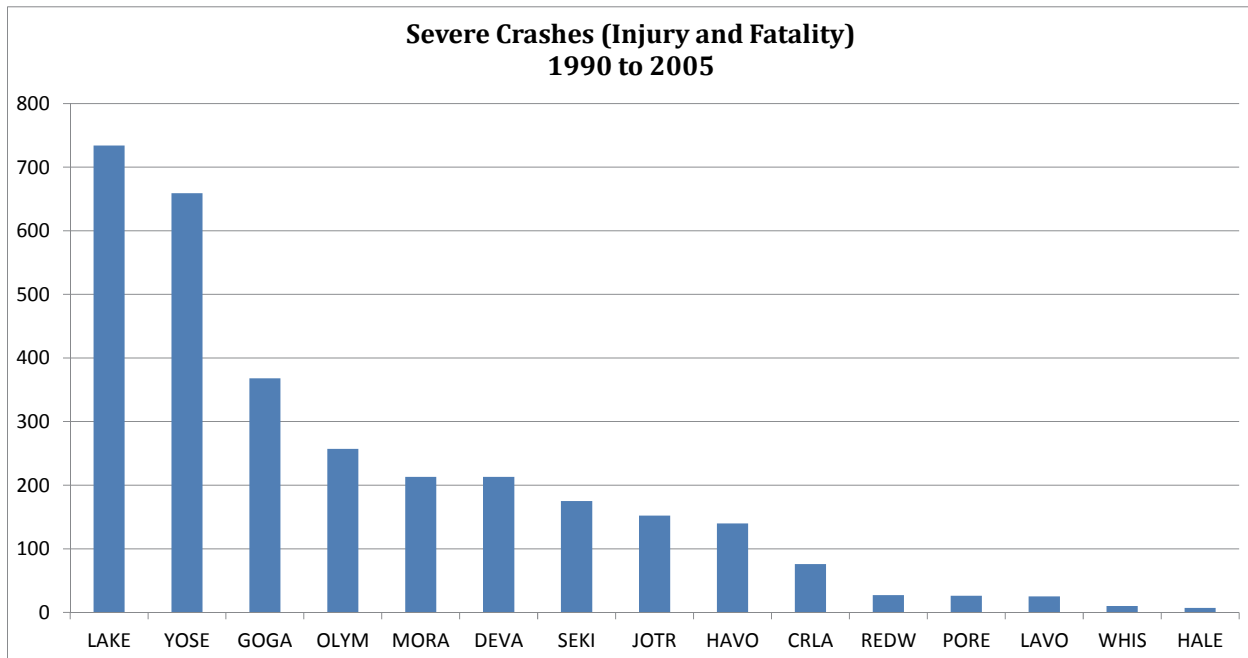
Regular bridge preservation activities are essential to minimizing the total cost of ownership. The Pacific West Region should commit to implementing maintenance recommendations from FHWA, taking care of all annual maintenance requirements at the park level, and queuing up more complex cyclic maintenance and repair work for the regional rehabilitation and preservation programs.

### **Safety Management**

Motor vehicle crashes are a major cause of death and injury in PWR parks. NPS has not had a servicewide accident reporting system since the Servicewide Traffic Accident Reporting System (STARS) ceased to function in 2005. For the subset of PWR parks where data is available, there are indications that specific routes pose higher dangers to motorists than others, and that some of these routes pose higher risk of serious accident than do similar two-lane rural roads in the surrounding state. These are routes or roadway segments that need special attention from roadway design and traffic engineers, to determine potential causes and identify remedies. PWR has begun implementing a Safety Management Program, based on existing project needs identified by engineering studies and park staff observations of high accident sites. However, additional analysis of larger traffic accident patterns is needed to identify other problem areas that may have been undetected. Projects should be identified based on the number of accidents on a particular roadway segment, as well as on accident *rates* for the segment. A route or a segment of a route may have low crash totals, but if the traffic volume is also low, it is possible that the crash rate is high. The goal should be to make NPS roads at least as safe as traveling on similar roads outside the park boundary. For example, the overall crash rate for the two-lane rural roads in the state of California is 117 per 100 million vehicle miles traveled (MVMT). The 2001-2005 crash rate in Joshua Tree NP was 180 per MVMT, indicating that visitors are increased risk on the park's roadways (*source: CH2MHill Report: Pacific West Region Crash Data Summary, 2010*).

In order to calculate crash rates, more effort is required to quantify traffic volumes on major park roads. The Washington Support Office (WASO) administers a traffic study program to collect traffic numbers for about 30 parks. The parks are included in the program based on a number of factors, including total roadway mileage, total bridge length, congestion levels, number of fatal and injury crashes, crashes per mile, percent of commuter traffic, and number of annual visitors. For park roads outside the WASO the collection program, PWR and FHWA are conducting an effort in 2014 to collect traffic counts on major routes in parks outside the WASO program. This information will be used to supplement information already collected by the WASO traffic study program.

**Figure 9**



Source: CH2MHill Report: Pacific West Region Crash Data Summary, 2010.

Crash records are being collected for parks since 2005 when STARS became inoperable. These records, minus personally identifying information, are being entered into a Traffic Accident Reporter (TAR) database, which is managed through the WASO office. This database will be used to report out crash totals and rates for roadway segments, helping park and program managers identify potential projects or other interventions (such as better enforcement or education). The TAR is intended as an interim stop-gap measure to provide a reporting system until a similar function has been added to the Incident Management Analysis and Reporting System (IMARS), at which time the TAR could be retired.

PWR invests approximately \$1 million annually on stand-alone safety improvement projects. Another \$1 million or more in safety improvements is incorporated each year into regularly programmed 3R and 4R projects. This work includes intersection realignments, tunnel lighting upgrades, spot-safety realignments for problem curves or slumps on roadways, installation of bike lanes where modal conflicts exist, rock-fall hazard mitigation (e.g. scaling or rock-bolting), guardrail replacements, installation of rumble strips and roadside delineators, etc.

Unit-level transportation safety studies should be prepared to develop prioritized safety improvement lists for parks. These studies should be developed in concert with FHWA engineers and Visitor and Resource Protection staff, and should address the Four "E's": Engineering, Enforcement, Education and Emergency Response. As more data becomes available for analysis and projects are identified and scoped, the Safety Management Program funding level should be re-evaluated.

### **Congestion Management**

Fortunately, the vast majority of roadways within PWR are relatively free of traffic

congestion. However, there are times when the visitor experience is negatively affected by the number of other vehicles sharing the roadways, especially when there is an expectation for solitude. There also can be times when traffic on a small number of road segments comes to a near standstill. Most traffic jams are associated with back-ups at entrance stations or at entrances to parking areas that have reached capacity. One exception is the Valley Loop Road in Yosemite Valley, which experiences traffic delays at intersections, due to the large numbers of pedestrians crossing roadways at key locations. Long delays on the Sunrise Road at Mount Rainier are caused when the terminus parking lot reaches capacity, typically on summer weekends or when the weather is fair. Traffic delays also occur at Mount Rainier at the entrance to the parking lots at Paradise, causing back-ups on Nisqually-Paradise Road, the main park entrance road from the west. Similar conditions occur at Haleakala NP, Muir Woods NM, Pinnacles NP and Sequoia NP.

A congestion survey administered to parks by the Denver Service Center in 2010 confirmed known problem areas in PWR (See Appendix 1, Congestion Mapping from *Technical Memorandum 7: Compiled Congestion Survey Information Report* for reported congestion problems by park). The primary problem experienced in PWR parks is caused by demand exceeding supply in parking lots, usually on busy weekends. Congestion problems should be monitored, and in some cases, projects can be identified to address the issue. However, care should be taken to preserve the visitor experience beyond the parking area: sometimes an increase in parking capacity or the use of shuttle buses can overload a visitor center, vista point or front-country trail system. It may be beneficial to conduct Visitor Experience/Resource Protection (VERP) studies or similar types of visitor use assessments to determine whether to proceed with a transportation project that would increase capacity. Chronic delays at entrance stations can often be alleviated with additional entry lanes. However, problems must be considered holistically, as it is possible to improve flow in one location, only to exacerbate problems and delays in another location. As defined in the NPS Management Policies, visitor carrying capacity is the type and level of visitor use that can be accommodated while sustaining the desired resource and visitor experience conditions in the park. Park managers are charged with identifying and staying within carrying capacities, so that park uses are managed in a way that they do not unacceptably impact the resources and values for which the parks were established.

Because of the types of interventions that are used to deal with congestion, e.g. expanding parking capacity, traffic demand management, shuttle service or reservations systems, congestion management is best combined with integrated planning efforts, which examine visitor experience, management zones, and broader resource protection goals. The transportation program should support funding transportation elements for this type of planning, but should not be used to fund visitor experience or resource impact studies for facilities like trails or visitor centers, which are more appropriately funded through other U.S.C. Title 54 NPS programs.

PWR invests approximately \$500,000 of Category I funds and \$1,000,000 of Category III funds annually on congestion management projects. These projects include parking lot expansion and reconfiguration, as well as planning, design and implementation of shuttle bus systems, transit staging areas and traffic demand management tools such as roadside variable message signs and web-based traffic information.

## **Traveler Information**

Traveler information, whether provided by permanent signage, variable message signs along roadways, AM radio broadcasts, websites, smart phone applications, or in person, is a key tool in facilitating visitor access to parks. Effective traveler information and way finding signage improve visitor experiences by helping visitors navigate a park with ease, and can help visitors avoid crowded locations and mitigate congestion. NPS partners, including gateway communities and the tourism industry, often play critical roles in getting information to visitors.

All NPS unit websites provide a “Plan Your Visit” page that typically includes information on directions, maps, temporary advisories and other information needed to plan a park visit. NPS is currently working on improving consistency and content for these pages, and is converting its websites to a new platform that will enable optimal viewing on mobile devices. The growing availability of GPS-enabled smart phones is increasing the potential to reach more visitors with on-demand, “just-in-time” information, such as real-time routing around traffic congestion, accident reporting, transit departure and arrival times, and other important travel information. Facilities that provide these types of services are often referred to as Intelligent Transportation Systems (ITS), which can be defined as the application of advanced information and communications technology to surface transportation in order to achieve enhanced safety and mobility while reducing the environmental impact of transportation.

PWR invests about \$300,000 annually in FLTP Category III funds for ITS. These systems are primarily intended to address traffic congestion problems. Upcoming projects include the following locations:

- Golden Gate NRA: Marin Parklands and Muir Woods
- Mount Rainier NP (Sunrise and Paradise Developed Areas)
- Yosemite NP (Baseline Traffic Management System is in place with expansion plans for specific areas)

The need to expand or manage the carrying capacity of existing infrastructure through ITS will increase as park visitation grows and visitation patterns shift. Improvements to the transportation networks will need to be coordinated with careful assessments about carrying capacity of other “downstream” visitor facilities, such as visitor centers, trails, overlooks and rest areas.

## **Access to the Park Boundary**

In the past thirty years since the creation of the Federal Lands Transportation Program, pressure to address failing infrastructure *around* parks has increased. Small rural roads often did not get much local support because of low numbers of residential or commercial users. However, these facilities are often vital for park access and for the tourism economy of the local communities. Some of these roads have benefitted from funding supplied through the Public Lands Highway Discretionary program, but this program was eliminated with the passage of MAP-21. However, the new legislation did create the Federal Lands Access Program (FLAP), a \$250 million/year national program to address these needs. Western states receive a sizeable portion of the program’s funding, due to the large amounts of Federal Land within their boundaries. FLAP is also providing critical

funding assistance for non-NPS roads within park boundaries that might otherwise see badly needed maintenance deferred indefinitely as local owners struggle to meet the financial demands of their transportation networks. Examples include Sir Francis Drake Boulevard at Point Reyes NS and John F. Kennedy Memorial Drive at Whiskeytown NRA. This funding assistance may reduce pressure for local governments to transfer ownership and maintenance responsibilities to NPS.

Increasingly, FLAP funds are being directed towards improving transit and other multi-modal connections from local systems to park destinations, as local agencies develop their programs and improve cooperation with NPS managers.

**Table 4**  
**Annual Federal Lands Access Program**  
**Funding by State\* as Established by MAP-21**

California	\$35,717,269
Montana	\$22,789,053
Oregon	\$22,078,490
Idaho	\$17,061,924
Washington	\$13,981,748
Nevada	\$7,085,158
Hawaii	\$265,000

\*only PWR states shown

Typical projects that receive FLAP funding include roadway rehabilitation, transit stop improvements, multi-use trails and highway enhancements such as rest stops. Assuming FLAP is extended in future transportation authorizations, PWR parks are tentatively programmed to benefit from almost \$43 million, for 11 projects in WA, OR and CA, from 2014 to 2018.

**Table 5**  
**Programmed FLAP Projects Benefitting PWR Parks (FY 2014 to FY 2018)**

FLAP Program	Amount	State	Park	Local Recipient	Project Title
	\$12,081,000	WA	OLYM	Jefferson Cty	Rehabilitate Upper Hoh Road
	\$739,000	WA	LARO	Lincoln Cty	Rehabilitate Hawk Creek Road
	\$6,267,000	WA	SAJH	San Juan Cty	Cattle Point Road Relocation
	\$950,000	WA	NOCA	Skagit Cty	Hard Creek Bridge Replacement
	\$1,119,000	WA	LEWI	WA DOT	Dismal Nitch Rest Area Improvements
	\$164,000	WA	OLYM	WA DOT	US 101 Lake Crescent Bus Stop and Pullout
	\$999,733	WA	OLYM	WA DOT	Rehabilitate East Beach Road
	\$500,000	OR	JODA	Wheeler Cty	Bridge Creek Road and Burnt Ranch Road Overlay
	\$154,000	OR	ORCA	Josephine Cty	Oregon Caves Highway Enhancement Project
	\$15,048,838	CA	PORE	Marin County	Rehabilitate Sir Francis Drake Boulevard
	\$4,800,980	CA	WHIS	Shasta County	Rehabilitate JFK Memorial Drive
	<b>\$42,823,551</b>	<b>Total</b>			

## Potential Threats Posed by Climate Change

Threats to park transportation systems related to climate change vary by location. In the Pacific Northwest, frequent flooding has become a serious problem. There has been a general shift since the late 1970s from a spring snowmelt dominated system to one dominated by fall and early winter rain-on-snow flooding. These flood events have been larger and more frequent than in years past, and have resulted in more damage to infrastructure. Northern areas are expected to continue to get more frequent and heavier storms, while southern areas are expected to receive less precipitation. Melting glaciers are generating higher sediment loads in outfall streams that often get deposited on roadways or under bridges that require significant maintenance efforts to clear. Roadways that parallel rivers and streams within or adjacent to the active stream channel are increasingly subject to damage. In extreme cases, these roads have to be relocated or abandoned.

Northwest roads with frequent flood damage:

- Mount Rainier NP
  - Nisqually-Paradise Road
  - Westside Road (unpaved)
  - White River Campground Road
  - Highway 410
  - Carbon River Road (unpaved, mostly converted to trail)
- Olympic NP
  - Hoh River Road (both NPS-owned segment and county road segment below)
  - Graves Creek Road (unpaved)
  - Elwha Valley Road
- North Cascades NP
  - Stehekin Valley Road (partially paved)
  - Cascade Pass Road
  - Highway 20 (not NPS-owned)

Other geographic areas within PWR may also be at increasing risk of flooding by streams, but recent storm damage trends do not support this. Parks in the California mountain ranges have been experiencing increased susceptibility to wildfire, and subsequent erosion and mass sliding of burned slopes has caused increased damage to roadways.

Sea level rise poses a threat to long-term sustainability of a small subset of transportation facilities in PWR. The Intergovernmental Panel on Climate Change predicts a range of scenarios, with predicted sea level elevations rising between 0.6 feet and 2.9 feet by 2100. Predicted sea level rise varies significantly by geographic location, with areas in the Pacific Northwest rising about half as much as areas in the southern part of the region. Effects on facilities will vary, depending on other factors such as geomorphology, storm frequency, wave patterns, local storm water drainage capacity, and types of construction. Rising sea levels may also alter or destroy natural features such as beaches or coastal bluffs, which may lead to changes in visitation patterns that will need to be taken into consideration when making transportation investment decisions. NPS and relevant non-NPS facilities likely to be affected to some degree in this time frame are listed below (non-NPS facilities shown in italics).



- Channel Islands NP: Piers and associated facilities on Anacapa, Santa Cruz, Santa Rosa and Santa Barbara Islands
- Golden Gate NRA
  - Stinson Beach and parking areas
  - Muir Beach, parking areas and *access road*
  - Rodeo Beach, Rodeo Lagoon and Mitchell Road
  - Fort Point and Marine Avenue
  - Crissy Field and multi-use trail
  - Ocean Beach and multiuse trail, *parking area*
- Olympic NP: Kalaloch Lodge, Rialto Beach
- Point Reyes NS: Drakes Beach Lot, *Sir Francis Drake Boulevard, Highway 1 along Tomales Bay and Bolinas Lagoon*
- Redwood NP: Enderts Beach Road, Redwood Information Center, *US 101 at Wilson Creek, Freshwater Lagoon and Big Lagoon*
- San Francisco Maritime NHP: Aquatic Park and Golden Gate Promenade
- WW II Valor in the Pacific NM: Pearl Harbor Visitor Center and Parking Lot

## Transportation and Resource Protection

Protection of sensitive natural and cultural resources is a basic requirement of all transportation program activities. The need for maintaining and improving access must be considered in relation to the core National Park Service mission of resource preservation for both present and future generations. The range of resources potentially affected by transportation projects and operations includes cultural and natural landscapes, scenic vistas, archaeological features, wildlife habitat, and the quality of our air and water.

### Historic Transportation Assets

As a principal custodian of historic properties, NPS manages a number of historic roadways that require special treatment to preserve their integrity. When it comes time to rehabilitate these roads, or make spot repairs to segments damaged by storms or landslides, it is often necessary to reconstruct contributing elements such as stone guard walls or curbing. This must be done in a way that is consistent with the Secretary of Interior Standards for the Treatment of Historic Properties. These guidelines establish standards for the rehabilitation or reconstruction work that may need to be accomplished to keep a historic road in service, and lay out specific requirements for how historic character is to be preserved. Rehabilitation on historic roads is more expensive than for non-historic roads: typical work in PWR parks involves costly rehabilitation or reconstruction of Civilian Conservation Corps (CCC) masonry structures, including retaining walls, guard walls, culvert headwalls, curbing, and stone-lined drainage features.

Major Historic Transportation Assets in PWR Parks:

- Park Roadway System, Mount Rainier NP
- Rim Drive, Crater Lake NP
- Lassen Park Highway, Lassen Volcanic NP
- Valley Loop Road, Yosemite NP
- Wawona Tunnel, Yosemite NP

Generals Highway, Sequoia NP  
Crater Rim Drive, Hawaii Volcanoes NP

The current replacement value (CRV) of all historic roadways in PWR is currently estimated at \$2.1 billion, including bridges, parking areas and tunnels. For comparison, the total CRV for all roadways in PWR, non-historic and historic, is \$6.2 billion. The deferred maintenance estimate for historic roadways totals \$362 million, approximately 37% of the \$976 million deferred maintenance costs for PWR roadways.

**Air Quality and Greenhouse Gas Emissions**

Air quality impacts from transportation are frequently cited as contributors to poor air quality. The effects are most noticeable in congested parks and non-attainment areas designated by the Environmental Protection Agency.

Most parks do not have direct influence over the air quality controls affecting the park and must coordinate with the congressionally-designated regional air quality authority, generally a metropolitan planning organization (MPO) or regional air quality planning commission. Nearby or upwind metropolitan areas, industrial or agricultural operations can significantly affect air quality within parks, endanger health, contribute to smog and reduce visibility.

Several areas adjacent to or near parks have been identified by the EPA as non-attainment areas for specific air pollutants. Non-attainment areas must plan for reduction of pollutants like carbon monoxide, ozone, and airborne particulate matter and must include those plans in their own regional long range transportation plans. Regional air quality conformity determinations are based on aggregated modeling for the entire region.

MPOs develop planning models to bring emissions into compliance with air quality regulations. Parks within or near these areas may be eligible for federal Congestion Mitigation and Air Quality Improvement (CMAQ) funds to help achieve or maintain National Ambient Air Quality Standards (NAAQS). Qualifying parks work directly with regional planning agencies and MPOs to determine appropriate actions.

**Table 6 Air Quality Non-Attainment**

Park	Non-attainment Area	Air Pollutants	Associated MPO	NPS or NPS-sponsored Transit System
CABR	San Diego County	8-hr Ozone	San Diego Association of Governments	No
CHIS	South Coast Air Quality Management District	8-hr Ozone	Santa Barbara County Association of Governments	Yes
DEPO	Great Basin Unified Air Quality Management District	24-hr Particulate Matter - Coarse (PM 10)	San Joaquin County Council of Governments	Yes
EUON	Bay Area Air Quality Management District	8-hr Ozone; 24-hr Particulate Matter - Fine (PM 2.5)	Metropolitan Transportation Commission	Yes
GOGA	Bay Area Air Quality Management District	8-hr Ozone; 24-hr Particulate Matter - Fine (PM 2.5)	Metropolitan Transportation Commission	Yes
JOMU	Bay Area Air Quality Management District	8-hr Ozone; 24-hr Particulate Matter - Fine (PM 2.5)	Metropolitan Transportation Commission	No
JOTR	South Coast Air Quality Management District	8-hr Ozone	Southern California Association of Governments	No
LAKE	Clark County	Carbon Monoxide	Regional Transportation Commission of Southern Nevada	No
MOJA	Mojave Desert Air Quality Management District	8-hr Ozone; 24-hr Particulate Matter - Coarse (PM 10)	Southern California Association of Governments	No
POCH	Bay Area Air Quality Management District	8-hr Ozone; 24-hr Particulate Matter - Fine (PM 2.5)	Metropolitan Transportation Commission	Yes
PORE	Bay Area Air Quality Management District	8-hr Ozone; 24-hr Particulate Matter - Fine (PM 2.5)	Metropolitan Transportation Commission	Yes
RORI	Bay Area Air Quality Management District	8-hr Ozone; 24-hr Particulate Matter - Fine (PM 2.5)	Metropolitan Transportation Commission	No
SAFR	Bay Area Air Quality Management District	8-hr Ozone; 24-hr Particulate Matter - Fine (PM 2.5)	Metropolitan Transportation Commission	No
SAMO	South Coast Air Quality Management District	8-hr Ozone; 24-hr Particulate Matter - Fine (PM 2.5)	Southern California Association of Governments	No
SEKI	San Joaquin Valley Air Pollution Control District	8-hr Ozone; 24-hr Particulate Matter - Fine (PM 2.5); 24-hr Particulate Matter - Coarse (PM 10)	San Joaquin County Council of Governments	Yes
YOSE	Mariposa County Air Pollution Control District	8-hr Ozone; 24-hr Particulate Matter - Fine (PM 2.5)	San Joaquin County Council of Governments	Yes

Source: *The Green Book Nonattainment Areas for Criteria Pollutants*, EPA, <http://www.epa.gov/airquality/greenbook/>

### Threatened and Endangered Species Habitat

PWR generally maintains its transportation infrastructure within its current footprint, however some assets such as roadways can pose mobility difficulties and hazards for some threatened, endangered or otherwise protected species. Consideration of habitat impacts is an important factor in expansion or relocation of transportation facilities. Additionally, roadway rehabilitation projects that include culvert or bridge work should include

considerations for accommodating passage of fish and other aquatic organisms through the structures.

Key habitat issues facing PWR parks:

1. Lake Mead NRA, Mojave NP, and Joshua Tree NP all have significant areas of desert tortoise habitat. Tortoises tend to create burrows in roadside berms that result from normal maintenance grading after storm events.
2. Fish passage is of particular concern in western Washington, due to binding commitments made by Territorial Governor Isaac Stevens to local Indian tribes in 1854-1855 to protect the local fisheries for the tribes' benefit. On March 29, 2013, the U.S. District Court for the Western District of Washington issued a permanent injunction requiring certain State of Washington agencies to provide and maintain fish passage for salmon at numerous culverts under State-owned roads, as part of *United States v. Washington, 2013*. The court imposed the injunction as a remedy following its 2007 declaratory order, finding that the State has built and operates stream culverts that block fish passage to and from the Tribes' usual and accustomed fishing places and these culverts deprive the Tribes of the fishing rights reserved by the Stevens Treaties. While the court order only pertains to Washington state roads, it may eventually pertain to all federal and local government roads within the case area.
3. Critical habitat for the northern spotted owl is located in Olympic NP, North Cascades NP, Mount Rainier NP, Crater Lake NP, Oregon Caves NM, and Redwood NP. Road rehabilitation and other construction work must minimize disruptions, especially during breeding seasons.
4. Hawaiian nene and petrel habitats exist in Haleakala NP and Hawaii Volcanoes NP. Road rehabilitation and other construction work must be designed and scheduled to minimize disruptions, especially during breeding seasons.

### **Motor Vehicle/Wildlife Collisions**

Vehicle collisions with wildlife are a concern in several parks within PWR, however only about 4% of PWR reported motor vehicle crashes involve collisions with wildlife (as compared to 17% for collisions Servicewide). For the individuals involved in crashes, however, the costs can be high; about a quarter of reported crashes result in injury or a fatality. Animal mortality associated with crashes is high and collisions with smaller animals are assumed to be under-reported, as these often do not result in vehicle damage and subsequent accident reports.

### **Scenery**

Protecting natural scenery is fundamental to the National Park Service's mission. Roadways can provide invaluable access to important vistas but can also detract from the landscape if insensitively designed or maintained. Roadside vistas, especially those which are historic, should be maintained to provide continued enjoyment for park visitors, as originally intended. Plans for roadway realignments should take advantage of potential new vistas and avoid disturbing existing landscapes. Directional and way finding signage should be designed to avoid clutter and redundancy. Roadside vegetation can provide valuable screening of visually obtrusive facilities such as water tanks, service roads, communication towers, and maintenance buildings. Detailed vista management plans are a good means of documenting park vista management goals and implementation methods.

### **Storm water Runoff and Water Quality**

Impermeable surfaces of roads and parking areas increase the volume and intensity of storm water flows, potentially leading to erosion and sedimentation of downstream water bodies. Runoff may also contain contaminants, especially runoff from high-use parking lots, where cooling engines tend to drip oil or other fluids onto the pavement. Runoff from these areas can be treated by a variety of methods, including vegetated buffer zones, “bioswales” (shallow drainage courses with gently sloped sides, designed to remove silt and pollution from surface runoff water), permeable pavement or infiltration beds, and catch basin filtration systems.

### **Roadside Vegetation and Native Flora**

NPS is charged with conserving natural resources and protecting native plant species. Roadside vegetation is often a key element in preserving the integrity of the roadway prism. However, proper maintenance involves periodic mowing and grading of ditches, clearing shoulders of woody vegetation, and selective clearing or pruning to provide for needed sight distance at intersections and sharp curves. Invasive weeds are becoming an increasing problem in many PWR parks, and roadway projects need to take weed proliferation and control into consideration. Proper weeding and revegetation of areas disturbed by construction activities is often critical to avoiding erosion and weed infestation problems. Projects teams need to plan ahead to propagate native seed or plantings for use in roadside revegetation work.

## **Financial Analysis**

### **Background**

The financial health of the NPS transportation portfolio is declining. Analyses prepared for the NPS National Long Range Transportation Plan show that between 2006 and 2012, the National Park Service invested on average \$469 million annually in transportation (including Title 23, Title 49 and Title 54 fund sources). In recent years, funding levels for the most significant transportation funding programs have leveled, dropped or been eliminated. NPS forecasts a reduced annual average of \$391 million in funding for capital, operations and maintenance for the period 2015 to 2020, yet annual transportation needs are estimated to be \$1.38 billion, leaving an annual Servicewide unmet need of \$989 million.

### **Fund Sources**

The NPS list of fund sources available for transportation-related expenses exceeds 60 fund sources. However, the vast majority of transportation funding from 2006 to 2012 has come from 12 primary sources. FLTP Category I-3R and -4R is the largest single funding source, at 52.4% of the total. The seven-year averages for expenditures out of these funds are shown in Table 7.

**Table 7**  
**PWR Primary Fund Sources and Work Types**

Primary Fund	Administration	Average Annual Obligations (2006-2012, 2012 dollars)***	Portion of Total	Maintenance	Component Renewal/Re-capitalization	Capital Improvement/New Construction	Transit Operations	Planning
<b>Title 54, US Department of Interior, National Park Service</b>								
Operational Base* -								
Park	Park Unit	\$8,965,703	10.7%	✓	✓		✓	
Rec Fee 80%	Park Unit	\$3,653,160	4.3%	✓	✓	✓	✓	✓
Transportation Fee	Park Unit	\$536,118	0.6%				✓	
Cyclic Maintenance	NPS Regional Office	\$7,569,802	9.0%	✓				
Repair/Rehab	NPS Regional Office	\$2,012,353	2.4%		✓			
Rec Fee 20%	NPS Regional Office	\$47,515	0.1%		✓	✓		
Line Item Construction	DOI	\$5,780,333	6.9%		✓			
Emergency Storm and Flood	WASO	<i>See Operational Base</i>		✓	✓			
<b>Title 23, US DOT/FHWA, Federal Lands Transportation Program</b>								
FLTP Cat I-3R & 4R	NPS Regional Office/WASO	\$44,013,153	52.4%	✓	✓	✓		✓
FLTP Cat III - ATP	NPS Regional Office/WASO	\$2,347,116	2.8%		✓	✓		✓
FHWA - PLHD**	FHWA	\$2,206,438	2.6%		✓	✓		✓
FHWA ERFO	FHWA	\$3,213,425	3.8%		✓			
<b>Title 49, US DOT/Federal Transit Admin.</b>								
TRIP/ATPPL**	DOI/DOT/FTA	\$3,718,977	4.4%		✓	✓	✓	✓
<b>TOTAL</b>		<b>\$84,064,094</b>	<b>100.0%</b>					

\* Includes Emergency Storm and Flood disbursed by WASO; \*\* Amount indicated reflects grant award amounts.

\*\*\* Source: AFS3 Summary Data Reports

### Work Types

NPS has designated five work types for ownership and operation of transportation assets, and check marks indicate which fund sources are being used for each work type. The work types are defined as:

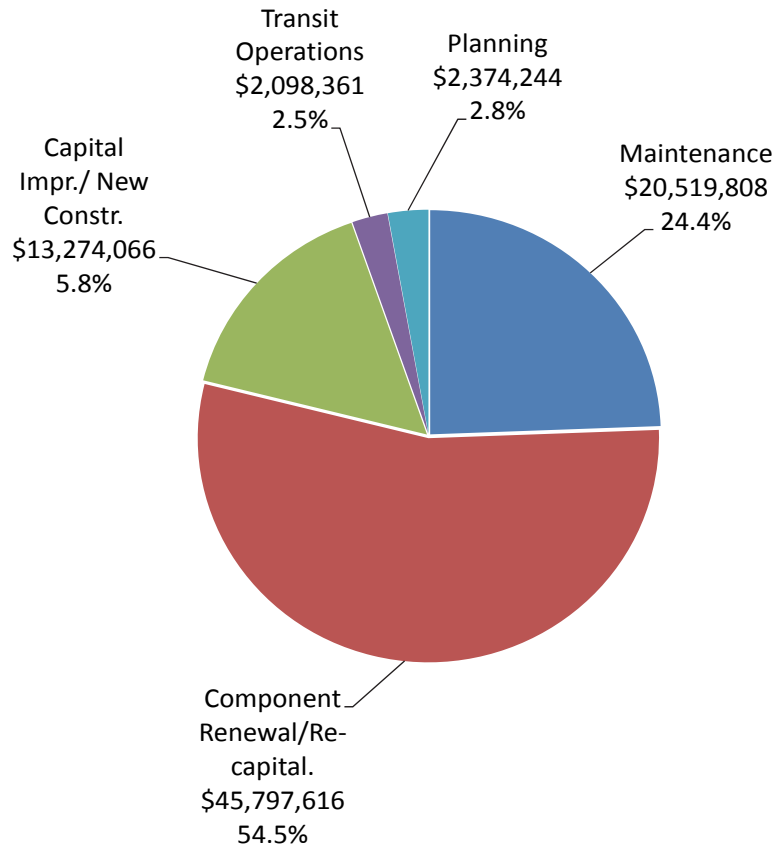
1. Maintenance
  - Corrective Maintenance (CM): Unscheduled reactive repairs that would not be estimated and planned, but are accomplished by local staff or existing service contractors.
  - Preventive Maintenance (PM): regularly scheduled periodic maintenance activities (within a year) on selected assets, such as cleaning ditches and mowing;
  - Regular and Recurring Maintenance (RM): work activities that recur based on normal wear patterns on a periodic cycle of greater than one year and less than ten years. This includes chip- and micro-seals for asphalt pavements, roadway striping, deck joint cleaning and sealing for bridges, etc.;
  - Deferred Maintenance (DM): maintenance that was not performed when

- scheduled and is delayed. Continued deferment of regular, preventive or recurring maintenance will result in deficiencies and higher long-term costs.
2. **Component Renewal/Recapitalization:** The planned replacement of a component or system that will reach the end of its useful life, based on the measured condition and life-cycle analysis. This includes 3R rehabilitation of roadway pavements and 4R reconstruction of roadways, when reconstruction is necessary to replace worn out facilities in situations where the roadway prism needs to be widened or realigned to serve current day traffic volumes and meet modern design standards. Work also includes unscheduled emergency repairs to roadways, in response to storm damage, rock fall, landslides, unexpected bridge undermining, etc. Emergency repairs that were not reimbursed by the Emergency Repairs for Federally Owned Roads (ERFO) program have averaged \$1.2 million annually from 2006 to 2012.
  3. **Capital Improvement/New Construction:** Major new construction projects and investments where none previously existed. Recent capital improvement projects have included bike paths and new transit facilities such as transit stops and shelters. No new NPS transit systems are anticipated within PWR.
  4. **Transit Operations** include costs to operate the two NPS-owned and operated systems in the Pacific West Region. It does not include operational costs for vendor-operated systems, which are self-supporting and not funded directly by the National Park Service. Transit capital expenditures are included in the Component Renewal/Recapitalization work type.
  5. **Planning:** Transportation plans, technical support for general management plans and environmental planning (NEPA) clearances at both the regional and individual park levels. NEPA compliance for Category I road work is included in the gross project costs under the Component Renewal/Recapitalization work type.

## Distribution of Funding Over Work Types, 2006 to 2012

Average expenditures from 2006 to 2012 are shown below.

**Figure 10: Expenditures by Work Type  
PWR Annual Average, 2006-2012  
\$84.1 Million (without ARRA Funding\*)**

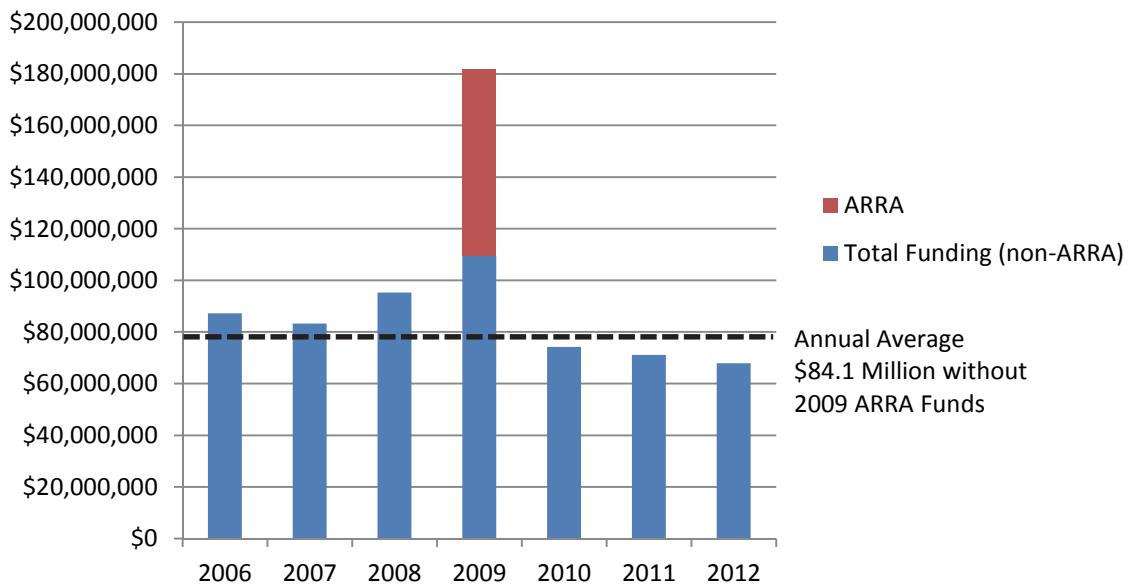


Source: AF53 Summary Data Reports and PTATS Allocation Reports

\*In 2009, funding was supplemented by \$68.9 million as part of the one-time stimulus from the American Recovery and Reinvestment Act (ARRA). Given the one-time nature of the additional funds, this plan uses the seven-year average of \$84.1 million, as calculated without the ARRA funds. This average better represents the typical amount of transportation funds available, and forms the baseline for future funding forecasts.



**Figure 11: PWR Total Funding Obligations  
2006 - 2012**



Source: AFS3 Summary Data Reports and PTATS Allocation Reports

**Funding Projections**

This plan forecasts future transportation related financial resources from 2015 to 2035. Future funding is modeled on historic and current amounts and assumes no major changes in Congressional funding levels or programs. Two exceptions are the recent cancellations of both the Public Lands Highway Discretionary (PLHD) and Transit in Parks (TRIP) programs, which from 2006 to 2012 amounted to over \$5.9 million annually for PWR parks. All future fund amounts are in year of expenditure (YOE) dollars.

Future funding forecasts are based on the historical average, increasing 2.1% annually after 2012. The trend from 2006 to 2012 follows a bell-shaped curve, peaking in fiscal year 2009, then decreasing, essentially ending up with an average funding level equal to that in 2006 (no growth in actual dollars, and a decrease in constant 2013 dollars). The 2.1% anticipated growth rate used for the projection is equal to the agency standard inflation rate of 2.1%; in other words, purchasing power is forecast to remain constant at today's levels.

The estimated growth rate is conservatively optimistic. Funding spikes similar to those provided through ARRA may recur, but such a possibility was not factored in the forecast due to and the uncertainty of future economic and political pressures. Other innovative funding mechanisms and financial partnerships were also considered but were not included in the financial forecasts due to the uncertainty of obtaining such funds for the types of projects typically implemented in national parks.

The 2.1% NPS inflation value trend was used to compare needs identified in the Needs Assessment. Key characteristics of the financial forecast include:

- No new fund sources are projected to be available during the planning period.
- Maintenance - Annual maintenance funds continue to provide the second largest

financial input to the total transportation program.

- Component Renewal/Recapitalization - Reducing deferred maintenance continues to be the priority and receives the majority of funding.
- Capital Improvements/New Construction - The loss of the TRIP and PLHD programs means an annual reduction of approximately \$1.6 million in funds for capital improvements.
- Transit Operations - Funds for the operation of the PINN shuttle will come primarily from a newly authorized transportation fee. No new grant program is anticipated to replace the discontinued Transit in Parks Program, which previously provided an average of \$895,000 annually for transit operations in PWR. Transit capital funds are included in the component renewal/recapitalization work type.
- Planning funds for transportation are indicated in the forecast at below current levels, due to the loss of planning funds previously attained through the PLHD and TRIP programs. These programs provided an average of \$1 million annually for planning efforts from 2006 to 2012.

The Federal Lands Transportation Program (FLTP) is the predominant transportation funding source for national parks in PWR. The current transportation spending authorization, and other NPS fund sources such as Recreation Fee, Cyclic Maintenance, Repair/Rehabilitation, and Line Item Construction, are expected to be continued, and to increase only as much the forecast inflation rate of 2.1%. Future funding totals are forecast below, shown in year of expenditure (YOE) dollars.

## Needs Assessment

This assessment identifies existing and future transportation needs for the Pacific West Region. It examines both programmed and unfunded needs from present to 2035. The analysis finds significant gaps between projected funding and estimated needs, in particular for preventive maintenance and operations, rehabilitation of roadways and parking areas, and recapitalization of transit vehicles.

Insufficient past funding has left the transportation system in need of significant repairs and major investments just to maintain the current infrastructure, operations, and level of service. Very little new construction or new service is being contemplated: 99% of the costs for work identified in PWR's current project priority lists for Category I/3R, Category I/4R and Category III is for maintenance, repair or recapitalization of existing roadway, parking and transit assets. Few major capital investments or new construction projects have been built in recent years that add new roadway capacity or new connections. Recently constructed capital improvement projects include bicycle/multi-use paths that increase mobility and access for non-motorized modes of travel. These projects typically use existing trail alignments. Transit service is provided through a variety of means, including NPS ownership, concessions contracts, cooperative agreements and service contracts.

In general, visitation levels at PWR parks have been fairly constant over the last twenty years. Significant increases in visitation are not anticipated for the planning period covered in this plan.

## **Major Assumptions**

Findings are based on the assumptions indicated below. These assumptions are required to extend past data and near-term future projections out to 2035.

No major additions (transfers from local governments, new construction) or deletions (demolitions/removals) to PWR's inventory of transportation infrastructure. As previously discussed, these are both possible but very difficult to predict with any certainty at this time.

Growth Rate – Growth in needs includes a 2.1% annual rate of inflation in order to provide a more accurate figure for the expenditure year.

American Reinvestment and Recovery Act (ARRA) – PWR received a significant increase in project funding in 2009 a result of ARRA. For the purposes of this planning document, a similar funding increase is not anticipated within the planning timeframe, and ARRA funds were not used in baseline funding calculations.

Alternative Transportation Systems (ATS) – Unless they can be shown to be financially sustainable, this plan assumes no implementation of new NPS-owned, operated, or maintained systems, due to (1) the accelerating costs of transit operations, (2) the perceived instability of transit funding, and (3) the need to commit operational funds to existing systems. Transit needs from existing ATS are extended cyclically from current *pro forma* forecasts.

## **Key Components of Needs**

### **Asset Management**

Forty-three percent of future needs are for pavement replacement or preservation. Due to expected funding shortfalls, the overall pavement condition for PWR roads is not anticipated to improve despite ongoing implementation of a comprehensive pavement preservation program. Focus on the primary park routes, however, should enable modest improvements in pavement condition for those roadways.

### **Transit**

Most of the transit operations are projected to be fully funded under existing sources through the planning period. Mount Rainier NP's transit service has not been funded since 2013, but may be funded in the future. Another significant issue is the cost of vehicle replacement. A fund source for recapitalizing vehicles at Yosemite NP has not been identified and will require approximately \$12.8 million in 2017 for 18 buses. Recapitalization needs for other systems will likely be met or covered through service contracts, vehicle leasing, and to a lesser extent, by FLTP Category III funding for smaller systems such as those at PINN and EUON.

### **Mobility, Access & Connectivity**

Maintaining access over aging bridges on primary park roadways will pose a financial challenge for PWR, but within the 20-year planning horizon should be manageable primarily through repair and preservation treatments to existing structures. A number of expensive bridge replacements along main park roadways are inevitable beyond 2035.

Improved connections to gateway communities will be possible where cost-effective solutions are found, but the focus will need to remain on basic access on park roadways. Rehabilitation projects will continue to make progress in meeting universal access goals for transit stops, parking areas, sidewalks and other key elements of the transportation network.

### **Visitor experience**

In some locations visitor experience will continue to suffer, from traffic congestion and poor roadway and parking conditions. Options for relieving congestion and lack of parking capacity are limited in some cases by the need to preserve a quality visitor experience at destinations beyond the parking lot, such as front-country trails, visitor centers and overlooks. Progress is expected, however, on improving visitor and employee safety on park roadways as the ability to analyze problems and implement cost-efficient solutions improves.

### **Resource Protection and Enhancement**

Historic roadways will continue to age and reach their end of practical service-life. Increased costs for rehabilitating these facilities in accordance with the Secretary's Standards for Historic Preservation will continue to place financial stress on transportation programs, but progress will be made in improving these roadways for modern traffic demands.

Natural resource protection goals will advance by incorporating best management practices for air and water quality. Revegetation and weed-control efforts will continue to ensure that transportation projects have a positive effect on local habitats, but will likely struggle with increased weed proliferation that affects roadways across the nation. Enhancement of fish and aquatic organism habitats will progress as they are incorporated into roadway rehabilitation projects through the use of properly designed stream crossings.

### **Sustainable Operations**

Adoption of more rigorous project selection and screening tools, such as the Capital Investment Strategy, will help PWR identify its most important transportation assets and commit spending to where it will be most effective. It will also reduce total life cycle costs for these high priority assets, by ensuring that basic levels of annual maintenance are performed. Lower priority assets will be less likely to be rehabilitated and may be removed from service. Increasingly, programs such as FLTP will need to incorporate facility removal into their multi-year programs. Additionally, Intelligent Transportation Systems will play an increasing role in optimizing use of existing infrastructure without expanding the developed footprint.

### **Total Transportation Needs for the Pacific West Region**

Total transportation needs for the Pacific West Region are projected by combining existing, unmet and future needs for all transportation assets. Total needs were then compared to projected financial resources to identify the funding gap. The sizeable gap represents a significant challenge in operating and maintaining transportation at an acceptable level in PWR parks.

Existing needs have been calculated based on current prioritized project lists in the Federal

Lands Transportation Program (FLTP), repair recommendations from the Highway Pavement Management Application (HPMA), estimated emergency repair needs, the NPS Bridge Management System, the Operations and Maintenance Requirements Cost Model from the NLRTP, Alternative Transportation System *pro forma*, and the Pacific West Region Safety and Congestion Management programs. Future needs were calculated by extending current needs to 2035 at the 2.1% inflation rate. Historic obligations have been normalized to 2012 dollars.

### **PWR Needs, 2015-2035**

The total annual estimated need for the PWR will grow from \$122 million in 2015 to \$194 million in 2035. The growth in need results primarily from the compound effects of inflation and the lack of adequate funding to reverse the declining trend in the overall condition of roadways and bridges.

Outputs from the Highway Pavement Management Application (HPMA) were generated to determine the most cost-effective treatments for PWR roads and parking areas. Since pavement treatments are cyclic in nature, the needs assessment extends the costs of pavement treatments to 2035 based on HPMA recommended cycles, adding inflation costs. Roadway pavement maintenance, rehabilitation and reconstruction activities dominate future transportation needs in the region.

### **Operation and Maintenance Needs**

The Operations and Maintenance needs for the four primary PWR transportation asset types are indicated below in Table 8. Marinas and waterfront assets were generally not included in these totals because they are not, with minor exceptions, part of the public access transportation portfolio under NPS management. Totals include needs for all paved and unpaved roads and parking areas in the inventory.

**Table 8: Operations and Maintenance Needs in 2015**

Current Requirements					
Asset Code	Asset Type	Operations	Preventive	Recurring*	Total
1100	Roads	\$10,352,681	\$7,975,508	Not incl.	\$18,328,189
1300	Parking	\$2,280,300	\$351,023	Not incl.	\$2,631,323
1700	Bridges	\$579,388	\$226,137	Not incl.	\$805,525
1800	Tunnels	\$551,597	\$343,543	Not incl.	\$895,140
	<b>Total</b>	<b>\$13,763,966</b>	<b>\$8,896,211</b>		<b>\$22,660,177</b>

Planned Spending					
Asset Code	Asset Type	Operations	Preventive	Recurring*	Total
1100	Roads	\$3,983,658	\$2,557,331	Not incl.	\$6,540,989
1300	Parking	\$607,168	\$99,046	Not incl.	\$706,214
1700	Bridges	\$154,347	\$77,510	Not incl.	\$231,857
1800	Tunnels	\$336,883	\$127,986	Not incl.	\$464,869
	<b>Total</b>	<b>\$5,082,056</b>	<b>\$2,861,873</b>		<b>\$7,943,929</b>

Gap between Planned & Required O&M by Asset Type					
Asset Code	Asset Type	Planned	Required	Difference	% Req't Met
1100	Roads	\$6,540,989	\$18,328,189	(\$11,787,200)	36%
1300	Parking	\$706,214	\$2,631,323	(\$1,925,109)	27%
1700	Bridges	\$231,857	\$805,525	(\$573,668)	29%
1800	Tunnels	\$464,869	\$895,140	(\$430,271)	52%
	<b>Total</b>	<b>\$7,943,929</b>	<b>\$22,660,177</b>	<b>(\$14,716,248)</b>	<b>35%</b>

Source: (from 2014 PAMP Re-Optimizer; reflects Effective Requirement which equals Raw Requirement minus Supplemental Funding)

\*Recurring Maintenance Needs are not included here because they have been modeled in more detail by FHWA bridge and pavement preservation engineers (see Bridge and Pavement Preservation Program sections for needs estimates).

\* Recurring Maintenance Needs are not included here because they have been modeled in more detail by FHWA bridge and pavement preservation engineers (see Bridge and Pavement Preservation Program sections for needs estimates).

### Major Project Needs

Table 9 identifies major project needs in PWR, as recorded in the current FLTP Category I and Category III priority lists, the FLREA 5-year program and detailed management plans such as the Yosemite Merced River and Tuolumne River Plans. The list does not include congestion or safety management projects. PWR will continue to take project submissions in those sub-categories in the annual Servicewide Comprehensive Call.

**Table 9: Significant PWR Projects for NPS Facilities**

<b>Park</b>	<b>Description</b>	<b>Estimated Cost</b>
CHIS	Replace Dilapidated Pier at Scorpion Anchorage at Santa Cruz Island	\$3,000,000
CRLA	Restore Safe Width of East Rim Drive, North Junction to Cleetwood	\$5,100,000
CRLA	Restore Safe Width of West Rim Drive	\$8,500,000
CRLA	Rehabilitate Pinnacles Road	\$9,700,000
CRLA	Rehabilitate East Rim Drive (Route 13), MP 4.5 to MP 12.0 (Phase I of II)	\$11,400,000
CRLA	Rehabilitate East Rim Drive, MP 12.0 to MP 23.1 (Phase II of II)	\$15,100,000
CRLA	Rehabilitate 9.6 miles of Crater Lake Highway (Route 011)	\$15,800,000
DEVA	Rehabilitate Southern Half of Artist Drive Road (4.4 miles)	\$1,800,000
DEVA	Rehabilitate Dante's View Road	\$5,700,000
DEVA	Rehabilitate Beatty Cutoff Road (Route 012) from MP 0.0 to MP 10.0	\$8,000,000
DEVA	Rehabilitate Badwater Road (Route 015) from MP 13.0 to MP 29.0	\$11,100,000
DEVA	Rehabilitate Emigrant Canyon Road A	\$12,400,000
DEVA	Rehabilitate Emigrant Canyon Road B	\$12,400,000
DEVA	Rehabilitate Badwater Road (Route 015) from MP 0.0 to MP 13.0	\$13,900,000
DEVA	Rehabilitate Jubilee Pass Road (Route 013) from MP 0.0 to MP 21.0	\$15,100,000
DEVA	Reconstruct 8 Miles of Lower Wildrose Road (Route 14, MP 17.0 to MP 24.9)	\$18,100,000
GOGA	Rehabilitate Entry Road, North and Central Parking Areas, Stinson Beach	\$2,100,000
GRBA	Reconstruct 4 of 12 miles - Wheeler Park Scenic Drive (Route 100, MP 0 to MP 11.75)	\$8,600,000
GRBA	Pave 6 miles of Baker Creek Road	\$16,500,000
HALE	Rehabilitate 4 Miles of Main Park Road	\$6,900,000
HAVO	Reconstruction/Rehabilitation of Crater Rim Drive from Main Park Entrance to Devastation Trail Parking (Route 10, MP 7.6 to MP 10.7)	\$5,300,000
HAVO	Rehabilitate Crater Rim Drive from Entrance to Devastation Trail Parking Lot, MP 2.8 to MP 7.6	\$6,500,000
LABE	Rehabilitate and Resurface Main Park Road, Spur Roads and Parking Areas (Northern Half of Park)	\$8,500,000
LABE	Rehabilitate and Resurface Main Park Road, Spur Roads and Parking Areas (Southern Half of Park)	\$10,800,000
LAKE	Rehabilitate Cottonwood Cove Access Road	\$11,800,000
LAKE	Rehabilitate Temple Bar Access Road Phase I - MP 9.3 to MP 17.5	\$13,300,000
LAKE	Rehabilitate Temple Bar Access Road Phase II - MP 0.0 to MP 9.3	\$13,300,000
LAKE	Reconstruct Katherine Access Road	\$13,800,000
LARO	Rehabilitate Spring Canyon Road and Parking Area	\$4,100,000
MOJA	Reconstruct Poorly Aligned Park Road Segments, Phase II (Morningstar Mine Road & Various Intersections)	\$7,700,000
MOJA	Rehabilitate Kelso Cima Road (Route 11, MP 0 to MP 18.96)	\$15,000,000

<b>Park</b>	<b>Description</b>	<b>Estimated Cost</b>
MORA	Replace/Lengthen Kautz Creek Bridge to Protect Structural Integrity During Flood Events	\$3,800,000
MORA	Rehabilitate Stevens Canyon Road, MP 9.5 to MP 14.0	\$6,100,000
MORA	Repair Fryingpan Creek Bridge (Sunrise Road)	\$3,900,000
MORA	Rehabilitate Sunrise Road MP 5.3 to MP 10.3 (Phase 2)	\$6,100,000
MORA	Rehabilitate Stevens Canyon Road (Route 013) MP 5.0 to MP 9.5	\$7,900,000
MORA	Rehabilitate SR 123, Southeast Boundary to Panther Creek (5 miles)	\$8,200,000
MORA	Rehabilitate Sunrise Road MP 0.00 to MP 5.3 (Phase I)	\$9,200,000
MORA	Rehabilitate Mather Memorial Parkway (SR 410) - Phase II (Cayuse Pass to MP 60)	\$10,400,000
MORA	Rehabilitate 12 Miles of Nisqually-Paradise Road, Longmire to Paradise	\$16,000,000
MUWO	Construct Access Improvements at Parking and Transit Staging Area Phase I	\$1,700,000
NOCA	Pave Five Miles of Stehekin Valley Road	\$8,500,000
OLYM	Rehabilitate Route 102, Camp David Jr. Road	\$2,100,000
OLYM	Replace Culvert with Bridge at July Creek on Route 104, Quinault North Shore Road	\$2,200,000
OLYM	Replace Culvert with Bridge at East Twin Creek on Route 107, Hoh Entrance Road	\$2,200,000
OLYM	Replace Finley Creek Temporary Bridge	\$3,100,000
OLYM	Rehabilitate Route 116 Lyre River Road and Route 101, East Beach Road	\$4,800,000
OLYM	Rehabilitate Hoh Entrance Road	\$8,500,000
OLYM	Rehabilitate Route 104, Quinault North Shore Road	\$10,200,000
OLYM	Rehabilitate Elwha Valley Road	\$13,000,000
OLYM	Rehabilitate Route 103, Sol Duc Valley Road	\$13,400,000
OLYM	Rehabilitate Lake Crescent Road (US Hwy 101)	\$18,200,000
PORE	Rehabilitate Mt Vision Road	\$2,500,000
PORE	Rehabilitate Lighthouse and Chimney Rock Roads	\$3,700,000
SEKI	Rehabilitate and Resurface 8.7 mi of KICA Generals Hwy from Pythian Camp to 1 mi south of the Wye	\$7,300,000
SEKI	Rehabilitate and Resurface 8.7 miles of the Generals Hwy Little Baldy North to Pythian Camp Road	\$8,200,000
SEKI	Rehabilitate 1.0 Miles of Generals Highway, Deer Ridge to Eleven Range	\$10,000,000
YOSE	Rehabilitate and Realign Roads and Parking at South Entrance	\$1,500,000
YOSE	Rehabilitate and Realign Roads and Parking surrounding South Entrance Kiosks	\$1,600,000
YOSE	Improve 8 Existing Shuttle Bus Stops at Yosemite National Park	\$2,100,000
YOSE	Realign Northside Drive at Yosemite Valley Day-Use Parking Area ("Camp 6")	\$2,500,000
YOSE	Rehabilitate Wawona Road from MP 0.0 to MP 2.6	\$3,100,000
YOSE	Stabilization Spot Repairs on the Big Oak Flat Road (MP 0.00 to MP 7.30)	\$4,300,000
YOSE	Rehabilitate Remainder of Yosemite Valley Loop Road and El Portal Road (Big Oak Flat to Pohono Bridge)	\$7,100,000



<b>Park</b>	<b>Description</b>	<b>Estimated Cost</b>
YOSE	Rehabilitate Mariposa Grove and Tram Road	\$8,000,000
YOSE	Rehabilitate Tioga Road, Phase 3 of 6, MP 15.2 to MP 23.0	\$14,800,000
YOSE	Rehabilitate Glacier Point Road, Badger Pass to Glacier Point (10.5 Miles)	\$15,700,000
YOSE	Reconstruct Valley Day-Use Parking Area for 750 Vehicles	\$4,600,000
YOSE	Construct West of Lodge Parking Area for 300 Vehicles	\$2,200,000
YOSE	Reconstruct Village Short-term Parking Area for 250 Vehicles	\$2,100,000
YOSE	Construct 189 Parking Spaces West of Curry Village	\$700,000
YOSE	Eliminate Off-road Parking and Relocate to TM Visitor Center; Expand Parking at Lembert Dome, Store, Stables Area, Pothole Dome and Wilderness Center	\$5,600,000
YOSE	Construct 300 Parking Spaces at El Portal Abbeville/Trailer Village	\$2,300,000
YOSE	Construct 415 parking spaces at Curry Orchard Parking Lot	\$2,700,000

### **Pavement Maintenance Needs**

Maintaining paved roadways represents the largest component of the overall transportation programming need. Because of its relative size, a specific analysis of need was prepared for this plan. Pavement condition is commonly expressed using Pavement Condition Rating (PCR), which is a numerical score based on distress factors measured by the Road Inventory Program, which uses a data collection vehicle and manual rating methods. These factors include amount of patching, cracking, wheel-path rutting and roughness of ride. Condition ratings are as follows:

POOR (<=60), FAIR (61 - 84), GOOD (85 - 94), EXCELLENT (95 - 100)

PWR has approximately \$24 million (net construction) annually available for 3R-type roadway rehabilitation and another \$10 million annually for pavement preservation (of which \$6 million annually comes from the Regular Cyclic Maintenance program). *Current funding is not sufficient to reach PWR's modest target of PCR 82:* if purchasing power remains constant over the 20-year planning horizon, overall pavement condition and deferred maintenance (DM) total will stay relatively constant, at 72 PCR and \$1.08 billion respectively. With the assumed 2.1% annual inflation, this DM can be expected to grow to \$1.63 billion by 2035. While the overall PCR target PWR has set is 82, higher PCR targets are set for the highest priority assets (functional class one and two roads), and lower PCR targets for less critical assets such as roadway functional classes three through eight and parking areas.

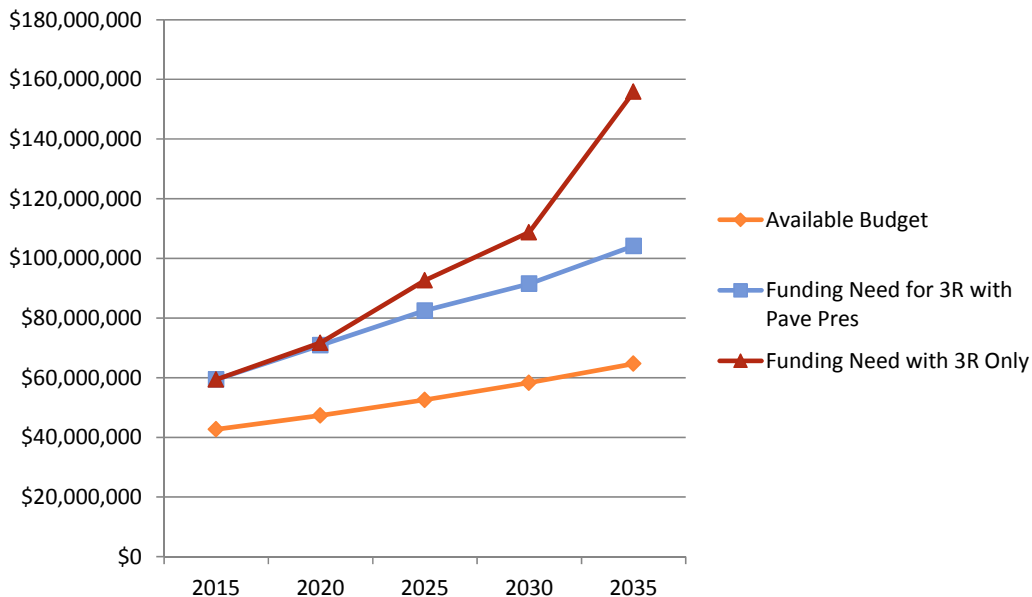
**Table 10**  
**PWR Pavement Condition Ratings (PCR) and 2035 Targets**

	Roads 1,2	Roads 3,8	Roads 4,5,6	Parking 1,2	Parking Other Public	Parking 3-8 and non Public	All
Route Miles	1,231	173	78	18	156	108	<b>1,764</b>
Current PCR	78.2	55.2	56.0	73.1	72.0	62.8	<b>73.4</b>
% Good Condition	49%	19%	18%	27%	21%	11%	<b>40</b>
% Fair Condition	36%	31%	32%	53%	55%	46%	<b>38</b>
% Poor Condition	15%	50%	50%	20%	24%	43%	<b>22</b>
<i>PCR Targets</i>	<i>85</i>	<i>75</i>	<i>75</i>	<i>80</i>	<i>80</i>	<i>70</i>	<i><b>82.2</b></i>

Source: HPMA Analysis for PWR Long Range Transportation Plan, Eastern Federal Lands Highway Division, 2014

The annual needs for 3R pavement rehabilitation to reach the modest PCR targets indicated above are shown in figure 12. Without pavement preservation treatments, rehabilitation needs increase significantly in the out years due to shortened service life of existing pavements. The annual shortfall under scenarios with and without pavement preservation begins at \$16 million in 2015, and grows to more than \$24 million and \$91 million respectively by 2035.

**Figure 12**  
**3R Roadway Rehabilitation with and without Pavement Preservation**  
**PWR Annual Funding Needs vs. Available Budget**



Forecast available budget is shown in orange. The blue line indicates the estimate of need to reach the PCR targets, assuming pavement preservation efforts continue at the current comprehensive level. The red line indicates the need to reach the same PCR targets, but without investing in pavement preservation efforts. Source: HPMA Analysis for PWR Long Range Transportation Plan, Eastern Federal Lands Highway Division, 2014

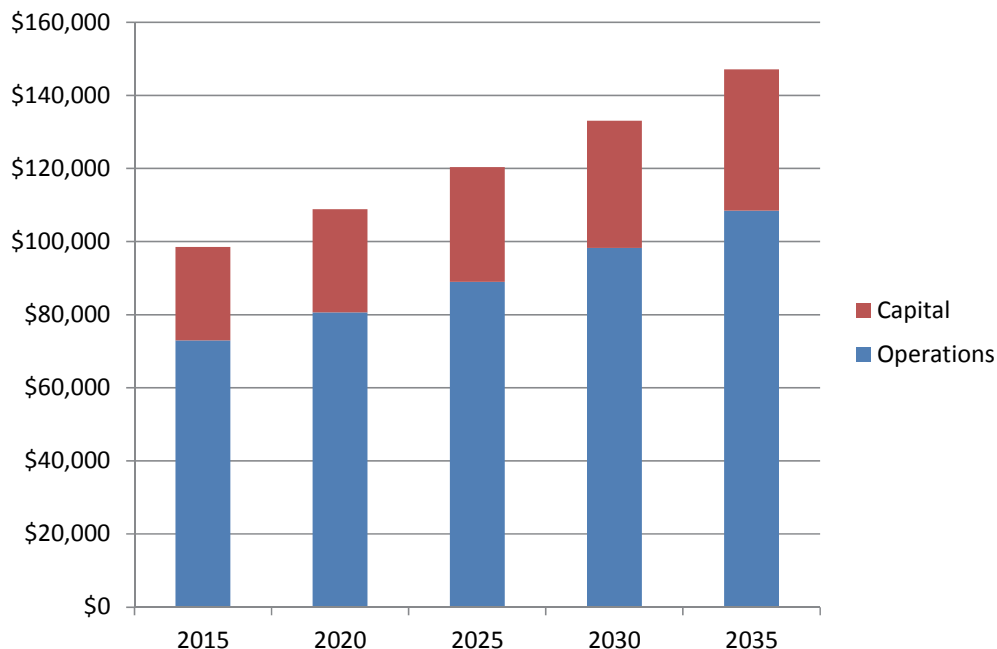
### Other Component Renewal/Rehabilitation Needs

PWR historically spends an annual average of \$56 million on Component Renewal/Recapitalization for transportation assets. This figure includes costs for planning, design and construction administration. Approximately \$33 million in funding for these projects comes from the FLTP, and \$23 million from Title 54 NPS programs and the former PLHD and TRIP programs. NPS funds are used to rehabilitate the full range of transportation assets, from minor drainage structures and roadside signs to marine piers, bridges and large parking lots.

### Transit System Needs

Figure 13 includes all costs necessary to operate the two transit systems owned and operated by the NPS. Future costs for capital and operational expenses were extrapolated from current *pro forma* financial statements, which indicate that expenses are generally covered by a combination of Recreation Fee, Transportation Fee, and Operational Base funding. Category III funds are programmed for replacement of vehicles for the small NPS owned and operated systems at EUON and PINN. Capital costs include fleet replacement on the schedule indicated in the *pro formas*. Additionally, one cycle of fleet replacement is assumed for each system with NPS owned vehicles, and is included in the future costs as an annualized amount. Costs beyond 2012 were forecast using the 2.1% annual inflation rate.

**Figure 13 Annualized Transit System Capital and Operations Needs (PINN and EUON only)**



Source: *Financial Pro Forma Models, NPS, 2013*

**Other Transit System Needs** - For some other PWR systems significant recapitalization needs remain unaddressed in years beyond the *pro forma* projection horizons. In the past, capital needs have been met with a combination of FLTP Category III funds and grant awards through the Federal Transit Administration Transit in Parks Program (TRIP). TRIP

has since been discontinued, and the Category III funds were generally intended as one-time investments to get systems established. Ongoing and future costs for capital and operational expenses are expected to be covered by a combination of funding sources, including Recreation Fee, Transportation Fee and ONPS. Revenues and expenditures are summarized in each park's *pro forma* financial assessments.

### **Planning**

The need for making wise investments in transportation services and infrastructure will grow more acute as visitation pressure at key park destinations continues to increase. From 2006 to 2012 the now-discontinued Transit in Parks Program (TRIP) distributed over \$6 million in planning grants to PWR parks. Given the pressing need for spending limited funds on the deferred maintenance backlog, it will be difficult to conduct comparable levels of planning activity without a new funding source.

**Table 11: PWR Projected Annual Transportation Needs, Funding and Gaps**

<b>Year 2015</b>			
<b>Work Type</b>	<b>Need</b>	<b>Projected Funding</b>	<b>Gap</b>
<b>Maintenance (Annual and Cyclic)</b>			
Operational Base (incl. Prevent. Maint.)	\$22,660,177	\$7,943,929	(\$14,716,248)
RCM and FLTP for Pavement Pres.	\$10,643,000	\$10,643,000	\$0
<b>Component Renewal/Recapitalization</b>			
3R Roadway Rehabilitation (Pavement)	\$48,732,000	\$32,790,800	(\$15,941,200)
Other Transportation Asset Rehabilitation	\$16,000,000	\$10,665,000	(\$5,335,000)
Bridge Preservation	\$3,885,000	\$3,885,000	\$0
Transit Recapitalization	\$1,036,000	\$30,000	(\$1,006,000)
<b>Capital Improvement/New Construction</b>			
4R Reconstruction and Realignment*	\$11,000,000	\$9,439,770	(\$1,560,230)
Safety Program	\$2,129,000	\$2,129,000	\$0
Congestion Management	\$798,000	\$798,000	\$0
Intelligent Transportation Systems	\$319,000	\$319,000	\$0
<b>Transit Operations</b>	<b>\$2,870,933</b>	<b>\$1,280,000</b>	<b>(\$1,590,933)</b>
<b>Planning</b>	<b>\$2,235,098</b>	<b>\$1,470,000</b>	<b>(\$765,098)</b>
<b>TOTAL</b>	<b>\$122,308,208</b>	<b>\$81,393,499</b>	<b>(\$40,914,709)</b>

<b>Year 2025</b>			
<b>Work Type</b>	<b>Need</b>	<b>Projected Funding</b>	<b>Gap</b>
<b>Maintenance (Annual and Cyclic)</b>			
Operational Base (incl. Prevent. Maint.)	\$27,895,000	\$9,779,000	(\$18,116,000)
RCM and FLTP for Pavement Pres.	\$13,102,000	\$13,102,000	\$0
<b>Component Renewal/Recapitalization</b>			
3R Roadway Rehabilitation (Pavement)	\$69,375,000	\$41,805,186	(\$27,569,814)
Other Transportation Asset Rehabilitation	\$19,695,971	\$13,128,596	(\$6,567,375)
Bridge Preservation	\$4,782,000	\$4,782,000	\$0
Transit Recapitalization	\$1,276,000	\$36,930	(\$1,239,070)
<b>Capital Improvement/New Construction</b>			
4R Reconstruction and Realignment*	\$9,000,000	\$8,000,000	(\$1,000,000)
Safety Program	\$2,620,000	\$2,620,000	\$0
Congestion Management	\$983,000	\$983,000	\$0
Intelligent Transportation Systems	\$393,000	\$393,000	\$0
<b>Transit Operations</b>	<b>\$3,534,113</b>	<b>\$1,575,678</b>	<b>(\$1,958,436)</b>
<b>Planning</b>	<b>\$2,751,401</b>	<b>\$1,809,567</b>	<b>(\$941,834)</b>
<b>TOTAL</b>	<b>\$155,407,486</b>	<b>\$98,014,957</b>	<b>(\$57,392,529)</b>

<b>Year 2035</b>			
<b>Work Type</b>	<b>Need</b>	<b>Projected Funding</b>	<b>Gap</b>
<b>Maintenance (Annual and Cyclic)</b>			
Operational Base (incl. Prevent. Maint.)	\$36,547,000	\$12,038,000	(\$24,509,000)
RCM and FLTP for Pavement Pres.	\$16,128,000	\$16,128,000	\$0
<b>Component Renewal/Recapitalization</b>			
3R Roadway Rehabilitation (Pavement)	\$88,053,000	\$64,789,534	(\$23,263,466)
Other Transportation Asset Rehabilitation	\$24,245,705	\$16,161,278	(\$8,084,427)
Bridge Preservation	\$5,887,000	\$5,887,000	\$0
Transit Recapitalization	\$1,570,000	\$45,461	(\$1,524,539)
<b>Capital Improvement/New Construction</b>			
4R Reconstruction and Realignment*	\$9,000,000	\$8,000,000	(\$1,000,000)
Safety Program	\$3,226,000	\$3,226,000	\$0
Congestion Management	\$1,210,000	\$1,210,000	\$0
Intelligent Transportation Systems	\$484,000	\$484,000	\$0
<b>Transit Operations</b>	<b>\$4,350,487</b>	<b>\$1,939,656</b>	<b>(\$2,410,831)</b>
<b>Planning</b>	<b>\$3,386,970</b>	<b>\$2,227,574</b>	<b>(\$1,159,396)</b>
<b>TOTAL</b>	<b>\$194,088,163</b>	<b>\$132,136,503</b>	<b>(\$61,951,659)</b>

Sources for Table 11: Operational Base (incl. Prevent. Maint.) was derived from calculations based off the 2014 PAMP Re-Optimizer - see table in Operations and Maintenance discussion. RCM and FLTP for Pavement Pres. need is calculated on current program spending amounts, which meet the need, inflated at 2.1% annually. 3R Roadway Rehabilitation (Pavement) need was derived by FHWA, using the HPMA application, using pavement condition targets indicated in Table 9. Non-pavement asset rehabilitation has historically accounted for approximately 35% of roadway rehabilitation costs, and has been factored into the 3R need calculations (see Pavement Preservation program section for details). Other Transportation Asset Rehabilitation need includes transit staging areas, bus shelters, docks and piers, and certain roadway appurtenances that need rehabilitation on cycles outside of normal roadway rehabilitation (large culverts, guard walls, etc.). Bridge Preservation need was derived by FHWA, using the Pontis application (see Bridge Preservation section for details). Transit Recapitalization need has been projected forward from the seven-year spending average, with inflation. 4R Reconstruction and Realignment need is based on the seven-year average spending history, and modified downward in future years to reflect anticipated gains made in bringing the inventory up to modern design standards. The needs for the Safety Program, Congestion Management Program and Intelligent Transportation Systems are based on the seven-year spending history, projected forward and adjusted for inflation. Transit Operations needs are based on financial pro forma for the NPS operated systems.

### **Unmet Needs: The Gap between Funding and Costs**

By 2035 the gap between projected annual transportation funding (\$132 million) and estimated annual needs (\$194 million) for the PWR will be \$62 million (see Table 11). This figure is largely the result of deferring major rehabilitation and reconstruction needs, which leads to a growing backlog of deferred maintenance and an increasing need for infrastructure investment declining conditions. Shortfalls in funding for regular maintenance for activities such as culvert cleaning, ditch pulling and mowing also lead to premature deterioration and increased storm damage to roadways and parking areas.

Implementation of the Capital Investment Strategy will help lengthen the service life for transportation assets that are identified as high priorities and keep annual maintenance requirements in balance by matching the core asset portfolio to the amount of operational funds available. Lower priority assets will deteriorate and eventually have to be removed from service. Program funds will be needed for projects to remove decrepit facilities that have negative effects on resources, scenery or the visitor experience.

### **Other Unmet Needs**

Roadway rehabilitation is the largest element of the transportation program that is projected to be underfunded. However, there are other important future needs that won't be fully met, which include efforts to address climate change impacts to facilities; implementing environmentally beneficial facility improvements such as providing for better fish passage and reducing wildlife-vehicle collisions; providing maintenance for future as yet un-built capital projects; providing for transit recapitalization costs; adopting innovative communication technologies to relieve transportation congestion problems; providing for accessibility to comply with the *Architectural Barriers Act* standards; rehabilitating aging and dilapidated roadway features on historic roads and bridges; and removal of facilities that are decommissioned due to lack of funding for operation and regular maintenance.

## Maintaining Access: 2015 to 2035

This plan offers a fiscally constrained strategy aimed at maintaining key visitor access to essential experiences in PWR parks. The investment strategy focuses on high priority assets for rehabilitation and preservation, and is aligned with the Capital Investment Strategy for reinvesting in assets that park-level managers have committed adequate operational and annual maintenance dollars.

### Key findings and conclusions

- Total funding for transportation is currently limited to \$81.4 million annually, and is predicted to grow in step with inflation at 2.1% annually, resulting in no net change in purchasing power.
- The gap between funding and identified need will grow mainly as a result of steady increases in deferred maintenance; the increase in deferred maintenance will be the result of no increase in PWR's purchasing capacity to meet rehabilitation and regular maintenance needs.
- While pavement preservation investments will maximize service life of pavements, inevitable aging and deterioration will outpace the agency's financial capacity to rehabilitate the roadways that need it. Roadway conditions will decline, leading to rough surfaces, decreased visitor enjoyment, increased annual maintenance needs and unsafe driving conditions.
- Preservation treatments will be employed to maximize the service life of bridges, but replacements are expected to come due at or near the end of this planning period in 2035. PWR will then face significant financial challenges in replacing numerous worn out structures.
- The costs for transit operations and vehicle recapitalization may pose a challenge for managers at some parks, as significant recapitalization needs remain unaddressed in years beyond the current *pro forma* projection horizons.

### Strategies for implementation:

- Funding priority will remain on maintenance of functional class one and two roadways and associated parking areas.
- Recapitalization will be focused on assets in Capital Investment Strategy (CIS) optimizer bands one and two.
- Prioritization for funding will go to projects that serve visitor areas and activities that are closely linked to the park's purpose and can't be substituted at another location within the park.
- Capital investments/new construction will be limited in order to conserve funds for repairs to existing facilities.
- Roads, parking areas and transit systems may need to be removed or downsized in order to bring inventory in line with budgets. Parks will align transportation assets with park purpose, as defined in establishing legislation, foundation documents, general management plans, and unit level long range transportation plans, if needed. Transportation program funds will be made available for a program of cost-efficient removals of low benefit/high cost assets.
- In regard to global climate change, careful consideration and life-cycle cost analysis must be made before major reinvestment in transportation facilities, especially those that are vulnerable to increasingly severe or frequent storm damage or sea-

level rise.

- The transportation safety management program will be adapted and improved as the Servicewide crash data collection and reporting capabilities are re-established. The process is expected to be completed by the end of 2015. Based on information provided by the new reporting system, it may be appropriate to increase near-term investment in addressing problem areas.
- The pavement preservation program funding levels (adjusted for inflation), will generally be adequate to meet system needs. Pavements that are in good enough condition to benefit from the program will be treated.
- The regional bridge preservation program will be enhanced to ensure that bridges on functional class one, two and three roadways remain at or above a Health Index of 92 in order to maximize the service life of these facilities.
- To ensure the sustainability of alternative transportation systems additional funding sources to cover transit operations and recapitalization costs will be pursued. Additional funding sources may include fare box receipts, parking fees, new grants and partnerships. Parks may seek approval for Transportation Fee increases through the Region and WASO program offices.
- Planning efforts will focus on reducing transportation congestion, improving visitor experience, and achieving financial sustainability.

### **Hope for the future:**

If future transportation funding levels exceed expectations, PWR should be well poised to take advantage of opportunities to improve visitor access and the quality of the visitor experience. This will require some ongoing planning efforts, including periodic updates to this plan and other park unit-level plans. Accurate inventory and condition assessments of the entire transportation infrastructure portfolio will remain critically important. Should there be funding increases above those projected in this document, PWR parks will begin to address the unmet needs identified above. Key improvements that could be made include:

- Improve the condition of important transportation facilities, including roadways, parking lots and transit staging areas. The modest pavement condition targets identified in this plan could be raised, allowing for smoother rides, less ongoing maintenance disruption and expense, and a safer environment for motorists, cyclists and pedestrians.
- Expand the number of existing roads and other transportation facilities to be included in the highest priority band of assets identified in park asset management plans (PAMPs), and consistent with the CIS. More facilities will receive regular, on time maintenance and care, so that NPS can minimize ownership costs for a larger proportion of its assets.
- Expand rehabilitation and other work requiring recapitalization to the larger set of assets in the high priority bands in revised PAMPs. More roads, parking areas, and transit facilities would qualify for rehabilitation funding, and PWR parks would make better progress in reducing the deferred maintenance backlog.
- Alternative modes of travel such as transit service and multi-use pathways, could be expanded and improved to better connect to surrounding communities, reduce congestion on roadways, and improve visitor experience. Recapitalization needs for existing transit systems (e.g. replacement of buses) would be funded. A reduction in fees and transit fares would encourage more visitors to use park transit services. Transit operations that depend on short-term funding sources such



- as grants or cooperative agreements could be made more stable and efficient.
- Other improvements could be made such as providing for better fish passage under roadways and reducing wildlife-vehicle collisions; expanding the use of innovative communication technologies to relieve transportation congestion problems; providing for better accessibility to comply with the *Architectural Barriers Act* standards; and rehabilitating aging and dilapidated roadway features on historic roads and bridges.



## Glossary of Selected Acronyms and Terms

ARRA	American Recovery and Reinvestment Act of 2009, commonly referred to as the "stimulus package." The Recovery Act was intended to create and save jobs, as well as spur economic activity and invest in long-term growth. Much of this activity was achieved through funding for federal contracts. The total ARRA expenditure estimate is \$840 billion.
ATP	Alternative Transportation Program, part of the Federal Lands Transportation Program (FLTP).
BIP	Bridge Inspection Program. The Bridge Inspection Team is responsible for the safety inspection and structural rating of approximately 1,400 NPS structures in accordance with the National Bridge Inspection Standards. The team also manages the NPS structures inventory and collects, maintains, and evaluates data, providing the FLH and NPS planners with an annual list of structure rehabilitation and repair priorities.
Category I	FLTP category of funding for NPS roads and bridges (see 3R and 4R sub-categories below).
Category II	FLTP category of funding for NPS parkways (there are no parkways in PWR).
Category III	FLTP category of funding for NPS alternative transportation systems. Category III is intended to provide for alternative modes of travel in national parks, including transit, marine, bicycle, and pedestrian.
CFLHD	Central Federal Lands Highway Division within FHWA. CFLHD operates as part of the FLTP, serving the needs of all central states (within PWR these include CA, NV, HI, and the Pacific Islands). CFLHD actively administers the surveying, designing and constructing of park roads and other roads on Federal lands.
CIS	Capital Investment Strategy. The CIS is a servicewide initiative that relies upon universal life-cycle management principles to address inherent threats to the financial sustainability of NPS's most valued assets. It is a focus of the FY 2015 Servicewide Consolidated Budget Call for both the Line Item Construction and Repair/Rehabilitation programs, and is expected to be expanded to other facility programs like FLTP in the near future. CIS provides park managers with the necessary tools to identify and commit to long-term life-cycle maintenance strategies that are consistent with budgetary constraints and resource limitations, while allowing discretionary authority to prioritize assets based on their intrinsic value to their respective park units.
CMAQ	Congestion Mitigation and Air Quality Improvement Program. The CMAQ program was implemented to support surface transportation projects and other related efforts that contribute air quality improvements and provide congestion relief, and is jointly administered by FHWA and the Federal Transit Administration (FTA). The CMAQ program provides funding to areas in nonattainment or maintenance for ozone, carbon monoxide, and/or particulate matter. MAP-21 provides just over \$2.2 billion in CMAQ funding for transportation-environmental projects for each year of the authorization-2013 and 2014.

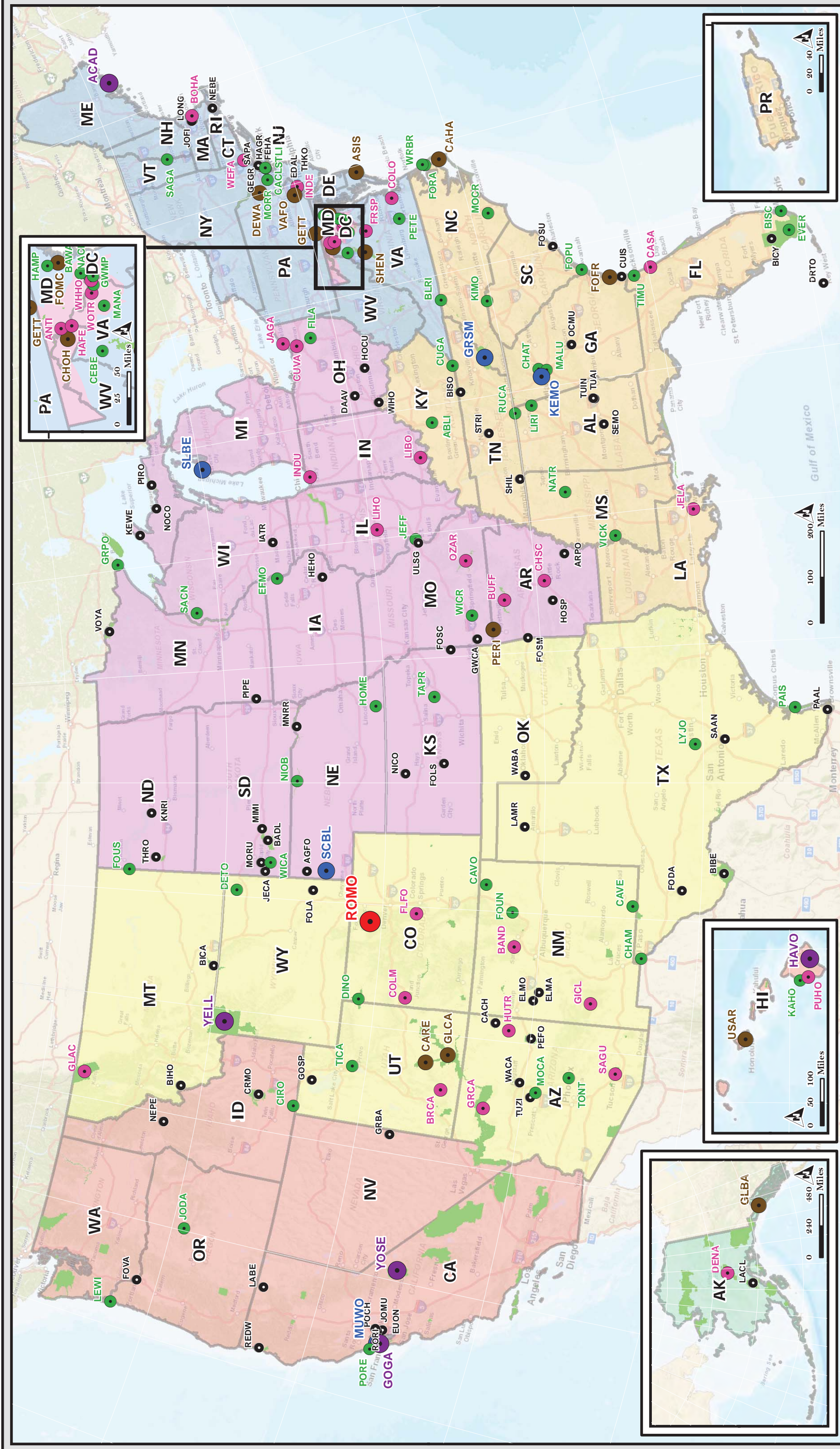
CRV	Current Replacement Value. The actual cost of replacing the facilities, not the book value. The total expenditure in current dollars required to replace a facility to meet current acceptable standards of construction and comply with regulatory requirements.
DSC	Denver Service Center. The National Park Service's centralized planning, design, and construction project management office.
EFLHD	Eastern Federal Lands Highway Division within FHWA. EFLHD operates as part of the FLTP, serving the transportation engineering needs of Federal Land Management agencies in the states east of the Mississippi River. EFLHD actively administers the surveying, designing, and constructing NPS roads and other Federal Lands roads. In addition, EFLHD provides traffic monitoring services, the road inventory program, asset management, pavement management systems, and bridge inspection services throughout the United States and Territories.
EPA	Environmental Protection Agency.
FHWA	Federal Highway Administration.
FLAP	Federal Lands Access Program. FLAP was created by MAP-21 to improve access to federal lands. The program is directed towards public highways, roads, bridges, trails and transit systems that are under State, county, town, township, tribal, municipal, or local government jurisdiction or maintenance and provide access to federal lands.
FLHP	Federal Lands Highway Program. The now-discontinued program for NPS transportation funding has been replaced by FLTP.
FLTP	Federal Lands Transportation Program. FLTP provides funds to the following agencies for transportation infrastructure investment: the National Park Service, the Forest Service, U.S. Fish and Wildlife Service, the Bureau of Land Management and the Corps of Engineers. MAP-21 replaced the Park Roads and Parkways Program with FLTP.
4R	Resurfacing, Restoration, Rehabilitation and Reconstruction of roadways. This work consists of altering the geometry of an existing roadway, intersection, or bridge. Widening lanes and modifying the horizontal and vertical alignment of the road bench are typical of 4R work. Category 4R projects also include work such as the replacement of large bridges (more than \$1.5 million); the relocation of roads; and construction of new roads, bridges, parking areas or parallel bicycle paths. These projects involve significantly higher costs per mile due to work required outside the existing roadway bench.
FTA	Federal Transit Administration. Administers various transit grant programs, including the now discontinued Paul S. Sarbanes Transit in Parks Program, a significant funding source for NPS transit projects during SAFETEA-LU.
HI	Health Index for bridges. The health index is a single number indicator of the structural health of the bridge. This indicator is expressed as a percentage value from 0 percent to 100 percent, corresponding to the worst and best possible conditions, respectively.
HPMA	Highway Pavement Management Application. Pavement management software

contracted for use by EFLHD. This software is a customized version of Stantec Consulting's proprietary software, Highway Pavement Management Application (HPMA). HPMA uses pavement condition data (collected by the EFLHD Roadway Inventory Program), to model future pavement conditions and recommend timely treatments for maintenance and rehabilitation.

ITS	Intelligent Transportation Systems. The application of advanced information and communications technology to surface transportation in order to achieve enhanced safety and mobility while reducing the environmental impact of transportation.
L RTP	Long Range Transportation Plan.
MAP-21	Moving Ahead for Progress in the 21 <sup>st</sup> Century Act (P.L. 112-141), the current highway funding authorization. MAP-21 was signed into law by President Obama on July 6, 2012 and has been extended to July 31, 2015. Funding surface transportation programs at over \$105 billion for fiscal years (FY) 2013 and 2014, MAP-21 is the first long-term highway authorization enacted since 2005.
NAAQS	National Ambient Air Quality Standards. The <u>Clean Air Act</u> , which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards for pollutants considered harmful to public health and the environment. EPA has set National Ambient Air Quality Standards for six principal pollutants, which are called "criteria" pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, particle pollution and sulfur dioxide.
ONPS	Operation of the National Park Service. This is the funding program for base operations of the agency.
PCR	Pavement Condition Rating. A number of distress factors comprise PCR, including type of cracking, amount of cracking, patches, potholes, rutting and roughness.
PFMD	Park Facility Management Division of WASO.
PLHD	Public Lands Highway Discretionary program, now discontinued.
PRP	Park Roads and Parkways Program, part of FLHP, now discontinued.
PWR	Pacific West Region of the National Park Service.
RCM	Regular Cyclic Maintenance program within NPS that funds regularly scheduled recurring maintenance and component renewal work activities that help to insure that assets can meet their intended design life.
RIP	Road Inventory Program. Takes inventory and assesses condition of paved roadway and parking area assets for NPS.
TAR	Traffic Accident Reporter. Database under development by WASO-PFMD to provide a single, reportable database for storing and querying motor vehicle crash records on NPS roads.
TCFO	Total Cost of Facility Ownership, taking into account all costs of acquiring, owning, and disposing of a building, roadway or other type of facility.

3R	Resurfacing, Restoration and Rehabilitation of roadways. This work is undertaken to extend the service life of roads and enhance safety. Typically, this work occurs entirely in the roadway bench. Occasionally, a 3R project can occur outside the bench for repair work for drainage structures, existing retaining walls, slope failures, and bridges. No more than 5% of project costs should be allocated to work outside the roadway bench without it being designated as 4R work, which has different standards for funding approval.
TRIP	Paul S. Sarbanes Transit in Parks Program, previously known as the Alternative Transportation in the Parks and Public Lands Program, now discontinued.
VERP	Visitor Experience and Resource Protection. The framework developed by NPS to analyze and manage visitor carrying capacity in national parks. VERP seeks to determine the appropriate range of visitor experiences for a given area; zoning is an important element of the VERP process. Zones are established on the basis of resources and not determined by the location of existing facilities.
WASO	Washington Support Office, headquarters for NPS.
WFLHD	Western Federal Lands Highway Division within FHWA. WFLHD operates as part of the FLTP, serving the needs of Oregon, Washington, Idaho, Montana, Alaska, and the Yellowstone and Grand Teton National Parks in Wyoming.
YOE	Year of Expenditure dollars, inflated at stated annual rate to future year (in this report, 2.1% annually).

**Appendix 1**  
Congestion Mapping from *Technical Memorandum 7: Compiled  
Congestion Survey Information Report*



NATIONAL PARK SERVICE

**Total # of Congestion Areas within Park**

- 0 (77)
- 1 - 2 (56)
- 3 - 4 (30)
- 5 - 6 (14)
- 7 - 8 (5)
- 9 - 10 (5)
- 11 (1)

**Alaska Region**  
**Intermountain Region**  
**Midwest Region**

**National Capital Region**  
**Northeast Region**  
**Pacific West Region**

**Southeast Region**  
**Park Boundaries**

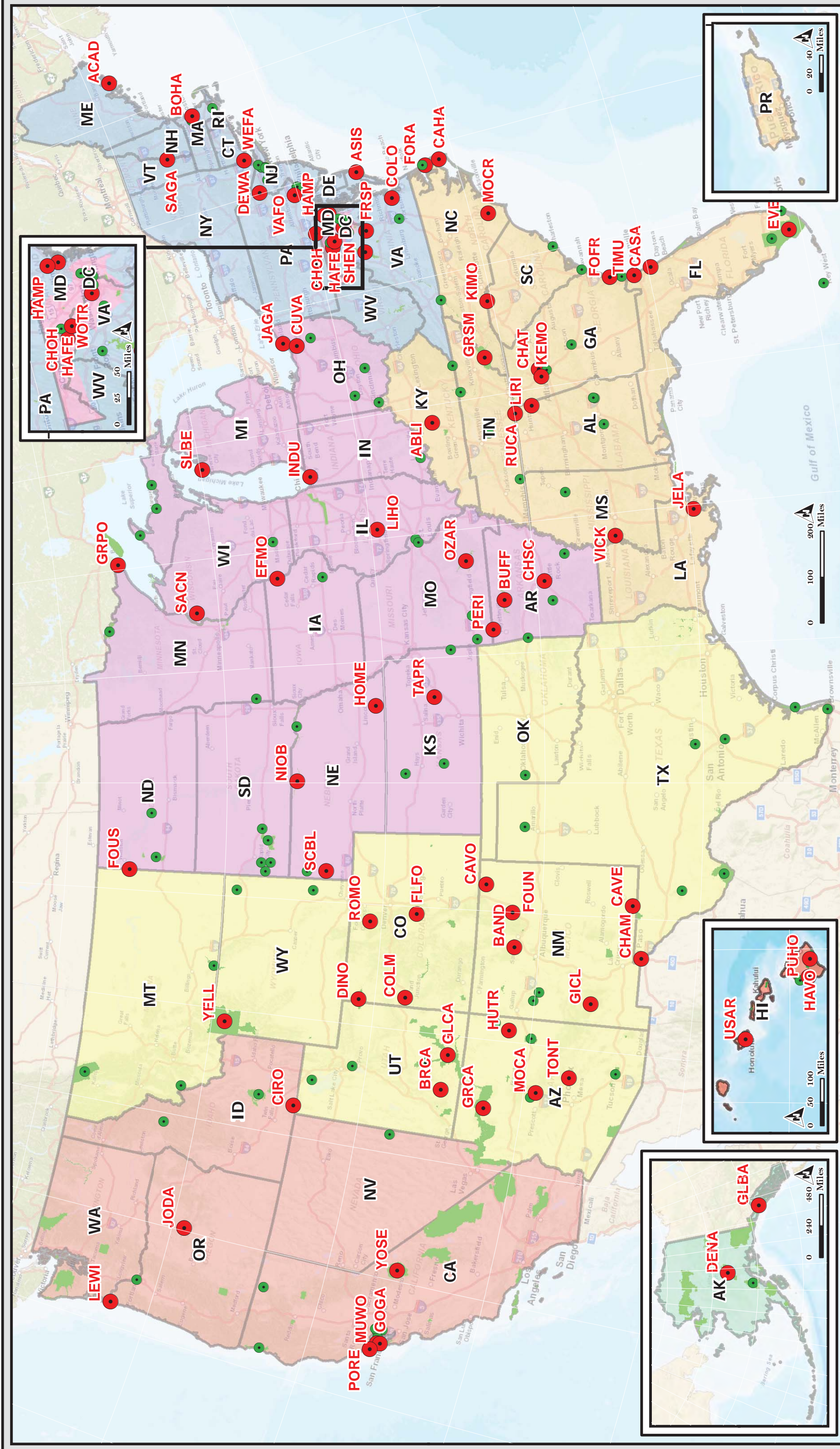
**NPS Congestion Management Survey Results**

**Congestion Summary**

**Figure 1**









## NPS Congestion Management Survey Results

Figure  
3

**Parks with Congestion at Parking Areas**

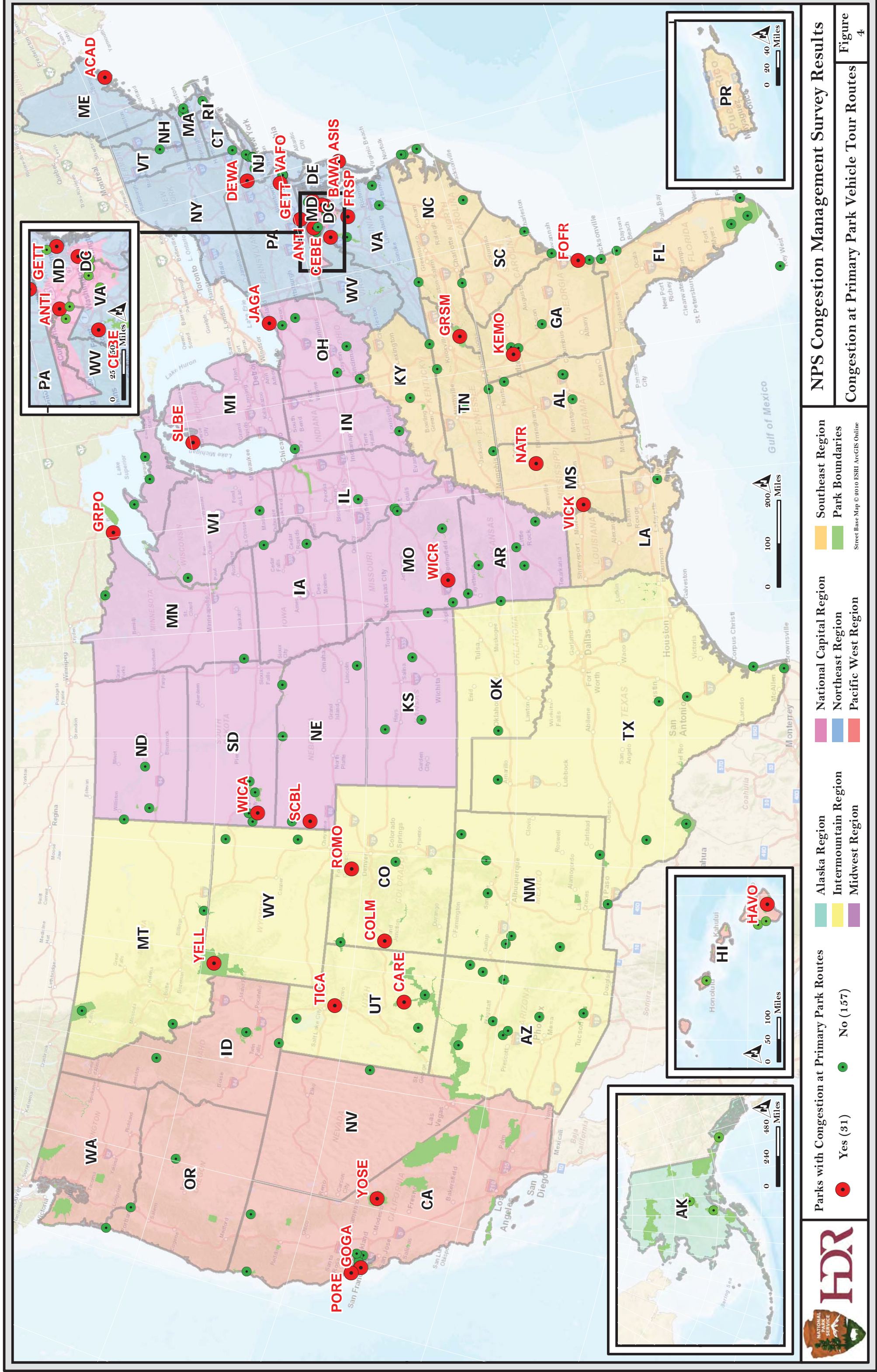
- Yes (78)
- No (110)

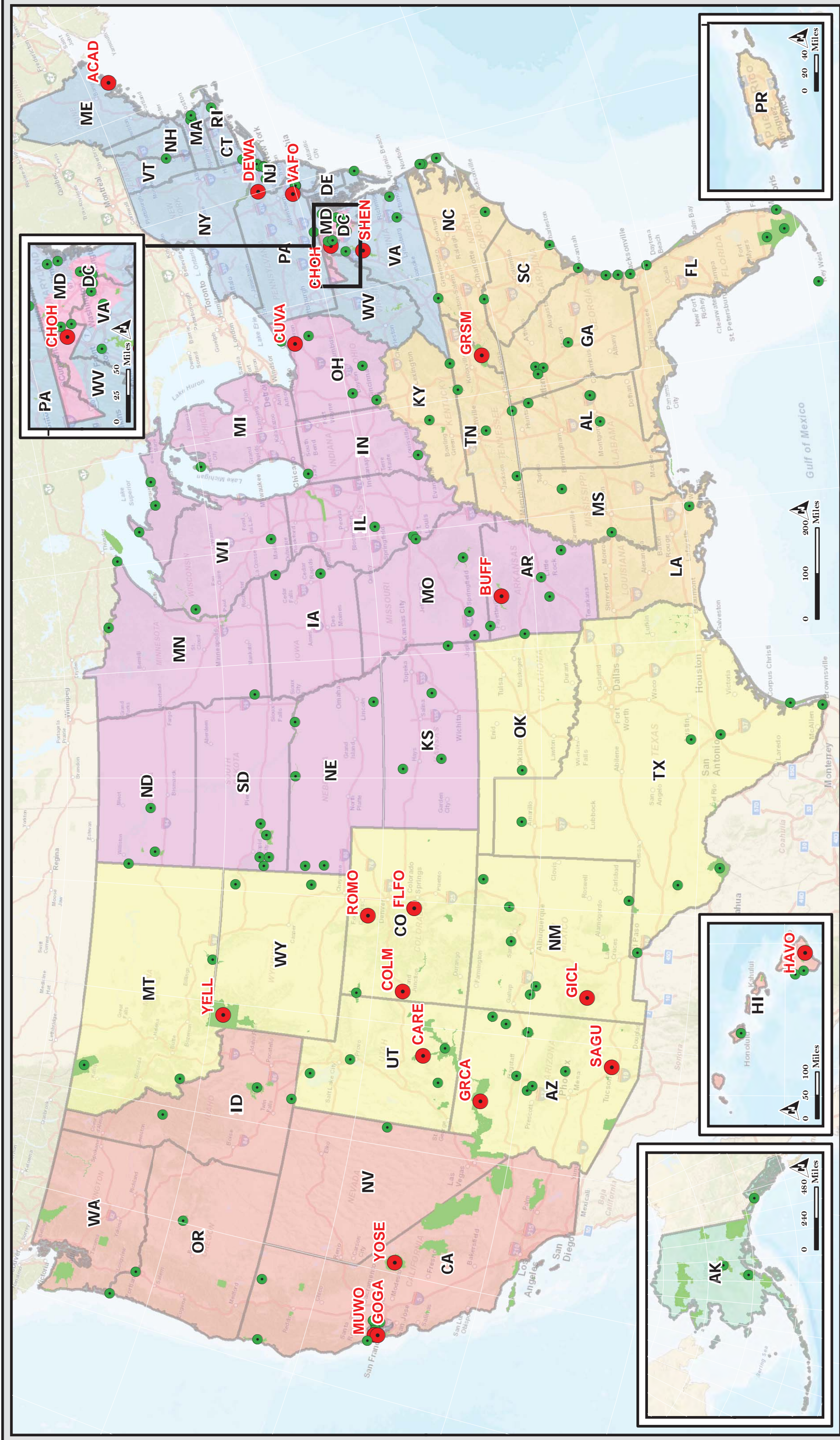
**Regional Legend**

- Southeast Region
- National Capital Region
- Alaska Region
- Northeast Region
- Intermountain Region
- Midwest Region
- Pacific West Region

**Other Legend**

- Park Boundaries
- Congestion at Parking Areas





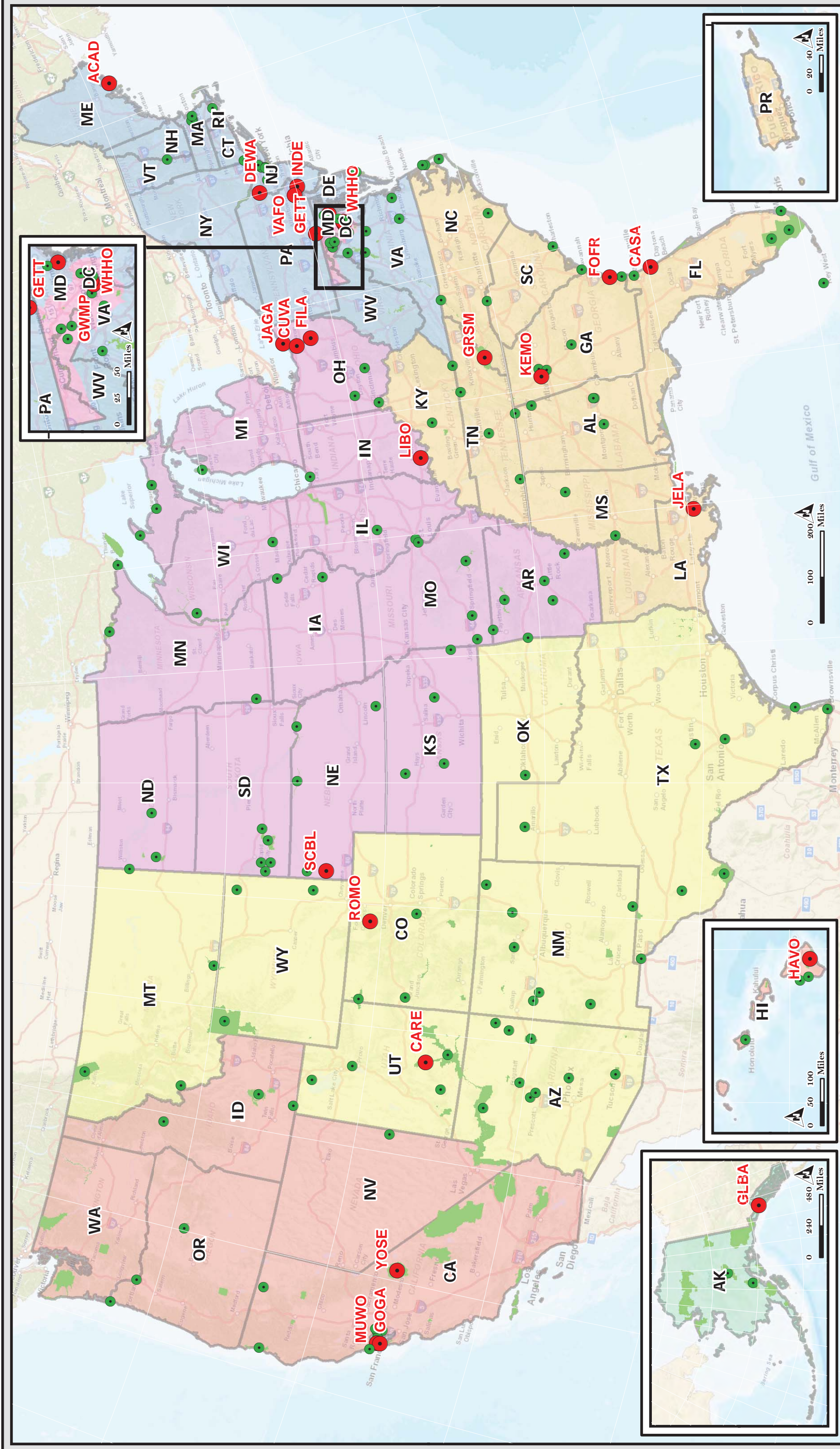
- Parks with Congestion at Trailheads
- Yes (20)
- No (168)

- Alaska Region
- Intermountain Region
- Midwest Region

- National Capital Region
- Northeast Region
- Pacific West Region

- Southeast Region
- Park Boundaries

NPS Congestion Management Survey Results  
 Congestion at Trailheads  
 Figure 5



**Parks with Congestion at Pedestrian Paths/Trails**

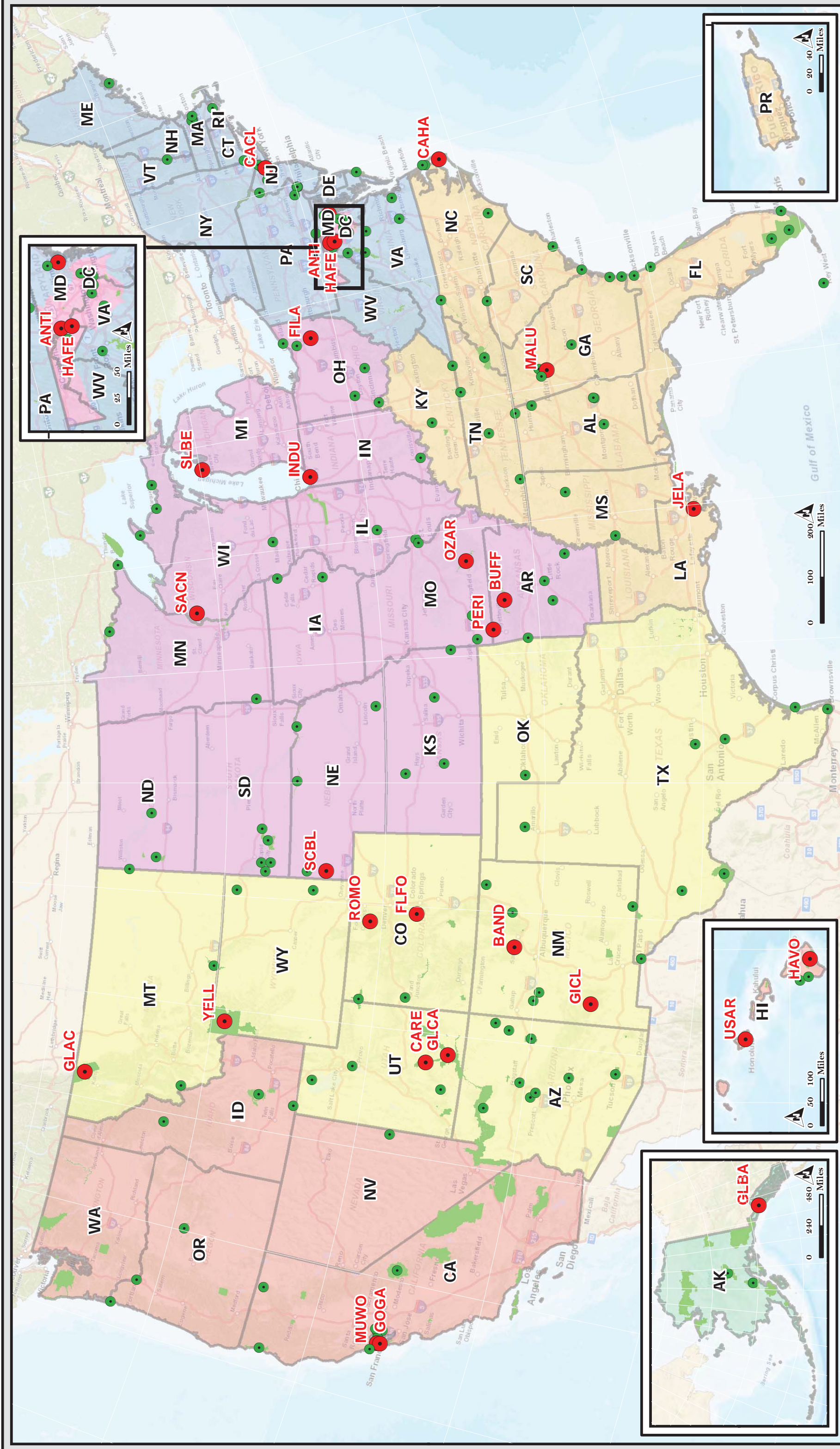
- Yes (25)
- No (163)

**Alaska Region**  
**Intermountain Region**  
**Midwest Region**

**National Capital Region**  
**Northeast Region**  
**Pacific West Region**

**Southeast Region**  
**Park Boundaries**

**NPS Congestion Management Survey Results**  
**Congestion at Pedestrian Paths/Trails**  
**Figure 6**



NATIONAL PARK SERVICE

**Parks with Congestion at Ped/People Loading Areas**

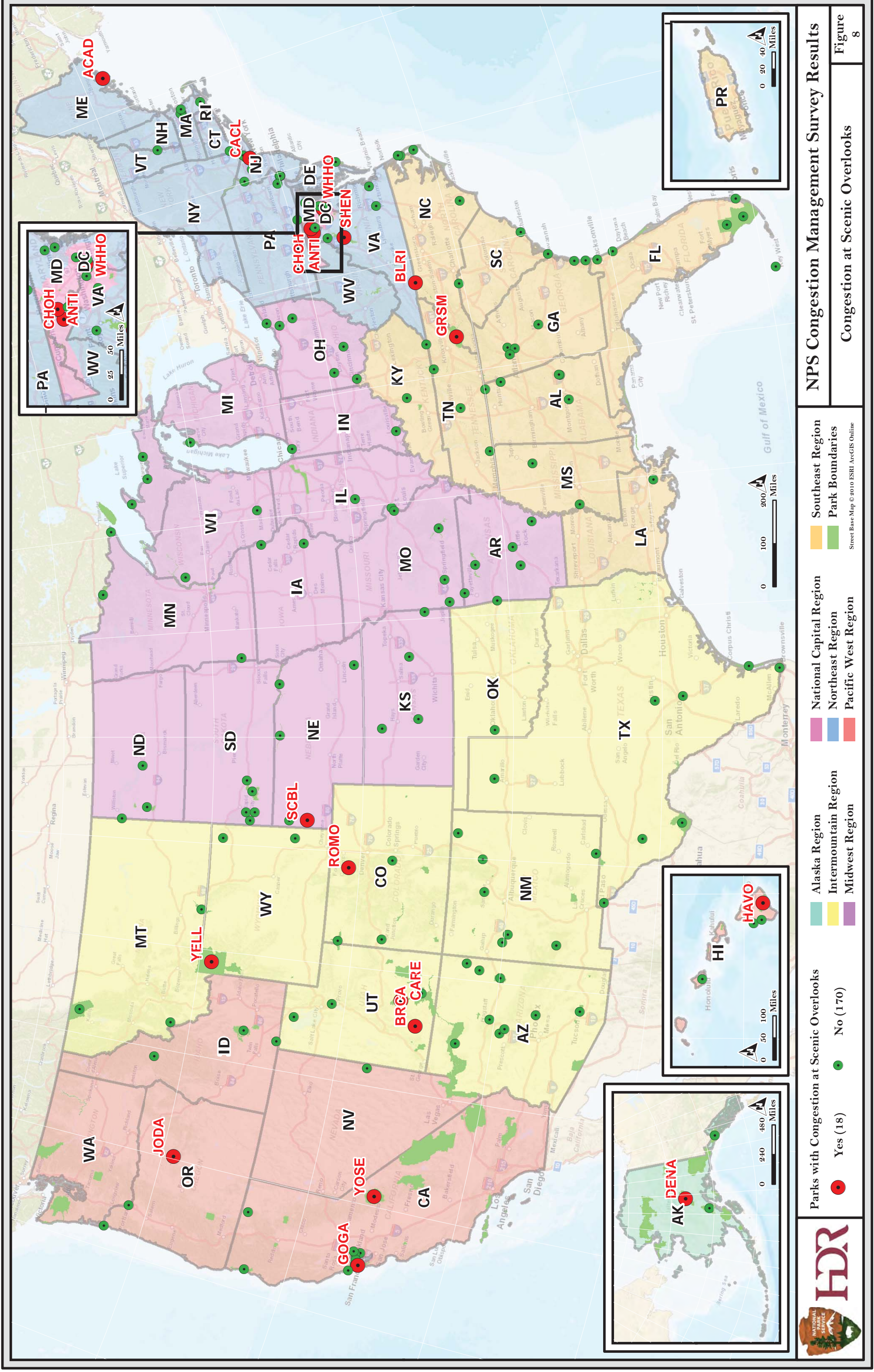
- Yes (28)
- No (160)

**Alaska Region**  
**Intermountain Region**  
**Midwest Region**

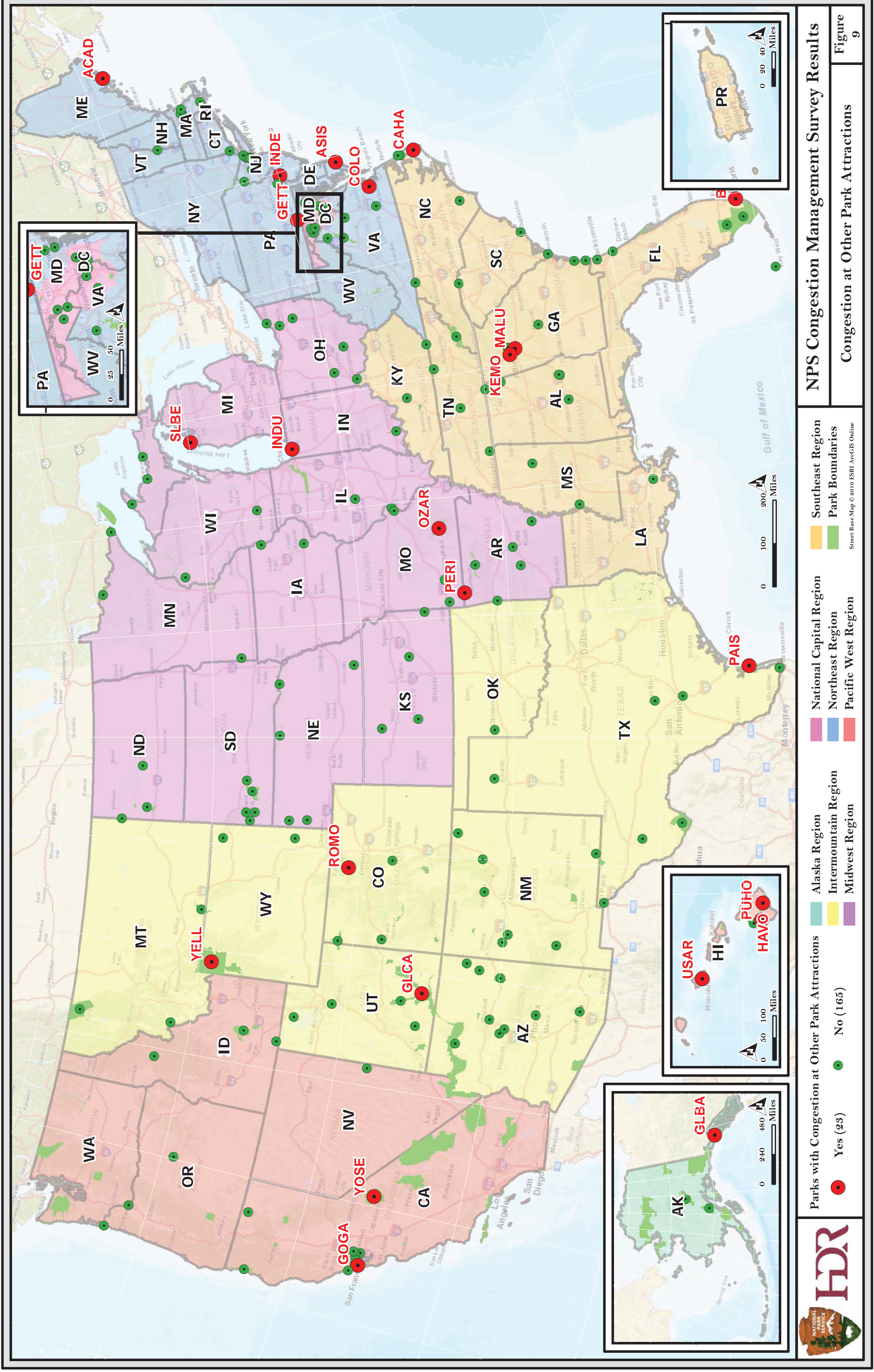
**National Capital Region**  
**Northeast Region**  
**Pacific West Region**

**Southeast Region**  
**Park Boundaries**

**NPS Congestion Management Survey Results**  
**Congestion at Pedestrian/People Loading Areas**  
**Figure 7**



**NPS Congestion Management Survey Results**  
**Congestion at Scenic Overlooks**  
**Figure 8**



**Parks with Congestion at Other Park Attractions**

- Yes (23)
- No (165)

**Alaska Region**  
**Intermountain Region**  
**Midwest Region**

**National Capital Region**  
**Northeast Region**  
**Pacific West Region**

**Southeast Region**  
**Park Boundaries**

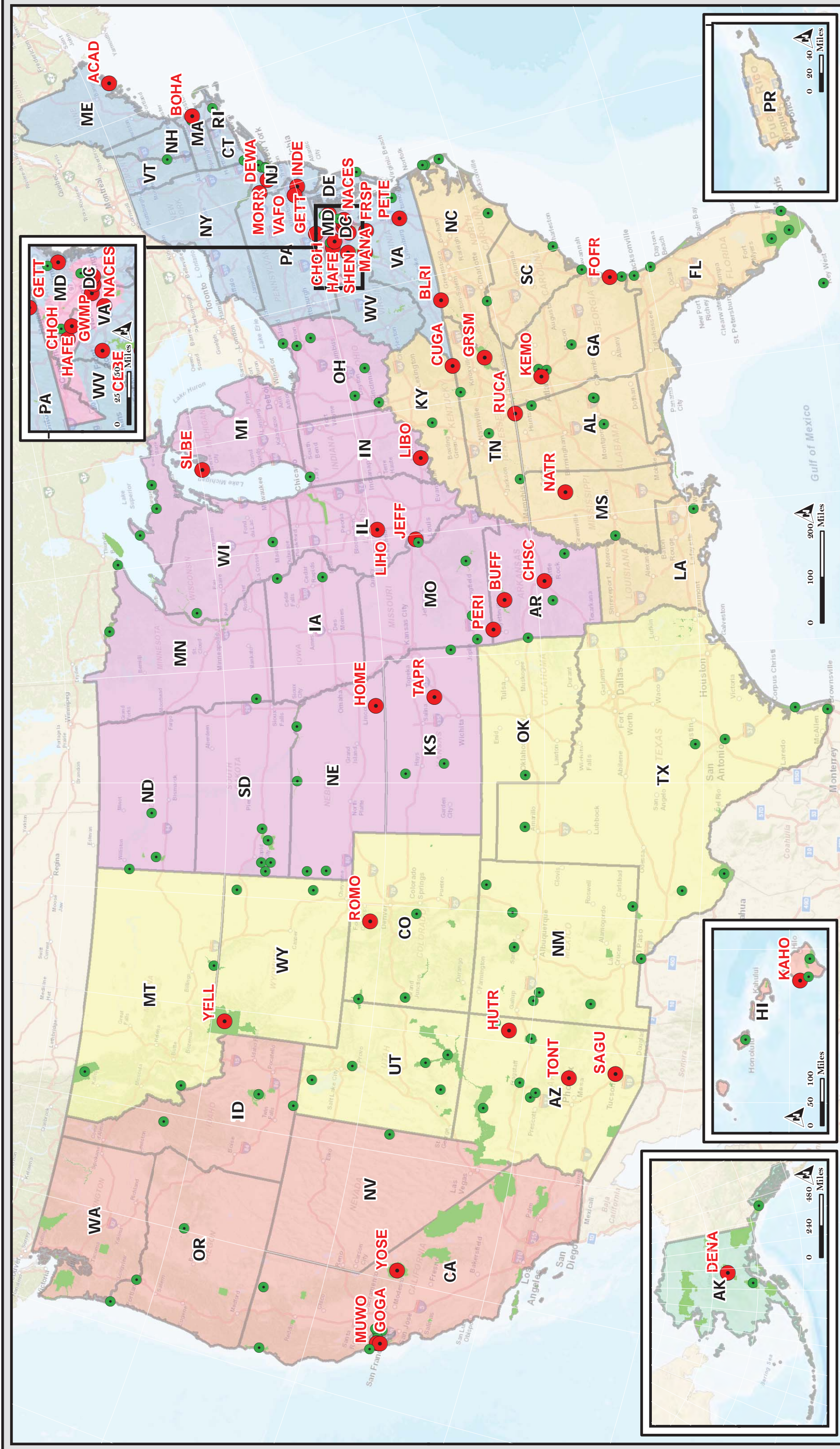
Street Base Map © 2010 ESRI ArcGIS Online

**NPS Congestion Management Survey Results**

**Congestion at Other Park Attractions**

**Figure 9**





NATIONAL PARK SERVICE

Parks with Congestion at Roadways Accessing Park

- Yes (45)
- No (143)

Alaska Region

- Alaska Region
- Intermountain Region
- Midwest Region

National Capital Region

- National Capital Region
- Northeast Region
- Pacific West Region

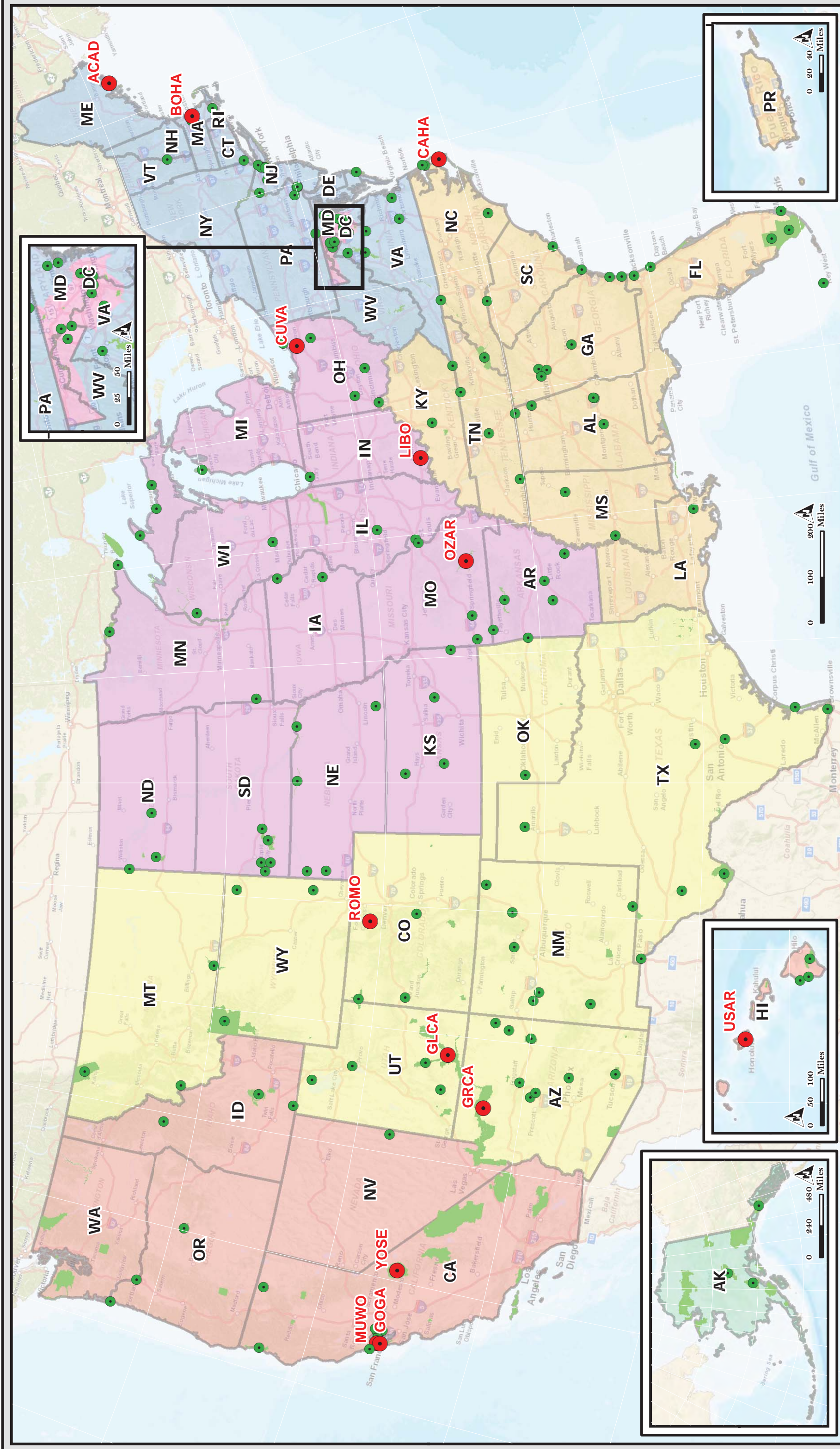
Southeast Region

- Southeast Region
- Park Boundaries

NPS Congestion Management Survey Results

Congestion at Roadways Accessing the Park

Figure 10



**Parks with Congestion at Transit Stops**

- Yes (13)
- No (175)

**Alaska Region**  
**Intermountain Region**  
**Midwest Region**

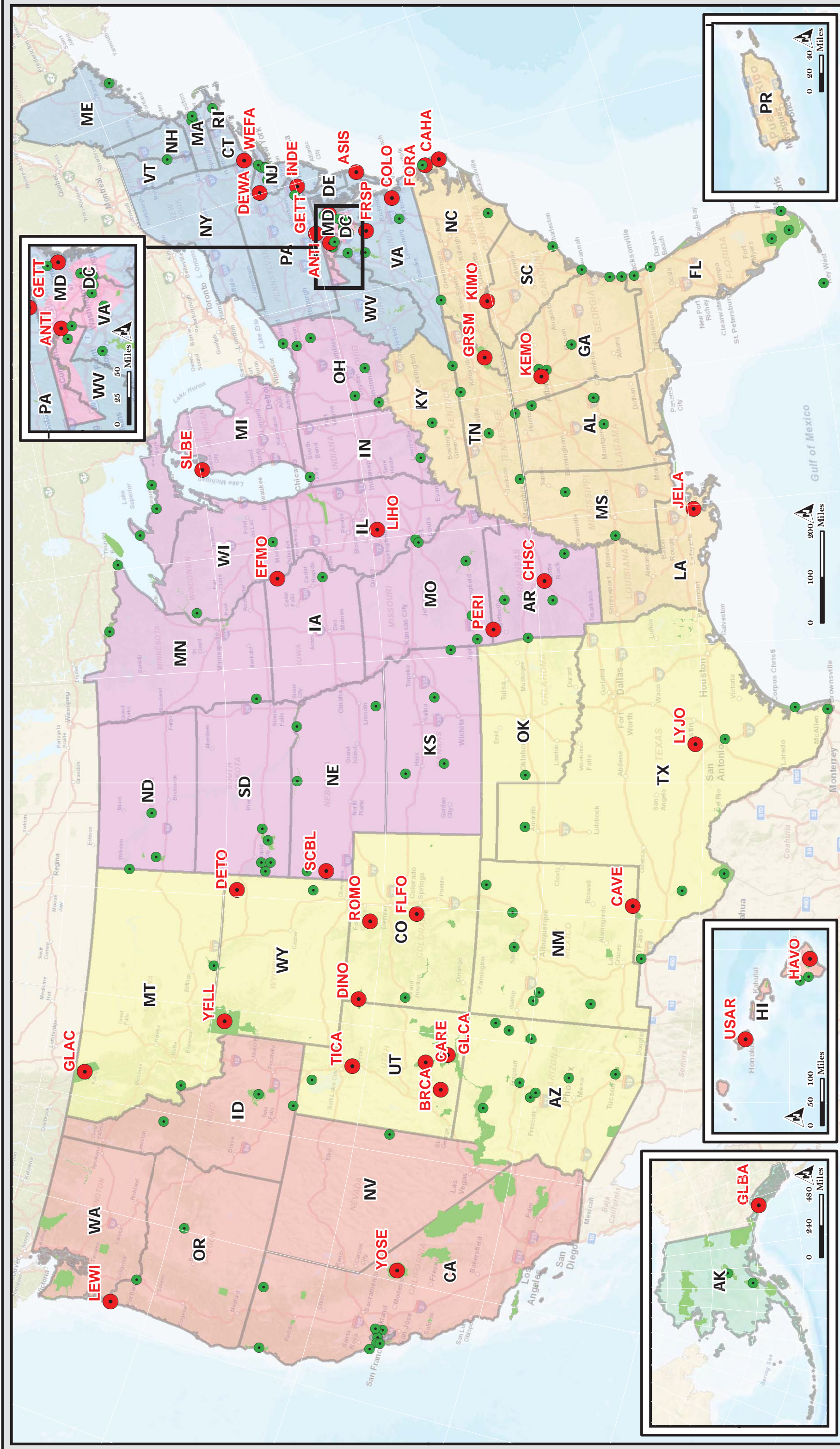
**National Capital Region**  
**Northeast Region**  
**Pacific West Region**

**Southeast Region**  
**Park Boundaries**

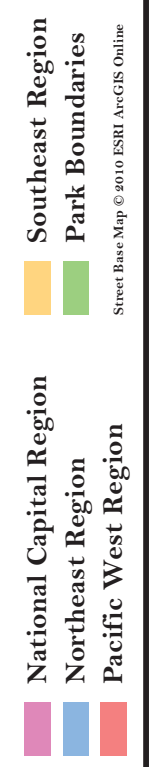
**NPS Congestion Management Survey Results**

**Congestion at Transit Stops**

**Figure 11**



**NPS Congestion Management Survey Results**



**Parks with Congestion at Visitor Centers**

- Yes (38)
- No (150)



**Congestion at Visitor Centers**



## Appendix 2

### Paul S. Sarbanes Transit in Parks Program (TRIP) Grants History in PWR

Fiscal Year	Park	Type of Project	Project Description	Funding	Asset Management Activity Type
2006	DEPO	Planning Study	Feasibility study for implementation of a sustainable transportation system for Reds Meadow/Devils Postpile.	\$ 167,000	Planning
2006	HAVO	Planning Study	Data collection/studies and re-source surveys for potential alternative transportation system along two primary roads where congestion and over-crowding are causing resource damage and compromising visitor safety and experience.	\$ 120,000	Planning
2006	LEWI	Bus	Fund shuttle bus leasing from the park's partner, Sunset Empire Transit District.	\$ 50,000	Transit Operations
2006	MUWO	Intelligent Transportation	Design and build electronic warning signs, traffic counters, high-way advisory radio, web cameras, a centralized management software package, and other equipment as necessary.	\$ 490,000	Capital Improvement/ New Construction
2006	MUWO	Planning Study	Secure consultant services for planning effort to address visitor access issues at Muir Woods National Monument (managed by Golden Gate National Recreation Area).	\$ 500,000	Planning
2006	NOCA	Bus	Purchase 4 buses to replace old buses that transport visitors within the Lake Chelan National Recreation Area.	\$ 947,000	Component Renewal/ Recapitalization
2006	PORE	Planning Study	Fund an implementation feasibility study and financial plan for the upgrade of an existing park shuttle system to an alternate-fuel system for the heavily visited Point Reyes Headlands.	\$ 175,000	Planning
2006	SAFR	Planning Study	Planning to extend San Francisco Municipal Railway's Historic streetcars from Fisherman's Wharf 0.85 mile to San Francisco Maritime National Historic Park and the Fort Mason Center at Golden Gate Nat'l Recreation Area.	\$ 300,000	Planning
2006	SEKI	Bus	Lease buses for the Giant Forest Shuttle and Gateway Shuttle Link to connect key sites within Sequoia National Park lodging, camping, food service facilities, popular day use trails, and features of the world-famous Giant Forest Sequoia grove.	\$ 165,000	Transit Operations
2006	SEKI	Bus	Purchase five shuttle busses for the City of Visalia to run a new service from the San Joaquin Valley to popular Sequoia National Park.	\$ 400,000	Component Renewal/ Recapitalization
2006	YOSE	Park and Ride Lot	Construct two park and ride lots to allow visitors to park and use the YARTS service to access the national park, mitigating congestion within the park.	\$ 582,579	Capital Improvement/ New Construction
2006	YOSE	Planning Study	Update traffic, transit, parking, and intersection counts; (2) update existing trip tables; (3) update and complete computer models; (4) evaluate the relationships between transportation and park experience; (5) correlate visitor experience with traffic data.	\$ 486,000	Planning

Fiscal Year	Park	Type of Project	Project Description	Funding	Asset Management Activity Type
2007	DEPO	Bus	Capital cost of leasing ten buses for the Red Meadows-Devils Postpile transit system Funds also to be used for visitor information on the transit system.	\$ 100,000	Transit Operations
2007	GOGA	Planning Study	Prepare operational plan for the Fort Baker Shuttle.	\$ 70,000	Planning
2007	LEWI	Bus	Fund shuttle bus leasing from Sunset Empire Transit District.	\$ 43,000	Transit Operations
2007	MUWO	Bus	Lease ten clean fuel shuttle buses for Muir Woods shuttle service and improve the Muir Woods Centennial transit stop.	\$ 492,500	Transit Operations
2007	SAFR	Planning Study	Prepare Environmental Impact Statement for the extension of the San Francisco Municipal Railway Historic Streetcar Route/Line.	\$ 493,000	Planning
2007	SEKI	Bus	Lease five 30' shuttle buses for the Giant Forest Shuttle System in Sequoia National Park.	\$ 225,000	Transit Operations
2007	YOSE	Bus	Lease Yosemite Area Regional Transportation System (YARTS) Vehicles.	\$ 264,600	Transit Operations
2007	YOSE	Bus	Complete park wide Integrated Transportation Capacity Assessment.	\$ 621,600	Planning
2008	CHIS	Planning Study	Conduct planning and complete engineering study to improve access to Santa Cruz Island.	\$ 380,000	Planning
2008	DEPO	Bus	Devils Postpile/Reds Meadow shuttle bus leasing.	\$ 105,000	Transit Operations
2008	GOGA	Bus	Implement a fee parking system to fund shuttle and transit access.	\$ 360,000	Transit Operations
2008	GOGA	Planning Study	Prepare an EIS.	\$ 490,000	Planning
2008	LEWI	Bus	Fund shuttle bus leasing from Sunset Empire Transit District.	\$ 43,000	Transit Operations
2008	MORA	Bus	Lease Paradise Area shuttle service vehicles.	\$ 110,900	Transit Operations
2008	MUWO	Other	Design accessible bus stops and multi-use link to transit at Muir Beach.	\$ 155,000	Planning
2008	SEKI	Bus	Lease shuttle buses for the Giant Forest Shuttle System.	\$ 230,000	Transit Operations
2008	SEKI	Bus	San Joaquin Valley/Sequoia NP gateway shuttle link.	\$ 250,000	Transit Operations
2008	YOSE	Bus	Lease Yosemite Area Regional Transportation System (YARTS) Vehicles.	\$ 272,520	Transit Operations
2008	YOSE	Tram	Purchase new tram vehicles for Mariposa Grove of Giant Sequoias.	\$ 1,600,000	Component Renewal/Recapitalization
2008	YOSE	Planning Study	Comprehensive transportation study and development of a multi-agency master transportation plan for Eastern Sierra.	\$ 350,000	Planning
2008	YOSE	Planning Study	Establish a Park Transportation Improvement Plan.	\$ 500,000	Planning
2009	DEPO	Bus	Purchase buses for transit in Reds Meadow and Devils Postpile.	\$ 1,600,000	Component Renewal/Recapitalization
2009	GOGA	Other	Bus stops and multi-use path to transit at Muir Beach.	\$ 460,000	Capital Improvement/ New Construction
2009	GOGA	Bus	Pilot Marin Headlands shuttle.	\$ 405,000	Transit Operations

Fiscal Year	Park	Type of Project	Project Description	Funding	Asset Management Activity Type
2009	GOGA	Other	Bus stop amenities in Marin Headlands and Fort Baker.	\$ 145,000	Capital Improvement/ New Construction
2009	LEWI	Bus	Fund shuttle bus leasing from the park's partner, Sunset Empire Transit District.	\$ 33,000	Transit Operations
2009	MORA	Bus	Park visitor shuttle bus lease.	\$ 110,900	Transit Operations
2009	PORE	Bus	Headlands shuttle bus lease.	\$ 47,000	Transit Operations
2009	PORE	Other	Stops, wayfinding and shelters.	\$ 296,400	Capital Improvement/ New Construction
2009	YOSE	Bus	Purchase 3 clean diesel buses for YARTS.	\$ 1,605,000	Component Renewal/ Recapitalization
2009	YOSE	Intelligent Transportation	Implement Integrated Parkside Traffic Management System.	\$ 1,280,000	Transit Operations
2010	CABR	Bus	Cabrillo Circulator Shuttle	\$ 625,000	Component Renewal/ Recapitalization
2010	LEWI	Bus	Lewis and Clark Explorer Shuttle	\$ 43,000	Transit Operations
2010	MORA	Bus	Lease Paradise Area shuttle service vehicles.	\$ 110,500	Transit Operations
2010	MORA	Intelligent Transportation	Install phase 1 intelligent transit information system.	\$ 375,000	Capital Improvement/ New Construction
2010	SEKI	Bus	Lease shuttle buses for the Giant Forest Shuttle System in Sequoia National Park.	\$ 240,000	Transit Operations
2010	SEKI	Planning Study	Complete Transportation and User Capacity Assessment.	\$ 450,000	Planning
2010	SEKI	Other	San Joaquin Valley/Sequoia NP gateway shuttle link.	\$ 660,000	Transit Operations
2010	YOSE	Intelligent Transportation	Install ITS and transit information systems in the southern part of Yosemite NP.	\$ 495,000	Capital Improvement/ New Construction
2011	GOGA	Other	Initial phase of improvements to California Coastal Bike/Ped Trail section in Presidio.	\$ 1,000,000	Capital Improvement/ New Construction
2011	GOGA	Bus	Purchase five 35-foot XHF vehicles.	\$ 1,100,000	Component Renewal/ Recapitalization
2011	MORA	Bus	Lease Paradise Area shuttle service vehicles.	\$ 106,400	Transit Operations
2011	SEKI	Bus	San Joaquin Valley/Sequoia NP gateway shuttle link.	\$ 250,000	Transit Operations
2011	SEKI	Bus	Lease shuttle buses for the Giant Forest Shuttle System.	\$ 270,000	Transit Operations
2011	YOSE	Planning Study	Complete planning for visitor transit, staging and pedestrian routes for Mariposa Grove of Giant Sequoias.	\$ 890,000	Planning
2012	ALKA	Other	The Ala Kahakai National Historic Trail will receive funds to improve infrastructure and access to the historic 175-mile trail by installing road, parking, and trail signs and trail treatments to improve trail user safety, protect cultural and natural resources, and enhance visitor's experiences, while honoring Native Hawaiian culture and the environment.	\$ 275,000	Capital Improvement/ New Construction

<b>Fiscal Year</b>	<b>Park</b>	<b>Type of Project</b>	<b>Project Description</b>	<b>Funding</b>	<b>Asset Management Activity Type</b>
<b>2012</b>	GOGA	Other	The Golden Gate National Recreation Area will receive funds to expand and complete the multiuse Bay Trail in the Presidio of San Francisco, creating an accessible, multi-use route for pedestrians and bicyclists traveling between the Golden Gate Bridge to destinations along the northern waterfront of San Francisco.	\$ 400,000	Capital Improvement/ New Construction
<b>2012</b>	MUWO	Bus	The Marin County Transit District will receive funds to purchase new vehicles and signage to expand its Muir Woods Shuttle service between Sausalito and the Muir Woods National Monument, which has 800,000 annual visitors. The shuttle service provides clean, fuel-efficient transportation to the park, easing congestion for visitors.	\$ 638,000	Component Renewal/ Recapitalization
<b>2012</b>	YOSE	Bus	The Yosemite Area Regional Transportation System will receive funds to purchase a clean diesel, ADA- accessible motor coach and expand its transit service to Yosemite National Park, where demand for alternative forms of transportation has been rising along with the number of visitors to the park each year.	\$ 583,941	Component Renewal/ Recapitalization
<b>TOTAL:</b>				<b>\$ 26,032,840</b>	







*National Park Service  
Pacific West Region*