Mount Rainier National Park
Washington

National Park Service
U.S. Department of the Interior

Nisqually to Paradise Draft Corridor Management Plan and Environmental Assessment

April 2023

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CHAPTER 1: PURPOSE AND NEED

BACKGROUND

The National Park Service (NPS) has prepared the Mount Rainier National Park Nisqually to Paradise Draft Corridor Management Plan (the plan) and environmental assessment to manage the flow of visitors in the Nisqually to Paradise Corridor, particularly during peak visitation months. The purpose of Mount Rainier National Park is to "protect and preserve unimpaired the majestic icon of Mount Rainier, a glaciated volcano, along with its natural and cultural resources, values, and dynamic processes. The park provides opportunities for people to experience, understand, and care for the park environment and also provides for wilderness experiences and sustains wilderness values" (NPS 2015a). This plan's intent is to support the park's purpose by examining options to address congestion and facility overuse, minimize or mitigate human health and safety issues, and ensure the protection of natural and cultural resources for visitor enjoyment.

The NPS preferred alternative is the proposed action, identified through the civic engagement process, to meet the park objectives of providing high-quality visitor experiences while protecting park resources and values. The other action alternatives under consideration were also identified during civic engagement and were carried forward for analysis to support informed decision making. After public review and comment on the draft plan and environmental assessment, the NPS decision maker will select one of the alternatives described in this draft plan and environmental assessment or may select a modified alternative that includes elements from among the alternatives described in the environmental assessment.

For the last 10 years, the park has consistently welcomed between 1.1 and 1.5 million visitors each year (figure 1), with the most visits occurring during the summer months between June and September (table 1). The park's foundation document identified the need for this plan to identify strategies addressing transportation congestion and traffic management at parking areas, entrance stations, and trailheads during peak summer days (NPS 2015b).

This chapter describes the project area, the plan's purpose and need, and issues addressed in this plan.

Project Area

Mount Rainier National Park is in west-central Washington, on the western slope of the Cascade Range, and encompasses 236,381 acres within the authorized, legislated park boundary (figure 2). The Nisqually to Paradise Corridor runs 18.4 miles through Mount Rainier National Park from the Nisqually entrance, located at the southwest corner of the park, to Paradise, a popular developed area for visitors (figure 3). The Nisqually entrance is the longest operating entrance station in the national park system (1898) and remains the busiest entrance to Mount Rainier National Park. The Nisqually entrance is a historic designed landscape and was developed as an entrance station by early federal employees, NPS staff, and the Civilian Conservation Corps in accordance with the rustic style of architecture and naturalistic landscape design. The approximately 15-acre landscape was laid out to support the functions of a park entrance station, with park entry and exit circulation, an administrative core, and peripheral residential and utility areas.

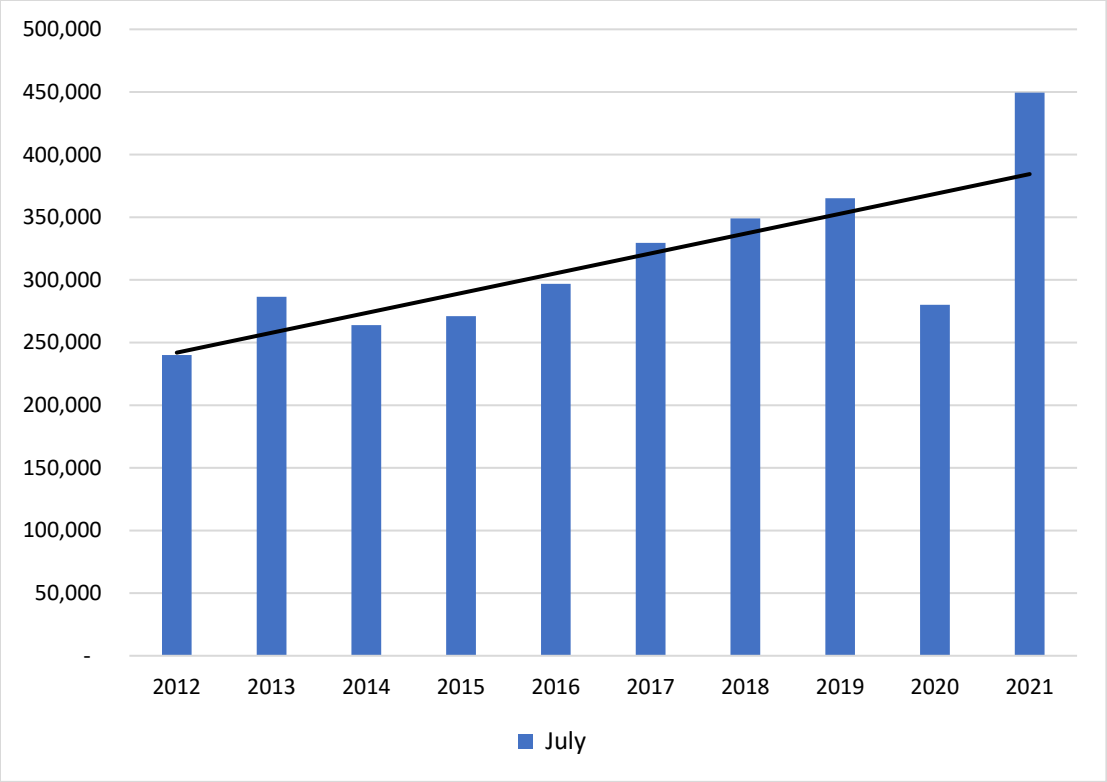

FIGURE 1. JULY VISITATION TO MOUNT RAINIER NATIONAL PARK (2012–2021)

Table 1. Summer Visitation to Mount Rainier (2011–2021)

Year	June	July	August	September
2011	90,181	243,791	272,128	196,242
2012	109,205	240,018	275,146	185,340
2013	178,339	286,562	287,340	154,566
2014	161,513	263,948	320,378	173,827
2015	160,878	271,118	259,670	179,756
2016	187,037	296,922	313,699	195,579
2017	189,348	329,618	323,130	195,641
2018	219,842	349,140	325,914	191,730
2019	219,641	365,200	378,305	184,166
2020	105,540	280,106	345,496	195,942
2021	235,769	449,446	362,942	257,993

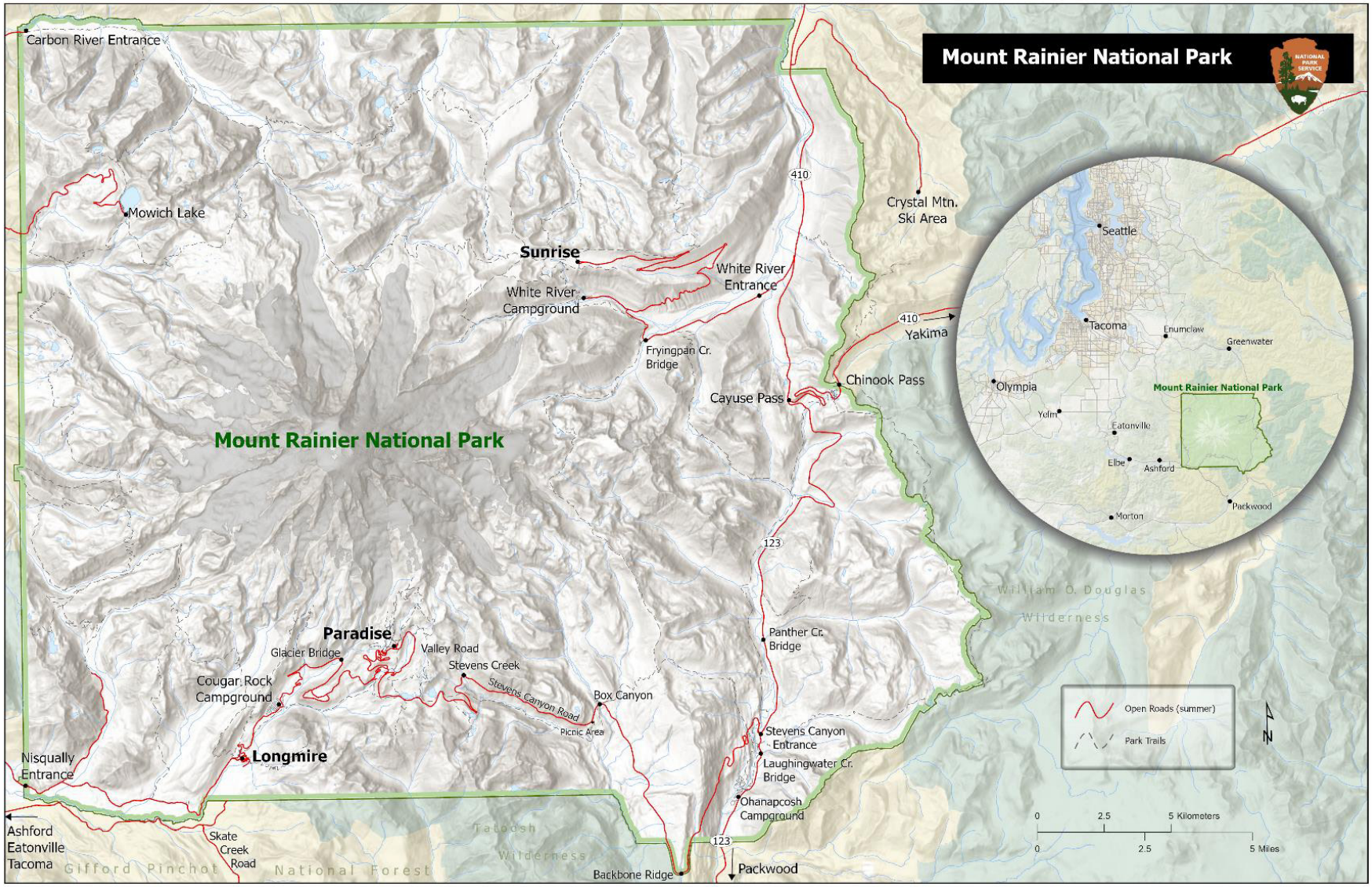

FIGURE 2. CORRIDOR MANAGEMENT PLAN PROJECT AREA

Other notable features along the road include the Nisqually entrance itself, Rampart Ridge, the Longmire Museum, the National Park Inn, Cougar Rock and Carter Falls, Comet Falls, Christine Falls, Ricksecker Point, and Narada Falls. Throughout this plan, Cougar Rock refers to the area encompassing the campground, parking lot, and picnic area unless otherwise specified (e.g., Cougar Rock picnic area). The Nisqually to Paradise Corridor is part of the Mount Rainier National Historic Landmark (NHL) District, which was established in 1997. This NHL district encompasses almost all the roads, historic trails, historic developed areas at Nisqually, Longmire, Paradise, Camp Muir, White River, and Sunrise, and the roads that connect these areas.

The Paradise developed area sits at the end of the Nisqually to Paradise Corridor and is famous for its glorious views and wildflower meadows. The park's main visitor center, the new Paradise Jackson Visitor Center, is in the Paradise upper parking area. The Paradise Inn, recognized as a national historic landmark for its architectural significance, is also located in the developed area. In the summer, visitors can hike one of the many trails for excellent views of Mount Rainier, subalpine meadows, and wildlife. In the winter, visitors can participate in winter activities, including winter camping, snowshoeing, and cross-country skiing. Sledding and tubing are permitted in designated areas.

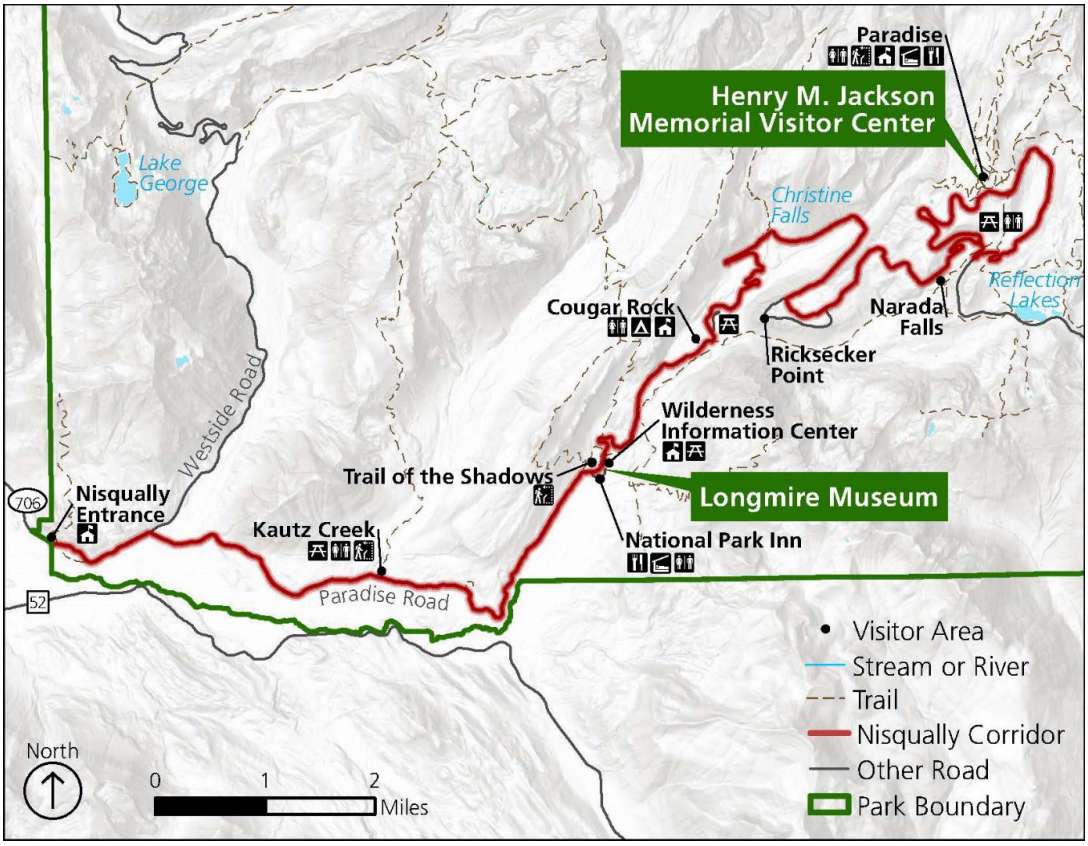

FIGURE 3. THE NISQUALLY TO PARADISE CORRIDOR

This plan also includes access management at Sunrise, located outside the corridor in the northeast section of the park. Sunrise is included in this plan because changes to visitor use at Paradise are expected to result in changes to the high visitation levels at Sunrise, the second most highly visited destination in the park. Considering the impacts of managed access outside of the corridor is important because when access is managed in one area of a park, the issues of

crowding may be displaced to different areas of the park. This need was identified during civic engagement to address issues related to crowding and access at Sunrise that may increase because of access management in the Nisqually to Paradise Corridor. Visitation at the White River entrance, which provides the only vehicle access to Sunrise, has increased by 75% from 2015 to 2021, on average, from July 1 to Labor Day Monday (see appendix C). The park would complete additional site-specific planning for the Sunrise area as needed in the future to meet visitor access and resource protection objectives.

PLAN PURPOSE, NEED, AND OBJECTIVES

The purpose of the Nisqually to Paradise Corridor management plan is to provide high-quality opportunities for visitors to safely use, experience, and enjoy the park and to develop strategies to concurrently protect natural and cultural resources.

This plan is needed to address a wide range of issues associated with congestion and facility overuse. The following plan objectives guide the development of the plan elements and action alternatives:

- **Address roadway congestion and minimize safety hazards to visitors, particularly during summer peak season.** Roadway congestion is frequently observed along State Route 706 (the National Park Highway) leading up to the Nisqually entrance. Inside the park, roadway congestion occurs at Paradise and extends along the Nisqually to Paradise Corridor, around Longmire, and at popular trailheads. High demand for parking at trailheads leads to visitor-created parking along the roadway and associated safety concerns.

- **Address parking lot congestion and facility overuse on busy summer days at Paradise and pullouts along the road and trails.** High visitation in the summer months leads to stress on facilities, services, and related infrastructure. During the summer months, there are more cars parked on Paradise Valley Road than in any designated parking lot. These high-use levels also impact facilities such as bathrooms and visitor centers, particularly at Paradise where high-use levels during peak periods result in an increased need for maintenance and repairs.

- **Protect alpine meadow environments and other natural resources.** The mid- to high-elevation ecological communities of Mount Rainier are elements of park significance, as identified in the park's 2015 foundation document. Impacts on these resources are occurring primarily at Paradise Meadows but also at view areas, road shoulders, and within a 1-mile radius of parking areas. These areas are an attraction because of wildflowers, views of Mount Rainier, photography opportunities, and picnics, but off-trail use is resulting in trampling impacts on sensitive subalpine vegetation and soil, degradation of aquatic resources, and wildlife disturbances.

- **Enhance the quality of the visitor experience at scenic viewpoints and along trails.** High levels of visitor use at Paradise Meadows, Comet Falls, Carter Falls, and other popular trails and viewpoints results in crowded conditions and high encounter rates in these locations, which diminishes the quality of the visitor experience.

- **Protect culturally significant transportation assets.** The roads in the Nisqually to Paradise Corridor are part of the NHL district. Preserving the historic integrity and

importance of these roadway systems is crucial to maintaining the historic significance of these resources.

The Nisqually to Paradise Corridor Management Plan defines desired resource conditions and visitor uses and experiences to be achieved in the park. The plan identifies specific management actions at locations throughout the park to enhance visitor experiences and sets priorities for resource protection by outlining strategies for managing visitor use and access. This includes identifying the appropriate use of the park's visitor use areas consistent with existing management plans and long-term stewardship. The plan also provides a long-term, adaptive framework for managers to use when implementing the plan to ensure the park provides quality visitor use experiences and protects park resources. This plan was developed consistent with the guidance outlined by the Interagency Visitor Use Management Council (https://visitorusemanagement.nps.gov/). This plan contributes to the park's overall planning portfolio by addressing some of the general management plan statutory requirements for the Nisqually to Paradise Corridor. This plan includes identified visitor capacities (appendix C) and strategies to manage to them (chapter 2) for areas along the Nisqually to Paradise Corridor, as well as the Sunrise area. This plan also includes updated guidance on the types and intensities of development for the park (appendix A) and actions to implement that guidance for the Nisqually to Paradise Corridor (chapter 2).

The Nisqually to Paradise Corridor Management Plan would implement some decisions from the general management plan (2002) based on updated visitor use studies, transportation studies, and changes in visitor use patterns throughout the park. Actions presented in the general management plan are included in the description of the no-action alternative in chapter 2, as these actions guide the current management at the park. The access management framework adopted by the park would be managed adaptively to ensure that the park is able to meet the desired conditions for visitor use and resource protection with the least impact on visitors and other park resources and values. This planning document and environmental assessment includes the following:

- evaluates and provides recommendations for a shuttle system within the park per the general management plan;
- carries forward some actions for implementation from the draft view and vista management plan;
- evaluates roadside parking within the Nisqually to Paradise Corridor and proposes both formalized pull-over areas and areas needing revegetation; and
- improves accessibility by adding Architectural Barriers Act-compliant parking stalls in key destinations, per the park's draft self-evaluation and transition plan.

RESOURCE IMPACT TOPICS

Impact Topics Retained for Further Analysis

Impact topics represent resources that could be affected, either beneficially or adversely, by implementing any of the proposed alternatives. The National Park Service used an interdisciplinary review process, existing studies and data, and public comments to determine which resources would likely be affected by this project. The following topics are carried forward for further analysis in this environmental assessment:

- Visitor Use and Experience – Actions considered among these alternatives would change how people access and experience areas within the park.
- Socioeconomics – Changes in visitor access in the park have the potential to affect businesses and communities within and around the park.
- Wilderness Character (Natural, Undeveloped, and Opportunities for Solitude or Primitive and Unconfined Recreation Qualities) – Changes to visitor use have the potential to alter use pattens and impacts, including within designated wilderness.
- Vegetation and Soils – Changes in visitor use, including but not limited to, the development of new trail segments, shuttle parking areas, or roadside scenic vista management, have the potential to result in site-specific impacts on vegetation and soils within the park.
- Special Status Species (northern spotted owl, marbled murrelet, and gray wolf) – Changes in visitor use and access management have the potential to affect special status species, particularly those actions that would require short-term impacts related to construction.
- Cultural Landscapes – Altering the use or design of the transportation system within the park has the potential to affect cultural landscapes that contribute to the historic significance of the park.
- Historic Structures – Some actions considered within the alternatives would result in changes to the built environment within the park, requiring a consideration of how these actions would potentially affect historic structures.

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Chapter 2
Alternatives

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CHAPTER 2: ALTERNATIVES

INTRODUCTION

This section includes a description of the alternatives being considered to support agency decision making to meet the purpose and need for the plan as described in chapter 1. This section includes the no-action alternative (alternative 1) and three action alternatives (alternatives 2, 3, and 4). The no-action alternative would continue current management and provides a basis for comparing the other alternatives. The action alternatives present different approaches to managing park resources and values within the Nisqually to Paradise Corridor, including a spectrum of visitor opportunities and amenities. Site-specific environmental planning and compliance for construction-related elements of the alternatives would be tiered from this plan as needed.

A concept statement for each alternative is presented, followed by strategies that would be implemented at Mount Rainier National Park within the Nisqually to Paradise Corridor. These strategies are organized by management topic. A summary of the alternatives is provided at the end of this chapter.

ALTERNATIVE 1 (NO ACTION, CONTINUE CURRENT MANAGEMENT)

Concept Statement

The no-action alternative describes current management of the project area. Under this alternative, visitors would continue to spontaneously access destinations in the corridor primarily by using private vehicles during normal park operating hours. Routine and cyclic maintenance to the road would continue to meet safety requirements. Under the no-action alternative, management direction would continue as identified in the park general management plan (GMP), approved in 2002. Actions that were approved but not yet implemented are noted as such.

Zoning and Desired Conditions

The current zoning and desired conditions outlined in the general management plan would continue to provide guidance for achieving physical, biological, and social conditions for overnight and day-use levels in different areas of the park. The Mount Rainier National Historic Landmark District would continue to overlie the management zones. Most of the district is within nonwilderness zones, but the Wonderland and Northern Loop Trails and some structures in the wilderness zones are also within the NHL district. A summary of the management zones is below. For full descriptions, refer to the general management plan (pages 58–63).

Summary of Nonwilderness Management Zones

Management zones for the nonwilderness areas include the following:

- Primitive Zone
- Sensitive Resource/Recreation Zone
- Roaded Multiuse Zone
- Visitor Facilities Zone
- Administrative Zone

In some areas, different management zones would be applied seasonally to accommodate the major differences in types of use and resource protection that are associated with winter snow cover. The application of summer zones would continue to be applied between the end of May and July, depending on the area and snow conditions, and would continue to end between late September and late October when the roads are not able to be kept clear using push plows. Generally, desired conditions for the visitor experience would continue to become more primitive in winter, when facilities such as roads, restrooms, and picnic tables are covered by snow.

Summary of Wilderness Management Zones

Seven management zones would be applied to the wilderness to allow for a variety of trail and off-trail experiences, including the following:

- Pristine Zone
- Primitive Zone
- Research Natural Area Zone
- Moderate-Use Climbing Zone
- High-Use Climbing Zone
- Semi-Primitive Trail Zone
- Transition Trail Zone

The zones would be the same in the summer and winter, although in the winter the wilderness would be less accessible to visitors because of snow. Areas without maintained trails would primarily fall into either the Pristine or the Primitive Zones. Most of the lower forest and glaciers would be classified as pristine, and most of the subalpine region would be in the primitive category. The Butter Creek Research Natural Area would be a separate zone. Access to this area would be limited to approved research and educational purposes. The major climbing routes would be within either the Moderate-Use Climbing Zone or the High-Use Climbing Zone. Most trail corridors and associated designated campsites, including much of the Wonderland Trail, would be classified as semi-primitive trail. A few of the more popular trails, including trails to Spray Park, Comet Falls, and Burroughs Mountain, would be categorized as the Transition Trail Zone.

Indicators, Thresholds, and Visitor Capacities

The general management plan identified preliminary indicators and thresholds[1] for wilderness zones and the Sensitive Resource/Recreation Zone but noted that the thresholds for resource indicators were still in development and not ready to be applied. While the general management plan established a framework to address visitor capacity, it did not identify specific capacities. The general management plan deferred establishing capacities until visitor experience and resource indicators and thresholds were applied and monitored by zone.

The general management plan identified the following actions that have not been fully implemented:

- A framework would be established, including identifying capacities, selecting indicators and thresholds by management zones, monitoring the indicators, and taking appropriate actions when conditions are nearing unacceptable or had a downward trend.

1. Although the general management plan used the terminology standards, updated NPS policy and guidance now refers to this concept as a threshold, which is used throughout this planning document.

Management actions would include visitor education, site management, deterrence and enforcement, and the regulation of use.

- The framework would include indicators, wilderness character standards, monitoring, and management actions unique to all wilderness areas.
- The framework would be applied in several high-priority areas that receive (or are expected to receive) high use levels and/or have suffered resource and visitor experience impacts, including Paradise. The Nisqually to Paradise Corridor management plan would fulfill this element of the general management plan for the Nisqually to Paradise and Sunrise areas within the park.
- Interim capacities would include using the current infrastructure, such as parking spaces, to set capacities for nonwilderness areas of the park. In wilderness areas, monitoring would continue to be conducted, and the wilderness character standards (identified in the 1992 wilderness management plan) would continue to serve as the interim capacities for the wilderness.

Reservation Systems

The general management plan identified the following action that has not been implemented:

- The time or place of entry and the length of stops would be controlled to ensure that bus parking spaces were used more efficiently.

Entrance Stations

Entrance into the park at Nisqually would continue to be managed with the existing single file queue of vehicles passing through the historic Nisqually entrance booths to pay the entrance fee. Congestion and road closures would continue to be communicated to park visitors through the road status map and text online, road conditions phone line, and the park's social media account(s).

Shuttles/Transit

Primary visitor access to the Nisqually entrance and Nisqually to Paradise Corridor occurs through personal vehicle. Occasionally, visitors access the area as part of road-based tours and commercially guided services such as climbing or wilderness expeditions. While a voluntary shuttle system was piloted during the Paradise construction projects and transported visitors from Ashford, Washington, to Longmire, and from Longmire to Paradise, this system was discontinued due to low ridership and visitor preference for driving personal vehicles. The general management plan proposed that the park evaluate the need for a shuttle system through a transportation planning effort. Existing shuttles to Longmire for concession employees would continue operating.

The general management plan identified the following actions that have not been implemented:

- Provide shuttle service to Longmire for NPS employees.

Commercial Services

The general management plan identified the following actions that have not been implemented:

- Tour buses would be managed to reduce congestion.
- Price incentives would be used during non-peak times to ensure bus parking spaces were used more efficiently.
- New regulations would be implemented, such as allowing buses to stop only at certain places and times or allowing only certain types and sizes of buses in the park.
- The National Park Service would work with bus tour companies to reduce the use of a single trail by large visitor groups, such as directing passengers to specific trailheads or splitting passengers into smaller groups.
- Tour bus companies would be encouraged to bring visitors into the park on weekdays, when use levels are lower.
- Tour bus companies would be encouraged to attract new clientele and to offer different types of tours, such as special-interest tours, family tours, or half-day tours.
- The National Park Service would work with gateway communities and regional tourist attractions to provide tour bus service.
- Tour bus operators and guides would be educated about park regulations.

Winter Strategies

Under the no-action alternative, skiing, snowshoeing, and snowboarding would continue to be allowed throughout the park. At Paradise, snow camping would be permitted, provided there are at least 5 feet of snow. Snow play (sledding) would continue to be managed as conditions allow in the groomed area at Paradise. Sledding would continue to be prohibited within the park when the groomed area is closed. Walk-in or ski-in camping would continue to be encouraged at Ohanapecosh and Cougar Rock Campgrounds. There would continue to be a maximum level of activity for non-concession commercial operators: 120 guided day trips and 36 five-night trips a season per commercial operator. Concession operations would retain access in the corridor; three mountain guide services and one lodging, retail, and food and beverage concession operation would continue to provide services in the corridor.

The National Park Service would continue to take measures to reduce risks to park visitors and employees from winter storms, avalanches, and other winter hazards. The road from Nisqually to Paradise would continue to be plowed for personal vehicles when feasible, and park staff would continue to close the Longmire gate nightly from early November to mid-April each year. While the park strives to maintain winter access to Paradise daily, this is not always achievable and, in many instances, the park closes access to visitors beyond Longmire. Park staff would continue to assess conditions each day and may elect to close the road for reasons including, but not limited to, road safety, weather, avalanche status, other hazards, or adequate staffing levels to provide emergency services. From fall 2019 to spring 2022, the gate at Longmire and Paradise Road has been closed to visitor access for an average of 60 days out of 181 days per winter season (from

November 1st to April 30th). However, it is important to note that the 2019–2020 winter season experienced an increase in the number of daily closures due to the COVID-19 pandemic.

The general management plan identified the following actions that have not been implemented:

- Winter access to Paradise would be provided via shuttles.

Strategic Communications

The National Park Service would continue to provide real-time video of parking conditions on the park's website and social media platforms and continue to maintain the highway advisory radio units and variable message signs along the corridor to communicate entrance delays. In accordance with the park's long-range interpretive plan, a major rehabilitation or replacement of the audiovisual programs and exhibits occurred in visitor centers and ranger stations within the park.

Existing visitor centers and museums would continue to provide more in-depth and focused interpretation.

The general management plan identified the following actions that have not been implemented:

- A variety of information systems would be used to inform visitors of recreational opportunities in the park and along entrance corridors to the park, real-time information regarding parking availability, traffic and weather conditions, and visitor options. These information systems include web-based interactive kiosks at welcome centers, a website providing the same information as the kiosk, and improved communications via satellite with handheld or in-vehicle devices.

- Limited interpretation (e.g., brochures, tapes, radio transmissions) would be provided on shuttles serving visitors.

- During the summer season, several new staffed visitor welcome centers would be operated outside of the park, along major roads leading into the park, to provide pre-visit information and orientation. The National Park Service would seek cooperative arrangements or partnerships with other federal agencies such as the US Forest Service, local communities, or other entities to repurpose existing facilities for this use.

Paradise

The level of use would continue to be controlled by the current parking infrastructure, and visitors would be encouraged to visit other areas of the park when the parking lots are full. Access to Paradise would continue to be provided via personal vehicles and commercial operators only, except for concession staff who regularly shuttle/carpool employees to Paradise. No public shuttle would be provided to access Paradise. No new designated parking would be provided. Existing visitor and administrative facilities would be retained. No modifications to the picnic area or connecting trails would occur. Trails at Paradise would continue to be maintained to minimize visitor impacts in subalpine and alpine meadows and other sensitive areas. Ranger patrols and visitor education would continue to inform visitors on why it is important to stay on the trail. The updated Jackson Visitor Center and rehabilitated upper and lower parking areas at

Paradise reflect the changes outlined in the park's 2002 general management plan and analyzed in the subsequent environmental assessment (NPS 2005b). Some minor modifications would continue to be made to nonwilderness trails to keep visitors on trails, including defining trail edges, installing barriers, or widening or narrowing small sections of trails or landings.

The general management plan proposed that all overflow parking would be eliminated through barricades and no-parking signs and phased in throughout key congested areas where overflow parking results in safety and resource concerns. Under any alternative, the Nisqually to Paradise Corridor management plan would fulfill this element of the general management plan by formally defining where roadside parking can and cannot occur for the Nisqually to Paradise area within the park.

The general management plan identified the following actions that have not been implemented:

- Visitors would be able to take shuttles to Paradise in summer and winter. Most NPS staff who work at Paradise would be required to take shuttles during the peak-use period to give visitors more opportunities to find parking spaces. The shuttle service would be coordinated with eliminating overflow parking to reduce traffic congestion and ensure effective visitor transportation within the park. The system would be implemented with the cooperation of businesses, local communities, and regional authorities.

- The parking area would be redesigned to make more effective use of available space, improve circulation, and provide shuttle drop-off areas. The number of designated parking spaces in the existing parking area footprint at Paradise would remain at about 750 spaces. However, the total number of parking spaces would decline with the elimination of overflow parking. This decrease would be partially offset by requiring employees, wilderness climbers, and wilderness campers to use shuttles.

- Parking lots and the picnic area would be gated to ensure that visitors could always drive through the Paradise area but could only stop when parking spaces were available.

- Fines would be given to visitors for going off-trail.

- When large groups arrive, the number of people entering a trail at one time would be managed to reduce group sizes.

Sunrise

The level of use would continue to be controlled by the current parking infrastructure. Access to Sunrise would continue to be provided via personal vehicles and tour buses. Parking for tour buses and visitors with disabilities would continue to be provided. Ranger patrols and visitor education would continue to inform visitors on why it is important to stay on the trail.

The general management plan identified the following actions that have not been implemented:

- From July through September, visitors could either take a shuttle to Sunrise or drive their private vehicles and park at Sunrise in designated spaces. Once the parking lot was full, visitors would be required to take shuttles to Sunrise or would be directed to other areas. A staging area for the shuttles, consisting of a parking area, restrooms, and waiting facility,

would be provided at a location to be determined. The National Park Service would work with Washington's State Department of Transportation, the US Forest Service, and the Crystal Mountain ski area to find a suitable staging site that would have a low impact on the environment.

- When the parking capacity at Sunrise was exceeded, visitors could take the shuttle into the area, or would be directed to other parts of the park and encouraged to drive to Sunrise at less busy times, such as on weekdays or during the fall.
- The number of designated parking spaces in the main Sunrise parking area would be expanded (from 260 to 300 spaces) within the existing footprint (including gravel areas), consistent with the cultural landscape. A cultural landscape report would be prepared to aid in the final design. Because no overflow parking would be allowed, the overall number of parking spaces at Sunrise would decrease.
- Additional picnic sites would be constructed at Sunrise within the existing footprint to accommodate more visitors.
- The *1992 Sunrise Development Concept Plan* would be implemented to construct a new ranger station and concession facility with concession employee housing to replace Sunrise Lodge. Other existing facilities would be retained.
- Some minor modifications would continue to be made to nonwilderness trails to keep visitors on trails, including defining trail edges, installing barriers, or widening or narrowing small sections of trails or landings.
- Fines would be given to visitors for going off-trail.
- When large groups arrived, the number of people entering a trail at one time would be managed to reduce group sizes.

Other Strategies and Actions by Key Location

Westside Road

Private vehicles are not allowed to cross the washout section along Tahoma Creek to the higher ground. Visitors can hike or ride bicycles along the road. Pack stock use is not allowed on Westside Road. The road would continue to be maintained in a manner compatible with the NHL district.

The general management plan identified the following actions that have not been implemented:

- Visitors can take shuttles along the road.
- Shuttles would drive as far as Klapatche Point and probably would operate from July through September. This period could be extended based on visitor use patterns.
- Minor improvements would be made to Westside Road so shuttles could use the road.
- Limited interpretation would be provided on the shuttle.

- If a washout occurred, visitors would be taken across the damaged area after the waters subsided, and then they could catch another shuttle. The National Park Service would accept the stranding of the shuttle bus for several weeks as a normal operational condition. If a large stretch of the road was destroyed by flooding, the future use of the road for shuttle service would be reexamined, and shuttle service might be discontinued.

- Picnic sites would be added at Tahoma Vista, Round Pass/Marine Memorial, and Klapatche Point.

In winter, Westside Road would remain unplowed to manage for skiing and snowshoeing. Visitors would continue to park near the intersection of Westside Road and Paradise Road.

Kautz Creek

The level of use would continue to be controlled by the current parking infrastructure. No changes to parking infrastructure, facilities, trails, or wayfinding would occur. Roadside parking would continue to occur.

Longmire

The level of use would continue to be controlled by the current parking infrastructure, and visitors would not be able to stop when the parking lots are full. No new designated parking would be provided. Existing visitor and administrative facilities would be retained. Due to considerable and unpredictable geologic hazards, employees who live and work at Longmire would continue to be exposed to more geologic risk than employees who work at Longmire and live elsewhere, and visitors passing through would continue to have even less exposure. The former Longmire Campground is used by park staff, volunteers, and tribes and is maintained as an important cultural landscape. A few picnic tables are scattered around Longmire and can be used by the public. Regarding geologic hazards, ongoing cooperation with the US Geological Survey (USGS) ensures that information online is up to date (USGS Cascade Volcano Observatory's website and the park website), studies are being conducted, and visitors are being notified of possible risks and the best actions to take in case of a geologic event. Existing shuttles to Longmire for concession employees would continue operating.

The general management plan identified the following actions that have not been implemented:

- Overflow parking would be eliminated.

- Shuttle service would be provided to Longmire for NPS employees.

- Visitors could take shuttles to Longmire, which would stop on the way to Paradise.

- A portion of the campground would be reopened to the public for picnicking.

- Increased efforts would be made to educate and inform visitors and employees about the threat of geologic hazards and what to do if a debris flow or other event occurred. Such efforts might include the following:

    - Additional information regarding geologic hazards would be provided in interpretive programs, including programs on the proposed shuttles.

- Warning signs would be placed about possible geologic hazards along roadways and in high-risk areas throughout the park.
- The possibility of building escape trails/routes where they do not currently exist would be studied.

Cougar Rock Picnic Area/Carter Falls Trailhead

The level of use would continue to be controlled by the current parking infrastructure. No changes to parking or road infrastructure, picnic areas, trails, or wayfinding would occur. Current picnicking opportunities would be maintained on a first-come, first-served basis.

Christine Falls/Comet Falls Trailhead

The level of use would continue to be controlled by the current parking infrastructure. No changes to parking or road infrastructure would occur. Roadside parking would continue to occur here. Parking would continue to be available at roadside pullouts 39 and 41 and on the south side of Paradise Road.

Ricksecker Point

The level of use would continue to be controlled by the current parking infrastructure. No changes to the parking infrastructure would occur. Roadside parking would continue at the pullout north of Ricksecker Point.

The general management plan identified the following actions that have not been implemented:

- A vault or portable toilet would also be added in a previously disturbed area.

Narada Falls

The level of use would continue to be controlled by the current parking infrastructure. No changes to the parking infrastructure or picnic area would occur.

Reflection Lakes

The level of use would continue to be controlled by the current parking infrastructure. No changes to parking infrastructure or facilities would occur, and roadside parking (pullouts 91, 93, and 105) would continue.

COMMON TO ALL ACTION ALTERNATIVES

Zoning and Desired Conditions

The zoning, as defined in the 2002 general management plan (GMP), would be updated to clarify and reduce redundancy of the 2002 GMP desired conditions to answer the question, "What are we managing for?" in each area of the park.

The changes (summarized below) are considered amendments to the park's general management plan. While the Nisqually to Paradise Corridor planning area does not fall within all zones of the park, the management zones for Mount Rainier National Park would be comprehensively

updated as a part of this planning process. All park zones are included in appendix A. See figures 4–5 for the spatial extent of the zones.

Zoning Changes

The first mile of Kautz Creek Trail, the first mile of Pinnacle Peak Trail (from the trailhead to the Pinnacle Saddle), and the section of the Wonderland Trail from Paradise Road to Carter Falls would be changed from the wilderness Semi-Primitive Trail Zone to the wilderness Transition Trail Zone. Ongoing monitoring has informed the park that trails directly adjacent to a highly trafficked corridor were not consistent with desired conditions of the Semi-Primitive Trail Zone, thus necessitating an update. By updating the zoning for the sections of these trails, management would be aligned with the current application of zoning at Comet Falls Trail, which is the Transition Trail Zone for the foremost section of the trail and the Semi-Primitive Trail Zone for the segment of trail further from the corridor.

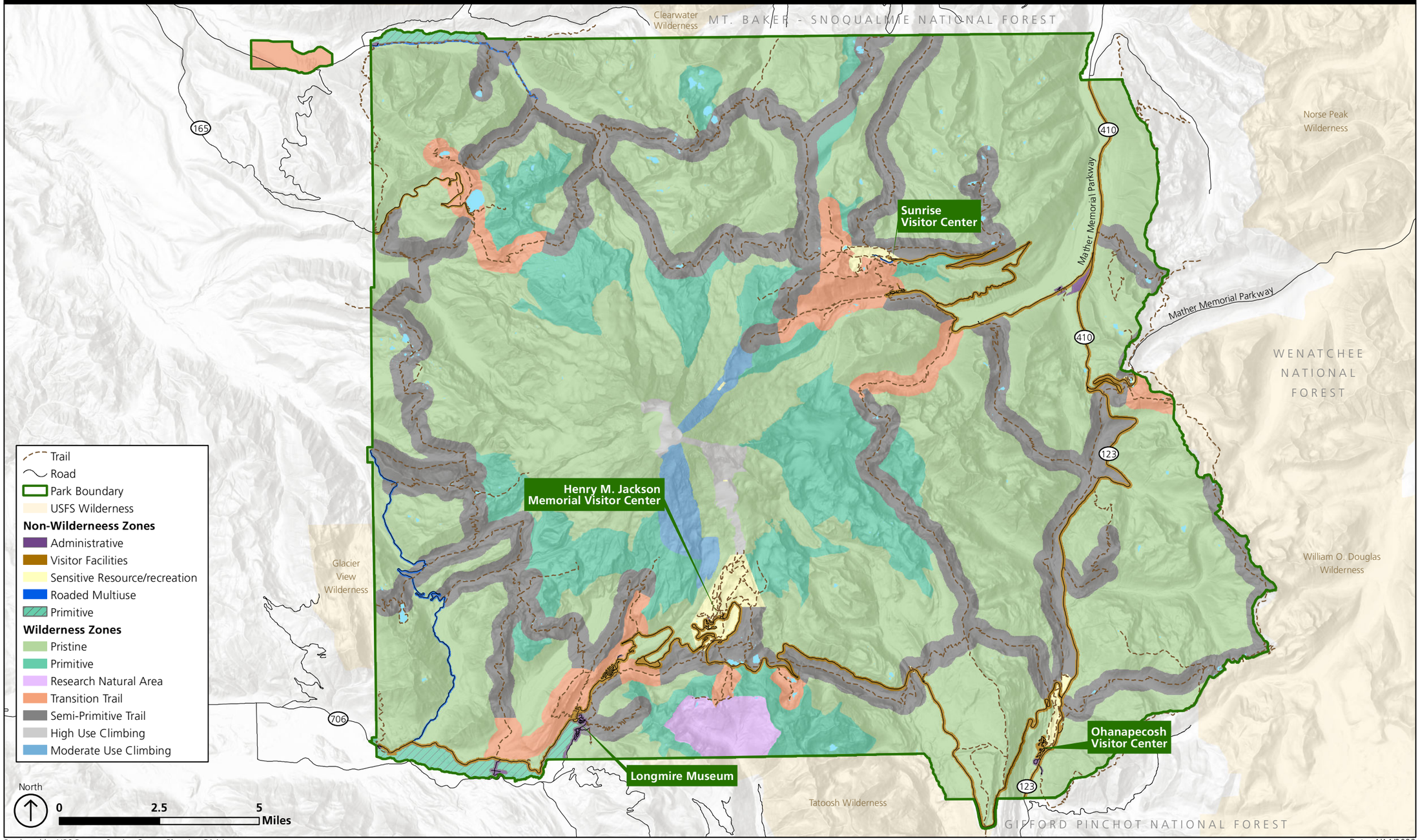
The Research Natural Area Zone adjacent to the Pinnacle Peak Trail would remain as it is currently zoned, but language would be added to provide more detailed guidance to protect the research integrity of this area.

Zoning would be updated between Cougar Rock and the Comet Falls Trailhead from the wilderness Pristine Zone to the wilderness Transition Trail Zone. This zoning change would follow the trail alignment to accommodate new wilderness trails.

Summer Zones
Parkwide

Mount Rainier National Park
Washington

National Park Service
U.S. Department of the Interior



Produced by NPS Denver Service Center Planning Division

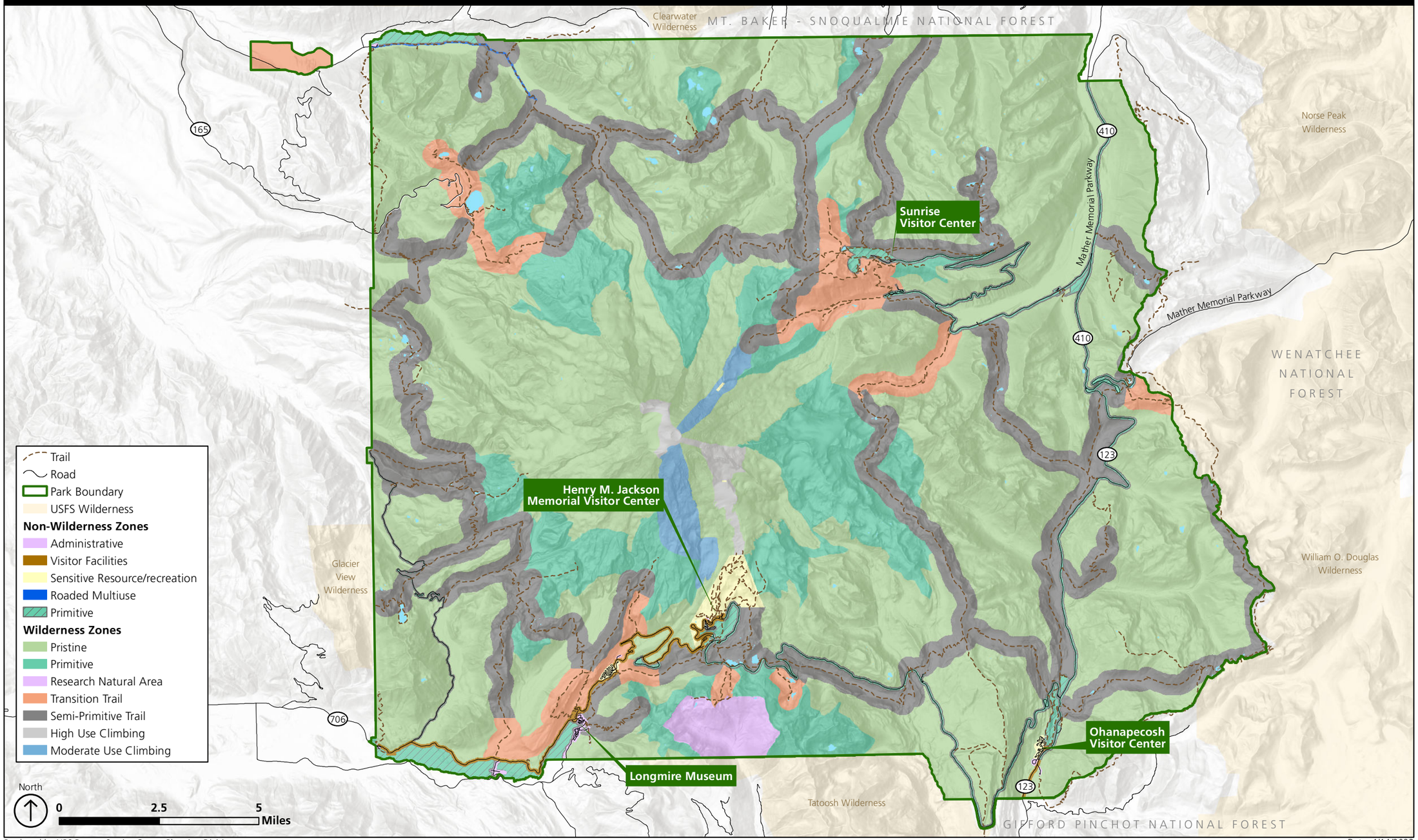
Date: 4/14/2023

Figure 4. Mount Rainier National Park Summer Zones

Winter Zones
Parkwide

Mount Rainier National Park
Washington

National Park Service
U.S. Department of the Interior



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Date: 4/14/2023

FIGURE 5. MOUNT RAINIER NATIONAL PARK WINTER ZONES

Indicators, Thresholds, and Visitor Capacities

This plan establishes indicators and thresholds and identifies visitor capacities using best practices created by the Interagency Visitor Use Management Council (the council). Indicators measure conditions that are related to visitor use, and monitoring is conducted to track those conditions over time. Thresholds have been identified that represent the minimally acceptable conditions associated with each indicator. The results from monitoring indicators and thresholds are used to inform and select the strategies park managers would use to achieve and maintain desired conditions. If indicators approach their respective thresholds, additional actions would be taken (as described in appendix B) to protect key resources, park values, and visitor experiences.

This iterative practice of monitoring, implementing management strategies, and then continuing to monitor to gauge the effectiveness of those actions would allow park managers to maximize benefits for visitors while achieving and maintaining desired conditions for resources and visitor experiences in a dynamic setting. The indicators to be monitored at Mount Rainier National Park related to the corridor plan are

- people per viewshed at select locations along trails,
- encounter rates on wilderness trails,
- vehicles at one time at key destinations,
- percent of bare ground adjacent to select trails, and
- largest patch index (measure of meadow fragmentation).

By identifying and managing the maximum amount and types of visitor use (visitor capacities), the National Park Service can help ensure that resources are protected and that visitors have the opportunity for a range of high-quality experiences. Through this planning effort, the park has identified strategies (in this chapter) to address vehicle and visitor use issues in the park. These strategies are key to informing the appropriate capacity for different areas in the park. Implementation of these indicators and visitor capacities are considered a part of the alternatives and are common to all action alternatives; however, visitor capacities for Paradise vary by alternative due to differences in strategies. Details on the indicators, thresholds, related potential actions, and identified visitor capacities are presented in appendix B and C. The visitor capacity analysis includes four steps: (1) determine the analysis area; (2) review existing direction and knowledge; (3) identify the limiting attribute; and (4) identify the visitor capacity (IVUMC 2016). While a summary of visitor capacity is provided below, it does not include the limiting attribute analysis (table 2). The limiting attribute is defined as the quality or characteristic that most constrains the area's ability to accommodate visitor use. Some examples of the limiting attribute for areas within the Nisqually to Paradise Corridor include the nearby wilderness boundary, visitor experience on trails, NHL designation and contributing features, and natural resource conditions. The identification of indicators, thresholds, and visitor capacity would fulfill the commitment in the general management plan to establish a visitor experience and resource protection framework for the Nisqually to Paradise Corridor.

Table 2. Proposed Visitor Capacities by Analysis Area Location

Analysis Area	No Action/Current Management	Proposed Visitor Capacity
Westside Road	Current use levels, approximately 15 people at one time, are maintaining desired conditions.	30 people at one time; commercial use would not exceed 25% of total use.
Kautz Creek	Current use levels are maintaining desired conditions.	105 people at one time; commercial use would not exceed 30% of total use.
Longmire	Current use levels, in both the summer and winter, are generally maintaining desired conditions.	450 people at one time; in the winter, 250 people at one time.
Carter Falls Trailhead	Current use levels are achieving and maintaining desired conditions.	70 people at one time.
Cougar Rock	The campground, picnic area, and parking lot experience use levels are achieving and maintaining desired conditions resources and visitor experience.	880 people at one time; in the winter, 120 people at one time.
Comet Falls Trailhead	During peak times, congestion on the roadway creates unsafe conditions, and encounter rates on the trail exceed thresholds, indicating that current use levels are not achieving desired conditions.	51 people at one time; commercial use would not exceed 15% of total use.
Christine Falls	While current visitor use levels are achieving desired conditions, occasional roadway congestion creates unsafe conditions for visitors.	40 people at one time; commercial use would not exceed 15% of total use.
Ricksecker Point	Current visitor use levels are achieving and maintaining desired conditions.	100 people at one time; commercial use would not exceed 45% of total use.
Narada Falls	Current use levels at this location are achieving and maintaining desired conditions.	160 people at one time; commercial use would not exceed 30% of total use.
Paradise	During the peak season and on peak days, current use levels do not consistently achieve desired conditions for visitor experience and resources. Trail conditions, visitor experience, and staff operations are impacted by peak use levels.	Alternative 2: 2,520 people at one time. Alternative 3: 2,500 people at one time. Alternative 4: 2,200 people at one time.
Paradise (winter)	Access to Paradise in the winter is dependent on road openings. On peak days, staff has observed nearly 2,000 people at one time at Paradise and associated congested parking lots. Current use levels are not consistently maintaining desired conditions.	1,540 people at one time.
Reflection Lakes	Current use levels are maintaining and achieving desired conditions.	115 people at one time; commercial use would not exceed 15% of total use.
Sunrise	During the peak season and on peak days, current use levels do not consistently achieve desired conditions and negatively impact the visitor experience and resources.	1,350 people at one time.

Reservation Systems

Across all action alternatives, a reservation system would be implemented to manage the volume and timing of vehicles at various locations throughout the park; however, the details vary across alternatives and are captured in each concept statement. The purpose of a reservation system is to manage use levels in key locations to ensure that desired conditions for resources and visitor experience are being maintained. During initial implementation, the system would be active during the peak season (approximately July 1st through Labor Day Monday) from approximately

7:00 a.m. until 5:00 p.m. each day; however, the season may be expanded to require reservations during weekends beginning on Memorial Day Weekend. The time of day when reservations are required would vary during the year based on use patterns and length of day. The timing and seasonality would be modified as needed based on observed conditions and monitoring. Other transportation corridors may be added to the system per monitoring of indicators, but expanding a reservation system to other areas outside of this planning scope would be subject to additional planning and civic engagement to support decision making.

Details of the reservation system would be designed and communicated with the public following the completion of this plan and prior to implementation. Regardless of the type of reservation system described in each alternative, the following considerations would be applied:

- The National Park Service would identify allocations for commercial service operators and NPS authorized use that would be excluded from reservations available to the public. Under NPS authorized use, tribal access would be provided in addition to NPS staff and concession-related staff (e.g., maintenance and operations staff).
- Visitors with wilderness use permits and/or overnight reservations within the corridor (e.g., Paradise Inn, Cougar Rock Campground, Backcountry Permit Reservations) would not be required to obtain a separate reservation to access the corridor.
- A percentage of reservations would be held aside for short-term purchase in addition to long-term, or advance, purchases. The time frame definitions for short-term and long-term would be identified during the design of the reservation system.
- Reservations would only be valid when accompanied by an entrance pass, which could be purchased in conjunction with a reservation, online, or at any of the entrance stations to the park.
- The park would evaluate how to effectively manage road-based commercial tours within transportation corridors.

Entrance Stations

The National Park Service would improve trip planning information to manage visitor expectations about entrance station wait times using various methods, such as the website, social media, and media press campaigns, and would coordinate with partners to disseminate information. In addition, wait time and information signs would be posted in gateway communities along the roadway in coordination with park partners. If feasible, a self-pay station would be piloted within outbound lanes at entrance stations to serve visitors who enter the park before the entrance station is staffed. Associated compliance and design would be completed prior to implementation as needed.

Commercial Services

Commercial vehicle parking would be allowed within authorized spaces only and would be enforced to ensure temporal and spatial distribution of use to reduce congestion. The park would explore opportunities to manage road-based commercial tours via commercial use authorizations to provide visitor opportunities for touring the park while maintaining desired conditions at key destination areas.

In the winter, commercial service operations would be updated to standalone permits for day-use and overnight-use trips. There would be an opportunity for no more than 10 non-concession commercial operators to offer a maximum of 10 guided day trips, as well as 10 non-concession commercial operators to offer a maximum of 3 guided 5-night trips. Authorized nonprofits would be included in the these limits.

Winter Strategies

The National Park Service would evaluate a different winter operations configuration at the entrance such as a designated chain-up lane. Winter day use access would be expanded at Cougar Rock by opening the road beyond Longmire during some days when it is not possible to open the road to Paradise. The park would install a gate or barricade above Cougar Rock, allowing for more recreational opportunities. Depending on monitoring and changes in visitation, a reservation system may be implemented during the winter. Additional civic engagement for winter access reservations would be completed at time of implementation.

Strategic Communications

Signage and wayfinding improvements would include developing orientation materials and signage in multiple languages, including the use of innovative technology. The National Park Service would implement the park phone application to provide trail maps, weather forecasts, and other information helpful for orientation and navigation. Additional trip planning, forecasting information, and seasonal wayfinding information would be developed and communicated to the public via the park website and mobile application. The National Park Service would provide focused information to the residents of local counties (including King, Pierce, Lewis, and Multnomah Counties) about off-peak times to visit the park. The National Park Service would coordinate with local lodging establishments to direct visitors to recreation.gov to purchase park passes and would evaluate providing pay stations outside of the park or online via a QR code. Communication improvements would include park designation of parking spaces for overnight users, including but not limited to Wonderland Trail users, at appropriate locations throughout the Nisqually to Paradise Corridor.

Scenic Vista Restoration

Roadside scenic vistas with cultural significance would be restored and maintained at select areas (see table 3) within the Nisqually to Paradise Corridor. These areas were identified and prioritized for near-term (three to five years) implementation under this plan to improve views of Mount Rainier and other scenic highlights, particularly in locations where scenic vistas were part of the historic design and intent of the road. Actions taken to restore scenic vistas would include thinning or pruning of vegetation in roadside areas outside of designated wilderness. Equipment used would include primarily hand tools (pull saws, loppers) and chainsaws where necessary. This action would include the removal of select individual trees and shrubs less than 18 inches in diameter at breast height. Vista management would include restoring filtered, framed, and feathered edge views. Filtered views provide access to scenic resources without clearing all the vegetation. They retain some trees between the viewer and the view object and lack a clearly defined start or end point. Filtered views are frequently achieved through selective thinning. Selective thinning is a vista-clearing technique in which some smaller trees are removed to open a filtered view. Framed views have a defined view boundary in which trees and landforms create frames (sides or edges) on either side of the view focal point. This term describes the way that

trees and/or landforms frame views to make them clearer and more distinct. Framed views are typically achieved through clearing. Clearing is a technique that removes all woody vegetation within a defined treatment area. Feathering is a vista-clearing technique that leaves the surroundings appearing natural and not manicured. This technique makes the surrounding vegetation edge transition look gradual and random to the extent possible. Feathering guidelines recommend that the horizontal edge of the clearing should be naturalistic, undulating, and not straight. The vertical transition should not be a consistent angle from the ground to the canopy and should contain an occasional larger tree or gap (see figure 6). Tree removals would be implemented outside of the nesting season for northern spotted owl and marbled murrelet within suitable habitat (March 15–September 30). Depending on site safety, natural resource conditions, and visual impact, cleared vegetation would either be left on-site or removed. Scenic vistas would be restored and maintained at the locations in table 3, which are highlighted in green in figure 7 below. Site-specific details for scenic vista clearing would include agency best practices for viewshed management. Additional locations may be identified in the Nisqually to Paradise Corridor where similar vista restoration or maintenance actions are needed. Some of these roadside pullouts are contributing to the Mount Rainier National Park National Historic Landmark District.

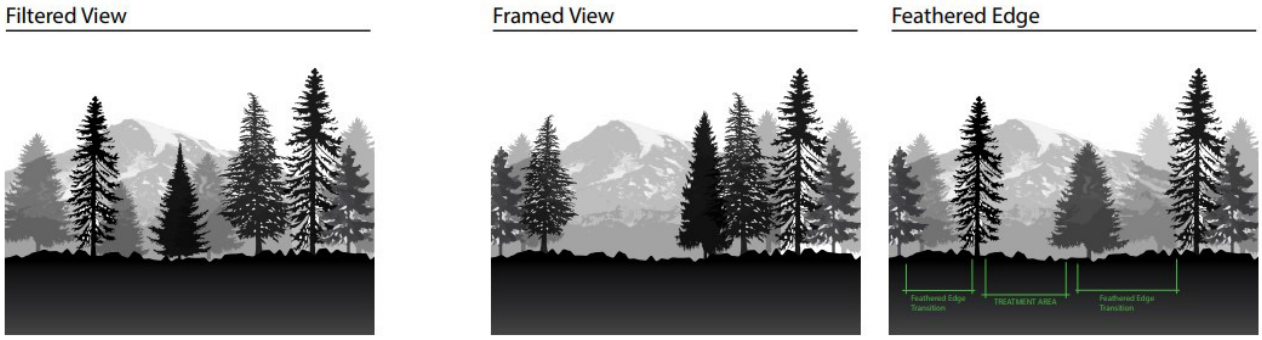

FIGURE 6. SCENIC VISTA PROPOSED TECHNIQUES

Table 3. Scenic Vistas Proposed for Restoration Activities

Vista ID	Name	Contributing to National Historic Landmark District?	Views to Be Restored
6	Christine Falls	Yes	Framed views of Christine Falls and bridge
9	Lower Miller Cutoff	Yes	Feathered view of Mount Rainier
10	Ricksecker Road	Yes	Feathered and framed view of Mount Rainier
13	Upper Miller Cutoff	Yes	Filtered views of Mount Rainier and Tatoosh Range
15	Canyon Rim View	Yes	Filtered view of Mount Rainier
18	Frog Heaven 3	No	Filtered view of Tatoosh Range
19	Oh My! Point	Yes	Feathered view of Tatoosh Range
23	Glacier View	No	Feathered view of Mount Rainier
29	Valley Road 5	Yes	Filtered view of Mount Rainier
31	Valley Road 7	Yes	Feathered view of Mount Rainier

Vista ID	Name	Contributing to National Historic Landmark District?	Views to Be Restored
32	Valley Road 8	No	Filtered view of Mount Rainier
33	Roadside across from community building	No	Filtered view of Mount Rainier

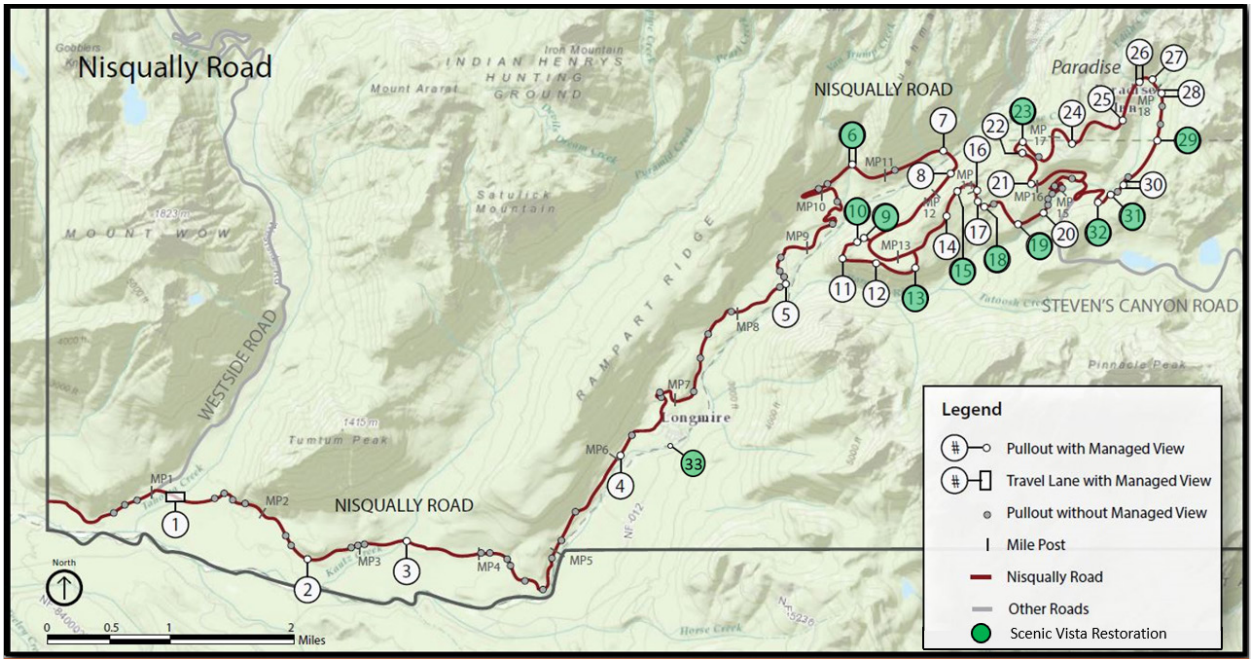

FIGURE 7. PULLOUTS ALONG NISQUALLY ROAD PROPOSED FOR SCENIC VISTA RESTORATION

Paradise

Visitor information and signage would be developed at the picnic area, lower lot, and Paradise Valley Road to improve visitor access, sense of arrival, and wayfinding. New pedestrian and vehicular wayfinding signs would be placed throughout the site, primarily at key decision-making locations.

Self-serve interpretation and trip planning resources would be improved by installing panels at the picnic area, the lower lot, the plaza of the previous visitor center, and the new visitor center plaza. In addition, an NPS arrowhead would be installed at the Jackson Visitor Center for public recognition.

Accessibility recommendations would be incorporated from the self-evaluation and transition plan (SETP) as appropriate, including modifications to make the restrooms in the picnic area universally accessible per Architectural Barriers Act (ABA) and International Code Council (ICC) standards. The National Park Service would rehabilitate the plaza (Slate) restroom within the existing footprint and expand the restrooms at the Jackson Visitor Center to improve the restroom capacity and functionality at Paradise. Accessibility improvements would be made to comfort stations and picnic areas that can meet the accessible route grades. Accessible parking stalls would be added near each of these newly updated facilities. All accessible routes from accessible stalls, comfort stations, picnic areas, and shuttle stops (where proposed) would meet ABA standards.

The upper lot would be for day-use vehicles only, with parking spots in front of and along the west side of the hill south of Paradise Inn reserved for inn guests. The lower lot would be for overnight and day-use vehicles. Per SETP recommendations, the number of accessible parking spots would be increased to seven spaces to meet ABA standards, two of which would be van accessible, in each of the three parking lots at Paradise. Parking for commercial operators would be authorized on Lower Valley Road only. Drop-off locations would be formalized and clearly identified in the upper lot. The National Park Service would evaluate repainting Canyon Y (the intersection of Nisqually to Paradise Road and Stevens Canyon Road) for clear separation of the travel lane.

A trail connection between the picnic area and Jackson Visitor Center, Barn Flat Trail, would be developed. All the pedestrian connections, new and existing, throughout the picnic area would be lined with curbs to prevent vehicles from parking in undesignated areas. Additional pavement markings would include striped crosswalks. All Paradise area trails would be improved and maintained, including general trail rehabilitation, and/or restoration, to improve access and resource sustainability. A picnic area would be developed at the lower or upper lot to increase picnicking opportunities, and a comfort station would be installed at the lower lot, providing multiple visitor services. As the park updates infrastructure, staff would consider opportunities to include technological improvements that promote environmental sustainability (e.g., electric vehicle stations), visitor safety, and visitor experiences, where appropriate, throughout the Nisqually to Paradise Corridor.

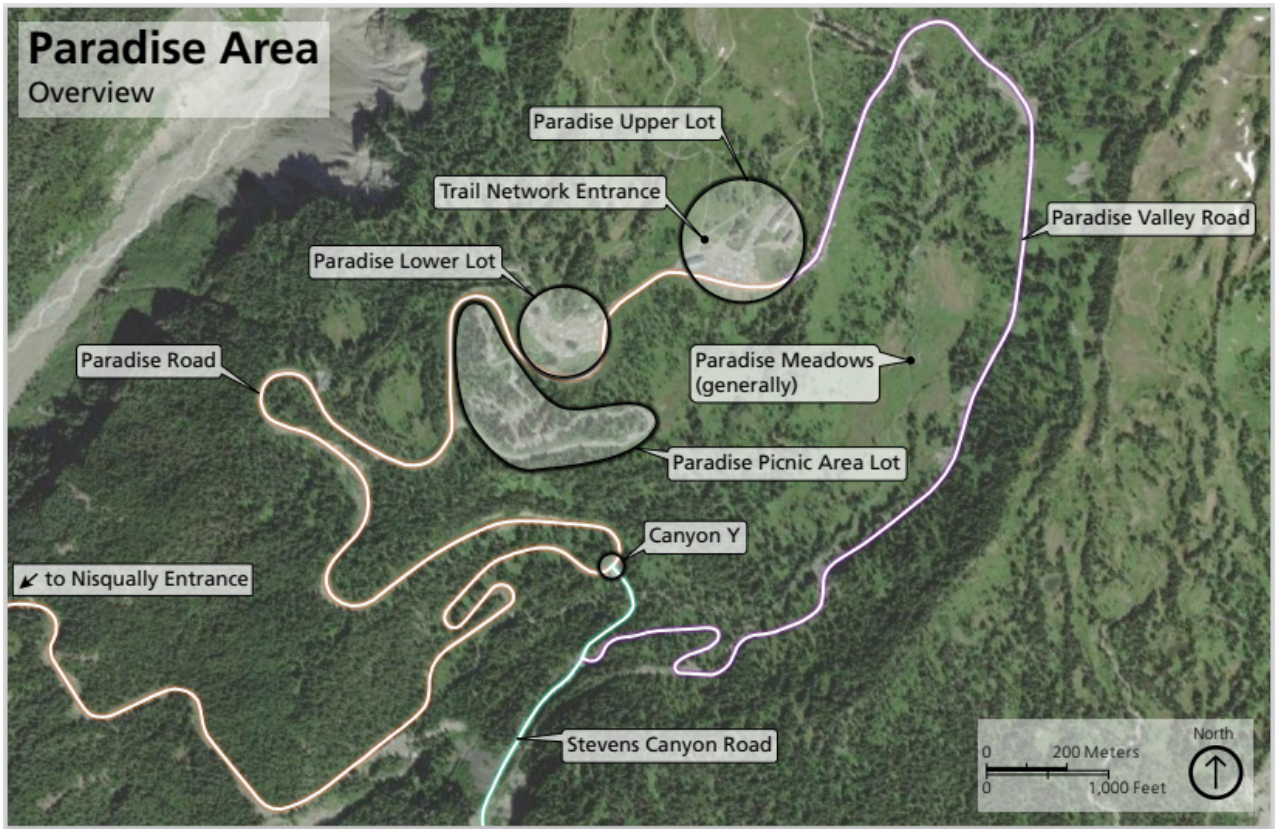

FIGURE 8. PARADISE AREA OVERVIEW MAP

FIGURE 9. OVERVIEW OF PARADISE PARKING AREAS

Sunrise

Access to the Sunrise area would be managed with a reservation system, as described in the Common to All Action Alternatives – Reservations System section. The White River to Sunrise Road Corridor would be included upon implementation, and other transportation corridors may be added to the reservation system when monitoring suggests that indicators are approaching thresholds and action is needed to ensure desired conditions are maintained. Visitors with valid campground reservations within the White River Corridor would not also need to obtain a reservation to enter through the White River entrance station. The park may consider adding reservable campsites within the White River Campground as a future action, as needed.

Other Strategies and Actions by Key Location

Westside Road

The National Park Service would continue to evaluate the condition of Westside Road. If the road were determined safe for visitor vehicle use, the park would consider commercial shuttle operations and commercial access beyond the gate to provide access to trailheads as discussed in the general management plan. The park may also consider options to manage public vehicle access through a reservation system for noncommercial vehicles in the future to redistribute visitor use in the corridor and help relieve congestion in other locations.

Bicycle use from the Nisqually entrance to Westside Road would be promoted. The roadside pullout by Tahoma Creek parallel to the roadway (pullout 4) would be blocked using boulders or other historically compatible barriers, and the roadside pullout near Dead Man's Curve (pullout 6) would be removed and restored to natural conditions. The National Park Service would also consider adding other recreational activities along Westside Road such as stock use during subsequent planning efforts (an updated wilderness stewardship plan).

Kautz Creek

Kautz would function as a trip-planning location by providing orientation panels, self-guided information, a kiosk, and information on restroom locations. A location for a covered picnic area would be evaluated. Roadside parking would be eliminated and enforced, and a sign indicating that there is parking ahead would be installed before the Kautz Creek bridge. The National Park Service would consider designated parking for commercial vehicles at Kautz Creek if there were expressed interest in operating commercial services on Westside Road and road conditions were compatible with this use.

Longmire

Longmire would function as a primary visitor destination/node in addition to Paradise. The sense of arrival, wayfinding and signage, interpretation, and self-guided opportunities at Longmire would be improved. Signage improvements may include additional administrative-only signs, a "one-lane bridge ahead" sign with the weight limit posted, and a seasonal sign for the bridge during winter stating authorized use only before the suspension bridge.

All modification and improvements would incorporate accessibility recommendations. Self-evaluation transition plan recommendations would be implemented to improve the accessibility of the Trail of Shadows.

Employee parking efficiency would be improved by allocating staff parking and better using the existing spaces. The National Park Service would evaluate operational changes to reduce staff parking in visitor spaces, such as using more back-up staff housing parking or exploring rideshare with Rainier Guest Services. The National Park Service would also reassess and evaluate services with partners.

The parking at Longmire Campground, primarily reserved for administrative use, and the community building would also be evaluated for parking efficiencies. Overnight parking at Longmire would be actively managed. Recreational vehicle parking areas would be designated and enforced. Roadside pullout 78 would be blocked off and restored to natural conditions.

Cougar Rock Picnic Area/Carter Falls Trailhead

The sense of arrival, wayfinding and signage, interpretation, and self-guided opportunities at Cougar Rock and the Carter Falls Trailhead would be improved. New pedestrian and vehicular wayfinding signs would be placed throughout the site, primarily at key decision-making locations.

A connector trail would be constructed along the roadway from the Cougar Rock picnic area to the Carter Falls Trailhead, and a location for a covered picnic area would be evaluated. All modification and improvements would incorporate accessibility recommendations.

Winter access would be expanded at Cougar Rock; see the "Winter Strategies" section above for more detail.

Christine Falls/Comet Falls Trailhead

Roadside parking would be eliminated and enforced, including roadside pullouts 39 and 41 and all roadside parking on the south side of Paradise Road. Curbing along the roadside would be considered. A connector trail from Cougar Rock to Comet Falls would be developed to reduce roadside parking at Comet Falls and to encourage visitors to park safely at Cougar Rock and walk to their destination. This trail would require additional site-specific planning and environmental compliance, tiered from this plan.

Ricksecker Point

The picnic tables at Narada Falls would be relocated to Ricksecker Point. The angle and placement of the sign for the Ricksecker one-way road turnoff would be modified to improve visitor safety. Roadside pullout 52 north of Ricksecker Point would be restored to natural conditions.

Narada Falls

The Narada Falls parking area would be striped. The picnic tables at Narada Falls would be relocated to Ricksecker Point. Self-evaluation and transition plan accessibility recommendations would be incorporated as appropriate, including modifications to make the restrooms universally accessible per ABA and ICC standards.

Reflection Lakes

The National Park Service would develop vault restroom facilities at Reflection Lakes to reduce resource impacts from human waste in the area. A designated photography spot would also be developed, such as a wayside, hardened pedestrian viewpoint, a pullout, or boardwalk. Parking would be improved at roadside pullouts 91 and 93; roadside pullout 105 would be blocked and/or

restored to natural conditions. Additional site-specific planning and environmental compliance tiered from this plan would be completed prior to implementation as needed.

Snow Lake Trailhead

To maximize parking opportunities within the corridor and provide opportunities for recreation outside of Paradise, the Snow Lake Trailhead parking lot would be striped to better organize vehicle parking and optimize the number of available parking spaces.

ALTERNATIVE 2: CORRIDOR-LEVEL ACCESS MANAGEMENT (NPS PREFERRED ALTERNATIVE)

Concept Statement

Under alternative 2, the Nisqually to Paradise Corridor would be actively managed by a reservation system for private vehicles at the Nisqually and Stevens Canyon entrances and also at the White River entrance. Paradise and other key destinations would continue to be accessed primarily by private vehicle. The frequency, timing, and seasonality of the reservation system would be adaptively managed based on observed conditions and effectiveness of the system to meet desired conditions. Other transportation corridors may be added to the system per monitoring of indicators.

Under alternative 2, visitor parking would be within designated lots, and overflow parking would be allowed on Upper Valley Road, which is anticipated to accommodate approximately 70 vehicles as needed for the reservation system. Parking would be prohibited on Lower Valley Road except for at trailheads. The Paradise picnic lot would be redesigned for efficiency, shifting the number of spaces from approximately 220 to 260. This action would accommodate 800 vehicles at one time and 2,400 people at one time.

Entrance Stations

A reservation would be required to enter the Nisqually and Stevens Canyon entrance stations during peak visitation times. See the reservation system section above for more information.

Shuttles/Transit

Under alternative 2, no new park-operated shuttles or transit would be provided on the Nisqually Road corridor to Paradise.

Winter Strategies

Refer to the “Common to All Action Alternatives” section for more information.

Strategic Communications

Refer to the “Common to All Action Alternatives” section for more information.

Paradise

Under alternative 2, parking would be allowed in marked spaces within designated lots (upper, lower, and picnic area lots), and overflow parking would be located along the roadside of Upper Valley Road from Paradise to Fourth Crossing Trailhead parking. Current roadside parking along

the south shoulder of the Upper Parking lot and narrow shoulder of Lower Valley Road from Lower Lakes Trailhead up Fourth Crossing bridge would not be allowed. Some minor modifications would occur to the picnic area to increase parking efficiencies, including improving circulation and increasing the number of available parking spaces as described below.

At the picnic area, existing parking stalls throughout the site would be restriped to better accommodate parking and drive aisle width requirements. Additional angled parking would be added in loop A (the northern picnic area) and parallel parking along the southernmost roadway. A few new pedestrian connections would be constructed. All the pedestrian connections, new and existing, throughout the picnic area would be lined with curbs to prevent vehicles from parking in undesignated areas. Additional pavement markings would include striped crosswalks. Accessible improvements would be made to comfort stations and picnic areas that can meet the accessible route grades. Accessible parking stalls would be added near each of these newly updated facilities. All accessible routes from accessible stalls, comfort stations, and picnic areas would meet ABA standards.

Other Strategies and Actions by Location

See the "Common to All Alternatives" section for additional area-specific proposed actions.

ALTERNATIVE 3: SITE-LEVEL ACCESS MANAGEMENT WITH COUGAR ROCK TO PARADISE SHUTTLE

Concept Statement

Under alternative 3, reservations would be required to access Paradise lots, and a shuttle service would be provided from the Cougar Rock picnic area parking lot to Paradise. Paradise and other key destinations would continue to be accessed primarily by private vehicle. Visitors without a Paradise reservation would be able to park at the Cougar Rock picnic area parking lot and ride to Paradise via the new shuttle. This shuttle may be operated by the National Park Service, a commercial services provider, or a partnership organization. Parking reservations at Paradise would be included upon implementation of this alternative, and reservations for parking at other locations in the park would be evaluated as an adaptive strategy per monitoring of indicators. A reservation system for private vehicles would be implemented at the White River entrance during peak visitor use times.

The shuttle would initially be available on a first-come, first-served basis. If parking demand at Cougar Rock exceeds supply, the park would expand the parking reservation system to include the shuttle parking lot or may require a reservation for the shuttle.

Under alternative 3, parking would be within designated lots only. Overflow parking would not be allowed on Upper Valley Road or Lower Valley Road except at the Fourth Crossing and Lower Lakes Trailheads. Access to the Paradise lots would be managed via a reservation/permit system. This action would accommodate 730 vehicles at one time. Paradise would also be accessed via a shuttle from Cougar Rock, resulting in a total of 2,500 people at one time.

Entrance Stations

To speed up fee processing and reduce gate queues at the Nisqually and Stevens Canyon entrance, the fee booths would be reconfigured to include two entrance booths in each lane (one in front of

the other) while maintaining the current number of driving lanes. Additional booths may be temporary structures during the early phase of implementation. Temporary and subsequent permanent structures would be designed to be compatible with the Mount Rainier National Historic Landmark District.

Shuttles/Transit

Under alternative 3, a new shuttle from Cougar Rock to Paradise would be provided to reduce vehicular congestion at Paradise. The shuttle would operate from approximately 7:00 a.m. to 9:00 p.m., seven days per week from July 1st to Labor Day Monday of each year and may be operated by the National Park Service, a commercial service provider, or a partner organization. The shuttle would primarily service day users to Paradise and some overnight users. The point of origin would be a redesigned parking lot located at Cougar Rock picnic area, across the road from the campground. Two shuttles would be in operation that depart approximately every 30 minutes, with an estimated 66-minute round trip from Cougar Rock to Paradise. Stops would include the Cougar Rock Campground, Narada Falls, and Paradise, with stops at Barn Flat, the Paradise lower lot, and the Paradise upper lot. If visitor use trends at Narada Falls change due to the shuttle stop and if visitor use begins to exceed the identified capacity, park staff may consider relocating the shuttle stop to an alternative location (i.e., Inspiration Point, Backbone Ridge) to accommodate visitors entering from the Stevens Canyon entrance and seeking access to Paradise.

The purpose of this shuttle would be to provide transportation from a remote parking lot within the park to allow visitors access to Paradise, even if Paradise lots are full. Parking along the Upper and Lower Valley Road would be eliminated, and visitors would only be allowed to park in designated lots. To continue to provide visitation to Paradise, visitors could park at Narada Falls or Cougar Rock and ride the shuttle to Paradise for the day. In addition, overnight users at the Paradise Inn, National Park Inn, or Cougar Rock Campground would have the opportunity to ride the shuttle. This alternative allows for interpretive opportunities on the shuttle while visitors travel from the remote parking lot to Paradise.

If monitoring suggests that visitor demand for the shuttle service exceeds the vehicles at one time threshold in the associated lots (e.g., Cougar Rock picnic area) and the number of visitors that the shuttle can accommodate, then a shuttle reservation would be implemented to ensure that desired conditions for resources and visitor experiences at Paradise and other areas within the Nisqually to Paradise Corridor are being achieved and maintained. The proposed shuttle system in alternative 3 was designed to stay within the identified visitor capacity and meet desired conditions (see appendix A).

Winter Strategies

Refer to the “Common to All Action Alternatives” section for more information.

Strategic Communications

Refer to the “Common to All Action Alternatives” section for more information.

Paradise

Visitor parking would be in designated lots (upper, lower, and picnic area lots) only. Current roadside parking along the narrow shoulder of Upper Valley Road and Lower Valley Road would

be discontinued; however, parking would be permitted at the Fourth Crossing parking lot and Lower Lakes Trailhead. A parking reservation/permit would be required to access the Paradise lots, allocated by use type. Rangers would be stationed at a temporary permit check booth at Canyon Y (the intersection of Paradise Road and Stevens Canyon Road) or Barn Flat to check permits. Paradise would also be accessed via a shuttle from Cougar Rock. The lower lot would have designated parking for climbers. The picnic area lot would be for day-use vehicles only. A shuttle stop would be developed for the Cougar Rock to Paradise shuttle along Paradise Road before the entrance to the upper lot.

As proposed in the general management plan, the park may conduct a short-term pilot to reverse the direction of one-way traffic on Valley Road when Valley Road is open during the summer season. During this pilot, visitors would access Valley Road from Stevens Canyon Road and travel uphill to Paradise. Access to Paradise via Valley Road was the original route of visitor travel at the park before the construction of a new approach from Narada Falls and Valley Road turning into a one-way route during the Mission 66 program (NPS 2010b). Access via Valley Road would allow visitors to access the parking lot at the upper lot by the Jackson Visitor Center first and then continue to the lower lot and the Paradise picnic lot. Results and findings from the pilot would be used to determine the long-term sustainability of this action, particularly in conjunction with the Cougar Rock to Paradise shuttle system.

Other Strategies and Actions by Location

See the "Common to All Alternatives" section for additional area-specific proposed actions.

Cougar Rock Picnic Area/Carter Falls Trailhead

Under alternative 3, the Cougar Rock picnic area would be developed to include approximately 100 parking spaces and serve as a parking area for the Paradise shuttle. Park staff would actively manage the picnic area/shuttle parking lot. Other improvements would include clear signage for vehicles and pedestrians and a covered waiting area with trip planning signage.

Two pull-off shuttle stops would be located on either side of Paradise Road, just north of the entries into the Cougar Rock picnic area and Cougar Rock Campground. Pedestrians would access the stops from new and improved pedestrian connections from both the picnic area and campground, including new median and crosswalk striping. Signage with park maps and benches would be placed at each stop for waiting visitors to enjoy. A third in-lane shuttle stop would be located at the start of the loop on the northern end of Cougar Rock picnic area. This shuttle stop would include signage, benches, as well as a permanent shelter. Accessible parking stalls would be relocated closer to the shuttle stop and the accessible comfort station with accessible routes. To accommodate larger shuttle buses, the pavement surface area into and out of the picnic area would increase for a larger vehicle turning radius. A similar improvement would also be made at the start of the northern loop. The northernmost parking lot pavement surface area would be expanded to accommodate approximately 30 additional parking stalls. This pavement surface expansion requires the relocation of individual picnic sites and the development of one accessible picnic area. When relocated, the accessible picnic area would include improvements to meet ABA standards.

Pedestrian connections throughout the picnic area would be realigned to create a more direct route along the east edge of each parking area to the shuttle stop. All accessible routes from accessible stalls, comfort stations, picnic areas, and shuttle stops would meet ABA standards.

Additional pavement markings would include striped crosswalks to facilitate safe, accessible routes from parking areas on the west side of the picnic area.

Longmire

Picnic tables or a sheltered picnic area would be evaluated in the Longmire area.

Narada Falls

A shuttle stop would be developed at this location for the Cougar Rock to Paradise shuttle.

ALTERNATIVE 4: SITE-LEVEL ACCESS MANAGEMENT

Concept Statement

Under alternative 4, a reservation system would be established at the site level. At the time of implementation, a reservation would be required to access Paradise parking lots, and other areas of the park could be added to the system per the monitoring of indicators. Paradise would continue to be accessed primarily by private vehicle. A reservation system for private vehicles would be implemented at the White River entrance during peak visitor use times.

Under alternative 4, parking would be within designated lots only. Overnight use parking would be permitted along Upper Valley Road, but roadside parking would not be allowed along Lower Valley Road except at the Fourth Crossing and Lower Lakes Trailheads. Access to the Paradise lots would be managed via a reservation system. This action would accommodate 730 vehicles at one time and 2,200 people at one time.

Zoning Changes

Zoning would be updated between Kautz and Longmire from the Pristine Wilderness Zone to the Transition Trail Wilderness Zone. This zoning change would follow the trail alignment to accommodate a new wilderness trail connecting these areas.

Entrance Stations

To speed up fee processing and reduce gate queues at the Nisqually entrance, the fee booths would be reconfigured to include two entrance booths in each lane (one in front of the other) while maintaining the current number of driving lanes.

Shuttles/Transit

Under alternative 4, no new park-operated shuttles or transit would be provided along the Nisqually Road to Paradise.

Winter Strategies

Refer to the “Common to All Action Alternatives” section for more information.

Strategic Communications

See the “Common to All Action Alternatives” section for more information.

Paradise

Parking would be allowed in designated lots (upper, lower, and picnic area lots). Current roadside parking along the narrow shoulder of Lower Valley Road from Fourth Crossing bridge to Lower Lakes Trailhead would be discontinued except at trailheads. A reservation would be required for access to the Paradise lots, allocated by use type. The picnic area lot would be for day-use vehicles only. Overnight parking for climbers would be designated in the lower lot and the Upper Valley roadside.

Other Strategies and Actions by Location

See the "Common to All Alternatives" section for area-specific proposed actions.

Kautz Creek

A trail loop connection would be developed between Kautz Creek and Longmire, which would follow the road alignment.

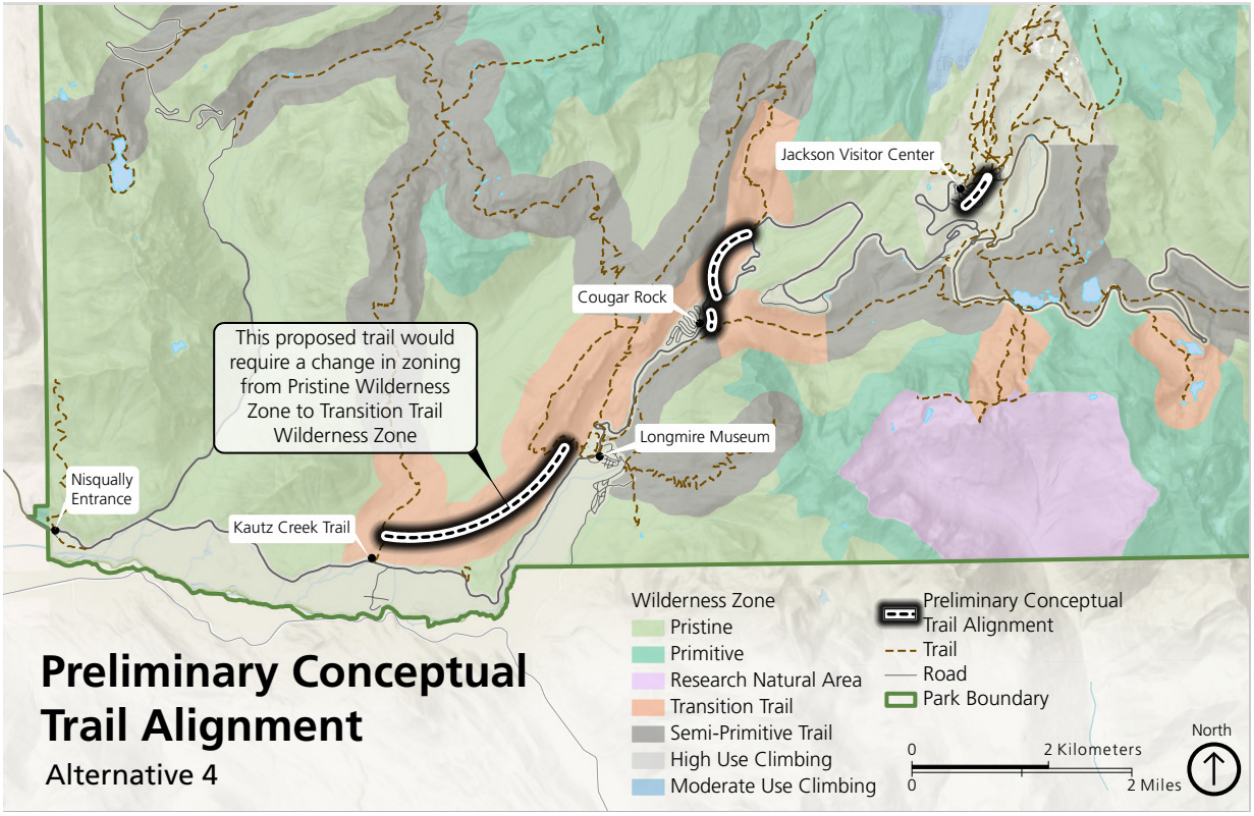

FIGURE 10. PRELIMINARY TRAIL CONCEPTS FOR ALTERNATIVE 4

ALTERNATIVES AND ACTIONS CONSIDERED BUT DISMISSED

The planning team considered other alternatives and potential actions, including those identified through civic engagement that were determined infeasible and/or not responsive to the purpose and need for action. These actions and the rationale for not carrying them forward for further analysis are summarized in appendix D.

SUMMARY OF ALTERNATIVES

Table 4 outlines the estimated number of parking spaces within the primary lots along the Nisqually to Paradise Corridor and the anticipated number of spaces across the alternatives. The numbers are specific to the lots only and excludes the many additional opportunities that visitors have for parking within formal roadside pullouts.

Table 4. Parking Inventory for Primary Lots and Proposed Changes by Alternative

Parking Lot Name	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Kautz	35	35	35	35
Longmire*	150	150	150	150
Cougar Rock Picnic Area	62	62	110	62
Comet Falls Trailhead	17	17	17	17
Christine Falls	13	13	13	13
Ricksecker Pt.	32	32	32	32
Narada Falls	67	67	67	67
Paradise Picnic Area	220 **(420)****	260	220	220
Paradise Lower Lot	230 **(300)****	230	230	230
Paradise Upper Lot	280 **(325)****	280	280	280
Upper Valley Road Roadside	N/A **(160)****	70	0	70
Reflection Lake and Pinnacle Peak Trailhead	38	38	38	38

*The total spaces for the Longmire parking lot are estimated at 179, but only 150 of those are available for public use, while the remainder is for administrative use.

**The bolded numbers in parentheses represent the average number of cars parked during a sample of data collection efforts during busy weekend days in July and August of 2021 and 2022.

Table 5. Summary Action Alternatives

Alternative	Alternative 1: No Action	Common to All Action Alternatives	Alternative 2: Corridor-Level Management (NPS Preferred Alternative)	Alternative 3: Site-Level Management with Cougar Rock to Paradise Shuttle	Alternative 4: Site-Level Management
Concept Statement	Visitors would continue to access destinations in the corridor primarily by private vehicle. Routine and cyclic maintenance would occur to meet safety requirements. The management direction established in the 2002 general management plan would continue.	Paradise and other destinations would be accessed primarily by private vehicle.	The corridor would be actively managed by a reservation system for private vehicles at the Nisqually, Stevens Canyon, and White River entrances.	In addition to private vehicle use, Paradise would also be accessed via shuttle from a remote parking lot at the Cougar Rock picnic area with a new Cougar Rock to Paradise shuttle. Most popular lots (including, but not limited to, Paradise) would be managed through a parking reservation/permit system or allocated by use type via permit. A reservation system for private vehicles would be implemented at the White River entrance.	The most popular lots (including Paradise) would be managed through timed entry or allocated by use type, such as wilderness permit holders, overnight guests, and short-term day use via permit. A reservation system for private vehicles would be implemented at the White River entrance.
Paradise Parking	All parking would continue to be available to visitors on a first-come, first-served basis. The level of use would continue to be controlled by the current parking infrastructure, and visitors would be encouraged to visit other areas of the park when the parking lots are full. No new designated parking would be provided. The general management plan identified the following actions, which have not been implemented: The parking area would be redesigned to make more effective use of available space, improve circulation, and provide shuttle drop-off areas. The number of designated parking spaces in the existing parking area footprint at Paradise would remain at about 750 spaces. However, the total number of parking spaces would decline with the elimination of overflow parking. This change would be partially offset by requiring employees, wilderness climbers, and wilderness campers to use shuttles. Parking lots and the picnic area would be gated to ensure that visitors could always drive through the Paradise area, but they could only stop when parking spaces were available.	The upper lot would be for day-use vehicles only, with parking spots in front of and along the west side of the hill south of Paradise Inn reserved for inn guests. The lower lot would be for overnight and day-use vehicles. Per SETP recommendations, the number of accessible parking spots would be increased to meet ABA standards at seven spaces, two of which would be van accessible. Parking for commercial operators would be authorized on Lower Valley Road only. Drop-off locations would be formalized and clearly identified in the upper lot. The National Park Service would evaluate repainting Canyon Y for clear separation of the travel lane.	All parking would continue to be available to visitors on a first-come, first-served basis once inside the corridor. Overflow parking would be permitted on Upper Valley Road only.	Establish a parking reservation system. Parking would occur in lots only at Paradise, and there would be no overflow parking on Upper or Lower Valley Roads.	Establish a reservation system to access Paradise. Reservation holders would be able to park in Paradise lots on a first-come, first-served basis. Parking would occur in the Paradise lots only with overnight use parking available along Upper Valley roadside, with no overflow parking on Lower Valley Road.

Alternative	Alternative 1: No Action	Common to All Action Alternatives	Alternative 2: Corridor-Level Management (NPS Preferred Alternative)	Alternative 3: Site-Level Management with Cougar Rock to Paradise Shuttle	Alternative 4: Site-Level Management
Entrance Stations	Entrance into the park at Nisqually would continue to be managed with the existing single-file queue of vehicles passing through the historic Nisqually entrance booths to pay the entrance fee.	The reservation system would be implemented at White River.	The reservation system would be implemented at Nisqually and Stevens Canyon.	The entrance booths at Nisqually and Stevens Canyon entrance stations would be stacked vertically to double up booths while maintaining the current number of lanes. A new entrance booth or other installation to support permit compliance would be installed on the Paradise Loop Road.	Same as alternative 3.
Reservation System *These systems would be adaptively managed based on observed conditions and the effectiveness of strategies to meet desired conditions.*	The GMP preferred alternative identified the following action that has not been implemented: The time or place of entry and the length of stops would be controlled to ensure bus parking spaces were used more efficiently.	The National Park Service would improve trip planning information to manage visitor expectations about entrance station wait times using various methods (i.e., website, social media, media press campaigns) and would coordinate with partners to disseminate information. Wait times and information signs would be posted in gateway communities along the roadway. A reservation for Sunrise would be required to enter the White River entrance station. Across all action alternatives, a reservation system would be implemented to a varying degree.	Parking-related traffic congestion on Nisqually to Paradise Road would be managed by establishing a reservation system for the Nisqually and Stevens Canyon entrances. During the initial implementation of the plan, all other areas of the park except Sunrise would continue to be managed on a first-come, first-served basis.	Establish a reservation system for vehicles at Paradise. During the initial implementation of the plan, all other parking lots except Sunrise would continue to be managed on a first-come, first-served basis.	Establish a reservation system for vehicles at Paradise. During initial implementation of the plan, all other parking lots except Sunrise would continue to be managed on a first-come, first-served basis.
Shuttles/Transit	Existing shuttles to Longmire for concession employees would continue operating. The general management plan proposed that the park evaluate the need for a shuttle system through a transportation planning effort. The general management plan identified the following action that has not been implemented: Provide shuttle service to Longmire for NPS employees.	N/A	No park-operated shuttles would be provided in this alternative.	**Cougar Rock to Paradise Shuttle** This shuttle would operate daily, seven days/week from July 1st of each year to Labor Day. The shuttle would run from approximately 7:00 a.m. to 9:00 p.m. with a 30–45-minute frequency (66 minutes round trip). Shuttle stops would include Cougar Rock picnic area, Cougar Rock Campground, Narada Falls, and Paradise (picnic area, lower lot, and upper lot). The user group would be composed primarily of day users and some overnight users (from the Cougar Rock Campground or the National Park Inn).	No park-operated shuttles would be provided in this alternative.

Alternative	Alternative 1: No Action	Common to All Action Alternatives	Alternative 2: Corridor-Level Management (NPS Preferred Alternative)	Alternative 3: Site-Level Management with Cougar Rock to Paradise Shuttle	Alternative 4: Site-Level Management
Cougar Rock Picnic Area	The level of use would continue to be controlled by the current parking infrastructure. No changes to parking or road infrastructure, camping areas, picnic areas, trails, or wayfinding would occur. Current camping and picnicking opportunities would be maintained as a mixture of reservations and a first-come, first-served basis.	Same as the no-action alternative.	Same as the no-action alternative.	The Cougar Rock picnic area would be converted to parking for Paradise shuttle, and picnic area parking would be designated for day users and/or overnight users (climbers/backpackers). Lot expansion/efficiencies, such as a covered waiting area with trip planning signage and restrooms, would be evaluated.	Same as the no-action alternative.

Chapter 3
Affected Environment and Impact Analysis

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CHAPTER 3: AFFECTED ENVIRONMENT AND IMPACT ANALYSIS

INTRODUCTION

This chapter describes the resources that could be affected by implementing the action alternatives. The topics relate to the key issues, which will inform the NPS decision on how to manage the Nisqually to Paradise Corridor. These resource descriptions provide baseline conditions for which the potential effects of the proposed actions can be compared. Effects or impacts mean changes to the environment that are reasonably foreseeable and include the following:

- direct impacts, which are caused by the action and occur at the same time and place,
- indirect effects, which are caused by the action and occur later or are farther removed in distance but are still reasonably foreseeable, or
- cumulative effects, which are caused by the action's incremental effects when added to the effects of other past, present, and reasonably foreseeable actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions.

The following resources are included in this analysis: visitor use and experience, socioeconomics, wilderness, vegetation and soils, northern spotted owl and marbled murrelet, cultural landscapes, and historic structures. Direct and indirect effects are discussed for each alternative and impact topic. Cumulative effects are discussed at the end of each impact topic. Throughout this plan, data from 2019 and 2021 serve as the baseline. Visitation in 2020 was unique due to the COVID-19 pandemic, and therefore, data from 2020 were not used. When appropriate, updated information is provided.

VISITOR USE AND EXPERIENCE

Affected Environment (Current and Expected Future Conditions of Resource)

Visitation to Mount Rainier has been increasing yearly, with more than 1.5 million visitors to the park in 2019 and over 1.6 million in 2021 (NPS 2022c). Increased visitation at the park has led to roadway and parking lot congestion, facility demand that exceeds supply, and impacts on resources and visitor experiences. Roadway congestion occurs on State Route 706, which leads to the park's boundary at the Nisqually entrance, and on Paradise Road, within the park boundary. Because the Nisqually entrance is the most popular for visitors, gate queues can exceed 2 miles (or 1.5 hours) and frequently block residential and business driveways, making roadway travel difficult on high-traffic weekends.

Corridor Roadway and Parking Congestion

Mount Rainier National Park experiences extremely concentrated use, with 70% of the more than 1.6 million annual visitors coming to the park on sunny weekend days between July and September.

Inside the park, roadway congestion occurs at Paradise extending down Paradise Road, around Longmire, and at other popular viewpoints and trailheads. High demand for parking at trailheads leads to visitors parking along the roadway and vehicle and pedestrian safety concerns. Limited

wayfinding information related to recreational opportunities within the corridor further exacerbates roadway congestion. Though overall vehicle volumes are lower during the winter season, roadside and trailhead parking capacity is greatly reduced, and icy/snowy roads are harder to navigate, causing slowdowns along some segments of roadway that lead to congestion. Roadways may also become blocked by stopped or stalled cars, creating safety hazards for visitors.

Key Locations in the Corridor

High levels of visitor use at Paradise Meadows, Comet Falls, Carter Falls, and other popular trails and viewpoints results in crowded conditions and high encounter rates in these locations, which diminishes the quality of the visitor experience. The demand for recreational activities in the frontcountry and backcountry areas of the park is increasing, and this trend is expected to continue considering the ongoing growth of the Seattle/Tacoma metro area. Descriptions of visitor use at key locations in the corridor are included below.

Westside Road

Due to several decades of severe flooding damage on Westside Road, private vehicle access has been restricted since 1989 and is now limited to a 3-mile section of Westside Road from Paradise Road to Dry Creek, which is open to motor vehicles and bicycles from June to September. A gate and small parking area are located at the end of this 3-mile section, with hiking and bicycling opportunities beyond this point. Recreational use is relatively low and is concentrated between the gate and Round Pass. A number of trails can be accessed from the Westside Road, including the Wonderland Trail.

Kautz Creek

Kautz Creek is the first visitor use area along Nisqually to Paradise Road after visitors enter the park at the Nisqually entrance. The Kautz Creek area is primarily used as a rest area, with restroom/picnic facilities (frequented by road-based tours), a viewing area via the accessible trail, and wilderness access from the Kautz Creek Trail. Park staff has observed some visitation increases since 2011, with the lot nearing capacity on sunny weekends. Because the lot is usually a quick restroom/break stop, the lot has a high turnover and typically does not fill or overfill for extended periods.

Longmire

Longmire is open year-round, with a museum, a wilderness information center, and a historic concessioner-operated inn and restaurant. Across the road from the National Park Inn is a 0.7-mile hardened loop trail. Longmire also provides visitor access to several wilderness trails, including the Wonderland Trail. Due to the various visitor services offered at Longmire, it is a popular destination within the park year-round.

Cougar Rock and Carter Falls Trailhead

The Cougar Rock area is composed of a parking lot and picnic area on the east side of the road and a campground on the west side of the road. Primary visitor use opportunities at Cougar Rock are picnicking and camping. The picnic area across the road from the campground is also used as trailhead parking for hiking on the Wonderland Trail.

Carter Falls is a viewpoint and trailhead off the Nisqually to Paradise Corridor. The area provides access to the Wonderland Trail to Carter Falls. The parking area is located near a sharp curve in the roadway, which creates a risk to visitor safety, especially for those who cross the road. Due to poor wayfinding, visitors tend to park on roadside shoulders.

Christine Falls and Comet Falls Trailhead

The Comet Falls Trailhead and parking lot provide access to a popular hiking route through designated wilderness to Comet Falls (about 1.8 miles) and Van Trump Park (about 3 miles). Christine Falls, located near Comet Falls Trailhead, is a small but popular attraction for auto-touring visitors in the road corridor. Two small roadside pullouts are near Christine Falls, from which visitors walk a short distance along the road to view and take photographs of the falls. The top of Christine Falls can also be viewed from the Comet Falls Trail. When the lot is full, visitors park their cars in the pullouts near Christine Falls and walk along the road to the Comet Falls Trailhead (NPS 2014b). The Christine Falls viewing area is located along the road, and because of the historic design of the site, visitors must walk along a narrow road shoulder from the pullouts to the viewing area, creating visitor safety concerns. Parking in undesignated areas creates traffic and pedestrian safety issues, causes traffic congestion, impacts the quality of the visitor auto-touring experience on Paradise Road, damages roadside park resources, and results in concentrated levels of visitor use along trails in the park's designated wilderness.

Ricksecker Point

Ricksecker Point is accessed by a one-way scenic drive that loops off Paradise Road and is primarily used for scenic viewing at an overlook area that offers dramatic views of Mount Rainier and the Nisqually Glacier. Although there are multiple overlooks at this location, the first overlook is located at the intersection with Paradise Road. Consequently, some visitors stand on the road to view and take pictures of the mountain, exacerbating congestion. Visitors often park on the road and in other undesignated areas close to the overlook rather than in designated parking spaces, which creates traffic bottlenecks, increases the risk of vehicle collisions, and results in many visitors walking or standing on the road with moving traffic.

Narada Falls

Narada Falls is a popular overlook area for visitors enjoying scenic drives through the Nisqually to Paradise Corridor of Mount Rainier National Park. The area includes scenic viewing of Narada Falls, trailhead access to hiking connections to the Wonderland Trail and Paradise, picnicking, restrooms, skiing and snowshoeing in the winter, road-based commercial tour stops, and overnight parking for backpackers on the Wonderland Trail. The parking lot is relatively small and, due to the variety of opportunities offered here, often experiences severe congestion that can cause backups on Paradise Road.

Paradise

The Paradise area sits at the end of the Nisqually to Paradise Corridor and is an attraction because of its wildflowers and views of Mount Rainier, which offer superlative photography opportunities. The area includes the picnic area, the Jackson Visitor Center, the Paradise Inn, the lower lot, the upper lot, Paradise Valley Road, and Paradise Meadows. Activities and services at the Paradise area include hiking, lodging, picnicking, visitor orientation, and interpretation. Visitors can hike one of the many trails for excellent views of Mount Rainier, subalpine meadows, and wildlife. In the winter, visitors participate in winter activities such as snowshoeing, cross-

country skiing, and tubing. Commercial services at Paradise include guided hikes; road-based tours stopping at this location; mountaineering training; commercial operations in the Jackson Visitor Center, the Paradise Inn, restaurant, and gift shop; and climbing concessioners.

During the summer months, more cars park on Paradise Valley Road than in any designated parking lot (NPS 2014b). Road shoulders are regularly filled with 50 to 100 parked cars adjacent to popular trailhead destinations, despite being designed for significantly lower use. The adjacent facilities are likewise overused past their intended capacity limits. Overflow parking and facility overuse on Paradise Road causes visual disruptions to the scenic quality of the valley, impacts natural and cultural resources (particularly the character of the park's oldest road), and creates safety hazards for visitors and park staff.

The lots at Paradise present additional challenges to overall corridor congestion. The Paradise upper lot is the most sought-after parking lot due to its proximity to the Henry Jackson Memorial Visitor Center. The upper lot typically fills up first, often with large vehicles/buses and overnight visitors. Overnight visitors are encouraged to park at Paradise lower lot, but no enforcement occurs, so these visitors occupy spaces in the upper lot, which is intended for day users. To mitigate unsafe roadside parking, staff directs cars to park in the picnic area when the upper and lower lots are full. The typical visitor drives past the picnic area, past the lower lot, and takes a chance at getting a parking space in the upper lot. When the upper lot is full, visitors tend to park along the roadside next to the upper lot and along Valley Road instead of looping all the way back around to park in the picnic lot or lower lot. When the parking lots are full, visitors must circulate for a spot or park along the roadside and walk back up against vehicle traffic, causing pedestrian and vehicle safety concerns and degrading the visitor experience.

Staffing levels have not increased with the increase in vehicle and visitor volume, which puts additional pressure on staff to actively manage growing use levels and associated issues. In addition, the reconstruction of the Jackson Visitor Center resulted in more than a 50% reduction of restroom stalls, which further amplified the issues of long restroom lines and difficulty for staff to clean facilities.

Reflection Lakes

Reflection Lakes, about a mile down Stevens Canyon Road from the Paradise Road intersection, offers iconic views of Mount Rainier. Primary uses at Reflection Lakes include scenic viewing, trailhead access (to Paradise and Pinnacle Peak Wilderness Trail), and access to alpine climbing training and technical climbing.

Sunrise

Sunrise and the White River Campground are accessed via the White River entrance station along Highway 410 (Mather Memorial Parkway). Like Paradise, the Sunrise area offers sweeping and awe-inspiring views of Mount Rainier and a series of trails that meander through subalpine meadows and through wilderness. Sunrise is typically closed from mid-October until Fourth of July weekend; however, during the summer months, the area experiences concentrated use. Parking lot congestion, overflow parking on shoulders, and resource and safety impacts occur during the summer months. When the parking area reaches capacity, park staff closes the gate at White River entrance station and initiates a one-in, one-out metering system, which results in long lines of vehicle that can extend to the intersection with Highway 410, resulting in safety concerns and adversely affecting visitor experience.

Impacts on Visitor Use and Experience

Alternative 1: No-Action Alternative

Under the no-action alternative, visitor use and experience would remain as described in the affected environment section above. The current adverse impacts on visitor use and experience due to crowding at key destinations; congestion along roadways, parking lots, and trails; and long queue lines at the entrance stations would continue to occur and degrade the experience.

Common to All Action Alternatives

Common to all action alternatives, a number of accessibility improvements would be made throughout the Nisqually to Paradise Corridor, including at Longmire, Cougar Rock, and Paradise. These improvements would beneficially impact visitor use and experience as a result of increased access and opportunities for visitors of all abilities.

Winter day-use access would be expanded at Cougar Rock by installing a barricade on the road above Cougar Rock and opening the road beyond Longmire on the days that winter snow conditions preclude fully opening the road to Paradise. This action would result in beneficial impacts on visitor use and experience due to expanded recreation opportunities during the winter season. The adaptive strategy for a reservation system during the winter would have a short-term negative impact on visitor use and experience as the system is implemented; however, the strategy would have a long-term beneficial impact on visitor experience by ensuring crowding and congestion is minimized during the winter.

Relocating picnicking opportunities from Narada Falls to Ricksecker Point and adding additional picnicking opportunities at Longmire would beneficially impact visitor use and experience as a result of expanded picnicking opportunities but could also have adverse impacts for visitors accustomed to or looking for picnicking locations at Narada Falls.

The installation of vault toilets and a designated photography area at Reflection Lakes would have beneficial impacts on visitor use and experience due to the availability and convenience of restroom facilities, less human waste in the environment, and a designated photography area with good views.

The closure and restoration of select roadside pullouts along the corridor would benefit visitor use and experience due to improved circulation and reduced congestion; adverse impacts could also occur due to reduced opportunities for pulling off and parking, particularly for repeat visitors accustomed to parking in certain locations. Designating parking stalls within the corridor as overnight use only for various recreational users would require clear communication and prescriptive management of parking, leading to beneficial impacts on visitor use and experience by reducing confusion regarding where to park and minimizing vehicular circulation for parking.

Connector trails would be developed between Cougar Rock and the Comet Falls Trailhead, from Cougar Rock to the Carter Falls Trailhead, and from the Paradise picnic area to the lower lot. These additional trails would result in beneficial impacts on the visitor experience because they would provide a safe pedestrian connection for visitors and increased recreational opportunities within the corridor.

The restoration and maintenance of scenic vista locations through selective thinning of roadside vegetation would result in short-term adverse impacts during the initial removal of vegetation for

those visitors who do not expect to see this kind of activity within the park. These actions would be expected to have long-term benefits for visitor experience for those traveling the Nisqually to Paradise Corridor or stopping at these locations to experience improved views of Mount Rainier and other scenic highlights, particularly in locations where scenic vistas were part of the historic design and intent of the road.

The implementation of a reservation system at the White River entrance station to access the Sunrise area would have a short-term adverse impact on visitor experience as visitors learn the new system and may be turned away from the gate. In addition, the reservation system would impact visitors seeking to obtain a wilderness permit via the White River Wilderness Information Center. However, this action would have long-term beneficial impacts on visitor use and experience because users with a reservation would experience less uncertainty, crowding, congestion, and more consistent visitor numbers throughout the day as compared to the concentrated use and uncertain access currently experienced. This situation would result in the potential for less visitor conflict and fewer encounters with other people on trails and throughout the Sunrise area. However, this action may have indirect effects as visitors who are unable to obtain a reservation are displaced to other areas of the park. Some displacement at White River is also occurring during times when the lots fill and vehicle access is metered at the entrance station, which can result in displacement to other areas within the park. The impacts of the varying reservation systems within the Nisqually to Paradise Corridor are analyzed below under each alternative.

Alternative 2: Corridor-Level Access Management (NPS Preferred Alternative)

In addition to the actions analyzed in the "Common to All Action Alternatives" section, alternative 2 would actively manage vehicle access to the entire Nisqually to Paradise Corridor to provide high-quality visitor experiences while alleviating congestion and crowding. Key benefits under this alternative include reducing vehicular congestion during peak hours throughout the Nisqually to Paradise Corridor and reducing wait times to enter the park via the Nisqually entrance. A primary goal of a reservation system is to redistribute visitation from peak hours to less-visited times of the day, reducing the potential for visitor frustration due to a lack of parking opportunities and resulting in more manageable gate queues. Under a reservation system, there would be no restrictions on length of stay, which could result in visitors continuing to have difficulty finding parking in key destinations, such as Paradise. In addition, only those visitors with a reservation would be able to spontaneously obtain a wilderness permit at Paradise and/or Longmire, adversely impacting the visitor experience for individuals accustomed to the existing availability of walk-up permits. However, the ability to secure a reservation in advance, coupled with reduced levels of congestion, is likely to result in improved visitor experience when compared to current conditions.

In addition to the reservation system to enter the corridor, changes to allowed parking in Paradise would likely improve vehicular circulation and reduce the potential for visitor and vehicle conflicts, therefore beneficially impacting visitor experience.

A key assumption with this analysis is that some visitors would avoid the reservation system by arriving before or after the operating hours of the system (approximately 7:00 a.m. to 5:00 p.m.). The reservation system may also cause visitor displacement to other areas of the park. This shift in the visitor use timing and locations may put additional strain on park operations and have an indirect negative effect on visitor use and experience if use increases during other times or in

other areas of the park. A corridor-wide reservation system may also result in fewer people coming to the park and choosing to recreate in other areas of Washington State, where reservations are not required.

Short-term adverse impacts on the visitor experience may include confusion with the new system and a percentage of visitors arriving to the Nisqually or Stevens Canyon entrance gates without a reservation and not being able to access the corridor. This situation may adversely impact both return visitors unaware of the system or first-time visitors who assume they can access the corridor spontaneously and could result in long wait times at the entrance stations. Although these impacts may occur during initial implementation of the system, the long-term beneficial impacts of reduced crowding and congestion would be expected to outweigh the adverse impacts of adjusting to a new system. The park would engage in widespread outreach prior to implementing a reservation system under this alternative and would continue to provide frequent and widespread communication about the reservation system and any updates implemented through the monitoring and adaptive management process.

A reservation system would adversely impact visitor experience due to the inability of visitors to spontaneously visit areas of the park during peak season. The climate of the Pacific Northwest often causes cloudy and overcast days when Mount Rainier is not visible. The park sees an uptick in visitation during sunny and blue-sky days when the "mountain is out" and visible to Washington State residents. A reservation system prevents spontaneous visitation and, therefore, would adversely impact this type of desired visitor experience. Furthermore, this action may have indirect effects as visitors who are unable to obtain a reservation are displaced to other areas of the park or surrounding public lands. In contrast, those who use the reservation system would be expected to have a higher-quality visit in the context of predictability of access and reduced crowding and competition for parking within the corridor.

Alternative 3: Site-Level Access Management with Cougar Rock to Paradise Shuttle

In addition to the actions analyzed in the "Common to All Alternatives" section, alternative 3 would actively manage vehicle access to Paradise as well as other key destinations, as needed. The reservation requirement for the Paradise lots is likely to provide high-quality visitor experiences while alleviating congestion and crowding. The shuttle operation would have a beneficial impact on visitors because it would provide an alternative form of transportation to Paradise for visitors who are unable to obtain a reservation and would also provide a new experience within the park to ride the shuttle and sightsee.

Parking reservations at Paradise would result in the reduced potential for visitor frustration due to parking lot congestion; however, adverse impacts include the need for advanced trip planning, reduced opportunities for spontaneous trips, and potential displacement of visitors to other areas of the park that are already busy and congested. Parking modifications at the Paradise picnic area and Christine Falls (restriping for parking efficiencies and pedestrian connector trails) would help improve circulation and reduce congestion and visitor-vehicle conflicts. A required reservation system may initially cause confusion and frustration for repeat visitors, but mitigation measures would be taken to ensure frequent communication. In addition, visitors without a reservation to park at Paradise or access via the shuttle would no longer be able to spontaneously obtain a wilderness permit at Paradise, thus degrading the visitor experience.

Modifications to the Cougar Rock picnic area for remote shuttle parking would reduce picnicking opportunities in this location, adversely impacting visitor experience for those seeking this

location for picnicking. The reconfiguration of booths at the Nisqually entrance would have beneficial impacts on visitor use and experience due to shorter queue length and wait times at the entrance stations, although those visiting the Paradise Area in a private vehicle may also experience limited wait times when entering the Paradise area for reservation permit compliance checks.

Alternative 4: Site-Level Access Management

In addition to the actions analyzed in the "Common to All Alternatives" section, alternative 4 would actively manage vehicle access to the Paradise area to provide high-quality visitor experiences while alleviating vehicle congestion and crowding. Key benefits under this alternative include reducing vehicular congestion during peak hours at Paradise while still allowing spontaneous travel and visitation to other locations within the corridor. In addition, gate queues at the Nisqually entrance may improve due to the strong relationship between the number of vehicles who enter the park via Nisqually and then go to Paradise (NPS 2013). However, visitors may still experience long queues at the Nisqually and Stevens Canyon entrance stations, as other areas of the corridor would not require a reservation and could be spontaneously accessed. To mitigate these adverse effects, the booths at the entrance station would be reconfigured to increase the rate of processing entrance fees.

A primary goal of a reservation system is to redistribute visitation to Paradise from peak hours (10:00 a.m. to 4:00 p.m.) to less-visited times of the day, reducing the potential for visitor frustration due to a lack of parking opportunities. Under a reservation system, Paradise would have no restrictions on length of stay, which could result in visitors continuing to have difficulty finding parking and circulating the lots, adversely impacting the visitor experience. However, the ability to secure a reservation in advance, coupled with reduced levels of congestion, is likely to result in improved visitor experience when compared with current conditions. In addition, updates to designated parking at Paradise to improve circulation and reduce potential for visitor-vehicle conflicts would beneficially impact visitors.

Short-term adverse impacts on the visitor experience may include confusion about the new system and a percentage of visitors arriving to Paradise without a reservation and being prevented from visiting Paradise. This situation may adversely impact both return visitors unaware of the system and first-time visitors who assume they can access Paradise spontaneously. Furthermore, visitors seeking a walk-up wilderness permit at Paradise would be adversely affected by the reservation system, as they would be required to obtain a Paradise reservation first; however, permits would continue to be available at other locations within the park, including Longmire.

Increased opportunities for day use at Longmire would have a long-term beneficial impact on visitor use and experience. In addition, a new loop trail from Longmire to Kautz would benefit visitor use and experience by increasing recreational opportunities in other areas of the park.

Cumulative Impacts across All Alternatives

Overall, past and ongoing road maintenance and other improvement projects, such as the development of the cellular facilities at Paradise, have had beneficial and adverse impacts on visitor experience due to updated technological services and communication patterns. The ongoing rehabilitation of Stevens Canyon Road; the proposed rehabilitation of portions of the Carbon River Road, State Route123, and Highway 410; and the proposed replacement of the Fryingpan Creek Bridge would improve the safety and travel conditions for visitors, thus

enhancing visitor access and experience, but would have short-term adverse impacts due to traffic delays and temporary closures during construction. Crowding and congestion at key destinations have adversely impacted visitor use and experience, causing visitor displacement to other areas of the corridor and the park. Therefore, these past, present, and reasonably foreseeable future actions contribute both beneficial and adverse impacts on visitor use and experience.

When combined with impacts from the common to all alternative actions to implement a reservation system to access the White River Corridor, improve visitor circulation and safety throughout the Nisqually to Paradise Corridor, and expand recreational opportunities, the cumulative impacts would result in short-term adverse effects associated with adjusting to the new systems but long-term beneficial effects of an improved and less congested visitor experience. The implementation of a reservation system for alternatives 2, 3, and 4 would exacerbate the short-term adverse impacts on visitors as they learn the new system but would have overall, long-term benefits by reducing crowding and congestion on the roadway and trails, thus providing opportunities for quality visitor experiences. Alternatives 3 and 4 would mitigate adverse impacts on visitor experience due to visitors' continued ability to spontaneously access other destinations within the corridor aside from Paradise and the White River area. There would also be beneficial impacts on visitor experience at the entrance stations (Nisqually, Stevens Canyon, White River), as the managed access system under alternative 2 would reduce gate queues, and the reconfiguration of the entrance booths under alternatives 3 and 4 would reduce gate processing rates.

SOCIOECONOMICS

Affected Environment (Current and Expected Future Conditions of Resource)

Given the location of Mount Rainier National Park and its proximity to a major metropolitan area, multiple geographic areas are considered in the evaluation of socioeconomics. King County, which encompasses Seattle; Pierce County, which includes Tacoma and is home to most of Mount Rainier National Park; and Lewis County, which includes the rest of the park and where Paradise lies, are the primary areas considered for socioeconomic analysis. Some of the potential management strategies and actions, such as a shuttle service and the reservation system, could affect transportation patterns within towns local to Mount Rainier, including, but not limited to, Ashford, Elbe, Eatonville, Packwood and Greenwater.

County Demographics

From 2010 to 2019,[2] the population increase for King, Pierce, and Lewis Counties combined was 15.1%, while the remainder of the US population increased by 6.8%.

Nearly 62% of the population is employed full time, compared to the national average of 59%. From 2015 to 2019, the bottom 40% of households accumulated approximately 10% of total income within King, Pierce, and Lewis Counties, while the top 20% of households accumulated nearly 65% of total income. These data suggest that income distribution is skewed, and

2. These years are used because the data source comes from the American Community Survey five-year estimates. Data from 2019 represent estimates from 2015 to 2019, while 2010 data represent estimates from 2006 to 2010.

development actions within the state that increase cost of living, fees, or other related burdens would cause disproportionate adverse effects on low-income communities.

Local Economics

In 2019, visitors to Mount Rainier spent approximately $56 million across sectors, including restaurants, hotels, recreation, and transit. The estimated value added to the regional economy, which considers monetary contributions from visitor spending, was estimated at $46 million (NPS 2019 Visitor Spending Effects). Given the COVID-19 pandemic, which resulted in the closure of national parks and many stay-at-home orders, data from 2020 are not used.

A visitor study conducted in 2012 evaluated visitation patterns and trends within the park and found that visitors to the national park contribute notably to the local gateway communities. Of the survey respondents, 42% of visitor groups stayed overnight in the park or in the area within 30 miles of the park. The most common places visited in the park were Paradise (70%), Longmire (40%), and Sunrise (30%) (NPS 2013a).

According to the *Economic Analysis of Outdoor Recreation in Washington State Report*, overall outdoor recreation participation increased by 30% statewide from 2015 to 2020, leading to an increase in consumer spending and contributions to the economy (Mojica and Fletcher 2020). In 2019, both Washington residents and tourists experienced nearly 600 million days of recreation. Nearly 90% of these days occurred on public lands, and approximately $18.8 billion was spent by visitors on trip-related expenses.

Pierce and King Counties are the primary destination counties for recreation on trails, with an annual number of user-day trips at 17 million and 48.5 million, respectively (Carter 2019). Importantly, this survey was specific to an analysis of nonmotorized trail use across the state and considers activities such as walking, running, biking, hiking, and backpacking. While the survey itself only included state residents, the research supplemented the information with data from out-of-state visitors to obtain a more comprehensive dataset.

In addition, the report found that trail use within Washington has increased in recent years. From 2008 to 2017, the number of Seattle-area hikers has grown at seven times the rate of population growth in Seattle. Similarly, from 2012 to 2018, annual sales of the Washington State Discover Pass, which serves as a parking permit for state recreational lands, increased by 55%. These trends are indicative of the increasing popularity of recreation within Washington.

Transportation

Results from a recent study of visitor transportation patterns suggest that between July and September 2019, approximately 38% of visitors to Mount Rainier National Park came from the Seattle–Tacoma area, while nearly 19% came from other areas within Washington. Therefore, nearly 45% of visitors to the park were from out of state. For all visitors to the park, the most popular gateway communities that visitors drove through included Ashford, Elbe, and Greenwater.

Impacts on Socioeconomics

Alternative 1: No-Action Alternative

Under the no-action alternative, the trends and conditions of socioeconomics would remain as described in the affected environment section above. The population growth, particularly in Seattle, and increased participation in outdoor recreation across the state is expected to continue and could lead to more visitation and congestion to the park. Increased use and travel could result in beneficial effects on the economies of gateway communities but could lead to more socioeconomic barriers to visiting the park.

Commercial services would continue under current operations, would continue to have more flexibility with trip planning, and would benefit from not having to compete to access the corridor or key destinations. Businesses inside and outside of the park boundaries would continue to be supported by park visitation, including commercial operators, and the associated visitor expenditures of stopping before entering the park for accommodations such as gas, food and groceries, and souvenirs.

Common to All Action Alternatives

The relocation and expansion of picnicking opportunities, paired with the additional connecting trails throughout the Nisqually to Paradise Corridor, would provide more recreational experiences for low-income communities who do not have the means to participate in other recreational opportunities that may require expensive gear, thus providing beneficial impacts on visitor socioeconomics.

The implementation of a reservation system at White River entrance station may have both beneficial and adverse impacts on local and regional socioeconomics. In some scenarios, visitors with a reservation to the park may be more likely to visit local businesses within gateway communities before or after their visit as part of their day or overnight trip. In contrast, visitors may forgo a stop in the gateway town, knowing they have a specific window of time to enter the park. The certainty of a guaranteed reservation could allow visitors to schedule other activities more easily, including visits to local businesses, tours, or other experiences. This analysis assumes that overall visitation to the Sunrise area would not decrease; however, it predicts that visitation would be more evenly distributed throughout the day, throughout the week, and throughout the peak season. A reservation system that stabilizes and disperses visitation patterns more consistently throughout the day and year could present new business opportunities in gateway communities. While it may create a consistent influx of visitors for businesses throughout the day, the system may also lead to increased park visitation at a time when businesses are closed. Therefore, this action would result in beneficial and adverse effects to gateway communities.

A reservation system requires visitors to book their visit in advance, requires technological access to a website, and costs additional money. The extra costs (typically $2–$6 per vehicle reservation), knowledge of trip planning, and access to a computer or smart phone may be a barrier for some individuals from low-income and/or underserved populations. Therefore, implementation of this system could adversely impact visitor demographics and the ability of underrepresented communities to visit the park; however, park staff will actively manage the proposed reservation system to provide robust information regarding how to use the reservation system prior to implementation to help minimize such impacts. The impacts of the varying reservation systems within the Nisqually to Paradise Corridor are analyzed below under each alternative.

Alternative 2: Corridor-Level Access Management (NPS Preferred Alternative)

In addition to the actions analyzed in the "Common to All Alternatives" section, alternative 2 would actively manage vehicle access to the entire Nisqually to Paradise Corridor. Under this alternative, capital expenditures would be relatively low and would include stacking entrance station booths at the Nisqually entrance to alleviate congestion and wait times at the entrance gate.

While reservation systems have been implemented in a few national parks in recent years (e.g., Rocky Mountain National Park, Arches National Park, Acadia National Park), the potential impacts of these systems on local and regional socioeconomics are unclear. In some scenarios, visitors with reservations to the park may be more likely to visit local gateway communities before or after their visit as part of their day or overnight trip. In contrast, visitors may forgo a stop in the gateway town, knowing that they have a specific window of time to enter the park. This analysis assumes that overall visitation would not decrease; however, it predicts that visitation would be more evenly distributed throughout the day, throughout the week, and throughout the peak season. This distribution would result in both beneficial and adverse impacts on business owners and residents in gateway communities, as visitation may occur when businesses are not open, and residents may see consistent vehicular traffic throughout the day rather than at peak times.

As stated above, reservation systems may also impact visitor demographics due to the requirements for additional fees, technological access, and trip planning that may hinder the ability for underrepresented communities to visit some areas of the park. Mitigation measures (e.g., partnerships, fee-free days) would be taken to reduce such impacts. Additionally, areas of the park outside of the Nisqually, Stevens Canyon, and White River entrances would remain open to spontaneous visits.

Alternative 3: Site-Level Access Management with Cougar Rock to Paradise Shuttle

In addition to the actions analyzed in the "Common to All Alternatives" section, alternative 3 would implement a managed vehicle access system for the Paradise area and the White River entrance only, while providing visitors seeking a spontaneous visit with an option to ride an in-park shuttle to Paradise or visit other areas of the park. Under this alternative, capital expenditures would be relatively high due to the operations of a shuttle system. This alternative would provide beneficial impacts on socioeconomics, as the shuttle system could present a new opportunity for a business as well as create additional jobs through its operation.

Similar to the impact analysis for alternative 2, it is unclear what potential impacts a reservation system at Paradise may have on socioeconomics in gateway communities, and the action could result in both beneficial and adverse effects. However, unlike alternative 2, this analysis assumes visitation to gateway communities would remain similar to current levels because, under alternative 3, visitors can access other areas of the Nisqually to Paradise Corridor without a reservation. Business owners in gateway communities are likely to experience concentrated visitation during peak times of the busy season. Under this alternative, gateway community residents may continue to be adversely affected by long queues at the Nisqually entrance, although this would be mitigated by adding another fee booth to each lane to increase the vehicle processing rate.

Impacts on visitor demographics from a reservation system would be similar, as described under alternative 2. However, impacts would be mitigated by providing the shuttle system from Cougar

Rock to Paradise. At the time of implementation, visitors would not be required to obtain a permit nor pay a fee to ride the shuttle, which would allow for spontaneous visitation not only to the Nisqually to Paradise Corridor but also to Paradise. However, if demand exceeds supply for the shuttle and parking at Cougar Rock, a reservation system would be implemented with similar effects as described above.

Alternative 4: Site-Level Access Management

In addition to the actions analyzed in the "Common to All Alternatives" section, alternative 4 would implement a managed access system for the Paradise area and the White River entrance that requires visitors to obtain a reservation. Capital expenditures would be relatively low and similar to the estimated amount for the common to all alternatives.

Impacts on the socioeconomics of gateway communities would be the same as described in alternatives 2 and 3 and would depend on whether visitors stop along the way before entering the park. Furthermore, under this alternative, gateway community residents may continue to be adversely impacted by the vehicle queues at the Nisqually entrance, although this would be mitigated by adding another fee booth to each lane to increase the vehicle processing rate.

Impacts on visitor demographics from a reservation system would be similar, as described under alternative 2. However, visitors could access other areas of the Nisqually to Paradise Corridor that are not managed by this system, thereby minimizing impacts on visitor demographics and allowing all visitors to access other destinations within the park.

Cumulative Impacts Across All Alternatives. Past park actions, such as fee increases and the implementation of short-term shuttle systems, have resulted in both short- and long-term impacts on the socioeconomic conditions of visitors, gateway communities, and local businesses. The shuttle system that was in operation to mitigate the effects of construction projects had adverse effects on socioeconomics, as it received low ridership and was deemed economically infeasible. Commercial service operations continue to provide socioeconomic benefits to commercial use authorized holders and local businesses in the gateway communities of the park due to job opportunities and trips that include gear rentals or visits to local businesses. Gateway community residents continue to be adversely affected by long queues at the Nisqually entrance. Ongoing transportation projects led by the Washington Department of Transportation and occurring between the City of Seattle and the National Park Service provide beneficial socioeconomic impacts due to increased job opportunities. The overall increase in population across the three counties analyzed would provide benefits to the economy; however, the increases may continue to create disparities between high- and low-income households. Increasing population trends would likely result in increased visitation to the park unit. As the economy in this region of Washington continues to flourish, low-income households would likely continue to face barriers to outdoor recreation as prices of travel accommodations, including flights, car rentals, and overnight lodging, continue to increase.

When combined with impacts from the strategy to implement a managed access system both at White River and within the Nisqually to Paradise Corridor, the cumulative impacts would have the potential for adverse effects on visitor socioeconomics due to the need for technological access to a website and the additional costs of making a reservation. These effects would be mitigated by the continued ability to visit other areas of the park outside of the Nisqually, Stevens Canyon, and White River entrances. Under alternatives 3 and 4, these impacts would be minimized by the retained opportunity that visitors would have to visit other destinations within the Nisqually to Paradise

Corridor without a reservation. In addition, the provision of a shuttle under alternative 3 would allow visitors to access Paradise without paying additional fees. The expanded recreational opportunities and accessibility improvements would provide beneficial impacts on visitor socioeconomics due to more activities that do not require purchasing or renting gear. Across all alternatives, local businesses and commercial operators would experience both beneficial and adverse impacts due to the reservation system, as it would shift visitation trends to be more consistent throughout the days and weeks during time of implementation. Alternative 2 would lead to beneficial impacts on gateway community residents, as the corridor-level access management would decrease gate queues and reduce vehicular congestion. Access management in alternatives 3 and 4 may still result in gate queues and thus adverse effects; however, booth reconfiguration at entrance stations should reduce cumulative adverse effects.

WILDERNESS – NATURAL, UNDEVELOPED, SOLITUDE OR PRIMITIVE AND UNCONFINED RECREATION

Affected Environment (Current and Expected Future Conditions of Resource)

In 1988, Congress designated approximately 97% (228,480 acres) of the park as wilderness under the Wilderness Act of 1964. The wilderness boundary abuts roads and developed areas within the park and is generally 200 feet from either side of the centerline of paved roads and 100 feet from the centerline of unpaved roads. Mount Rainier Wilderness also contains the Butter Creek Research Natural Area, which was established in 1942, before wilderness designation. Although the majority of the project area is not within wilderness, signs of human activity within the project area can be seen and heard from adjacent designated wilderness areas in the park.

Agencies responsible for administering designated wilderness are required by law to preserve the wilderness character of the area. Current and expected future conditions of three wilderness qualities are analyzed in this document, including natural, undeveloped, and opportunities for solitude or primitive and unconfined recreation. The wilderness qualities of untrammeled and other features of value were not carried forward for detailed analysis, as described in appendix E.

Natural

The natural quality of wilderness represents how wilderness ecological systems are substantially free from the effects of modern civilization. Although generally in good condition, ecological systems within Mount Rainier Wilderness have been and continue to be affected by actions beyond the wilderness boundary. The wilderness supports a number of threatened and endangered species (34 mammal, bird, amphibian, and fish species listed as threatened or endangered by the state and/or federal government; and 8 plant species listed by Washington State as vulnerable). Five species are known to be extirpated from the wilderness. The number of invasive species within the wilderness is unknown. The range of the barred owl, a species native to the eastern United States that competes with the northern spotted owl, has expanded into wilderness, and three nonnative fish species can be found within wilderness mountain lakes. Opossum have been documented in the park outside of wilderness, near the park boundary by Ashford. These invasive species threaten the natural processes of the wilderness, as they have the potential to out-compete native species, particularly in light of climate change; create monocultures in once diverse habitats; and substantially alter the wildland fire regime.

The impact of climate change on natural processes is also a growing concern within wilderness. Impacts include decreased snow cover, glacial retreat, decreased summer stream flow, increased frequency and magnitude of floods, increased storm temperature, rising tree line, changes in phenology, and longer growing seasons.

Undeveloped

Mount Rainier Wilderness is relatively undeveloped overall in contrast to areas where mechanization and human infrastructure dominate the landscape. This quality of wilderness represents how wilderness retains its primeval character and influence and is essentially without permanent improvements or modern human occupation.

Motorized equipment and mechanical transport, such as helicopters and chainsaws, are regularly used in Mount Rainier Wilderness for administrative operations when using this equipment is deemed necessary for administering the area for the purpose of wilderness in accordance with a minimum requirements analysis process. The use of such equipment degrades the undeveloped quality. For Mount Rainier National Park, many of the helicopter flights depart from two locations within the Nisqually to Paradise Corridor: Fourth Crossing and Kautz Creek.

Opportunities for Solitude and/or Primitive and Unconfined Recreation

Visitors to Mount Rainier National Park have opportunities experience connection to wilderness without disruption from the sights and sounds of other people and to engage in traditional outdoor experiences. These opportunities are considered abundant throughout the park where topography, the trail network, dense vegetation, and the spacing of campsites encourages visitors to embrace solitude and primitive recreation. Ample opportunities exist throughout the Nisqually to Paradise Corridor for visitors to access wilderness from the extensive trail network and experience solitude and/or primitive recreation. The current permit system for overnight use of the wilderness and backcountry encourages visitors to spread out throughout the wilderness and find solitude without support from facilities or motorized transportation.

The quality of solitude is degraded by infrastructure in the visitor viewshed, meaning the structure may be within or adjacent to designated wilderness. This quality is degraded by the use of motorized tools and mechanical transport and by the recreational and administrative infrastructure. These structures and installations include, but are not limited to, fire lookouts, trails, bridges, and patrol cabins. The park also has an extensive research and monitoring program that entails installation of scientific equipment throughout the wilderness area.

Modern human activities that occur inside or outside of the wilderness boundary, such as use of mechanized equipment, light from surrounding gateway communities and cities, noise from helicopters and planes, and the presence and noise from other visitors and vehicles can negatively impact this quality. In addition, opportunities for unconfined recreation are impacted by policies and guidance in place, such as restrictions on the use of campfires, implementing a year-round permit system for visitors to camp in backcountry and wilderness areas, group size limitations, and food storage policies.

Impacts on Wilderness

Alternative 1: No-Action Alternative

Under the no-action alternative, the trends and conditions of wilderness character would remain as described in the affected environment section above. Impacts on solitude and primitive recreation opportunities would likely increase as visitation continues to increase in the park under the no-action alternative. Current threats to vegetation and soils, special status species, and threats from nonnative species are covered in other sections of this chapter and would continue to impact the natural quality. As described in the visitor use and experience section, areas that experience concentrated use would continue to degrade opportunities for solitude.

Common to All Action Alternatives

Trail development from Kautz Creek to Longmire and Cougar Rock to Carter Falls would have short- and long-term adverse impacts on the natural and undeveloped qualities. New infrastructure would detract from ecological systems being free from the effects of modern civilization, and the development of these trails would require zoning these areas from "pristine" wilderness to semi-primitive conditions to allow for trail construction. Additional planning and compliance for the trail construction effort would be completed separately and tiered from this plan/environmental assessment. If commercial services are provided along Westside Road, opportunities for solitude would be positively impacted in this area. Use levels would continue to be below thresholds for visitor encounters. In this area, the increase in access improves opportunities for primitive and unconfined recreation.

A reservation system for the White River entrance station assumes that visitor use to this area of the park would be more distributed throughout the day rather than concentrated at peak times. Under this assumption, the system would beneficially impact opportunities for solitude along wilderness trails that are accessed via trailheads in the corridor. However, an additional system to access this area of the park would degrade the quality of unconfined recreation for visitors. Managed access may reduce visitor impacts, such as off-trail use and trampling, and therefore would provide beneficial impacts on natural quality.

Alternative 2: Corridor-Level Access Management (NPS Preferred Alternative)

Under this alternative, impacts on wilderness character qualities would occur, although the primary impacts are discussed in the visitor use and experience section and relate to how visitors experience wilderness. A reservation system for the Nisqually to Paradise Corridor assumes that visitor use in the corridor would be more distributed throughout the day, rather than concentrated at peak times of the day. Under this assumption, the system would beneficially impact opportunities for solitude along wilderness trails that are accessed via trailheads in the corridor. However, an additional system to access this area of the park would degrade the quality of unconfined recreation for visitors. Managed access may reduce visitor impacts, such as off-trail use and trampling, and would therefore provide beneficial impacts on the natural quality.

Alternative 3: Site-Level Access Management with Cougar Rock to Paradise Shuttle

In addition to the actions analyzed in the "Common to All Alternatives" section, alternative 3 would impacts wilderness character qualities, although the primary impacts are related to how visitors experience wilderness and, therefore, covered in the visitor use and experience section. The qualities that would be impacted include natural, undeveloped, and opportunities for solitude and

primitive or unconfined recreation. It is assumed that by requiring a parking reservation for visitors to access Paradise, use on adjacent wilderness trails would be less concentrated, thereby increasing opportunities for solitude. In addition, less concentrated use would reduce visitor impacts such as trampling and off-trail use, providing beneficial impacts on the natural quality. Providing a shuttle from Cougar Rock to Paradise, paired with parking reservations, would reduce the number of private vehicles accessing this area of the corridor; however, the shuttle system is anticipated to be louder than private vehicles and would degrade opportunities for solitude.

The construction required for development of the Cougar Rock shuttle area and implementation of a shuttle system would adversely impact the undeveloped quality of the adjacent wilderness areas by creating additional infrastructure. The parking reservation system would have an adverse impact on unconfined recreation. The surrounding wilderness trails may periodically experience concentrated use from shuttle drop off within the Paradise area, thus adversely impacting opportunities for solitude in these areas. However, the reservation system would be designed to mitigate adverse impacts on wilderness character to ensure visitor dispersion in nearby wilderness.

Alternative 4: Site-Level Access Management

In addition to the actions analyzed in the common to all alternatives section, alternative 4 would have impacts on wilderness character qualities, although the primary impacts are discussed in the visitor use and experience section and relate to how visitors experience wilderness. A reservation system for Paradise assumes that visitor use in this area of the park would be more distributed throughout the day rather than concentrated at peak times of the day. Under this assumption, the system would beneficially impact opportunities for solitude along wilderness trails that are accessed via trailheads in the corridor. However, an additional system to access this area of the park would degrade the quality of unconfined recreation for visitors. Specific to the natural quality, managed access may reduce visitor impacts, such as off-trail use and trampling, and therefore provide beneficial impacts on ecosystems near trails.

Cumulative Impacts Across All Alternatives

Past and ongoing actions within Mount Rainier Wilderness, such as hazard tree management, fire management, trail and infrastructure construction and maintenance, invasive species treatment, and research, have resulted in both adverse and beneficial impacts on wilderness character due to human modification and manipulation of the environment. Park management activities that influence ecological systems, such as fire management, have adverse impacts on the natural quality; however, these activities provide beneficial impacts by reducing risks from wildfire. The use of motorized tools and the presence of structures, including trails within wilderness, impacts the undeveloped quality while benefitting the natural quality and opportunities for recreation. The presence of noise and light intrusions from surrounding lands and visitation to the national park would impact opportunities for solitude. The requirement for visitors to obtain a wilderness use permit and camp in designated sites adversely impacts primitive and unconfined recreation while benefiting the natural quality and opportunities for solitude.

When combined with these past, present, and reasonably foreseeable future projects, the cumulative impacts of actions within this plan are not expected to significantly change wilderness character within Mount Rainier Wilderness. Across all alternatives, there would be beneficial and adverse cumulative impacts on each of the wilderness character qualities. While opportunities for solitude would be improved due to less congestion at Paradise, Sunrise, and the adjacent

wilderness areas, a managed access system adversely effects visitor opportunities for primitive or unconfined recreation. There would be cumulative beneficial impacts on the natural quality as actions within this plan would likely result in less off-trail trampling in wilderness.

VEGETATION AND SOILS

Affected Environment (Current and Expected Future Conditions of Resource)

Vegetation in Mount Rainier National Park is diverse, encompassing three ecological zones: the alpine zone, the subalpine zone, and the forest zone. The Nisqually to Paradise Corridor begins in temperate forests in the Nisqually River Valley, passes through montane forests at middle elevations, and then through subalpine parkland in the area near Paradise. The project area includes the western hemlock zone, pacific silver fir zone, and mountain hemlock zone (NPS 2009). The western hemlock zone extends from the Nisqually entrance to 1 mile past Longmire and includes the following dominant trees: Douglas fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and western red cedar (*Thuja plicata*) (NPS 2012). The pacific silver fir zone extends from 1 mile past Longmire to Ricksecker Point and includes the following dominant vegetation: silver fir (*Abies amabilis*), a shrub layer of huckleberry species (*Vaccinium* sp.), and codominant noble fir (*Abies procera*) (NPS 2012). The mountain hemlock zone extends from Ricksecker Point to Paradise and includes subalpine vegetation with a mosaic of meadows and scattered tree islands. The dominant species are subalpine fir (*Abies lasiocarpa*) and mountain hemlock (*Tsuga mertensiana*) (NPS 2012). Common species found in the subalpine zone include white mountain heather (*Cassiope mertensiana*), pink mountain heather (*Phyllodoce empetriformis*), yellow mountain heather (*Phyllodoce glanduliflora*), kinnikinnick (*Arctostaphylos uva-ursi*), Sitka mountain ash (*Sorbus sitchensis*), false azalea (M*enziesii ferruginea*), false hellebore (*Veratrum viride*), and avalanche lily (*Erythronium montanum*), among many other subalpine plant species (NPS 2010).

A total of 306 plant species occur in the Nisqually to Paradise project area (NPS 2012). Of these 306 species within the project area, 68 are exotic plants, 11 of which are listed as Washington State noxious weeds (NPS 2009). Nonnative plants such as bentgrass (*Agrostis stolonifera*), orchard grass (*Dactylis glomerata*), Kentucky bluegrass (*Poa pratensis*), clover (*Trifolium* sp.) and dandelions (*Taraxacum officinale*) are widespread in the project area (NPS 2009). No state or federally listed threatened or endangered plants have been observed in the project area (NPS 2009). Numerous large trees occur near the Nisqually to Paradise Corridor. These large trees are valued for both their ecological significance and their historic importance, as they were retained during original road construction as part of the roadway design to enhance the visitor experience. The Nisqually to Paradise Corridor contains 253 trees larger than 18 inches diameter at breast height within 5 feet of the road pavement (NPS 2012). Whitebark pine (*Pinus albicaulis)* is a federally threatened species with potential to occur within the park, but this species does not have a confirmed presence within the project area. A number of state-listed special status plant species have potential to occur within the park, but none have a confirmed presence within the project area.

Soils in the project area include alluvial soils derived from river or glacial deposits, colluvial soils on side slopes, soils derived from volcanic mudflows, and tephra soils formed from pyroclastic deposits of ash (USDA 2016; NPS 1988). Soils in the project area are generally well-drained (USDA 2016). Alluvial soils occur in major river valleys, along streams, wet benches, and alluvial slopes and fans and consist of coarse, undifferentiated fine or very fine sands (USDA 2016; NPS

1988). Colluvial soils occur on slopes at all elevations, especially steeper slops, are generally unstable, and consist of coarse, unconsolidated mixed parent materials (USDA 2016; NPS 1988). Mudflow soils are characterized by poorly sorted materials and include rounded rocks and boulders intermixed with fine loamy sands, cobbles, and gravel (NPS 1988). Tephra soils are common in forest communities and are typically coarse sands or gravelly sandy loams with less than 10% organic material (USDA 2016; NPS 1988). Overall, soils adjacent to slopes beyond the edge of the road pavement have been disturbed by past human activities, such as road construction and periodic ditch maintenance (NPS 2012).

Primary threats to vegetation and soils include disturbance leading to the compaction and loss of vegetation and soils, nonnative species, and climate change. The most severe damage causing compaction and loss of vegetation and soils is evident in areas popular for hiking, including the subalpine and alpine meadows. Damage ranges from trampled vegetation to severely eroded trails up to 3 feet deeper than the intended trail design (NPS 2002). Many plant species in these areas of impact are unable to initiate new growth following repeated trampling, resulting in vegetation loss (NPS 2002). Continued use of social trails results in soil compaction or soil loss following vegetation loss. Social trails on slopes may become channels for surface water runoff, resulting in further soil erosion and decreased soil and slope stability.

The threat of nonnative species alters how ecosystems cycle nutrients and energy; changes food web structure and dynamics; and causes decline or loss of native biotic species and assemblages, leading to reduced biotic diversity. Nonnative species also contribute to forest fragmentation and deforestation (NPS 2014a). In addition, climate change will result in changes in precipitation and temperature and more intense floods and droughts (NPS 2014a). Glacial recession due to climate change would impact the timing of snowmelt and runoff, negatively impacting vegetation species and soils in the subalpine zones. Changes to vegetation species' spatial and elevational distribution and loss of vegetation species are also expected, along with an increase of forest pests and pathogens (NPS 2014a). Lastly, increases in debris flow events and sedimentation would impact soil stability. Impacts from climate change would occur across the range of alternatives.

Impacts on Vegetation and Soils

Alternative 1: No-Action Alternative

In the no-action alternative, the trends and conditions of vegetation and soils would remain as described in the affected environment section above. Impacts from nonnative species would likely increase as visitation continues to increase at the park under the no-action alternative. The current resource threats of loss of vegetation and soils, nonnative species, and climate change would continue to occur. Cumulative impacts resulting from other past, present, and reasonably foreseeable future actions are included later in this section.

Common to All Action Alternatives

The thinning of select vegetation, as per the scenic vista restoration management actions, would result in permanent adverse impacts of up to 10 acres of vegetation (predominately hemlock forest, fir forest, big huckleberry, and beargrass forest) and soils in the park due to the removal of select vegetation, including trees less than 18 inches diameter, and shrubs. On steep slopes, the removal of trees would contribute to reduced soil stability.

The removal and restoration of roadside parking (at Reflection Lakes, Ricksecker Point, Christine Falls/Comet Falls Trailhead, Longmire, and Westside Road) would allow these areas to restore to natural conditions. Soils would not be compacted, and vegetation would be reestablished in the currently trampled gravel area, resulting in a beneficial impact of approximately 0.2 acres to both vegetation and soils.

Construction of approximately 2.5 miles of trails (Paradise picnic area to the visitor center, Cougar Rock picnic area to Carter Falls Trailhead, and Cougar Rock to Comet Falls) would result in permanent adverse impacts of up to 1.9 acres of vegetation (predominately shrubland, hemlock forest, fir forest, and subalpine fir forest) and soils in the park. This estimate is based on an average trail width of 4 feet for all trails except for the connector trail in Paradise, which may be up to 8 feet wide pending final trail design. Temporary construction impacts of up to 3 feet would occur on each side of the trails, resulting in 1.8 acres of short-term impacts due to construction. Initial trail construction would cause soil compaction and loss through erosion. Trail design and route placement would minimize vegetation removal. In some areas, up to 6 to 8 inches of topsoil would be removed to create trails with a sustainable slope tread allowing proper water drainage. Recreational use of the trails would likely cause continued adverse soil impacts, including loss of organic litter and soil compaction and erosion. With construction of new trails and facilities, there is the potential for informal spur trails to develop as visitors travel off maintained trails to reach a destination.

Some of the areas where new trails would be built currently experience off-trail use. As a result, formalizing these trails would reduce off-trail impacts on vegetation and soils including trampling and compaction. Enhanced communication and partnerships would encourage visitors to stay on trail and minimize their role in unintentionally introducing or spreading invasive species. In addition, the smaller commercial and permitted group sizes and temporal/spatial distribution of commercial use groups would help reduce likelihood of off-trail travel and associated impacts on vegetation and soils. The park would design new trails to minimize the potential for soil and vegetation disturbance and would implement best management practice to minimize impacts during the construction and maintenance of trails. As outlined in appendix A, monitoring visitor-created trail impacts and the percent bare ground and largest patch index indicators would help mitigate vegetation loss (and associated soil loss) through active monitoring and implementing associated strategies.

Managing access to Sunrise through a reservation system at the White River entrance would disperse visitors throughout the day, resulting in reduced congestion on trails. This change is expected to reduce the incentive for visitors to travel off-trail to bypass busy areas on the trail, therefore reducing vegetation and soil trampling and compaction at Sunrise.

As per the mitigation measures described in appendix F, trail clearing and the resulting removal of vegetation would be made as narrow as possible. All healthy trees 18 inches diameter breast height and larger would be retained. Removal of healthy trees of any size would be limited to the minimum amount necessary to complete trail placement and where no alternate placement options exist. Where passive plant restoration after soil disturbance is not possible, park staff would revegetate with native plants where necessary to minimize impacts of construction. For protection against erosion and to maintain resource integrity, native vegetation and soil would be retained as much as possible. Rare plant species and large tracts of forest area would also be protected. Signage and information about the benefits of on-trail use and lessening adverse

impacts of vegetation trampling and soil compaction from hiking on the trails and adjacent areas would be improved.

Alternative 2: Corridor-Level Access Management (NPS Preferred Alternative)

In addition to the actions analyzed in the "Common to All Alternatives" section, under alternative 2, the reservation system would disperse visitors throughout the day, resulting in reduced congestion on trails. This change would, in turn, reduce the incentive for visitors to travel off-trail to bypass busy areas on the trail, therefore reducing negative impacts on vegetation and soil by reducing vegetation and soil trampling and compaction.

In addition, not endorsing roadside parking on Lower Valley Road would reduce the impacts of trampling and compaction on both vegetation and soil. Soils would not be as compacted, and vegetation would reestablish in the currently trampled gravel areas, resulting in a beneficial impact on both vegetation and soils.

Alternative 3: Site-Level Access Management with Cougar Rock to Paradise Shuttle

In addition to the actions analyzed in the "Common to All Alternatives" section, under alternative 3, the development of three shuttle stops at Cougar Rock would result in the removal of vegetation and paving of natural soils. Approximately 30 newly constructed parking spaces would similarly result in the removal of vegetation and paving of natural soils. In total, the new surface area paved due to these actions is approximately 19,900 square feet, or 0.5 acres. This development would result in permanent adverse impacts of up to 0.5 acres of vegetation (predominately fir and western hemlock forest) and soils in the park due to removal of vegetation and soils needed to clear out the area for level paving. The action of paving 0.5 acres at Cougar Rock would also expand the area of forest managed under the hazard tree management program. This action would result in additional tree removals, over time, for those determined to be hazardous.

Implementation of the Cougar Rock to Paradise shuttle may also result in increased adverse impacts on alpine meadow trails, if visitors exiting the shuttle are not metered to spread out at Paradise. As these trails serve as the entry zones at Paradise, congestion from the Cougar Rock to Paradise shuttle may result in soil and vegetation trampling and off-trail travel if trails are crowded.

Parking reservations at Paradise would limit the number of visitors accommodated by this area, resulting in reduced congestion on trails. This change would, in turn, reduce the incentive for visitors to travel off-trail to bypass busy areas on the trail, therefore reducing negative impacts on vegetation and soil through reduced vegetation trampling and soil compaction. In addition, not endorsing roadside parking on both Lower Valley Road and Upper Valley Road would reduce the impacts of trampling and compaction on both vegetation and soil. Soils would not be as compacted, and vegetation would take over the currently trampled gravel area, resulting in a beneficial impact on both vegetation and soils.

Alternative 4: Site-Level Access Management

In addition to the actions analyzed in the "Common to All Alternatives" section, under alternative 4, construction of approximately 2.2 miles of trail from Kautz Creek to Longmire would result in permanent adverse impacts of up to 1 acre of vegetation (predominately hemlock forest, silver fir, and shrubland) and soils in the park based on an average trail width of 4 feet. Temporary construction impacts of up to 3 feet would occur on each side of the trails, resulting in

1.6 acres of short-term impacts due to construction. Initial trail construction would cause soil compaction and loss through erosion. Trail design and route placement would minimize vegetation removal. In some areas, up to 6 to 8 inches of topsoil would be removed. Recreational use of the trails would likely cause continued adverse soil impacts, including the loss of organic litter and soil compaction and erosion. With the construction of new trails and facilities, there is the potential for informal spur trails to develop as visitors travel off maintained trails to reach a destination.

Under alternative 4, a reservation system would be implemented, similar to under alternative 2. The reservation system would disperse visitors throughout the day, resulting in reduced congestion on trails. This change would, in turn, reduce the incentive for visitors to travel off-trail to bypass busy areas on the trail, therefore reducing negative impacts on vegetation and soil through reduced vegetation trampling and soil compaction. In addition, not endorsing roadside parking on Lower Valley Road would reduce the impacts of trampling and compaction on both vegetation and soils. Soils would not be as compacted, and vegetation would take over the currently trampled gravel area, resulting in a beneficial impact on both vegetation and soils.

Cumulative Impacts Across All Alternatives

Past actions, such as road and trail construction and maintenance activities, have resulted in vegetation clearing, the unintentional introduction or spread of invasive exotic plants, and soil erosion. Planned future hazard tree removal would result in the removal of individual trees to meet safety requirements. The proposed replacement of the Fryingpan Creek Bridge and minor trail reroutes would also result in the removal of vegetation and construction related soil disturbance. Stream stabilization along sections of the Nisqually River would reduce the potential for erosion and slumping, leading to fewer vegetation impacts and increased soil stability. These past, present, and reasonably foreseeable future projects would have a local long-term minor adverse impact on vegetation and soils. Those impacts, in combination with the local long-term negligible-to-minor adverse effects of the actions across all action alternatives, would result in a local long-term minor adverse cumulative impact on vegetation and soils. Mitigation measures described in appendix F would be implemented to reduce adverse impacts on vegetation, including minimizing the removal of large trees, protecting native species, and limiting opportunities for invasive species introduction; however, these projects would contribute long-term adverse effects to the adverse trends in vegetation and soils in the park.

SPECIAL STATUS SPECIES – NORTHERN SPOTTED OWL, MARBLED MURRELET, AND GRAY WOLF

Affected Environment (Current and Expected Future Conditions of Resource)

A variety of sources were referenced to determine the presence of threatened and endangered species within the project area, including US Fish and Wildlife Service's Information for Planning and Consultation, the Washington Department of Natural Resources, and the Mount Rainier NPS species list (NPSpecies). The species considered in this environmental assessment are provided in table 6. Three federally threatened species, the northern spotted owl, marbled murrelet, and gray wolf, have been carried forward for analysis in this plan. All other federally threatened and endangered species were not analyzed in detail because there is no potential for the species or their habitat to occur in the planning area or there is no potential for the proposed actions to affect these species.

Table 6. Federally Endangered, Threatened, and Candidate Species That May Occur in Mount Rainier National Park (as of March 2022)

Common Name	Scientific Name	Federal Status	Potential for Species or Habitat in Planning Area	Proposed or Designated Critical Habitat Present in Planning Area
Gray wolf	*Canis Lupus*	E	Yes	No
Marbled murrelet	*Brachyramphus marmoratus*	T	Yes	No
Northern spotted owl	*Strix occidentalis caurina*	T	Yes	No
Yellow-billed cuckoo	*Coccyzus americanus*	T	No	No
Bull trout	*Salvelinus confluentus*	T	Yes	Final
North American wolverine	*Gulo luscus*	P	Yes	No
Whitebark pine	*Pinus albicaulis*	T	No	No
Monarch butterfly	*Danaus plexippus*	C	No	No

T = Threatened, E = Endangered, P = Proposed, C = Candidate

At the time of this writing, two of the given species from these reference sources have no potential to occur within the project area. The yellow-billed cuckoo has no habitat within the project area because this species' habitat is riparian vegetation, and there are no proposed actions involving riparian vegetation removal. The Monarch butterfly has no suitable habitat, as there is no milkweed within the project area. Bull trout have the potential to occur in the planning area, as there is critical habitat within the White River area of the park. However, none of the actions proposed at Sunrise have the potential to affect bull trout or critical habitat, and accordingly, it was dismissed from further analysis. Since the proposed action does not include any changes to snow management, it is highly unlikely that the wolverine would be affected by the plan. No habitat for whitebark pine would be affected by this project. The Monarch butterfly has no suitable habitat, as there is no milkweed within the project area.

For the purposes of this analysis, federally threatened and endangered wildlife species potentially impacted by the project include northern spotted owl, marbled murrelet, and gray wolf. The analysis area includes project locations within the elevation range for habitat for these species.

Northern Spotted Owl (Federally Threatened) and Critical Habitat

Spotted owls are long-lived nonmigratory birds that establish territories that they defend against other owls and avian predators. Spotted owls range across their territories over the course of each year hunting for prey. In western Washington, spotted owls prey almost entirely on northern flying squirrels and other small mammals (Forsman et al. 2001). Spotted owls are mostly nocturnal, although they also forage opportunistically during the day. The nest tree used within a territory may change from year to year, but alternate nest trees are usually located within the same general core area (Forsman, Meslow, and Wight 1984). Northern spotted owls' nesting and fledging season extends from March 15 through September 30. The breeding season is divided into an early season of March 15 to July 31 and a late season of August 1 to September 30. Nest trees may include Douglas fir, grand fir, Pacific silver fir, or other species. Critical habitat for spotted owls has been designated on adjacent national forest lands in Lewis and Pierce Counties, but no critical habitat has been formally designated in the park (USFWS 2008).

Suitable habitat for the northern spotted owl includes areas with multiple canopy layers and a variety of tree species, sizes, and ages, including standing and downed dead trees. Mount Rainier National Park contains approximately 80,000 acres of suitable spotted owl habitat (NPS 2009). Nests are usually found in forests up to 4,800 feet in elevation. Project sites below 4,800 feet in elevation that are within suitable habitat for the spotted owl include Cougar Rock, Christine Falls, all trails (excluding those at Paradise), and some of the scenic vista restoration management locations along the road corridor. Of these areas, the only sites with spotted owl activity within the last 10 years include Cougar Rock and Christine Falls, and pullout 6 Christine Falls and the Community Center building.

Primary threats to northern spotted owls include population decline, loss of nesting and roosting habitat, and climate change. Many populations of spotted owls continue to decline, especially in the northern parts of the species' range. Decreased survival rates of northern spotted owls is associated with high proportions of territories where barred owls are detected, suggesting that competition with barred owls is contributing to a declining population of the northern spotted owl. In addition, historic and recent loss of nesting and roosting habitat greatly contributes to population declines of northern spotted owl (NPS 2014a). Climate models generally predict warmer, wetter winters and hotter, drier summers for the Pacific Northwest, which have been associated with lower population growth rates, survival, and recruitment of spotted owls, suggesting that future climate conditions may be less favorable for the northern spotted owl.

Marbled Murrelet (Federally Threatened) and Critical Habitat

Murrelets are robin-sized diving seabirds that forage in sheltered nearshore waters and are year-round residents of coastal areas from northern California to Alaska. Murrelets typically nest in high canopies of old-growth forests or stands of large trees with mistletoe and make daily migrations from inland to sea. Nests occur primarily in large, old-growth trees with large branches or deformities that provide a suitable nest platform. In Washington, the nesting period for marbled murrelets is from April 1 through September 23 (USFWS 2012). Critical habitat has been designated on adjacent national forest lands in Lewis and Pierce Counties, but no critical habitat has been formally designated in the park (NPS 2012).

Mount Rainier National Park contains approximately 26,500 acres of potential murrelet nesting habitat (NPS 2012). Suitable habitat for the marbled murrelet can be found in park areas below 3,800 feet in elevation. High-quality habitat exists along the western boundary of the park in valleys running east and west, and lower-quality suitable habitat exists along the southern and southeastern areas of the park (NPS 2012). Project sites below 3,800 feet in elevation that are within suitable habitat for the murrelet include Cougar Rock, Christine Falls, all trails (excluding those at Paradise), and pullout 6 Christine Falls and the Community Center building. Cougar Rock, Christine Falls, and select areas for vista management actions contain old-growth trees that could provide murrelet habitat. Although specific trail alignments are not identified in this plan, it is possible that the general areas where trails would be implemented may pass through areas that provide suitable murrelet habitat.

Primary threats to marbled murrelets include population decline, loss of habitat, human-induced mortality, and nest predation. Studies suggest that populations of marbled murrelet are somewhat stable within the park, but continued surveys are critical for better understanding the occurrence and distribution of the species in the park over time (NPS 2012). Outside of the park, populations of marbled murrelets have been in decline throughout the region (Miller et al. 2012). Population

declines are higher in areas with loss of older forest habitat, suggesting a correlation between habitat loss and species decline (USFS 2011). Accidental capture of marbled murrelets in fishery gill nets is a major threat to the species (Carter et al. 1995). Oil spill pollution can also result in habitat loss and degradation for marbled murrelets along shore habitats (Carter et al. 1995). The marbled murrelet is also vulnerable to noise disturbance during the breeding season when adults are producing and incubating eggs.

Gray Wolf (Federally Endangered)

Wolves use a broad range of habitats if there is an abundance of prey (USFWS 1987). The key elements of wolf habitat include a sufficient year-round prey base, suitable denning and rendezvous sites for raising young, and minimal exposure to humans. Gray wolves were recently relisted under the Endangered Species Act in February 2022. The project area is within ungulate habitat, which provides foraging opportunities for wolves. Elk and black-tailed deer are common in the park. Gray wolves were eradicated from the state of Washington by the 1930s, and currently no known wolves live in the park; however, this species has become reestablished in Washington State and can potentially occur in or occupy the project area within the project time frame (WA DFW 2021).

Wolves cover large areas for prey and may travel 30 miles in a day. Territory size ranges from 50 square miles to more than 1,000 square miles, depending on prey availability and seasonal movements of prey (USFWS 2007). Wolf groups, or packs, typically consist of an alpha male and female, their offspring, and other nonbreeding adults, and the pack defends their territory against other wolves. Wolves reproduce in late winter, and pups are born in dens between mid-April and early May. In early summer, pups are moved to rendezvous sites, often within 1 to 6 miles of the den. Rendezvous sites are often in meadows with adjacent forested cover. Rendezvous sites may change through the season until the young can travel with adults, usually by September to early October. Wolves, particularly yearlings, may disperse up to hundreds of miles away in search of a new territory and/or pack.

The primary threat to wolves is conflict with humans. Wolves have historically been feared by humans, resulting in human-caused mortality, such as intentional and unintentional hunting, trapping, and shooting. Human attitudes continue to threaten wolves' existence (Bruskotter 2010). Wolves are also sensitive to the presence of humans nearby when pups are young (i.e., around den sites and early rendezvous sites). These factors contribute to the dispersal of wolves across the state of Washington and whether a wolf pack would establish in and/or around the park within the planning time frame.

Impacts on Special Status Species

Alternative 1: No-Action Alternative

Under the no-action alternative, the trends and conditions of the northern spotted owl, marbled murrelet, and gray wolf would remain as described in the affected environment section above. Population decline of the northern spotted owl, human-induced mortality of the marbled murrelet, and the potential for wolf conflicts with humans would likely increase as visitation continues to increase at the park under the no-action alternative. The current resource threats of habitat loss, predation, climate change, and conflicts with humans would continue to occur.

Common to All Action Alternatives

The thinning of select vegetation for scenic vista restoration would result in permanent adverse impacts on up to 0.7 acres of suitable habitat for both the northern spotted owl and the marbled murrelet. Since trees suitable for nesting would not be removed, this action would not have a discernable effect on habitat for the spotted owl nor murrelets. Removal of trees would occur outside of the nesting season within suitable habitat, avoiding impacts on active nest sites. Selective tree removal may result in site-specific, increased canopy fragmentation in these areas of roadside forest, which may increase the marbled murrelet's risk to nest predation if an active nest is located within or near an area where trees have been removed. Vista management actions are unlikely to permanently impact wolves because no known wolves currently exist in the park. In the future, if wolves create rendezvous and denning sites, they are more likely to be in meadows surrounded by forested cover than along the roadways where the vista management actions would occur.

The removal and restoration of roadside parking areas would not involve any ground disturbance. The restoration of these areas would result in increased habitat buffers for all three species—0.1 acres of suitable habitat for northern spotted owl, 0.1 acres of suitable habitat for marbled murrelet, and 0.2 acres for gray wolf—a beneficial impact.

Construction of approximately 2.5 miles of trails (Paradise picnic area to the visitor center, Cougar Rock picnic area to Carter Falls Trailhead, and Cougar Rock to Comet Falls) would result in permanent adverse impacts of up to 0.5 acres of suitable habitat for both the northern spotted owl and marbled murrelet, based on an average trail width of 4 feet for all trails except for the connector trail in Paradise, which may be up to 8 feet wide, pending final trail design. This action may reduce both species' ability to nest and roost in those specific removed trees and may result in increased canopy fragmentation, which may increase the marbled murrelet's risk to nest predation. Trail design and route placement would minimize the removal of large trees and would avoid known nest sites. Temporary construction impacts of up to 3 feet would occur on each side of the trails, resulting in up to 0.7 acres of short-term impacts on both northern spotted owl and marbled murrelet suitable habitat. Trail development is unlikely to permanently impact wolves because no known wolves currently exist in the park and due the size of the area within a wolf's range compared to the footprint of the proposed construction. In the future, if wolves create rendezvous and denning sites, they may be impacted by trail development if they are near these sites. Construction activities may result in short-term noise impacts on all three special status species.

Of the three proposed trails, Cougar Rock to Carter Falls is anticipated to be able to be built without the use of blasting. The two remaining trails, Paradise to Visitor Center and Cougar Rock to Comet Falls, would likely require blasting. Paradise to the visitor center trail is above the suitable habitat for northern spotted owls and marbled murrelets and is therefore highly unlikely to impact the species. The proposed trail alignment from Cougar Rock to Comet Falls is within suitable habitat for the owl and murrelet, but the proposed trail alignment is within historic owl territory that has not been occupied recently. If blasting is necessary for trail construction, it would be completed outside of the nesting season within suitable habitat for northern spotted owl and marbled murrelet to avoid potential for adverse effects. Construction activities may result in short-term noise impacts on gray wolves by impacting the behavior of their prey, but due to their wide range and ability to move to other habitats, this would result in short-term to negligible impacts on wolves.

The newly created trails would result in an increase in recreational use of areas formerly without human presence. This change in recreation has the potential to introduce new noise impacts or increase the availability of food sources for corvids, which may adversely impact nesting birds. Park staff would provide information about Leave No Trace principles and the benefits of remaining on the trail to help reduce long-term impacts from recreational use. Lastly, the smaller commercial and permitted group sizes and temporal/spatial distribution of commercial use groups would help reduce the likelihood of off-trail travel and associated short-term noise impacts of visitor use on all three species.

Managing access to Sunrise through a reservation system at the White River entrance would disperse visitors throughout the day, resulting in reduced congestion on trails. This change may result in changes in wildlife behavior due to more frequent human presence throughout each day at Sunrise.

As per the mitigation measures described in appendix F, construction activities would be limited to specific times of the day and year to minimize impacts during nesting seasons in suitable habitat for the northern spotted owl and marbled murrelet, and in areas near known wolf denning or rendezvous sites, to reduce short-term noise impacts associated with construction. Healthy trees of any size that may serve as suitable habitat to either the northern spotted owl or the marbled murrelet (based on elevation) would not be removed except where they interfere with trail traffic and/or the trail cannot be relocated to eliminate the interference. No healthy trees 18 inches diameter breast height and larger would be removed unless no alternatives exist for the trail route or safety. If removal of trees over 18 inches diameter breast height is required, additional consultation would occur under a separate process. Signage and educational materials would be improved regarding the benefits of on-trail use and would lessen the adverse impacts of visitor-related noise from hiking on the trails and adjacent areas.

Alternative 2: Corridor-Level Access Management (NPS Preferred Alternative)

In addition to the actions analyzed in the "Common to All Alternatives" section, under alternative 2, the reservation system would disperse visitors throughout the day, resulting in reduced congestion on trails. This change may result in changes in wildlife behavior due to more frequent human presence throughout each day. These effects would be similar to what is described above. In addition, not endorsing roadside parking on Lower Valley Road would result in increased habitat buffers for all three species—a beneficial impact.

Alternative 3: Site-Level Access Management with Cougar Rock to Paradise Shuttle

In addition to the actions analyzed in the "Common to All Alternatives" section, under alternative 3, the development of three shuttle stops and 30 newly constructed parking spaces at Cougar Rock would result in tree removal and new surface area of approximately 19,900 square feet, or 0.5 acres. At an elevation of approximately 3,200 feet, this development would result in permanent adverse impacts of up to 0.5 acres of suitable habitat for both the northern spotted owl and marbled murrelet, an impact of less than 1% of total suitable habitat for both species in the park. Expanded development may result in the need to remove additional hazard trees within suitable habitat. This action may result in increased canopy fragmentation, which may increase the marbled murrelet's risk to nest predation. Cougar Rock development is unlikely to permanently impact wolves because no known wolves currently exist in the park. In the future, if wolves create rendezvous and denning sites, the wolves may be impacted by this development if

they are near the developed area. Construction activities may result in short-term noise impacts on all three special status species.

Increased recreational use of Cougar Rock would likely cause increased adverse impacts on all three species, due to increased visitor use in an area formerly without human presence. As a new shuttle stop, higher concentrations of visitor use-related noise would be anticipated in this area. Enhanced communication platforms and partnerships would increase opportunity for park staff to educate about Leave No Trace principles and the benefits of traveling on the trail, which would help reduce long-term impacts on special status species from recreational use. In addition, the smaller commercial and permitted group sizes and temporal/spatial distribution of commercial use groups would help reduce likelihood of off-trail travel and associated short-term noise impacts of visitor use to all three species. As outlined in appendix A, implementation of the visitor-created trails monitoring indicator would help mitigate short-term noise impacts of visitor use on special status species through active monitoring and implementation of associated strategies.

Parking reservations at Paradise would not impact special status species due to the elevation being outside of the suitable habitat for both the northern spotted owl and marbled murrelet. Implementing parking reservations at Paradise is unlikely to permanently impact wolves because no known wolves currently exist in the park. In addition, not endorsing roadside parking on both Lower Valley Road and Upper Valley Road would result in increased habitat buffers for all three species—a beneficial impact.

Alternative 4: Site-Level Access Management

In addition to the actions analyzed in the "Common to All Alternatives" section, under alternative 2, the construction of approximately 2.2 miles of trail from Kautz Creek to Longmire would result in permanent adverse impacts of up to 1 acre of suitable habitat for both the northern spotted owl and marbled murrelet, based on an average trail width of 4 feet for all trails. This action may reduce both species' ability to nest and roost in those specific removed trees and may result in increased canopy fragmentation around the new trail alignment, which may increase the marbled murrelet's risk of nest predation if an active nest is located near the area of trail development. Trail design and route placement would minimize the removal of large trees and would avoid known nest sites. Temporary construction impacts of up to 3 feet would occur on each side of the trails, resulting in up to 1.6 acres of short-term impacts on both northern spotted owl and marbled murrelet suitable habitat. Trail development is unlikely to permanently impact wolves because no known wolves currently exist in the park. In the future, if wolves create rendezvous and denning sites, they may be impacted by trail development if they are near these sites. Construction activities may result in short-term noise impacts on all three special status species.

The newly created trails would result in an increase of recreational use of areas formerly without human presence. Park staff would provide information about Leave No Trace principles and the benefits of traveling on the trail, which would help reduce long-term impacts from recreational use. In addition, the smaller commercial and permitted group sizes and temporal/spatial distribution of commercial use groups would help reduce the likelihood of off-trail travel and associated short-term noise impacts of visitor use to all three species. As outlined in appendix A, implementing the visitor-created trails monitoring indicator would help mitigate short-term noise impacts of visitor use on special status species through active monitoring and implementation of associated strategies.

Under alternative 4, a reservation system would be implemented, similar to under alternative 2. The reservation system would disperse visitors throughout the day, resulting in reduced congestion on trails. This may result in changes in wildlife behavior due to more frequent human presence throughout each day. In addition, not endorsing roadside parking on Lower Valley Road and would reduce the impacts of trampling and compaction on both vegetation and soil. Soils would not be as compacted, and vegetation would take over the currently trampled gravel area, resulting in a beneficial impact on both vegetation and soils.

Cumulative Impacts Across All Alternatives

Past actions, such as road and trail construction and maintenance activities, have resulted in the disturbance and loss of suitable habitat for the northern spotted owl, marbled murrelet, and gray wolf. Planned future hazard tree management would result in the removal of individual trees, although no trees actively used for nesting would be removed. Planned streambank protection of the Nisqually River; the proposed replacement of the Fryingpan Creek Bridge; the proposed rehabilitation and maintenance on State Route123, Highway 410, and the Carbon River Fairfax Road; and the periodic dredging of Tahoma Creek may affect northern spotted owl and marbled murrelet during construction. These past, present, and reasonably foreseeable future projects may affect listed species. Each project will be subject to section 7 consultation pursuant to the Endangered Species Act, including formal consultation for any actions that may affect and have the potential to result in adverse effects on listed species. Mitigation measures outlined in appendix F would be implemented to avoid or minimize adverse impacts on special status species, including surveying for activity centers and limiting construction activities to specific times of day and year. Although these projects have the potential to contribute cumulatively to adverse effects on listed species, these actions would not jeopardize the continued existence of any listed species nor would they result in the adverse modification of critical habitat.

CULTURAL LANDSCAPES

Affected Environment (Current and Expected Future Conditions of Resource)

The area of potential effects for this project encompasses cultural landscapes and contributing features to the Mount Rainier National Historic Landmark District and/or cultural landscapes and contributing features to the Mission 66 program at Mount Rainier, and the temporary staging and stockpiling areas for construction activities at each project site described below.

Designated in 1997, the Mount Rainier National Historic Landmark District exemplifies the history of the National Park Service's early 20th-century master planning. The period of significance of the historic district begins with the federally sponsored construction of Nisqually Road in 1904 and ends with the completion of Stevens Canyon Highway in 1957. The NHL district is a noncontiguous district with a contiguous core that follows the park road system. Nisqually Road, Westside Road, and Stevens Canyon Highway are within the area of potential effects, but the NHL road system includes other areas outside the scope of this planning effort. The district follows a corridor of 30 feet from the centerlines of the roads on either side and includes ditches, swales, and all other historic structures associated with road construction. Contributing resources to the NHL district include aspects of spatial organization, circulation, topography, vegetation, structures, buildings, and vehicular bridges. The NHL district encompasses all development during the period of significance. The corridor connects and includes all major developed areas of the park, the

Wonderland Trail, and the two spur entrance roads in the northwestern corner of the park (Toothman, Begley, and Carr 1996).

The Nisqually Road opened access to and views of topography. Certain roadside overlooks and developed areas were installed to emphasize important views, and vegetation has been managed in these areas to provide convenient locations for viewing. These scenic overlooks are included within the corridor of the NHL district (Toothman, Begley, and Carr 1996) and discussed further below.

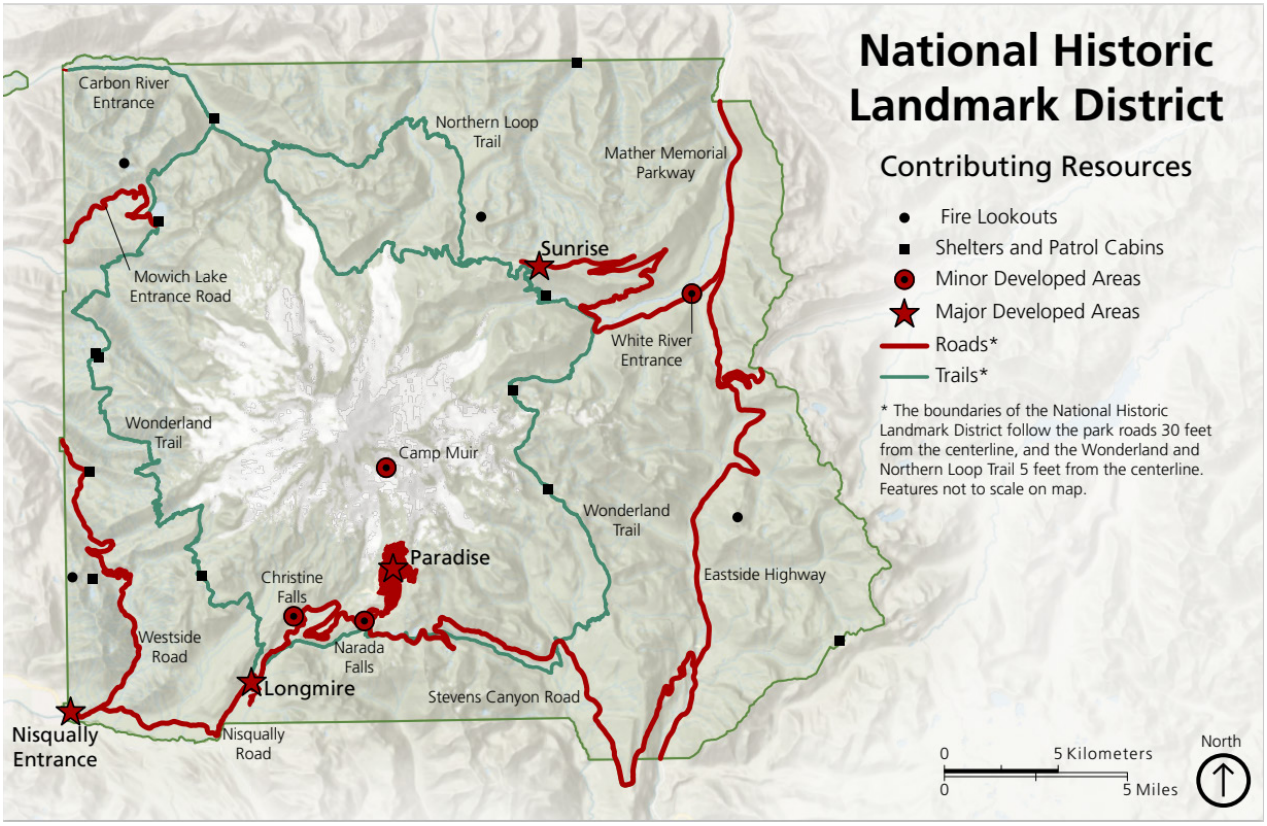

FIGURE 11. MOUNT RAINIER NATIONAL PARK NATIONAL HISTORIC LANDMARK DISTRICTS

The most important impact on the historic integrity of the circulation system overall was the construction of a new approach to Paradise from Narada Falls in the late 1950s as part of the Mission 66 program. The Mission 66 program's (NPS 1957) main projects included road construction, such as the completion of Stevens Canyon Road; a winter access road to Paradise (Paradise Loop Road); and improvements on Westside and Mowich Lake Roads. The new approach to Paradise from Narada Falls (along the Paradise Loop Road), extended Paradise Road and made Valley Road, the 1920s approach to Paradise, into a one-way loop returning down to the Narada Falls area (NPS 2010b; Toothman, Begley, and Carr 1996). The change in circulation also meant that many of the intended scenic views on Valley Road were no longer readily visible by traveling downhill (NPS 2015b). While the intersections of the park road system have good integrity to the period of significance, the new turnoff to Paradise, as well as the nearby intersection between the returning (one-way) traffic from Paradise and Stevens Canyon Highway, are not historic. No part of the new approach road to Paradise is within the NHL district (Toothman, Begley, and Carr 1996), although it is part of the Mission 66 program designs.

At the time of the Mount Rainer National Historic Landmark District nomination, the period of significance for the district ranged from 1904 to 1957, with the completion of Stevens Canyon Highway. Though completed as part of the park's Mission 66 program, Stevens Canyon Highway is a special case, as it was planned, designed, and partially constructed earlier, but construction was interrupted by World War II. When construction resumed, it was completed according to the original plans. Other features within the NHL district were constructed after World War II and were considered contributing to the NHL because they were integral to the overall character of the road corridor and were considered a logical extension of the principles of NPS road construction (Toothman, Begley, and Carr 1996). Additions and changes made to Mount Rainier and the NHL district as part of the Mission 66 program were eligible for consideration for the national register by reaching the 50-year mark (36 CFR 60.4; National Register Bulletin 1995; NPS 1995a); however, a nomination had not been prepared to analyze these additions as part of the nationwide NPS Mission 66 program In 2015, a multiple property listing of NPS Mission 66 Era Resources nationwide was accepted to the national register. This nomination's period of significance included the pre-Mission 66 era (1945) through the end of the Parkscape USA program (1972). The 2015 nomination notes that from a prototype prospectus at Mount Rainier National Park, a basic premise of the entire Mission 66 program emerged (Carr et al. 2015). Given the importance of the park in piloting planning efforts for the Mission 66 program, as noted in the 2015 multiple property documentation, modifications made to Mount Rainier National Park through 1972 may now be eligible for the national register. Further research and documentation are necessary.

Overall, the cultural landscapes at Mount Rainier include the initial designs and the Mission 66 alterations as part of NPS park master planning. A series of cultural landscape inventories were completed for the park, as well as individual nominations for the National Register of Historic Places (NRHP) for segments of the NHL corridor and developed areas within the corridor. These inventories and nominations were completed prior to the 2015 multiple property listing of NPS Mission 66 Era Resources nationwide, and therefore a determination of eligibility is needed for these Mission 66 resources within the park. In 2021, draft process guidelines for consensus determination of eligibility for Mission 66 campgrounds were released (NPS 2021), and draft national register nominations began for the Stevens Canyon Highway Mission 66 Developed Area, the Paradise Picnic Area, and the Cougar Rock Developed Area, which includes the campground and associated ranger station and the picnic area. The State Historic Preservation Officer has provided concurrence (2022) that the Stevens Canyon Highway Mission 66 Developed Area, the Paradise Picnic Area, and the Cougar Rock Developed Area are eligible for inclusion in the national register. An update to the NHL documentation is currently underway.

Finally, public graffiti incidents have increased in recent years, which negatively affects the cultural landscape.

Nisqually Entrance

The Nisqually entrance (CLI 400018) was included in the 1997 NHL nomination for Mount Rainier as a developed area that contributes to the significance of the NHL district. The entrance was listed in the national register (1991) as the Nisqually Entrance Historic District for its design and construction (NRHP Criterion C), embodying the complementary styles of rustic architecture and naturalistic landscape architecture, and for its association with the American Parks Movement and early NPS master planning (NRHP Criterion A). The Nisqually entrance is a historic designed landscape, yet it has seen modifications since its earliest designs. The Nisqually

entrance is the longest operating entrance station in the national park system and remains the busiest entrance to Mount Rainier National Park (NPS 2010a).

Paradise Road (aka Nisqually to Paradise Road, Road to Paradise, Government Road)

The 18.4-mile Nisqually Road, contributing to the NHL historic district, is a main road built between 1904 and 1915. In 1915, paving of the road in cement-gravel was complete, and the road opened to cars from the park boundary all the way to Paradise. The road was improved in 1918 with the addition of bridges over Kautz and Tahoma Creeks, and throughout the 1920s and 1930s, many of the road's most noticeable features were built. The circulation pattern of the NHL district was approved by Horace Albright in 1929 and describes a great loop from the Seattle–Tacoma area via the Mountain Highway to Ashford, entering the park at Ashford, proceeding from Paradise via Stevens Canyon Highway to the southeast corner of the park, and exiting the park to the north via the Mather Memorial Parkway, returning to the Puget Sound communities via Route 410. The historic circulation system of the park and the NHL district is remarkably intact (Toothman, Begley, and Carr 1996; NPS 2010b).

The Nisqually Road is characterized by crenelated guard walls of native stone; masonry-veneered concrete bridges; and frequent scenic overlooks that provide views of the mountain and of the surrounding landscape of waterfalls, rivers, and forests. The road today basically adheres to the original alignment of the road completed in 1915, as amended in the 1920s and 1930s. Since the centerline of the road mostly follows the alignment of the road during the period of significance, and since almost all the major structures associated with the road are original, the roadway can be said to have excellent integrity overall to the period of significance (Toothman, Begley, and Carr 1996).

The road landscape has four component landscapes: the Nisqually entrance, Christine Falls, Ricksecker Point, and Narada Falls (NPS 2010a, 2010b). The Cougar Rock Developed Area has a draft determination of eligibility for its Mission 66 resources. Scenic overlooks along the road are located at Kautz Creek, near Longmire, at Christine and Narada Falls, at Oh My Point and Canyon Rim, along Ricksecker Point, and on the old approach to the Paradise Inn (now the one-way loop) in Paradise Valley (Toothman, Begley, and Carr 1996). Many of these original pullouts (no more than shoulders, which accommodated 1–2 cars) remain in the same location but have been paved. Pullouts developed after 1940, especially above Christine Falls, tend to be wide and relatively large, merging the ideas of pullouts and viewpoints. New pullouts tend to be in areas as a response to increased vehicles and visitation. Despite these new pullouts, the road retains its overall historic character, landscape scale, and relationship to the natural landscape and designed elements (NPS 2010b).

Westside Road

Westside Road (CLI 400031) is a 15.2-mile linear cultural landscape with a period of significance from 1926 to 1934, corresponding to the road's design and construction as a scenic drive through Mount Rainier National Park. The road is distinguished by its outstanding engineering achievements and features of naturalistic design. Westside Road's historic designed landscape is a rare example of an early national park highway and is an integral part of the early master plan for the park. Westside Road is a contributing feature to the NHL district, and the road gives an idea of what the park roads were like before they were paved (Toothman, Begley, and Carr 1996). The remaining landscape characteristics such as spatial organization, circulation, buildings and structures, small scale features, topography, views and vistas, natural systems and features, and archeological sites support the road's naturalistic character. Their patterns and surviving features

continue to exist as originally planned, conveying the integrity of the road as a scenic highway (NPS 2011b).

The cultural landscape inventory recommended that the boundary of the road, as defined in the 1997 NHL district nomination, be updated and expanded to encompass all the features associated with the road. The cultural landscape inventory recommended adding the final 2.8-mile segment of the road from Klapatche Point to its terminus at the North Puyallup River to the NHL district; widening the NHL boundary to a 200-foot corridor to include all the constructed features along Westside Road; and including the developments at Puyallup River Crossing, Round Pass, and Tahoma Vista. The Washington State Historic Preservation Officer concurred with these additions (NPS 2011b).

Portions of the road and road structures have been damaged by rockfall, slides and floods, and parts of the road have been closed or altered for visitor health and safety. The park's general management plan closed Westside Road to private vehicles beyond Fish Creek, though visitors could take shuttles in the summer, hike, or ride bicycles along the road (NPS 2011b, 2002). While shuttles were listed in the general management plan, there is no shuttle operation along Westside Road (NPS 2015b). Overall, Westside Road has good integrity.

Kautz Creek

First built in 1947 (NPS 2010b), the Kautz Creek interpretive pullout is located next to the east bank of the Kautz Creek and is noncontributing to the NHL district. The pullout provides the first view of Mount Rainer on Nisqually Road. The overlook has a picnic area, comfort station, and short accessible trail that interprets the 1947 flood (NPS 2015b). The trail ends at an overlook just north of Kautz Creek Bridge, and a social trail connects the bridge to the overlook. The overlook and reinforced concrete bridge are noncontributing to the NHL district (NPS 2015b; Toothman, Begley, and Carr 1996). The recovery area from the 1947 flood around the Kautz Creek Bridge is regularly maintained by mowing the shoulder area and removing hazardous trees. In some places, large rocks have been placed to discourage cars from pulling off and damaging the vegetation (NPS 2010b). The modifications to the cultural landscape at Kautz Creek, while not contributing to the NHL district, may be eligible for the national register due to the association with work during the Mission 66 period. A cultural landscape inventory and determination of eligibility is needed for this area before further modification.

Longmire

The 105-acre Longmire Village was originally developed in 1883 as a resort by James Longmire, making it the park's oldest developed area. Although it originally served as park's headquarters, the area was redeveloped between 1926 and 1944 into a rustic park village, providing a destination site for park visitors. The area also became the center of park maintenance. These additions to Longmire during this period remain the most intact layer of historic development (NPS 2009). The Longmire Village developed area contributes to the NHL district (Toothman, Begley, and Carr 1996).

Rehabilitation of the Longmire Village cultural landscape and the National Park Inn (built in 1917 and relocated in 1920) before the NHL district nomination significantly altered the spatial organization and circulation pattern of the historic town plan. All parking for the village was relocated from the village plaza to an expanded parking lot on the other site of the National Park Inn. This relocation resulted in the back of the hotel becoming its front entrance, and the central

role of the plaza was diminished both as a civic space and as an arrival and gathering place of the park. The new arrival area lacks the dramatic views of Eagle Mountain and Mount Rainier that originally gave the plaza its powerful and unique character (Toothman, Begley, and Carr 1996).

Carter Falls

The pullout at Carter Falls is contributing to the NHL district, and the Wonderland Trail and Carter Falls Trail are accessible from this pullout (NPS 2015b). The NPS Cultural Resources Inventory System does not have a record of Carter Falls nor a cultural landscape inventory of the area.

Cougar Rock

The Cougar Rock Campground does not date to the period of significance of the NHL district and is therefore not within the NHL district (Toothman, Begley, and Carr 1996). The campground and picnic area were, however, designed and built as part of the Mission 66 program within the park (NPS 1996).

Before implementing the modification designs for the Cougar Rock picnic area, a cultural landscape inventory is needed. In 2022, the State Historic Preservation Officer concurred that the Mission 66-era Cougar Rock Developed Area Picnic Area was eligible for listing in the national register. The NPS Cultural Resources Inventory System does not have a record of Cougar Rock nor a cultural landscape inventory of the area.

Comet Falls

The Comet Falls Trailhead was installed in 1985 and has formal parking associated with it (NPS 2010b). The NPS Cultural Resources Inventory System does not have a record of Comet Falls nor a cultural landscape inventory of the area.

Christine Falls

Christine Falls (CLI 400019) is a component landscape of the Nisqually Road (NPS 2010b; Toothman, Begley, and Carr 1996). The historic landscape was designed to bring visitors close to the falls, where they could experience the beauty of the falls from a unique vantage point (NPS 2022a). The Christine Falls pullouts (formal parking areas east and west of Christine Falls Bridge) and the viewing area at Christine Falls, accessed by a short trail, contribute to the NHL district (NPS 2015b, 2010b).

Ricksecker Point

Ricksecker Point (CLI 400020) is a component landscape of the Nisqually Road (NPS 2010b) and is composed of a historic pullout with an overlook point along the Ricksecker Loop Road (NPS 2015b). The point was designed as a scenic road and place for visitors to experience spectacular, panoramic views of the Tatoosh Range, Nisqually and Paradise Valleys, and Mount Rainier. The landscape characteristics and features of Ricksecker Point date from its period of development between 1927 and 1940 (NPS 2022a). Ricksecker Point, as well as the pullouts and travel lanes at Lower Miller Cutoff, along the Ricksecker Loop Road, and at Upper Miller Cutoff contribute to the NHL district (NPS 2015b).

Narada Falls

Narada Falls (CLI 400021) is a scenic overlook along the Nisqually Road (Toothman, Begley, and Carr 1996) and is a component landscape of the Nisqually Road (NPS 2022a, 2010b). The Narada Falls developed area includes the roadside overlook and retaining wall, the trail to the comfort station, the bridge over the Nisqually River, the comfort station, and the paved trail and overlook. The boundaries of the NHL district widen to include the parking area, 10 feet from all pavement and masonry construction. The roadside overlook and retaining wall, the trail to the comfort station and the comfort station itself, a picnic area, waysides at the upper part of the falls, the lower trail and overlook, and the Narada Falls Bridge are all contributing resources to the NHL district.

Paradise

Various cultural landscapes are present in the Paradise developed area (period of significance 1916–1942), a rustic park village featuring a subalpine meadow and views of the mountain ranges. Constructed by the National Park Service and the Rainier National Park Company in the early 20th century and followed by years of improvements, the area manifests the park and the National Park Service's early park planning philosophy and design. The Paradise developed area moreover retains much of its historic character, though several features were removed during the Mission 66 program. The Paradise developed area is a contributing resource to the NHL district; however, the Scoop Jackson Visitor Center (constructed in 1967 and demolished in 2008), its parking lots, the picnic area, and the road between the Paradise Bridge the visitor center were not included in the boundaries of the NHL district (Toothman, Begley, and Carr 1996; Repanshek 2008).Various structures were identified as contributing to the district and listed in the national register as part of a multiple-property nomination in 1991 (NPS 2017a).

The Paradise picnic area encompasses portions of the historic Paradise Camp (1930s). The Paradise picnic area was the former site of wooden housekeeping cabins constructed between 1926 and 1931. In the 1950s, the housekeeping cabin complex and the Paradise Lodge were removed to provide parking for the Scoop Jackson Visitor Center (1967) as part of the Mission 66 construction era. The Paradise picnic area was also part of this project and installed in much of its current configuration by 1962 (NPS 2008b; Toothman, Begley, and Carr 1996). In 2008, a new visitor center, the Henry M. Jackson Memorial Visitor Center, was constructed in a historically compatible architectural style near the site of the original Paradise Camp Lodge (later Tatoosh Club). The new visitor center restored much of the spatial organization of Paradise and historical character that was lost during the Mission 66 program (NPS 2017a, 2008b; Repanshek 2008). Entering the Paradise picnic area, below the Henry M. Jackson Memorial Visitor Center, one pullout, "Pullout 24: Unnamed below Jackson Visitor Center, MP 17.0," is noncontributing to the NHL district (NPS 2015b).

The Paradise picnic area is not within the boundaries of the NHL district; its facilities do not date to the period of significance. However, since the picnic area was modified as part of the Mission 66 program, a cultural landscape report and a historic structure report should be completed before modifications are made (Booz, Allen, Hamilton 2019).

The Paradise lower parking lot is part of the Paradise developed area, a contributing resource to the NHL district (Toothman, Begley, and Carr 1996). While the current parking lots at Paradise are counted as contributing structures to the NHL district, the parking lots associated with the 1966 Jackson Visitor Center are not within the boundaries of the NHL district (Toothman, Begley, and Carr 1996). Similar to the Paradise picnic area, however, the Paradise lower parking lot was modified as part of the Mission 66 program. A draft determination of eligibility was

written in 2021, but the State Historic Preservation Officer has not yet concurred on the determination.

The Paradise upper parking lot is also part of the Paradise developed area, a contributing resource to the NHL district, and the parking lots at Paradise are counted as contributing structures to the NHL district (Toothman, Begley, and Carr 1996). The Paradise upper parking lot was formerly the location of an unpaved parking area, Paradise Camp, and the Paradise Camp building, built in 1918. Over time, this unpaved parking area became the primary Paradise parking plaza. During the 1950s, encouraged by Mission 66 objectives, a new round of master planning occurred at the Paradise developed area, including the demolition of Paradise Camp, which became a parking expansion today known as the Paradise upper parking lot (NPS 2008b).

Stevens Canyon Highway

Stevens Canyon Highway (CLI 400032) is a contributing feature to the NHL district (Toothman, Begley, and Carr 1996) due to its association with the National Park Service's most complete and significant example of park master planning. The highway is a linear landscape that extends approximately 21 miles from Paradise at its intersection with the Nisqually Road (Toothman, Begley, and Carr 1996) to its intersection with the East Side Highway (NPS 2004).

The road is an important connector route between the eastern and western sides of the park and developed areas, and the alignment of the highway was carefully chosen to showcase spectacular scenery while carrying vehicles on a route that was the most economically feasible and least destructive to park resources. The surviving landscape characteristics and features continue to exist as originally planned, conveying the integrity of the road as a scenic highway. The Stevens Canyon entrance station was constructed as part of the Mission 66 program (1964) (NPS 2005b, 2004).

Reflection Lakes

Reflection Lakes is a recreational and scenic area located along Stevens Canyon Highway and is a component landscape of the Stevens Canyon Highway cultural landscape. The segment of Stevens Canyon Highway to Reflection Lakes was constructed between 1931 and 1935 (NPS 2022a, 2004). The area includes both Reflection Lakes, two parking pullouts, a series of trails, and the surrounding landscape (NPS 2022a).

The Wonderland Trail Corridor and its associated historic elements are counted as one structure in the NHL district description, and the boundaries of the NHL district follow the Wonderland Trail 5 feet from its centerline on either side (Toothman, Begley, and Carr 1996). Between Reflection Lakes and Ohanapecosh, a 16-mile segment of the Wonderland Trail was built in 1913. Between 1915 and 1924, trail improvements were implemented along the Wonderland Trail and other trails around Reflection Lakes (NPS 2022a).

During the Mission 66 era, additional design plans were created for the Reflection Lakes area, including parking turnouts, fencing, and other infrastructure improvements. Since the Mission 66 planning effort, the Reflection Lakes area has remained largely unchanged except for the installation of a sidewalk and boulder wall in 2013 (NPS 2022a, 2005). A cultural landscape inventory is underway for Reflection Lakes (in draft 2021) and should be completed before any proposed actions in this plan for this area are implemented.

Impacts on Cultural Landscapes

Alternative 1: No-Action Alternative

Under the no-action alternative, the trends and conditions of cultural landscape of the NHL district would remain as described in the affected environment section above. Beneficial impacts on the cultural landscape largely comprise current management action to preserve and protect the landscape. The no-action alternative would, however, allow for adverse overcrowding conditions to occur, which would ultimately result in damage to the cultural landscape due to exceeding resource capacity, continued visitor trampling of vegetation and attendant soil erosion, and trail and shoulder widening because of damage to vegetation and erosion. The no-action alternative would also promote continued prohibition of private vehicles on Westside Road for the visitor safety, which would adversely affect the historic circulation of the NHL district. Finally, under the no-action alternative, baseline documentation, such as cultural landscape inventories and determinations of eligibility and updated listings in the NPS Cultural Resource Inventory System, would be further delayed since these documents and data entries would need to precede modifications of the cultural landscape in the other action alternatives.

Common to All Action Alternatives

As noted above, there are cultural landscapes that contribute to an NHL district and are listed or eligible for listing in the national register. Although there will be impacts to these cultural landscapes under NEPA, when taken together with the mitigation measures described earlier in this document, there would be no adverse effects to historic properties under section 106.

The addition of signage at Kautz Creek, if it is compatible with the NHL district, would not have a direct impact on the cultural landscape.

A new gate or barricade above Cougar Rock for winter day-use access when the Paradise area is closed would need to be compatibly designed and built similarly to other gates and barricades within the NHL district. The gate or barricade would have a direct adverse impact on the cultural landscape by introducing nonhistoric features into the NHL district. Similarly, the design of pilot self-pay stations at Longmire and Kautz Creek and vault toilets at Reflection Lakes would need to be compatible with the design of the NHL district. The self-pay stations and vault toilets would have an adverse, direct impact on the cultural landscape by introducing nonhistoric features into the park. These should be situated carefully to minimize impacts on the NHL district.

Beneficial direct impacts across all alternatives include targeted tree removal to restore historic viewsheds, which were integrated into the road design and visitor experience. Retained parking areas and pullouts (situated on original roadbed), overflow parking, parking along the south side of Nisqually to Paradise Road, and targeted revegetation would maintain the historic road character, retain the feeling of the cultural landscape, and protect the cultural landscape from further deterioration. The installation of permanent, compatible barriers to prevent parking along road shoulders would also be a beneficial direct impact by reducing visitor intrusions and park infrastructure/temporary barriers into the viewshed. At Comet Falls in particular, curbing that is compatible with the historic character of Nisqually to Paradise Road would be installed to prevent cars from parking along roadsides and to restore the area to its natural character. The Sunrise area would additionally see a beneficial direct impact by limiting vehicles and people per viewshed as part of a permitting system for parking in the area. When Sunrise reaches capacity,

the park would meter access at the gate allowing for one vehicle to enter for each vehicle departing.

The establishment of a commercial tour of Westside Road would provide a measure of continuity with historic use patterns for the NHL district, lessening the adverse indirect impact of having the road closed. Congestion at Paradise may lessen with dispersal to Westside Road, as decreased congestion would improve the experience at the viewpoint and the cultural landscape at large at Paradise. The cultural landscape at Westside Road would also be improved since the road features and developed areas that contribute to the NHL district would be maintained for visitors. Lack of maintenance along Westside Road is currently allowing these features to deteriorate. Establishing this commercial tour, which would improve the cultural landscape and historic use pattern of the NHL district, however, overlooks the visitor safety threat of touring Westside Road, which was closed due to geophysical slides. The proposed parking lot for Westside Road would still be situated in a geological hazard area.

Alternative 2: Corridor-Level Access Management (NPS Preferred Alternative)

In addition to the actions analyzed in the "Common to All Alternatives" section, under alternative 2, beneficial direct impacts on the cultural landscape would include reducing the congestion at areas of high visitation. Congested areas additionally have diminished views, and reducing the number of people at the viewpoint would improve the visitor experience. The reduction of congestion would also improve visitor accessibility of scenic views and restore the design and intent of scenic areas, which were an element in the historic park master planning. In particular, Christine Falls, which is currently barely accessible because of overcrowding, would be directly impacted and improved by a reduction in congestion provided under alternative 2. Another beneficial direct impact of alternative 2 includes the mitigation of wear and tear to park structures (such as the Nisqually suspension bridge), as this alternative would not overwhelm park infrastructure. Alternative 2 would additionally reduce the likelihood of visitors going off-trail and creating social trails near vista points and overlooks, since visitors walk around trees that block the viewshed and create vegetation resource damage.

Adverse direct impacts from alternative 2 include an increase in congestion in other locations, particularly at entrances, and resource damage associated with congestion and overuse at other areas along the road corridor. Construction of a connector trail to Comet Falls would alter the historic layout of the Mission 66 campground and picnic area and directly and adversely impact the cultural landscape. These modifications, as well as the installation of new parking, and new pedestrian connections, would also adversely and directly impact the Mission 66 designs at the Paradise picnic area lot. These modifications and new developments would also be compatibly designed to minimize adverse effects to the NHL district and cultural landscapes under section 106.

Alternative 3: Site-Level Access Management with Cougar Rock to Paradise Shuttle

In addition to the actions analyzed in the "Common to All Alternatives" section, under alternative 3, beneficial and direct impacts on the cultural landscape would include maintaining the intent and design of Nisqually to Paradise Road as a scenic drive and example of park master planning. The reversal of circulation on Valley Road would restore part of the originally designed circulation patterns, give visitors a better appreciation of the planned scenic views while traveling uphill, and restore a sense of arrival, which are mentioned in the NHL district documentation. The original circulation patterns were changed as part of Mission 66 program improvements, and

this alternative would partially restore the original design and intent of Valley Road circulation and enjoyment.

Along the roadway, an overall reduction in congestion would improve visitor appreciation of scenic views and restore the design and intent of these areas, which was an element in the historic park master planning. The shuttle service would have a direct adverse impact on the cultural landscapes since the intent of Nisqually to Paradise Road was for the enjoyment of visitors in personal vehicles. The shuttle service would also introduce a new, constant source of noise, as shuttles are louder than personal vehicles. The shuttle service would directly impact the cultural landscape and visitor experiences, especially along the Wonderland Trail, part of the NHL district, between Longmire and Paradise. Alternative 3 may also result in an indirect impact of a total increase the number of visitors at Paradise due to combined private vehicle park reservations, shuttle access, and commercial tours. An increase in the number of visitors at Paradise would block or intrude upon the scenic views.

The installation of picnic tables or a sheltered picnic area at Longmire and a covered picnic area at Kautz would be evaluated for their potential impacts. Their designs would need to be compatible with the design of the NHL district and their location situated carefully to minimize adverse effects on the NHL district under section 106. The potential sheltered picnic areas would have an adverse, direct impact on the cultural landscape by introducing nonhistoric features into the park.

The conversion of the Cougar Rock picnic area into a remote parking lot for Paradise would directly impact the Mission 66 campground and picnic area designs, which are eligible for the national register. Modifications to the Cougar Rock picnic area may also directly and adversely impact the cultural landscape and possibly historic structures due to damage caused by snow removal, drainage, and water runoff. The addition of parking lots for shuttles would directly impact the cultural landscape at Kautz Creek and Westside Road, changing the circulation of the area. The installation of parking lots in all areas would necessitate changing the topography and the cultural landscape through grading and possibly slope retention infrastructure. At Christine Falls, the addition of connecting trails and their associated trailheads would directly impact the cultural landscape of the scenic drive by increasing vehicles and visitors within the viewshed. New social trails may also be created by visitors due to an increase in parking in this area. Changes to the Carter Falls Trailhead would directly impact its historic character and the NHL district.

The addition of shuttle stops and new pedestrian connections would directly impact the scenic views and the historic design of the road corridor. Associated wait times for shuttles may lead to indirect impacts such as increased vandalism (graffiti) along the historic guard walls underneath the bridges (contributing and noncontributing to the NHL district). Vandalism may also occur on the shuttle stops themselves, further having a visual impact on the character of the district. Additional visitation may result in the creation of more social trails and a widening of the road prism, which would diminish the cultural landscape. The anticipated continuation of parking in overflow lots and in unsanctioned parking areas to access the shuttle stops would indirectly adversely impact the cultural landscape and views due to visual intrusions and resource damage from exceeding the designed parking capacities. Finally, the proposed increase in vehicular traffic may create more vehicular and pedestrian interactions, which is not aligned with the NHL district master planning of the road corridor.

Finally, the reconfiguration of fee booths (kiosks) at the Nisqually entrance to two entrance booths in each line (one in front of the other) may adversely and directly impact the cultural landscape of the Nisqually entrance. The entrance and booths have been modified, however, since the period of significance for the NHL district The existing booths were built in 1988 in the Rustic style. The middle booth, located on the Mission 66-era island, replaced an earlier Mission 66-era booth (Architectural Resources Group 2021). New booth design would be compatible with the NHL district architecture. Additional compliance would include a determination of eligibility of Mission 66 resources as the Nisqually entrance and proceed under section 106 consultation.

Alternative 4: Site-Level Access Management

In addition to the actions analyzed in the "Common to All Alternatives" section, under alternative 4, the reduction of congestion at areas of high visitation would be beneficial to maintaining the cultural landscape by limiting viewshed intrusions, restoring the design and intent of scenic areas, and improving visitor appreciation of scenic views, which was an element in the historic park master planning. Eliminating informal parallel parking along Paradise Valley Road would also directly improve the cultural landscape of this stretch of road since adding this parking was previously allowed to improve congestion and was not part of the original design. Alternative 4 would potentially lessen the visitation impact on the trails, which are being widened by heavy use and trampling. A decrease in visitor vegetation trampling along the roadside and a decrease in widening the road prism would also occur since all visitors would have a parking spot. Additionally, to support the actions of alternative 4, infrastructure for permitting, staffing, informal parking, and new signage would need to be installed, which would also directly and adversely impact the cultural landscape. New social trails may also be created by visitors, with an increase in parking in this area, and indirectly, adversely impact the cultural landscape and associated resources.

Finally, reconfiguring fee booths (kiosks) at the Nisqually entrance to two entrance booths in each line (one in front of the other) may directly and adversely impact the cultural landscape of the Nisqually entrance. The entrance and booths have been modified, however, since the period of significance for the NHL district. The existing booths were built in 1988 in the Rustic style. The middle booth, located on the Mission 66-era island, replaced an earlier Mission 66-era booth (Architectural Resources Group 2021). New booth design would be compatible with the NHL district architecture. Additional compliance would include a determination of eligibility of Mission 66 resources as the Nisqually entrance and proceed under section 106 consultation.

Cumulative Impacts Across All Alternatives

Overall, past actions and events have influenced and affected the current condition of the cultural landscape within the project area. Nisqually to Paradise Road, an important contributing element to the Mount Rainer National Historic Landmark District, has undergone periodic reconstruction, maintenance, repairs, and overlays since its construction (NPS 2012). Most development and past actions, including Mission 66 actions and development (NPS 1957, 2008b), have occurred within the road corridor and within the NHL district, including roadside developments at the Nisqually entrance; facilities at Longmire and Paradise; Cougar Rock Campground; and other pullouts, parking areas, and trailheads along the road, all contributing to the current condition of the cultural landscape. In 2006, flooding washed out a portion of the road at Sunshine Point and required temporary closure of the road and permanent closure of the campground (NPS 2012). Portions of Westside Road and road structures have been damaged by

rockfall, slides, and floods, and parts of the road have been closed for visitor health and safety (NPS 2011b, 2002). Across the action alternatives, the installation of new parking areas and bus stops; modifications to picnic, parking, and camping areas and trails; and the installation of parking barriers would continue the periodic reconstruction, maintenance, repairs, and overlays to the contributing cultural landscape features of Nisqually to Paradise Road and the NHL district (NPS 2012). The careful design of these additions and modifications, in conformance with the secretary of the interior's standards and guidelines, should ensure that additions and modifications would not be incompatible, out of scale, or in great contrast to the character and aesthetic of the cultural landscape and NHL district. Thus, the additions and modifications would minimally affect the spatial organization, scale, and visual relationship among landscape features and circulation patterns. The commercial tours on Westside Road may be a partially beneficial impact by opening portions of the cultural landscape to visitors again. The tours would, however, have cumulative adverse impacts on the cultural landscape when considering infrastructure and maintenance necessary for visitor safety. Following are additional cumulative impacts across all alternatives:

- Under alternative 2, the installation of kiosks at the Nisqually and Stevens Canyon entrance stations would have a minor adverse direct impact on the cultural landscape and viewshed, regardless of the design compatibility with the NHL district, and modifications to campground and picnic areas would impact the Mission 66 designs and layout. Congestion, overuse, and resource damage issues would be mitigated at known areas, but these issues may arise at others.

- Under alternative 3, planned foreseeable actions may result in a transfer of adverse direct and indirect impacts on the cultural landscape, viewshed, and resources contributing to the NHL district from some areas of the park to other areas. Long-term, direct, adverse impacts on the cultural landscape are associated with shuttle infrastructure, parking lot and picnic modifications, and the reconfiguration of the Nisqually entrance booths, as well as shuttle noise and visual intrusion not compatible with the NLH district. New infrastructure to support this alternative may also provide more opportunities for indirect impacts, such as vandalism (graffiti) on structures (historic and nonhistoric), creating an adverse visual impact on the landscape character of the district.

- Under alternative 4, planned foreseeable actions may result in cumulative and long-term adverse impacts on the cultural landscape by adding support infrastructure, changing the intent of the visitor experience within the cultural landscape, and modifying the design of NHL district and Mission 66 resources.

HISTORIC STRUCTURES

Affected Environment (Current and Expected Future Conditions of Resource)

Nisqually Entrance

As previously mentioned, the Nisqually entrance was listed in the National Register of Historic Places (1991) as part of the Nisqually Entrance Historic District. Original construction details and remodeling details from roughly the 1950s into the early 1970s for the contributing historic structures can be found in the 1991 national register nomination (Toothman 1983a). The boundaries of the national register historic district are the same as the boundaries of this

developed area, which is part of the larger NHL district. The Nisqually entrance is delineated by an 800-foot square, one side of which is on the park boundary, centered on the entrance arch. Within this 800-foot square, the entrance arch, the comfort station road, and several buildings contribute to the NHL district. The kiosk bypass road and structures were added in the 1960s or later and do not contribute to the NHL district. The current entrance booths were constructed in the late 1980s (Toothman, Begley, and Carr 1996; NPS 2010a; Architectural Resources Group 2021). Since the NHL district documentation, however, the 2015 NPS Mission 66 Era Resources national register nomination was accepted, which includes the prototype Mission 66 program developed at Mount Rainier. A determination of eligibility for potential Mission 66 resources at the Nisqually entrance and the park are needed, and further section 106 compliance would be completed before modifications from the general management plan and this plan are initiated.

Paradise

The historic developed area within the NHL district includes the Paradise parking lot area and the portions of Paradise Park and Paradise Valley circumscribed by the Skyline Trail, the Nisqually Road, and the Lakes Trail. The 1967 Scoop Jackson Visitor Center (nonextant) and its parking lots reconfigured the basic spatial definitions and sequences of the western portion of the developed area, and therefore, the NHL district does not include the area of the 1967 visitor center, the old campground area (picnic area) nor the portion of the Paradise Loop Road that leads to Paradise from the Nisqually Road (Toothman, Begley, and Carr 1996). The historic comfort station, referred to as the slate restroom, is in the Paradise developed area and contributes to the NHL district (Toothman, Begley, and Carr 1996). The historic Paradise comfort station/slate restroom (NR P-304) is also a contributing feature to the Paradise Historic District and is significant for its reinforced concrete construction, built to withstand the heavy snowfalls at Paradise, and stone veneer that blends the building with the surrounding terrain. Despite the installation of new fixtures prior to the national register nomination, the comfort station has remained largely unaltered (Toothman 1983b). The Henry M. Jackson Visitor Center (2008) is located within the NHL district (Toothman, Begley, and Carr 1996) and has been designed to be architecturally compatible with the NHL district. The 2008 visitor center, however, does not contribute to the NHL district (NPS 2002).

Finally, graffiti is an existing issue at the park and has been negatively affecting both historic and nonhistoric structures of the park's built environment.

Impacts on Historic Structures

Alternative 1: No-Action Alternative

Under the no-action alternative, the trends and conditions of historic structures would remain as described in the affected environment section above. Beneficial impacts comprise the current management of these resources where no changes to the historic fabric are anticipated. Adverse impacts on historic structures include a continued lack of a determination of eligibility for Mission 66 resources at the Nisqually entrance, which would be needed before undertaking the proposed actions in the other alternatives.

Common to All Action Alternatives

Beneficial direct impacts across all alternatives include managing access to within capacity. Managing access would be expected to mitigate wear and tear on historic structures. The

rehabilitation of historic structures, such as the historic Paradise comfort station/slate restroom (NR P-304), would be undertaken in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (NPS 2017b), and few, if any, adverse impacts are anticipated.

Alternative 2: Corridor-Level Access Management (NPS Preferred Alternative)

In addition to the actions analyzed in the "Common to All Alternatives" section, under alternative 2, beneficial impacts include bringing the Paradise picnicking facilities back into alignment with its original design, intent, and capacity and rehabilitating the historic comfort station. Additionally, modifications to support a consolidated picnic area and rehabilitated historic structure include modifications to meet Architectural Barriers Act Accessibility Standards and ensure improvements to plumbing and utility lines. Modifications to the consolidated picnic area and historic comfort station will be undertaken in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (NPS 2017b), and few, if any, adverse direct impacts are anticipated.

Alternative 3: Site-Level Access Management with Cougar Rock to Paradise Shuttle

Under alternative 3, beneficial direct impacts are the same as those found in the "Common To All Alternatives" section. Modifications to the Cougar Rock comfort station should be undertaken in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (NPS 2017b), and few, if any, adverse direct impacts are anticipated. Anticipated rehabilitation of the Cougar Rock comfort station includes updating the plumbing, adapting for potential winter use, and providing for visitor accessibility that meets Architectural Barriers Act (ABA) standards. Finally, alternative 3 calls for the installation of stacked entrance booths at the Nisqually entrance. Since the NHL district is delineated by an 800-foot square at the Nisqually entrance, the installation of these stacked entrance booths should be architecturally compatible with the historic structures that contribute to the NHL district. In 2022, the State Historic Preservation Officer concurred that the Nisqually entrance kiosk (Property ID: 725867), located one road width away from the old porte-cochere, is not eligible for listing in the national register, as it was constructed in 1988, well after the conclusion of the Mission 66 and Parkscape USA programming era (Architectural Resources Group 2021). Associated wait times for shuttles may lead to an indirect impact of increased vandalism (graffiti) along the historic guard walls underneath the bridges (both contributing and noncontributing to the NHL district).

Alternative 4: Site-Level Access Management

Under alternative 4, beneficial impacts are the same as those found in the "Common To All Alternatives" section.

Cumulative Impacts Across All Alternatives

Across all action alternatives, research to determine the eligibility of historic structures for the national register, the presence of Mission 66 resources and their eligibility for the national register, and appropriate treatment strategies are needed before modifications or alterations can take place. The rehabilitation of historic buildings and structures would be undertaken in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (NPS 2017b), and few adverse impacts are anticipated. Mitigation of direct and indirect adverse impacts on historic structures would include careful consideration of the treatment and rehabilitation/modification designs to minimize impacts on the integrity the historic structures.

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Chapter 4
Consultation and Coordination

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CHAPTER 4: CONSULTATION AND COORDINATION

INTRODUCTION

The National Park Service conducted civic engagement during the planning process to provide an opportunity for the public to learn about and contribute to the planning process throughout the project. Consultation and coordination with federal and state agencies, tribal nations, and other interested parties were also conducted to identify issues and/or concerns related to natural and cultural resources. This section provides a summary of the public involvement and agency consultation and coordination that occurred during planning.

PUBLIC INVOLVEMENT

To ensure that a variety of stakeholders and the public could participate in the planning process, multiple phases of civic engagement were provided. Two rounds of civic engagement were completed in the summers of 2020 and 2021 to further explore issues, develop goals, and gather public feedback on potential management strategies. Civic engagement resulted in 1,830 individual correspondences, more than 360 attendees at public and stakeholder meetings, and more than 4,500 views of online materials. Public input during civic engagement was used to identify potential management strategies and inform the range of alternatives carried forward for full analysis in the plan and environmental assessment. Stakeholders additionally provided important insight on identifying issues, developing goals, and providing feedback on potential management strategies.

Additional information about civic engagement periods in the summers of 2020 and 2021 can be found under the "Document List" header at https://parkplanning.nps.gov/nisquallycorridor.

AGENCY CONSULTATION

Agency consultation and coordination began early in the planning process and is ongoing to ensure that all relevant agencies are informed of any NPS planning actions.

The park invited tribal consultation to help inform the analysis of the proposed action and the alternatives. Affiliated tribes who were sent letters regarding the project include the following:

- Cowlitz Indian Tribe
- Muckleshoot Indian Tribe
- Nisqually Indian Tribe
- Puyallup Tribe of Indians
- Squaxin Island Tribe
- Confederated Tribes and Bands of the Yakama Nation

During the development of this plan and environmental assessment, the park initiated more robust consultation with affiliated tribes. The park also has initiated section 7 consultation with

the US Fish and Wildlife Service and section 106 consultation with the Washington State Historic Preservation Officer.

PARTNERSHIPS

The National Park Service is legally unable to commit to actions on lands outside of the NPS boundary. As such, actions outside the NPS boundary are not analyzed in this plan. However, the National Park Service is committed to continuing to explore partnership strategies with the appropriate partners. Some partnership strategies the National Park Service would continue to explore include the following:

Town of Ashford. Digital and variable message signs could be used for route planning and wait times. Permanent signs could be installed indicating turnoffs for alternate routes. Visitor orientation and information, such as self-guided information, could be improved. A recreational vehicle staging area could be developed outside the park to provide the opportunity for visitors with a recreational vehicle to park and drive a towed vehicle into the park. Driveways could be striped from Kernahan Road to the Nisqually entrance to discourage drivers from blocking them, similar to what has been implemented near Washington State ferry terminals in high-traffic locations.

Skate Creek Road. The National Park Service could coordinate with the US Forest Service and other partners to improve Skate Creek Road. If improvements are made to the road, a variable message sign could be installed at the Kernahan Road turnoff with directions to the Stevens Canyon entrance and wait times for both entrance stations.

Elbe. Visitor orientation and information outside the park, such as self-guided information, could be improved.

Eatonville. Static signs could be installed with average travel time on weekends, recommended routes, and where to find traffic information.

Regional Access. The National Park Service could work with a concessionaire to provide public transit to and from rural areas. A concession opportunity could be solicited for a hiker shuttle from Ashford into the park. The National Park Service could explore partnering with regional transit-to-trails programs to support access opportunities that could not require a car. The National Park Service could work with car rental companies at the Seattle-Tacoma International Airport to provide park trip planning information.

Appendixes

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APPENDIX A: GENERAL MANAGEMENT DIRECTION

INTRODUCTION

This chapter outlines the general management direction for Mount Rainier National Park. The general management plan (GMP) for the park provides high-level guidance on how the park will be managed. This chapter clarifies and reduces redundancy of the 2002 GMP desired conditions and answers the question, "What are we managing for?" in each area of the park.

ZONING

The zoning, as defined in the 2002 general management plan, needed minor updates and clarification in some areas. In the more than 20 years since the general management plan was developed, visitor activities and experiences have changed, as well as some NPS policies. In some cases, the zoning does not provide sufficient detail to inform the decisions of park managers regarding appropriate visitor uses and resource conditions. Therefore, this amendment updates the zones and descriptions to clarify the context and direction for these areas of the park. The changes (summarized in "Chapter 2: Alternatives") are considered amendments to the park's general management plan. The current zone descriptions can be found in the general management plan. While the Nisqually to Paradise Corridor planning area does not fall within all zones of the park, the management zones for Mount Rainier National Park were comprehensively updated as a part of the planning process, and all park zones are included in this chapter. See figures A-1 and A-2 for the spatial extent of the zones. The National Park Service also proposes a zoning change between Kautz and Longmire and between Cougar Rock and the Comet Falls Trailhead from pristine wilderness to transition trail wilderness. This zoning change would follow the alignment of Paradise Road to accommodate new wilderness trails.

DESIRED CONDITIONS BY MANAGEMENT ZONE

Desired Conditions for All Zones

High-quality experiences are provided in settings with a range of visitor densities (high to low) that are not dominated or degraded by crowding or congestion of vehicles or visitors. These settings are characterized by high-quality natural and cultural resources, natural soundscapes, and dark night skies. The number of visitors to key park attractions is managed in a way that prevents conflicts over available parking spaces and between different activity participants and provides access for a variety of activities. Visitors with different abilities have equitable opportunities to access all park facilities where possible.

The Mount Rainier National Historic Landmark District would continue to overlie the prescriptive management zones. Most of the district would be within nonwilderness zones, but the Wonderland and Northern Loop Trails and some structures in the wilderness zones would also be within the NHL district.

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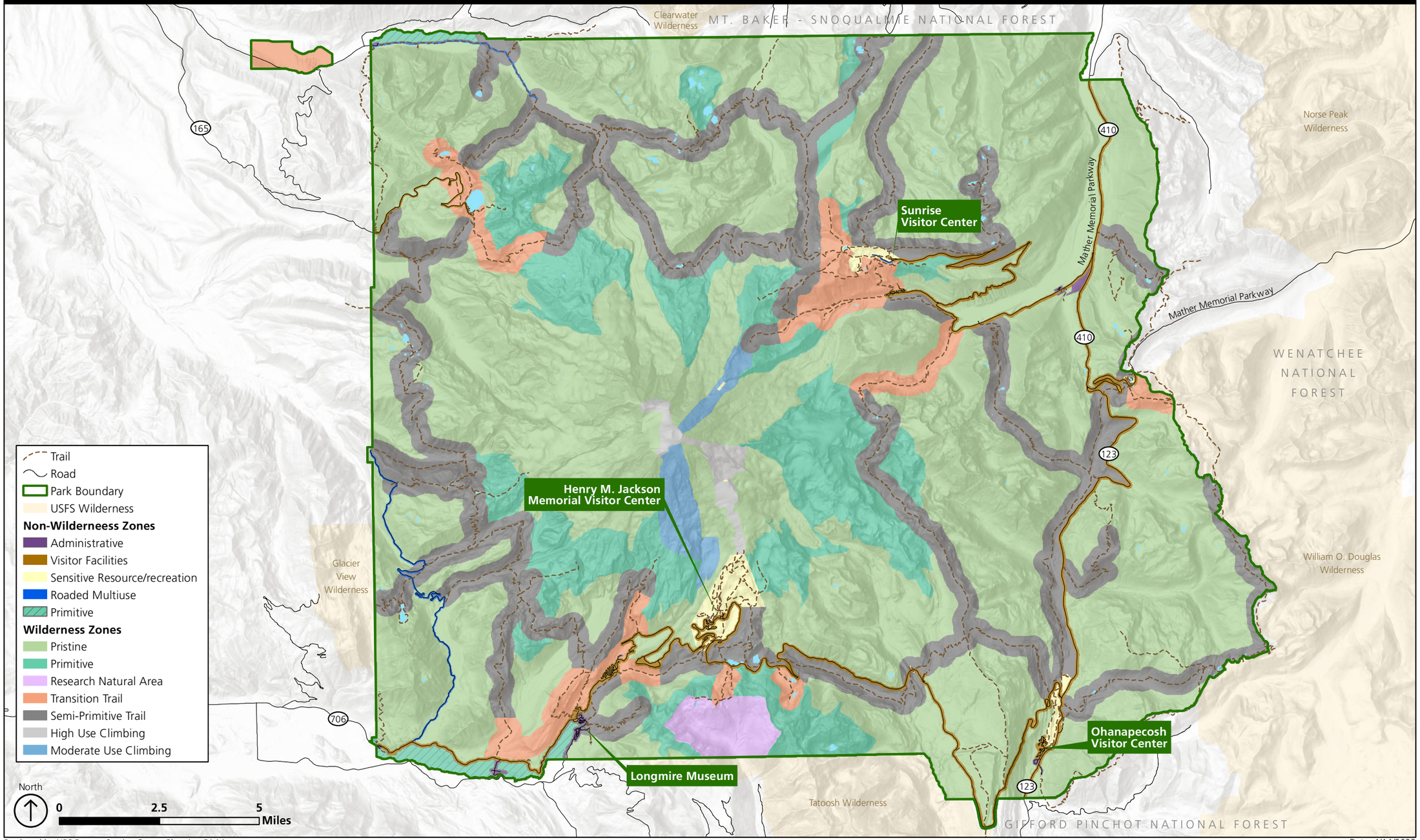
Summer Zones
Parkwide

Mount Rainier National Park
Washington

National Park Service
U.S. Department of the Interior



Produced by NPS Denver Service Center Planning Division

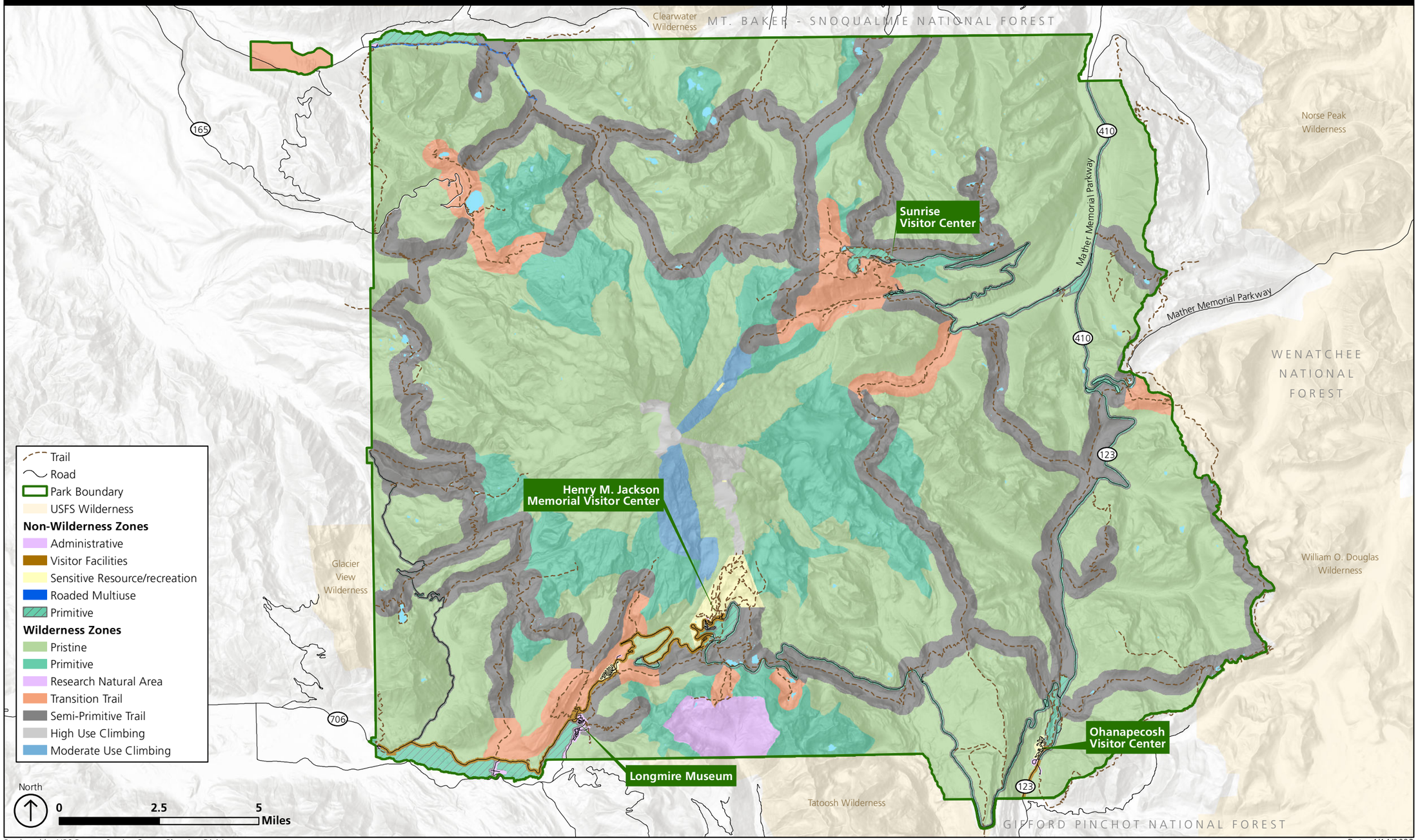
Date: 4/14/2023

Figure A-1. Mount Rainier National Park Summer Zones

Winter Zones
Parkwide

Mount Rainier National Park
Washington

National Park Service
U.S. Department of the Interior



Produced by NPS Denver Service Center Planning Division

Date: 4/14/2023

Figure A-2. Mount Rainier National Park Winter Zones

Summary of Nonwilderness Management Zones

In some areas, different management zones would be applied seasonally to accommodate the major differences in types of use and resource protection that are associated with winter snow cover. The application of summer zones usually would begin between the end of May and July, depending on the area, and is subject to change based on environmental conditions such as snow depth. The zones would transition back to winter based on environmental conditions or when the roads could not be kept clear using push plows. This situation usually occurs between late September and mid-October.

Generally, the visitor experience of the management prescription would become more primitive in winter when facilities such as roads, restrooms, and picnic tables are covered by snow. Resource management concerns change seasonally, as soils and vegetation are protected by snow.

Nonwilderness Zones

Primitive Zone

Summary

This zone generally would be managed like the Primitive Zone in the wilderness area—as an unmodified landscape with natural processes unimpeded and significant cultural resources preserved. The only signs of human use would be some primitive routes (way trails) and possibly some maintained trails. Visitors could be apart from but relatively close to developed areas. Although not part of designated wilderness, mechanized use by visitors would not be permitted, and overnight use would not be permitted (unlike other wilderness zones). Dynamic hydrological processes preclude the development of infrastructure and facilities.

Natural Resources

Natural ecological functions, components, and processes would not be influenced by human use except for minimal modifications of soils, hydrology, and plants in localized areas by significant cultural resources and a few user-made travel routes.

Cultural Resources

Significant cultural resources that might be present and would be managed for preservation include prehistoric and historic archeological sites and ethnographic resources.

Visitor Experience

- Visitors could experience a feeling of exploration while being near developed facilities.
- Few people would be present; many opportunities for solitude would exist.
- Cross-country hiking would be the primary focus, but some maintained trails and user-developed way trails would exist.
- No overnight or visitor mechanized use would be permitted.
- No special skills and knowledge would be needed because the zone has few facilities and other people.
- In the winter, vehicular access would not be provided to the zone.

- No on-site interpretation or information would be available, but off-site interpretation and education might be available.

Facilities and Activities

- Minimal signs of human use would be present except for a few primitive routes.
- Some primitive routes (way trails) and unmaintained constructed trails might exist, but the zone has no maintained markers such as signs, blazes, or cairns.
- Overnight camping would not be permitted.
- No visitor facilities would be permitted, except trails and associated structures. Trail structures might include culverts, bridges, turnpiking, and signs. Some way trails also might be present.
- Some administrative facilities and uses take place in this zone.

Sensitive Resource/Recreation Zone

Summary

This zone would be applied to areas where easily accessible resources have a high potential for damage. The landscape would generally be natural and only slightly modified by facilities and structures in localized areas. Signs of human use would be few and limited to designated trails, facilities, and use areas. Visitors would be closely managed to minimize impacts and could experience resources but would remain relatively close to developed areas. A high degree of social interaction would be possible, but the experience of park resources would be generally unimpeded by others.

Natural Resources

- Natural ecological functions, components, and processes would not be influenced by recreational use, except in a small part of zone.
- The environment would be intentionally modified in trail corridors (about 10 feet wide), with a few designated campsites.
- The zone would only be 100 feet wide when applied only to trails to accommodate rerouting trails and when required by natural conditions.
- Vegetation restoration efforts would be coordinated with ongoing and proposed projects, including infrastructure, and roads and parking.
- Social trails, abandoned trails, and denuded areas would be restored and reduced.
- Clear trail routing and signage would be provided.
- Plant identification tags would be provided for visitor education.

Cultural Resources

Significant cultural resources that might be present and managed for preservation include prehistoric and historic archeological sites, historic structures, cultural landscapes, and ethnographic resources.

Visitor Experience

- The experience of park resources is generally unimpeded by other visitors and relatively close to developed facilities.
- Visitors could see and enjoy natural and cultural resource attractions while still being near developed facilities.
- Visitors could pursue a variety of nonmotorized and nonmechanized activities and use wheelchairs on designated trails; however, to protect sensitive resources, no cross-country travel would be permitted in the summer.
- No stock use would be permitted.
- Many people would be present, and fewer opportunities for solitude would exist.
- Visitors could move along trails relatively freely, experience park resources near developed facilities, and not be impeded by others.
- Camping might be permitted, but only in designated trailside camps and in shelters in the summer (in winter, cross-country camping would be permitted near developed areas).
- Overnight party size would be limited.
- No special skills or knowledge would be needed to use these areas, but visitors should be informed about minimum impact practices.
- Bulletin boards, wayside exhibits, signs, and formal/informal interpretive programs would provide information.
- In the winter, access would not be facilitated by mechanized or motorized means (e.g., grooming equipment).
- Visitors could have a memorable experience.

Facilities and Activities

- Facilities and structures would be in localized areas.
- Hiking would be the primary activity.
- Most trails are hardened, well-defined, highly maintained, usually with many trail structures. Some unmaintained, constructed trails might be present.
- A few designated trailside campsites and walk-in picnic areas are available, as well as a few benches, shelters, and small restrooms.

- No roads would be provided in this zone.
- Emergency access would be provided throughout Paradise.
- Visual impacts on the landscape would be balanced with visitor orientation signage.
- The zone would have seasonal flexibility, with resilient, modular, removable signs for the winter season.
- Universal design would be used for interpretation (e.g., audio).
- Facilities would meet accessibility requirements, and there would be accessible recreation and interpretation opportunities.
- Accessible trail routes and universal design would be provided, including trail descriptions of routes and pulloffs/trail junctions with universal access and in keeping with the NHL district.
- Smooth walking surfaces and minimal social trails would be provided for improved visitor experience.
- Multilingual signage and wayfinding would be present.
- Stone masonry structures would be maintained for visitor safety.

Roaded Multiuse Zone

Summary

- The natural landscape would be noticeably modified by graveled roads, trails, walk-in campgrounds and picnic areas, and small buildings. The zone would have much social interaction. Visitors would arrive and experience park resources by horse, bicycle, or hiking on trails or roads. Motor vehicles would be permitted only for administrative use as shuttles or to transport people with disabilities.
- Natural Resources:
- Natural ecological functions, components, and processes would be moderately modified intentionally in a 50-foot unpaved road corridor and by developments in localized areas.
- The zone would be 200 feet wide.

Cultural Resources

Significant cultural resources that might be present and preserved are historic roads, bridges, and culverts, prehistoric and historic archeological sites, and ethnographic resources, such as traditional routes. There may be some modification to the built historic environment if deemed necessary to provide for visitor safety and sustainable access. Such modifications, if needed, would be designed to avoid or minimize adverse effects to historic properties to the extent practicable.

Visitor Experience

- Motorized vehicles during the summer are permitted for public shuttles (including commercial), visitors with disabilities, and park administration.
- Visitors could see resources via trails or graveled roads.
- Roads and associated structures would foster a feeling of an area untouched by time, ecologically and historically.
- Nonmotorized recreational activities would be permitted, such as bicycling, hiking, horseback riding, cross-country skiing, snowshoeing, and walk-in camping.
- No cross-country travel would be permitted in summer.
- Many people would be present, and few opportunities would be available for solitude.
- No special skills or knowledge would be needed.
- Summer camping would only be allowed in walk-in campgrounds; cross-country camping would be allowed in the winter.
- Motorized winter access might be available.
- Interpretation would be available but concentrated at trailheads and camps.

Facilities and Activities

- The zone would include gravel roads, trails, walk-in campgrounds and picnic areas, and small buildings.
- Activities would include hiking and bicycling.
- Graveled roads, entrance stations, and small buildings like those listed for the sensitive resource/recreation zone might be present.
- New trails might be located in roadbeds.
- Some limited parking would be available.
- Visitor and administrative facilities would generally be well concealed and almost unnoticeable from road corridor(s).
- Structures along roadways (rock walls and stone-faced concrete bridges) would be designed to ensure ecological and historical consistency.
- Safe and intuitive vehicular circulation and parking, pedestrian routes to amenities, and access to facilities would be provided.

Visitor Facilities Zone

Summary

High modification would occur to natural processes and the natural landscape. This zone would offer highly structured opportunities to enjoy and learn about the park. Many facilities and services would be available, usually in a concentrated area. Only in this zone could people find lodges, visitor centers, and drive-in campgrounds. Visitors would have much social interaction. Natural processes and natural landscape might be highly modified.

Natural Resources

Natural ecological functions, components, and processes would be intentionally modified to varying degrees, depending on the type of visitor facility (less in campgrounds and in Camps Muir and Schurman, and more in visitor center parking areas).

Cultural Resources

- Significant cultural resources that might be preserved would be cultural landscapes and landscape features, such as buildings, structures, roads, bridges, natural areas, and topographic features.
- Historic buildings and other contributing features of the NHL district would be protected and preserved.
- The historic road and contributing elements may be modified to provide for sustainable visitor access that meets vehicular safety requirements. If such modifications are needed, they would be designed to avoid or minimize the potential for adverse effects to historic properties to the extent practicable.
- Prehistoric and historic archeological sites and ethnographic resources such as traditional routes would be protected and preserved.

Visitor Experience

- Timely travel information and other communications regarding roadway conditions would set visitor expectations and provide prearrival planning information.
- Highly structured and fully accessible opportunities would be available for enjoying and learning about park.
- Visitors could access the zone by foot, bicycle, and motor vehicle.
- Visitors could experience much social interaction while acquiring information and the conveniences needed to experience park resources.
- Motorized and nonmotorized uses would be available, including attending interpretive programs and exhibits, scenic driving, walking, dining, picnicking, camping, and other activities would be available in highly developed areas.
- Many people would be present, including park rangers, and there would be limited opportunity for solitude.

- No special skills or knowledge would be needed.
- In the winter, access may be provided by mechanized or motorized means (grooming equipment).
- Formal and informal interpretive programs would be available frequently, with delivery concentrated at visitor centers, trailheads, parking areas, and pullouts.
- The roadways and parking lots would circulate with a minimum level of service of acceptable level of driver comfort and some delay at peak times (a volume-to-capacity ratio of 0.7–0.8).

Facilities and Activities

- A wide array of visitor services and facilities would be available, including roads, entrance stations, visitor centers, lodges, and campgrounds.
- Activities would include bicycling, hiking, snow play, scenic driving, skiing, and camping.
- Many visitor facilities and some administrative facilities would be present.
- All types of visitor-related buildings would be permitted in this zone, and this would be the only zone where visitor centers, lodges, paved roads, and drive-in campgrounds are permitted.
- Visitors could access this zone by paved and graveled roads as well as trails.
- Facilities would be accessible to all visitors.
- Utility developments would be present to the extent possible, but not evident.

Administrative Zone

Summary

High modification would occur to natural processes and the natural landscape. The primary purpose of this zone would be to support the management and operation of the park. The zone would be highly developed, with concentrations of administrative facilities. General visitation would not occur, although some visitors might access these areas to obtain staff assistance, to solve a problem, or to learn about historically significant buildings.

Natural Resources

Natural ecological functions, components, and processes would be intentionally modified to various degrees, depending on the type of administrative facility (less modified for trails to water supplies and more modified in park maintenance and housing areas).

Cultural Resources

Significant cultural resources that might be preserved in this zone are historic buildings, structures, and other contributing features to the cultural landscape or historic district, prehistoric and historic archeological sites, and ethnographic resources (such as traditional routes and tribal designated use areas).

Visitor Experience

- General visitation would not occur, although some visitors might access these administrative areas and buildings to obtain staff assistance or learn about historically significant buildings.
- Visitor recreation opportunities would not be offered.
- Interpretive opportunities would be available in the zone, such as visiting and learning about historically significant buildings.
- Facilities and Activities:
- Concentrations of administrative facilities would support park management and operation.
- Activities would be associated with park administration.
- The zone would be highly developed, with all types of administrative-related buildings.
- Where feasible, facilities would be separated or screened from visitor use areas and adequate wayfinding provided.
- Access would be via some paved and gravel roads and parking areas except for areas with primarily administrative purposes.

Summary of Wilderness Management Zones

Seven management zones would be applied to the wilderness to allow for a variety of trail and off-trail experiences. The zones would be the same in both the summer and winter, although the wilderness would be less accessible to visitors in the winter because of snow.

Areas without maintained trails would primarily fall into either the pristine or the primitive zones. Most of the lower forest and glaciers would be classified as pristine, and most of the subalpine region would be in the primitive category.

The Butter Creek Research Natural Area would be a separate zone. Access to this area would be limited to approved research and educational purposes.

The major climbing routes would be within either the moderate-use or the high-use climbing zones.

Most trail corridors and associated designated campsites, including much of the Wonderland Trail, would be classified as semi-primitive trail.

A few of the more popular trails, including trails to Spray Park, Comet Falls, and Burroughs Mountain, would be categorized as transition trail.

Wilderness Zones

Pristine Zone

Summary

This zone would be a landscape where unimpeded natural processes could proceed, and signs of human use would be minimal. Significant cultural resources would be preserved. Trails would not be maintained, travel would be primarily cross-country, and visitors would have abundant opportunities for solitude. Visitors would need a high degree of self-reliance to enjoy these areas.

Natural Resources

- Natural ecological functions, components, and processes would be minimally influenced by recreational use.
- The natural landscape would be unmodified, with the only possible exception being significant cultural resource structures.

Cultural Resources

Significant cultural resources that might be preserved are prehistoric and historic archeological sites and ethnographic resources.

Visitor Experience

- Visitors might experience a high sense of adventure and exploration.
- Visitors would have plentiful opportunities for solitude and few chances of meeting park staff or other visitors.
- Activities would depend on cross-country foot travel.
- Day and overnight party size would be limited.
- The area would have no designated campsites or marked trails.
- Permits for dispersed camping and adherence to Leave No Trace standards would be required (no camping within 100 feet of surface water).
- No on-site interpretation or signs would be available, but off-site interpretation and education would be encouraged.
- Little area-specific information from the park and commercial publications would be available, allowing for self-discovery of park resources. Visitors would have a low potential for contact with other people.
- A high amount of outdoor skill would be needed.
- The level of risk would be high because trails and other people would not be present.

Facilities and Activities

- Very minimal signs of human use would be evident, and no formal trails or designated campsites of any kind would exist.
- Marked routes (trails, blazes, cairns, signs) generally would not be present, but informal trails might be present.
- Temporary wanding would be permitted on snow for resource protection and safety reasons.
- The use of research equipment and monitoring devices might be allowed.

Primitive Zone

Summary

This zone would be a nearly unmodified landscape with natural processes unimpeded and significant cultural resources preserved. Subtle signs of human use might be present in parts of zone because way trails would continue to be created and used and campsites designated. Opportunities for solitude would be high. Travel would still be primarily cross-country, but encounters with people would be more likely than in Pristine Zone. Visitors would feel apart from other people in wilderness but not entirely alone. A high degree of self-reliance would be needed to enjoy these areas.

Natural Resources

Natural ecological functions, components, and processes would not be influenced by recreational use except for a few minimal modifications to hydrology, plants, and soils in localized areas resulting from significant cultural resources and a few hiker-created travel routes and campsites.

Cultural Resources

- Significant cultural resources that might be preserved are prehistoric and historic archeological sites and ethnographic resources.
- Visitor Experience
- Opportunities to experience solitude and quiet would exist.
- Visitors would feel apart from other people but not entirely alone.
- Visitors might have a moderate sense of adventure and exploration.
- Opportunities for solitude would be common; some possibility would exist to encounter other people and some signs of human use (more than in Pristine Zone).
- Most activities would depend on cross-country foot travel.
- Permits for dispersed camping and adherence to Leave No Trace standards would be required.
- A few designated campsites might be present in sensitive alpine areas.

- The Size of day and overnight parties would be limited.
- Some lightly maintained way trails would exist.
- No on-site interpretation or signs would be available, but off-site interpretation and education would be offered.
- Good outdoor skills would be needed, but less self-reliance would be required because of user-created routes and a higher chance of meeting others.

Facilities and Activities

- Minimal signs of human use would be present except for a few primitive routes and designated campsites in alpine areas.
- Other facilities and activities are the same as in the Pristine Zone, except possibly a few designated campsites to protect sensitive areas.
- Some primitive routes (way trails) and unmaintained constructed trails might exist; however, no maintained markers such as signs, blazes, or cairns would exist.

Research Natural Area Zone

Summary

This zone would be an unmodified landscape where unimpeded natural processes could proceed. Significant cultural resources would be preserved, with a focus on baseline ecological research and no visitor impacts. Research and monitoring devices might be evident. Few visible signs of human use would exist, and access granted only for approved research and education.

Natural Resources

- In general, no visible signs of human use would be evident.
- Natural ecological functions, components, and processes would not be influenced by recreational use.
- Some user-developed routes might exist for access to research and study areas.
- Permits would be required for research use and for associated camping.
- Cultural Resources:
- Significant cultural resources that might be preserved are prehistoric and historic archeological sites and ethnographic resources.
- Permits would be required for research use and associated camping.

Visitor Experience

- Recreational day use would not be promoted, and overnight use would not be permitted.
- Access would be for approved research and educational purposes.

- Off-site interpretation and education might be available.

Facilities and Activities

- Facilities would be for research and educational purposes only. No permanent administrative or visitor use facilities would be present in this zone.
- No established trails of any kind would exist.
- Research or monitoring devices might be evident.

Moderate-Use Climbing Zone

Summary

This zone is a nearly unmodified landscape with natural processes unimpeded and significant cultural resources preserved. Few visible signs of human use would exist except for a few climbing routes and designated campsites or other wilderness-appropriate structures. The visitor experience would be oriented toward mountaineering, with low-to-moderate potential for social interaction. Although dispersed use would be prevalent, there often would be a delineated route toward summit.

Natural Resources

- Recreational use would not influence natural ecological functions, components, and processes, except in a minor part of the zone.
- Areas would be intentionally modified in narrow trail corridors through snow and alpine environments and in a moderate number of designated and dispersed camps for hikers and climbers.
- Measures to control the impact of human waste would be used to limit damage to sensitive resources in this alpine and permanent snowfield zone.
- Where the zone contains only trail corridors, the zone is about 0.5 miles wide to allow for rerouting trails, if required, by changes in natural conditions such as snowmelt and crevasse patterns.

Cultural Resources

Significant cultural resources that might be preserved are prehistoric and historic archeological sites and ethnographic resources.

Visitor Experience

- A sense of adventure, exploration, and accomplishment off the beaten path would be available, with more solitude and self-reliance than the High-Use Climbing Zone. A moderate-to-low degree of social interaction and more opportunities for solitude would exist.
- The main activity in this zone would be mountaineering; however, there could be day hikers, and commercial guide services might be permitted.

- Visitors could sense a high degree of adventure and exploration while encountering a moderate number of other visitors.
- Many opportunities for solitude would exist, but there is also potential for much social interaction.
- High amounts of self-reliance and outdoor skills would be needed because of inherent dangers in terrain and climate.
- Most travel would be cross-country but there could be some way trails or routes, and some routes would have no commercial use.
- Limits on public and commercial day and overnight use and party size would be implemented.
- Permits would be needed for wilderness camping and climbing.
- Campsites would be primarily self-selected but distributed among established bare ground sites and other durable surfaces to protect the sensitive alpine environment.
- Adherence to Leave No Trace standards would be required, except in areas with designated campsites. No on-site interpretation or signs would be offered, but off-site interpretation and education would be available.

Facilities and Activities

- Facilities and activities for this zone are the same as the High-Use Climbing Zone.
- Where not well defined by foot traffic, routes might be temporarily wanded to ensure visitor safety or protect sensitive alpine resources.
- Some way trails and unmaintained constructed trails might be present.
- A few designated campsites would be available in sensitive areas, and other structures allowed by the Wilderness Act might be permitted, such as toilets, radio repeaters, and cultural resources.
- Rock walls or shelters might be permitted in certain places.
- Research equipment and monitoring devices might be allowed.

High-Use Climbing Zone

Summary

This zone would be similar to the Moderate-Use Climbing Zone, but more people would be present and would have a moderate-to-high potential for social interaction.

Natural Resources

- Recreational use would not influence natural ecological functions, components, and processes, except in a minor part of the zone.

- Areas would be intentionally modified in narrow trail corridors through snow and alpine environments and in a moderate number of designated and dispersed camps for hikers and climbers.
- Measures to control the impact of human waste would be used to limit damage to sensitive resources in this alpine and permanent snowfield zone.
- Where the zone contains only trail corridors, the zone is about 0.5 miles wide to allow for rerouting trails, if required, by changes in natural conditions such as snowmelt and crevasse patterns.
- More designated, well-dispersed campsites would exist where areas would be intentionally more modified than the Moderate-Use Climbing Zone.

Cultural Resources

Significant cultural resources that might be preserved are prehistoric and historic archeological sites and ethnographic resources.

Visitor Experience

- A sense of shared adventure, risk, and accomplishment, with less emphasis on solitude and self-reliance would be available. More people would be encountered than in the Moderate-Use Climbing Zone.
- Few opportunities for solitude would exist, and potential would exist for a high degree of social interaction.

Facilities and Activities

- A few wilderness-appropriate recreational developments such as primitive routes and designated campsites.
- Activities would be oriented toward mountaineering.

Semi-Primitive Trail Zone

Summary

This zone is a nearly unmodified landscape with natural processes unimpeded and significant cultural resources preserved. Visitors could enjoy wilderness hiking with a moderate potential for social interaction. Moderately maintained trails in narrow (4 feet) corridors would be present with associated signs and so would be highly modified. Possibly other visitor and administrative structures would exist, such as trailside camps.

Natural Resources

- Natural ecological functions, components, and processes would not be influenced by recreational use, except in a minor part of this zone.
- Natural conditions would be intentionally modified in areas within trail corridors and around designated campsites.

- The zone is about 0.5 miles wide to allow for rerouting trails, if required, by changes in natural conditions such as floods or major windthrow.

Cultural Resources

- Preservation, rehabilitation, or restoration would be used to maintain significant cultural resources, such as patrol cabins, fire lookouts, trail shelters, historic trails, and other cultural landscape features.
- Some cultural resources, such as patrol cabins, would be used for routine or regular administrative use.
- Other cultural resources, such as trail shelters, might be used intermittently by visitors.

Visitor Experience

- Visitors could have a wilderness experience with occasional periods of solitude.
- Visitors could sense adventure and exploration.
- Signs of human use and structures would readily be apparent in localized areas.
- Travel would be on foot along user-developed and maintained trails, with people widely dispersed.
- Opportunities for solitude would be relatively common but interspersed with opportunities for social interaction.
- The size of day and overnight parties would be limited.
- A permit would be needed to camp in designated camps (with marked campsites) where a moderate number of people might be encountered (few opportunities to camp apart from others would exist in peak periods).
- No on-site interpretation and education would be offered, but signs on trails and in camps would give miles, direction, warnings, and resource protection data.
- Off-site interpretation and education would be offered. Visitors could understand and appreciate the cultural landscape.
- A lower level of knowledge and skills would be needed than in Pristine and Primitive Zones because there are more trails and more people.

Facilities and Activities

- The zone would include designated trails, camps, and other wilderness–appropriate structures.
- Activities would be oriented toward hiking.
- Trail(s) would be moderately maintained; associated trail structures like culverts, bridges, and turnpiking might be present.

- Signs on trails, in camps, at trailheads and trail junctions would give miles, direction, warnings, resource protection information; designated routes and user-developed trails would be marked or flagged for safety.
- Unmaintained constructed trails might be present.
- Temporary wanding on snow would be permitted to protect resources or for safety.
- Trailside camps with designated campsites would be available.
- Other structures, such as primitive toilets, patrol cabins, shelters, fire lookouts, and radio repeaters, would be present.
- Research equipment and monitoring devices might be allowed.
- Essential administrative or minor utility systems might be present.

Transition Trail Zone

Summary

This zone is a nearly unmodified landscape with natural processes unimpeded and significant cultural resources preserved. Visitors could enjoy wilderness hiking with a high potential for social interaction. Development would be the same as in the Semi-Primitive Zone, but more evidence of human use would exist. Well-maintained trails in 8-foot corridors would be available and so would be highly modified.

Natural Resources

- The same conditions as the Semi-Primitive Zone would exist, except natural ecological functions, components, and processes would be intentionally modified and influenced by recreation in a larger area.
- The zone is about 0.5 miles wide to allow for rerouting trails, if required, by changes in natural conditions such as floods or major windthrow.

Cultural Resources

Conditions and guidance are the same as the Semi-Primitive Trail Zone.

Visitor Experience

- Visitors would have a scenic wilderness hiking experience with the potential for a high degree of social interaction, without feeling crowded.
- The same as Semi-Primitive Zone would exist except for number of people who might be encountered. Opportunities for solitude uncommon would be present, with many opportunities for social interaction. In designated camps, there are chances of encountering many people. Visitors would be widely dispersed or concentrated along well-maintained trails.

Facilities and Activities

- The same conditions as the Semi-Primitive Zone would exist, but with greater evidence of human use.
- The same facilities as the Semi-Primitive Zone might be permitted, except possibly more trailside camps and trails dispersed through the zone. Campsites might be more closely spaced.

APPENDIX B: INDICATORS AND THRESHOLDS

INTRODUCTION

This plan establishes indicators and thresholds and identifies visitor capacities using best practices created by the Interagency Visitor Use Management Council (the council). Indicators measure conditions that are related to visitor use, and monitoring is conducted to track those conditions over time. Thresholds have been identified that represent the minimally acceptable conditions associated with each indicator. The results from monitoring indicators and thresholds are used to inform and select strategies that park managers would use to achieve and maintain desired conditions.

Management strategies and mitigation measures are described for each indicator and complement actions presented in this plan. This iterative practice of monitoring, implementing adaptive strategies, and then continuing to monitor the effectiveness of management actions allows park managers to maximize benefits for visitors while achieving and maintaining desired conditions for resources and visitor experiences in a dynamic setting. Some indicators include additional management strategies, which may be used if monitoring and the associated management strategies are not achieving the desired conditions, indicating a more drastic change is needed. In this scenario, the management strategies would result in implementation of one of the alternatives not selected as the preferred in this plan (i.e., shifting from Alternative 2: Corridor-Level Access Management to Alternative 3: Site-Level Access Management). The associated thresholds and management strategies included below would be used to inform the visitor capacity identification found in appendix C.

Indicators. Indicators translate the broad description of desired conditions into measurable attributes (e.g., number of people at one time at key locations, number of visitor-created trails) that can be tracked over time to evaluate changes in those desired conditions. Indicators are a critical component of the visitor use management framework. The planning team considered many potential issues and related indicators that would identify impacts of concern, but those described below were considered the most noteworthy given the importance and vulnerability of the resource or visitor experience affected by visitor use. The planning team also reviewed the experiences of other park units with similar issues to identify meaningful indicators.

Thresholds. Thresholds that represent the minimum acceptable condition for each indicator were then established, taking into consideration the qualitative descriptions of the desired conditions, data on existing conditions, relevant research studies, and staff management experience. Although defined as "minimally acceptable," thresholds still represent acceptable conditions. Also, establishing thresholds does not imply that no action would be taken before reaching the threshold. One goal of visitor use management is to strive to make progress toward desired conditions. Thresholds identify the point at which the effects of visitor use on desired conditions are anticipated to become enough of a concern that a management action is needed to achieve and maintain desired conditions. For some indicators, triggers have been developed for the preferred alternative. A trigger reflects a condition of concern for an indicator that is enough to prompt a management response to ensure that desired conditions continue to be maintained before the threshold is crossed.

Indicators and thresholds that would be implemented as a result of this planning effort, including rationale for these indicators and thresholds and associated potential management strategies, are described below.

MONITORING STRATEGY

The results from monitoring the following indicators and thresholds are used to inform and select the strategies park managers would use to achieve and maintain desired conditions. If indicators approach their respective thresholds, additional actions would be taken to protect key resources, park values, and visitor experiences.

This iterative practice of monitoring, implementing management strategies, and then continuing to monitor to gauge the effectiveness of those actions would allow park managers to maximize benefits for visitors while achieving and maintaining desired conditions for resources and visitor experiences in a dynamic setting.

Indicator Topic: People per Viewscape

Indicator: Number of people per viewscape at select locations along nonwilderness trails

Threshold:

- Skyline Trail to Myrtle Falls: 90-square-foot per person platoon-adjusted density for Myrtle Falls Trail on busiest (95th percentile) day. This threshold translates to no more than approximately 76 people per viewscape 90% of the sampled time.
- Skyline Trail to Glacier Vista: 17-square-foot per person stairway-adjusted density on busiest (95th percentile) day. This threshold translates to no more than approximately 21 people per viewscape 90% of the sampled time.

Rationale:

Crowded trail conditions have been documented to adversely affect the quality of visitor experience in national parks. This indicator aids managers in understanding the density of visitor use occurring at key destinations along trails. This indicator allows NPS staff to accurately and efficiently evaluate the number of people visible at one time in a landscape and compare those numbers to desired conditions for the area. People per viewscape is also used by park managers and researchers to quantify visitor crowding impacts on natural resources (such as trail widening, caused by visitors leaving the trail to pass other parties) along higher-use hiking trails, walking paths, and other scenic nonmotorized transportation corridors in national parks. By monitoring and protecting visitor experiences at key destinations, the effectiveness of management strategies that influence specific destinations can be assessed and adjusted as needed. Research suggests that visitors can identify site-specific standards for crowding. These visitor-based standards can be used to guide the development of social indicators and thresholds for crowding.

The density of visitors on Skyline Trail to Myrtle Falls is adjusted to address the platoon effect because visitors tend to travel in groups and are not evenly spaced out when traveling along the trail. Often, pedestrian movement is typified by the formation of platoons. Platoons can also form when passing is impeded, owing to insufficient space; faster pedestrians must slow down behind slower pedestrians (Schoon 2016). At least 90 square-foot platoon-adjusted density ensures visitors have just an occasional need to adjust path to avoid conflicts, maintaining the desired

condition for visitors to be able to move relatively freely along trails. These pedestrian densities are based on the US Federal Highway Administration Highway Capacity Manual that provides procedures for analyzing pedestrian flows on walkways. At least 90 square feet per person correlates with a level of service B under the Highway Capacity Manual.

Monitoring:

Monitoring of this indicator would occur at Skyline Trail to Myrtle Falls and a narrow segment of Skyline Trail below Glacier Vista. Over a specific period of time (e.g., one hour), document the number of people visible at one time from specific vantage points associated with key destinations. Monitoring would occur at as many different times of the day and year as possible, ensuring that the busiest days and high-use trail segments are captured. Monitoring may use a variety of tools, including automatic trail cameras, manually captured photos by staff, or trail counters, depending on park operations (e.g., staffing availability, environmental conditions).

Management Strategies:

- Develop and implement a public information effort about the desired conditions for the park, the actions the National Park Service is taking to achieve those conditions, and how visitors can best experience the park. This information could be distributed through direct visitor contact, park publications, wayside exhibits, maps, social media, websites, and park partners. The goal would be visitors self-dispersing to approved sites or coming during lower-use periods of the day or season. Similar levels of hiker use could be accommodated but without concentrating use during peak periods.
- Ensure that informational materials that cover a wide variety of topics—such as locations for permitted activities, park rules and regulations, and Leave No Trace practices—are available for visitors in a variety of languages and when visitor centers are closed.
- Use up-to-date technology to provide information to visitors before and during their visits.
- Collect data for sites, trails, or destinations where additional information on visitor use patterns, levels, and behaviors could further inform thresholds. This information would be collected and used to refine thresholds before taking actions that limit or reduce visitor use.
- Provide information on other visitor destinations in the corridor. Focus on destinations that typically have lower use levels. Encourage hikers to take a certain route during peak-use times.
- Increase maps and signage about various destinations both in and outside the park.
- Provide real-time parking lot status updates. Rangers at contact stations could relay this information to visitors before they reach that location.
- Actively manage and enforce parking at the Paradise lots to avoid unendorsed parking along roadways.
- Manage commercial uses to ensure smaller group sizes and/or manage the timing and places tour groups can visit. Enforce parking for commercial groups in authorized spaces.

- Separate when and where visitor use occurs at a location by allowing private and commercial entities to access a location at different times or in different physical areas.
- Implement the Mount Rainer National Park communication strategy.
- Implement a parking reservation or timed-entry system for Paradise.

Indicator Topic: Encounter Rates on Wilderness Trails

Indicator: Number of individual hikers encountered on wilderness trails per hour

Threshold: No more than 65 encounters occur per hour on peak summer days (Transition Trail Zone threshold).

Rationale:

Opportunities for solitude are critical to wilderness character. This indicator monitors the amounts of use and social conditions on wilderness trails by measuring the number of groups that visitors encounter as they travel on wilderness trails. Encounter rates are a primary means by which opportunities for solitude would be measured on wilderness trails. The indicator would allow NPS staff to monitor the general type of experiences that visitors have along trails and help determine whether reducing encounters on trails is necessary. This indicator would be useful for understanding the effects of parking enforcement or a reduction in parking. Two subzones are within the wilderness management zones: semi-primitive and transition. Thresholds for these different zones within the wilderness zone were determined based on the estimated daily use for trails in these zones and the draft wilderness character monitoring plan.

Monitoring:

Mount Rainer National Park has an established protocol for estimating visitor encounters, based on observational encounter monitoring correlated with entrance and exit counts. The resulting model uses trail count data as an input. A trail counter is currently installed and functional on three trails: Comet Falls, Pinnacle, and Carter Falls. Field trail encounter surveys would occur to reevaluate statistical relationships, as necessary. The three specified trails would be monitored annually with trail counters. Park staff may use additional trail counters on other trails based on management questions. Intensive encounter surveys on the three specified trails would be conducted every three years during peak summer use.

Management Strategies:

- Use public information from sources such as intelligent transportation systems, the US Forest Service, the Washington Trails Association, guidebooks, and social media to communicate peak use, entrance wait times, and provide alternate options for recreation opportunities.
- Restrict overflow, road-shoulder parking at trailheads.
- Manage transportation facilities and services (e.g., redesign trailhead parking, restrict commercial road tour guided hikes, meter traffic at entrance gates)

- Require parties of more than 12 to obtain a special use permit.
- Implement a day-use quota via a free or low-cost permit.

Indicator Topic: Parking Lot Congestion

Indicator: Number of vehicles at one time at parking lots and roadside parking areas

Threshold: Vehicles at one time does not exceed the design capacity of parking lots or authorized roadside parking areas more than 20% of the time.

Trigger:

- Trigger 1: For lots within the Nisqually to Paradise Corridor, vehicles at one time does not exceed the design capacity for the parking lots or authorized roadside parking more than 15% of the time.
    - Corrective management action: Implement a timed-entry system specific to the lot or area (as described in alternative 4).
- Trigger 2: For lots within the Nisqually to Paradise Corridor, vehicles at one time does not exceed the design capacity of the parking lots or authorized roadside parking more than 15% of the time for three consecutive years.
    - Corrective management action: Implement a timed-entry system specific to the lot or area (as described in alternative 4); if operating the Cougar Rock to Paradise shuttle, expand the reservation system to include the shuttle.

Rationale:

Free-flowing roads and parking areas allow access for emergency services, equipment, and personnel. This indicator is a measure of visitors' ability to find parking at popular destinations. This indicator provides an important measure of parking lot conditions in relation to visitor access to popular destinations and potential park resource impacts that result from parked vehicles in unauthorized areas when lots are full. This indicator helps track conditions to ensure that visitors have safe and stress-free access to popular visitor destinations (including visitor centers, trails, and facilities, such as restrooms) by reducing vehicle congestion and conflicts in parking lots. This indicator would also help park staff understand the number of visitors displaced to other areas of the park and is a proxy for the congestion concerns and density of people at facilities. Parking lot congestion, particularly at Paradise, is related to traffic congestion and safety associated with vehicles backing up on the highway and traffic on the highway at the entrance station.

Furthermore, when visitors are unable to recreate in desired destinations due to these areas reaching parking and/or trail capacities, visitors typically visit other areas of the park that are underused. This indicator also measures visitors' ability to find parking at destinations that may be underused. Monitoring parking lot congestion at proximal parking lots along the corridor, such as Snow Lake, Kautz Creek, and Box Canyon, would help the park to understand the impacts of parking lot management strategies and whether use is displaced to other locations along and outside of the corridor. Monitoring this indicator and threshold would also allow for a

greater understanding of visitor use patterns, such as busy times of the year and the specific locations where crowding occurs.

Monitoring:

Monitoring would be integrated with the existing parking management program. The locations to be monitored include, but are not limited to, Paradise, Reflection Lakes, Narada Falls, Comet/Christine, Cougar Rock, Snow Lake, Kautz Creek, and Westside Road. The monitoring would occur at a to-be-determined frequency for each location that allows park staff to determine if the standard for this indicator is being met.

Management Strategies:

- Increase enforcement of endorsed parking only.
- Post signs indicating parking is at capacity (return at a later, designated time).
- Provide real-time information regarding parking and access opportunities (such as text alerts and radio station updates).
- Provide forecast for parking conditions to help inform visitor decisions regarding trip timing.
- Increase public education efforts to encourage voluntary redistribution of use to off-peak times.

Related Potential Management Strategies:

- Establish a reservation system for a percentage of available parking areas while retaining spaces for spontaneous arrival.
- Offer a commercial hiker shuttle service with parking outside the park (or identify suitable parking within park).
- Use variable entrance fee pricing to encourage travel during off-peak days of the week or times of the year.
- Identify and document the authorized parking capacity of parking lots and authorized roadside parking areas to establish baselines for monitoring.
- Continue and/or expand visitor information regarding alternate trail access points.
- Post signs near the park entrance indicating that parking is available at these specified locations.
- Provide improved trail access at infrequently used trailheads (e.g., Kautz Creek).

Indicator Topic: Bare Ground

Indicator: Percent of bare ground adjacent to trails (within 6.4 feet [5 meters]) of maintained trail edge)

Threshold:

- 0–1% Good condition: Take preventative measures to reduce impacts and continue to perform facilities maintenance and restoration work to help visitors navigate without impacting the meadow while monitoring for impacts at set intervals more than three years apart.
- 1–5% Moderate condition: Take preventative measures and delineate trails seasonally to reduce impacts and protect meadow areas; increase investments in restoration, and increase monitoring frequency, especially in high-risk areas.
- >5% Degraded condition: Make changes to reduce meadow impacts.

Rationale:

Vegetation coverage in local meadows is an important indicator of ecosystem function, preserving wildlife habitat, biodiversity, soil health, and hydrologic systems. Functional and healthy meadow systems are critical to the visitor experience and cultural landscape values in Mount Rainier, where many park visitors seek an opportunity experience "peak bloom" in Paradise Meadows. Trampling that leads to visible impacts may create positive feedback of soil drying and compaction and further vegetation loss, resulting in areas that are difficult to restore and requiring years of trampling exclusion and active restoration (c.f. Rochefort et al. 1989; Curtis, Macdonald, and Gould 2012). Bare ground is defined as an area with a loss of vegetation cover due to trampling (Leung et al. 2011). Percentages of bare ground are used to determine the condition of a meadow area (as in the condition categories outlined above of "good," "moderate," and "degraded," derived from Yosemite National Park's *Merced Wild and Scenic River Comprehensive Management Plan*). The percentage of trampled meadow area that impacts ecosystem function is challenging to quantify, but visible impacts on visitors in the form of bare ground in the immediate view of the trails are both easier to monitor and a have more immediate effect on the visitor experience and cultural landscape. Past and existing management responses to meadow conditions can be used to propose condition thresholds for bare ground or percent impacted areas in Paradise Meadows within 16 feet of the edge of any trail. From the last inventory of trampled areas in Paradise (Rochefort et al. 1989), 6.7% of the total area within 16 feet of any trail edge was impacted by off-trail use. That percentage of impacted ground was deemed enough to trigger large changes in management of the meadows, including creating new rest areas, converting social trails to maintained facilities, and developing new methods of patrolling trails (e.g., Meadow Rovers) and excluding new impacts (rope and pole systems and new signs). This percentage sets a standard for degraded conditions near the trail that triggers large-scale management actions. Impacts of less than 1% of the area within 16 feet of a trail edge, or 0.5 acres, of the whole Paradise trail system may be a reasonable concession to occasional off-trail impacts. Current conditions may be estimated, given restoration activities to date and no updated inventory, as 4.6% of trail-adjacent areas are bare ground, placing the meadow in moderate condition and requiring extensive restoration efforts, trail modifications (e.g., trail-widening efforts), and frequent monitoring to return the meadow to desired conditions.

Data collected for this indicator would help NPS staff prioritize restoration efforts and prompt adaptive actions related to reducing off-trail use. An increase of 1% from the prior year, regardless of any change in threshold conditions, would suggest that management efforts need to continue focusing on meadow restoration and reducing further bare ground impacts. A switch between condition categories would suggest that more focused and stringent protective measures need to be taken. Monitoring bare ground would help determine whether natural resources are impacted by current patterns of visitor use. Monitoring of this indicator would help track the condition of meadow health and the effectiveness of any management strategies aimed at reducing off-trail use. Monitoring bare ground in conjunction with largest patch index is important to understanding the location and extent of visitor-caused impacts on meadows.

Monitoring:

Monitoring would occur by monitoring the ground and documenting images of bare ground patches as spatial features using aerial photography/satellites. The following locations would be monitored: Paradise trails that are adjacent to monitoring locations for people per viewscape, Skyline Trail to Myrtle Falls, and Skyline Trail to Glacier Vista. Representative subsamples from Paradise Meadows would capture a diversity of elevation, vegetation type, and visitor use/density and would be confirmed with ground truthing. This monitoring would include updating the past complete inventory (from 1986 to 1987, and the most recent condition assessment) using an interannual subsampling method. This monitoring effort would also revisit select high-use areas and restored areas interannually to monitor expansion and contraction of bare ground.

Future potential monitoring efforts may include:

1. developing methods for full inventory and rapid assessment of degraded meadow areas using remote imagery and machine learning models
2. implementing community science data collection to expand the reach of documentation of bare ground

Management Strategies:

- Create and implement a comprehensive communication and education program, which may include working with partners to provide information to people when they are planning their trips; reinforcing communication within park wayfinding; using trained Meadow Rovers to provide on-site education and enforcement; and using physical barriers like rope trail boundaries and signs to decrease further impacts and to protect restored areas. Education efforts would occur year-round, with an emphasis on the spring and summer seasons.
- Reroute trails to reduce the appeal of social trails, and construct new trails to better accommodate visitor capacity (e.g., appropriate width, surface, optimal locations).
- Institute more designated rest and scenic vista areas along trail system.
- Limit visitor access to the meadow (or sections of meadow) that are rated as moderate condition.
- Implement focused condition assessments and restoration plans to reduce bare ground areas most likely to enhance habitat.

- Explore the potential for future monitoring efforts, including community science mapping of trail edge disturbances, to educate visitors and create awareness of issue.

Indicator Topic: Largest Patch Index

Indicator: Largest patch index (LPI)

Threshold:

- LPI[5] <82% (or following the LPI5 for planned trails and waysides): Management actions are required beyond standard actions (i.e., focused restoration, increased monitoring frequency).
- LPI[5] <70%: The meadow is degraded and requires increasingly intensive efforts (i.e., facilities planning for trail repairs to reduce impacts, planning to address root causes, dedicated staff to delineate trails and direct visitors, increased investment in timely repairs).

Rationale:

Meadow fragmentation, which occurs due to maintained trails, trampling, and other disturbances, alters the natural state of functional ecosystems, causes disturbance edge effects that can lead to further meadow health degradation, and disrupts wildlife movements. Many of the large patches of meadows in Paradise are within the viewsheds of multiple trails. The large expanses of the Paradise Meadow systems are a critical element of the visitor experience and cultural landscape values. The largest patch index (LPI) (adapted from McGarigal and Marks 1995) quantifies the remaining, unfragmented areas of Paradise Meadows, estimating areas unaffected by recreational facilities or disturbance. The LPI[5] index is derived from the sum of the areas of the five largest patches (continuous intact areas) in the meadow, divided by the total landscape (meadow) area, and then multiplied by 100 (see formula below). The resulting number (a percentage) indicates the extent to which the meadow area is divided (fragmented), resulting from visitor-created trails. If no trails are present, the total index value would be 100%. The lower the percentage of the LPI[5], the smaller the size of unfragmented meadow patches.

LPI[5] = Sum (areas of 5 largest patches)/Total study area

In a 2012 reanalysis of the social trails inventory from the 1989 Paradise Meadow plan, when only maintained trails were included, the LPI[5] was 82% (Rochefort et al. 1989; Moskal and Halabisky 2012). The largest patch index sets a threshold for desired conditions, where an LPI[5] of 82% indicates that recreational use is contained within the trail system, and restoration and maintenance activities have restored impacted meadow areas. Those conditions would result in a decreased frequency of monitoring and lower need for management actions. From the same 2012 reanalysis, the LPI[5], when including off-trail impacts or social trails, was 60.4%. Those conditions were enough to trigger large-scale management actions in the Paradise Meadow plan and were considered an indication of degraded meadow systems. The shift from desired conditions to a less than 70% LPI[5], or degraded status, would be the loss (or disconnection) of about 125 acres from the largest patch sizes in the maintained trail system.

Monitoring the largest patch index would help determine the extent of vegetation damage in a sensitive environment by visitor use and estimate departure from both a functional meadow system and the desired conditions of the NHL district. The largest patch index is a measure of

fragmentation to track conditions of large-scale landscapes such as meadows. Percent bare ground addresses measures of trail adjacent vegetation loss, impacts on the visitor experience, and direct impacts on trail facilities. The largest patch index identifies fragmentation location and polygons within the whole Paradise system, addressing meadow function, wildlife habitat, and the total meadow viewshed in a more wholistic way. Data collected for this indicator would help NPS staff decide to either formalize or revegetate informal trails. Monitoring the largest patch index in conjunction with bare ground is important to understanding the location and extent of visitor-caused impacts on meadows.

Monitoring:

Monitoring would occur at Paradise and Reflection Lakes. See the previous section for documentation of bare ground areas as the basis for the largest patch index. A combination of ground mapping and delineation from aerial/satellite imagery is used to monitor this indicator. Largest patch index monitoring could also include estimates of meadow areas that are not bare ground but are impacted vegetation not representative of healthy vegetation communities (e.g., introduced weeds or highly trampled but still extant vegetation of low diversity).

Future potential monitoring efforts may include:

1. developing methods for full inventory and rapid assessment of degraded meadow areas using remote imagery and machine learning models
2. implementing community science data collection to expand the reach of documentation of bare ground

Management Strategies:

- Create and implement a comprehensive communication and education program, which may include working with partners to provide information to people when they are planning their trips; reinforcing communication within park wayfinding; using trained Meadow Rovers to provide on-site education and enforcement; and using physical barriers like rope trail boundaries and signs to decrease further impacts and to protect restored areas. Education efforts would occur year-round, with an emphasis on the spring and summer seasons.
- Reroute trails to reduce the appeal of social trails and construct new trails to better accommodate visitor capacity (e.g., appropriate width, surface, optimal locations).
- Institute more designated rest and scenic vista areas along trail system.
- Limit visitor access to the meadow (or sections of meadow) that are rated as degraded.
- Implement focused restoration plans to increase patch sizes.
- Increase monitoring frequency, annually (at least subsampling areas) for lower the largest patch index.

- Explore the potential for future monitoring efforts, including community science mapping of trail edge disturbances, to educate visitors and create awareness of issue.
- Explore modifying visitor traffic patterns (e.g. one-way trails) to reduce propensity for off-trail hiking.

OTHER RELATED MONITORING

Roadway Congestion and Wait Times

The park is committed to monitoring roadway congestion and wait times on State Road 706 leading to the Nisqually entrance. The visitor experience entering the park and local businesses and residences along State Road 706 are impacted by entrance queue length and duration. Monitoring roadway congestion and wait times would inform management strategies seeking to improve the flow of traffic into the park and inform public communications around trip planning. Additionally, monitoring may indicate the need to update the timed entry system (e.g., reallocate the number of hourly permits available). or adaptive strategies for managed access. This information is obtained observationally, using real-time traffic applications (i.e., Google Maps), and entrance station employees asking visitors to report their estimated wait time.

Visitor-Created Trails

Visitor-created trails remain important for the park to monitor throughout the corridor. These trails are noticeable to observers; lead to resource concerns, such as fragmentation and soil compaction; and are not managed directly by park staff. Visitors may be leaving designated trails for a variety of reasons, such as wanting to reach a destination off the designated trail, obtaining river access, short cutting, using the latrine, passing slower-moving people on the designated trail, or avoiding congested conditions. By tracking new visitor-created trails, NPS staff can understand how often additional visitor-created trails are developed, prompting actions such as education, signage, closures, trail restoration, or formalization. The park can monitor visitor-created trails by observing and documenting the number of exit points from formal trails or using GIS or GPS-based mapping.

MONITORING STRATEGY FOR SUNRISE

Indicator: Number of people per viewscape at select locations along nonwilderness trails

Objective: Park staff will collect data to understand current conditions and establish a threshold based on the best available data that maintains and achieves desired conditions.

Rationale: It has been documented that crowded trail conditions adversely affect the quality of visitor experience in national parks. This indicator aids managers in understanding the density of visitor use occurring at key destinations along trails, such as Silver Forest Trail and Sourdough Ridge Trail to Frozen Lake and Fremont Lookout. This indicator allows NPS staff to accurately and efficiently evaluate the number of people visible at one time in a landscape and compare those numbers to desired conditions for the area. The people per viewscape indicator is also used by park managers and researchers to quantify visitor crowding impacts on natural resources (such as trail widening as visitors leave the trail to pass other parties) along higher-use hiking trails, walking paths, and other scenic nonmotorized transportation corridors in national parks. By

monitoring and protecting visitor experiences at key destinations, the effectiveness of management strategies that influence specific destinations can be assessed and adjusted as needed. Research suggests that visitors can identify site-specific standards for crowding. These visitor-based standards can be used to guide the development of social indicators and thresholds for crowding.

The density of visitors along these trails is adjusted to address the platoon effect because visitors tend to travel in groups and are not individually evenly spaced out when traveling the trail. Often, pedestrian movement is typified by the formation of platoons. Platoons can also form when passing is impeded, owing to insufficient space; faster pedestrians must slow down behind slower pedestrians (Schoon 2016). At least 90-square-foot platoon-adjusted density ensures visitors have just an occasional need to adjust their path to avoid conflicts, maintaining the desired condition for visitors to be able to move relatively freely along trails. These pedestrian densities are based on the US Federal Highway Administration Highway Capacity Manual that provides procedures for analyzing pedestrian flows on walkways. A density of at least 90 square feet per person correlates with a level of service B under the Highway Capacity Manual.

Monitoring: The locations for monitoring along the two trails (Sourdough Ridge Trail and Silver Forest Trail) will be established as part of the objective. Once the vantage point associated with each location is determined, park staff or volunteers will document the number of people visible at one time. Monitoring should occur at different times of the day and year if possible, ensuring that the busiest days and high-use trail segments are captured. Monitoring may use a variety of tools, including automatic trail cameras, manually captured photos by staff, or trail counters, depending on park operations (e.g., staffing availability, environmental conditions).

Management Strategies:

- Collect data for sites, trails, or destinations where additional information on visitor use patterns, levels, and behaviors could further inform thresholds. This information would be collected and used to refine thresholds before actions that limit or reduce visitor use are taken.
- Implement a reservation system at the White River entrance station and adapt as necessary to ensure thresholds, once developed, are not being exceeded for people per viewscape at the identified locations.
- Develop and implement a public information effort about the desired conditions for the park, the actions the National Park Service is taking to achieve those conditions, and how visitors can best experience the park. This information could be distributed through direct visitor contact, park publications, wayside exhibits, maps, social media, websites, and park partners. The goal would be to have visitors self-disperse to approved sites or come during lower-use periods of the day or season to accommodate similar levels of hiker use but without concentrating that use during peak periods.
- Ensure that informational materials cover a wide variety of topics—such as locations for permitted activities, park rules and regulations, and Leave No Trace practices—and are available for visitors in a variety of languages and when visitor centers are closed.
- Use up-to-date technology to provide information to visitors before and during their visits.

- Provide information on other visitor destinations in the Sunrise area. Focus on destinations that typically have lower-use levels. Encourage hikers to take a certain route during peak-use times.
- Increase maps and signage about various destinations both in and outside the park.
- Provide real-time parking lot status updates. Rangers at contact stations could relay this information to visitors before they reach that location.
- Manage commercial uses to ensure smaller group sizes and/or manage the timing and places tour groups can visit. Enforce parking for commercial groups in authorized spaces.
- Separate when and where visitor use occurs at a location. Separation could be done by allowing private and commercial entities to access a location at different times or in different physical areas.

Indicator: Number of Vehicles at One Time at highly used parking lots

Threshold: Vehicles at one time does not exceed the design capacity of parking lots or authorized roadside parking areas more than 20% of the time.

Rationale: Free-flowing roads and parking areas allow access for emergency services, equipment, and personnel. This indicator is a measure of visitors' ability to find parking at popular destinations. This indicator provides an important measure of parking lot conditions in relation to visitor access to popular destinations and potential park resource impacts as a result of parked vehicles in unauthorized areas when lots are full. This indicator helps track conditions to ensure that visitors have safe and stress-free access to popular visitor destinations (including visitor centers, trails, and facilities such as restrooms) by reducing vehicle congestion and conflicts in parking lots. This indicator would also help park staff understand the number of visitors displaced to other areas of the park and is a proxy for the congestion concerns and density of people at facilities. Parking lot congestion is related to traffic congestion and safety associated with vehicles backing up at the White River entrance station and onto Highway 410.

Monitoring: Monitoring will be integrated with the existing parking management program. Monitoring will occur during a range of conditions (weekday/weekend) at a to-be-determined frequency that allows park staff to determine if the threshold for this indicator is being met.

Management Strategies:

- Identify and document authorized parking capacity of parking lots and authorized roadside parking areas to establish baseline for monitoring.
- Increase enforcement of endorsed parking only.
- When the reservation system for White River entrance station is not in effect, post signs indicating that parking is at capacity (return at a later, designated time).
- Provide a forecast for parking conditions to help inform visitor decisions regarding trip timing.

- Make greater public education efforts to encourage voluntary redistribution of use to off-peak times.
- Consider offering a shuttle service from Crystal Mountain, which would require some level of partnership with Crystal Mountain operations for potential shuttle parking, staging, and funding to support purchase and operations.
- Consider using variable entrance fee pricing to encourage travel during off-peak times (days/week or times of year).
- Consider closing the lot overnight.

Indicator: Percent of bare ground adjacent to trails (within 6.4 feet [5 meters]) of maintained trail edge)

Objective: Park staff will collect data to understand current conditions and establish a threshold that maintains and achieves desired conditions. No more degradation to vegetation should occur beyond existing conditions.

Rationale: Vegetation coverage in local meadows is an important indicator of ecosystem function, including preserving wildlife habitat, biodiversity, soil health, and hydrologic systems. Functional and healthy meadow systems are critical to the visitor experience and cultural landscape values in Mount Rainier. The meadow and subalpine park land within the Sunrise area is a significant draw for visitors. Park staff has noted that visitor use within this area of the park often reaches, and sometimes exceeds, capacity during summer weekend days. This amount of visitor use results in crowded trails and associated trampling.

Trampling that leads to visible impacts may create positive feedbacks of soil drying and compaction and further vegetation loss, resulting in areas that are difficult to restore, requiring years of trampling exclusion and active restoration (e.g., Rochefort et al. 1989; Curtis, Macdonald, and Gould 2012). Bare ground is defined as an area with a loss of vegetation cover due to trampling (Leung et al. 2011). Percentages of bare ground are used to determine the condition of a meadow area (as in the condition categories of "good," "moderate," and "degraded" derived from Yosemite National Park's Merced Wild and Scenic River Comprehensive Management Plan).The percentage of trampled meadow area that impacts ecosystem function is challenging to quantify, but visible impacts on visitors in the form of bare ground in the immediate view of the trails are both easier to monitor and a more immediate effect on the visitor experience and cultural landscape.

Data collected for this indicator would help NPS staff prioritize restoration efforts and prompt management actions related to reducing off-trail use. An increase of 1% from the prior year, regardless of any change in threshold conditions, would suggest that management efforts need to focus on restoring meadows and reducing further bare ground impacts. A switch between condition categories would suggest that more focused and stringent protective measures need to be taken. Monitoring bare ground will help determine whether natural resources are impacted by current patterns of visitor use. Monitoring of this indicator would help track the condition of meadow health and the effectiveness of any management strategies aimed at reducing off-trail use. Monitoring bare ground in conjunction with the largest patch index is important to understand the location and extent of visitor-caused impacts on meadows.

Monitoring: Monitoring bare ground at Sunrise would be a new effort and requires baseline data collection to understand current conditions. The data collection would entail a combination of satellite imagery or aerial photography and on-the-ground monitoring in the field. The locations to be monitored will be determined but should be aligned with locations where people per viewscape along the Sourdough Ridge Trail and Silver Forest Trail will be monitored. Baseline data should be collected within one year of the plan's implementation.

The following percentages, guided by Paradise monitoring of this indicator, may be adjusted pending baseline data collection:

- 0–1% Good condition (Preventative measures to reduce impacts and continued efforts to perform facilities maintenance and restoration work to help visitors navigate without impacting the meadow, monitoring for impacts at set intervals >3 years apart)
- 1–5% Moderate condition (Preventative measures and increased delineation of trails seasonally to reduce impacts and protect meadow areas, increased investment in restoration, increased monitoring frequency, especially in high-risk areas)
- >5% Degraded condition (Management changes to reduce meadow impacts)

Management Strategies:

- Create and implement a comprehensive communication and education program. This may include work with partners to provide information to people when they are planning their trips; reinforce communication within park wayfinding; use trained meadow rovers to provide on-site education and enforcement; and use physical barriers like rope trail boundaries and signs to decrease further impacts and protect restored areas. Education efforts may occur year-round, with an emphasis on the spring and summer seasons.
- Reroute trails to reduce the appeal of social trails, and construct new trails to better accommodate visitor capacity (e.g., appropriate width, surface, optimal locations).
- Institute more designated rest and vista areas along the trail system.
- Limit visitor access to meadows (or sections of meadow) that are rated as moderate condition.
- Implement focused condition assessments and restoration plans to reduce bare ground areas most likely to enhance habitat.
- Explore the potential for future monitoring efforts, including community science mapping of trail edge disturbances, to educate visitors and create awareness of the issue.

Indicator: Largest patch index

Objective: Park staff will collect data to understand the current conditions and establish a threshold that maintains and achieves desired conditions. No more degradation to vegetation should occur beyond existing conditions.

Rationale: Meadow fragmentation, or the division of the meadows by maintained trails, off-trail trampling, and other disturbance, alters the natural state of functional ecosystems, causing

disturbance edge effects that can lead to further meadow health degradation and disrupt wildlife movements. Large patches of meadows in Sunrise are within the viewscapes of trails and may experience off-trail impacts. Due to topography and the existing trail system at Sunrise, park staff has noted that visitors may primarily stay on trail and are less likely to trample through the meadows in comparison to Paradise, potentially explained by multiple reasons, including sweeping views of the mountain from many trails and then having difficulty traversing rocky slopes in some areas. In addition, off-trail snow travel at Sunrise isn't as much of an issue compared to Paradise, as the area and access road are closed seasonally and the much of the snow cover is melted when public access opens. Nevertheless, the large expanses of the Sunrise meadow systems are a critical element of the visitor experience and cultural landscape values. The largest patch index (LPI) (adapted from McGarigal and Marks 1995) quantifies the remaining, unfragmented areas of Sunrise Meadows, estimating areas unaffected by recreational facilities or disturbance. The LPI[5] index will be derived from the sum of the areas of the five largest intact patches in a given meadow, divided by the total landscape (meadow) area and then multiplied by 100. The resulting number (a percentage) indicates the extent to which the meadow area is divided (fragmented), resulting from visitor-created trails. If no trails are present, the total index value would be 100%. The lower the percentage of the LPI[5], the smaller the size of unfragmented meadow patches.

Monitoring the largest patch index would help determine the extent of vegetation damage in a sensitive environment and identifies vegetation fragmentation within the Sunrise area. This allows park staff to improve meadow function, wildlife habitat, and the meadow viewscape in a holistic manner. Data collected for this indicator would help NPS staff decide to either formalize or revegetate informal trails. Monitoring the largest patch index in conjunction with bare ground is important to understand the location and extent of visitor-caused impacts on meadows.

Monitoring: The monitoring location for the **largest patch index** at Sunrise will be determined by park staff, but a rough estimate is shown below in figure B-1. The proposed area includes the Fremont Lookout, the meadow west of Frozen Lake, and some of the whitebark woodland area. A combination of ground and aerial/satellite imagery manual delineation is used to monitor the largest patch index. Largest patch index monitoring could also include estimates of meadow areas that are not bare ground but are impacted vegetation not representative of healthy vegetation communities (e.g., introduced weeds or highly trampled but still extant vegetation of low diversity).

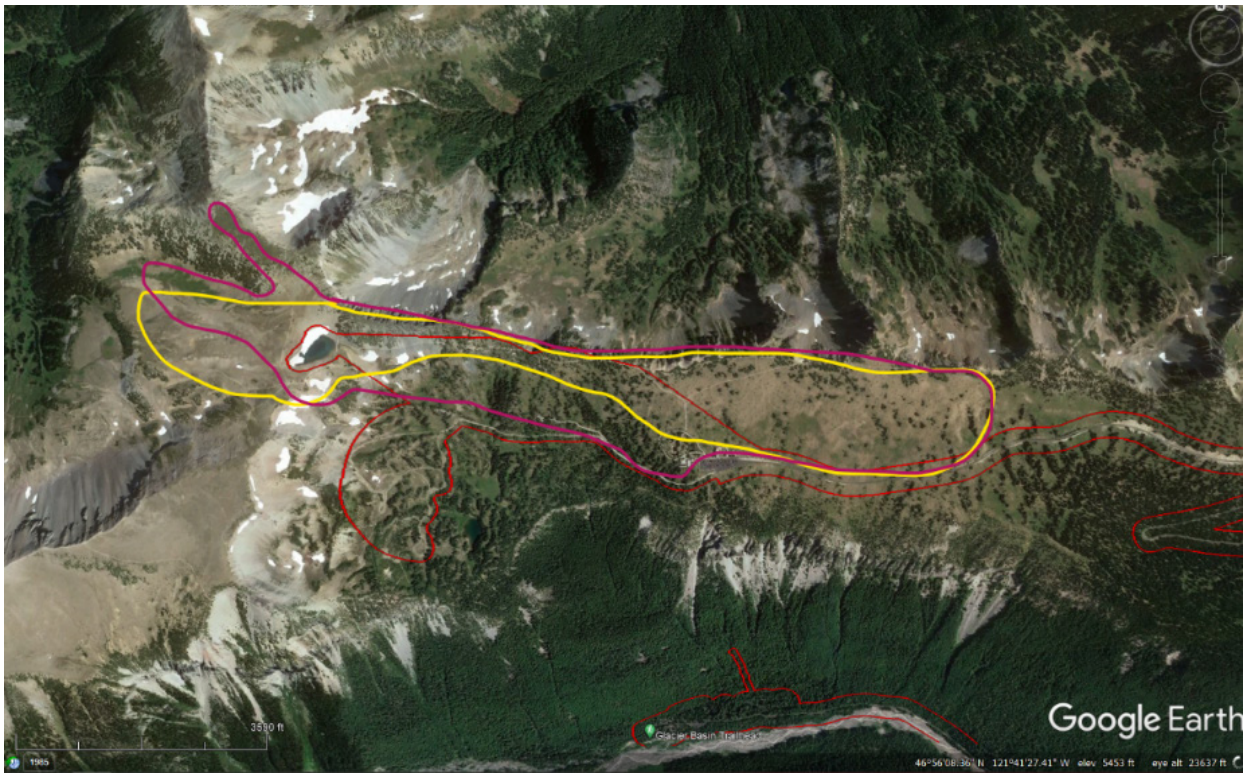


FIGURE B-1. PROPOSED MONITORING FOR LARGEST PATCH INDEX IN SUNRISE.
OPTIONS ARE DELINEATED BY YELLOW AND PURPLE LINES, WHILE THE RED LINE INDICATES THE WILDERNESS BOUNDARY.

Management Strategies:

- Create and implement a comprehensive communication and education program. This program may include work with partners to provide trip-planning information; reinforce communication within park wayfinding; use trained meadow rovers to provide on-site education and enforcement; use physical barriers like rope trail boundaries and signs to decrease further impacts and to protect restored areas. Conduct education efforts year-round, with an emphasis on the spring and summer seasons.
- Reroute trails to reduce the appeal of social trails, and construct new trails to better accommodate visitor capacity (e.g., appropriate width, surface, optimal locations).
- Institute more designated rest and vista areas along trail system.
- Limit visitor access to meadows (or sections of meadow) that are rated as degraded.
- Implement focused restoration plans to increase patch sizes.
- Increase monitoring frequency to annually (at least subsampling areas) for lower largest patch indexes.
- Explore the potential for future monitoring efforts, including community science mapping of trail edge disturbances to educate visitors and create awareness of issue.

- Explore modifying visitor traffic patterns (e.g., one-way trails) to reduce the propensity for off-trail hiking.

OTHER RELATED MONITORING

The following indicators are connected to this planning effort and carried forward for continued monitoring to generally inform the plan and potential adaptive management strategies.

Wait Times at White River Entrance Station

The park is committed to monitoring roadway congestion and wait times leading to the White River entrance station. The visitor experience entering the park and safety conditions when the line backs out to Highway 410 are impacted by entrance queue length and duration. Monitoring wait times will inform management strategies seeking to improve the flow of traffic and will inform public communications around trip planning. Additionally, monitoring may indicate the need to update the reservation system (e.g., reallocate the number of permits available). This information is obtained observationally, using real-time traffic applications (i.e., Google Maps), and entrance station employees asking visitors to report their estimated wait time.

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APPENDIX C: VISITOR CAPACITY

OVERVIEW

This section provides additional information about the visitor capacity identification as it relates to the visitor use management framework for the Mount Rainier National Park Nisqually to Paradise Corridor Management Plan. For a full description of the Interagency Visitor Use Management Council (IVUMC) Visitor Use Management Framework and additional resources, please visit https://visitorusemanagement.nps.gov/VUM/Framework.

The IVUMC defines visitor capacity as the maximum amounts and types of visitor use that an area can accommodate while achieving and maintaining the desired resource conditions and visitor experiences that are consistent with the purposes for which the area was established. By managing amounts and types of use, the National Park Service can help ensure that resources are protected and that visitors have the opportunity for a range of high-quality experiences. Visitor capacities will be used to inform and implement the management strategies selected as part of this corridor plan. Identifying visitor capacity is also directed by legal mandates that require the National Park Service to identify and implement commitments for visitor capacities for all areas of a park unit per the National Parks and Recreation Act of 1978 (IVUMC 2016, 2019). Visitor capacities were identified using best practices and examples from other plans and projects across the National Park Service. The process for identifying capacity follows four guidelines: (1) determining the analysis area, (2) reviewing existing direction and knowledge, (3) identifying the limiting attribute, and (4) identifying visitor capacity and implementation strategies.

This section of the plan outlines the considerations and process used to identify visitor capacity for key destinations.

VISITOR CAPACITY ANALYSIS AREAS

Analysis areas for visitor capacities are based on where the capacities will be implemented and managed and should include all the various factors that influence the desired conditions for that area. For each analysis area, an overview of the setting, relevant indicators, visitor use issues, current use levels, and visitor capacity identifications are described. Current use levels have been informed by relevant studies and data, and the actions contained in this plan were considered as part of the visitor capacity identifications.

The sites listed below were selected as the analysis areas for visitor capacities. Where applicable, specific management strategies outlined in this plan that will be used to implement visitor capacities have been included. Visitor capacities will be monitored as described, and if associated thresholds are exceeded (see appendix A), management strategies will be implemented to ensure that capacities are not exceeded. Listed in order from west to east along the Nisqually Corridor, the analysis areas include:

- Westside Road
- Kautz Creek
- Longmire

- Carter Falls
- Cougar Rock
- Comet Falls Trailhead and Christine Falls
- Ricksecker Point
- Narada Falls
- Paradise
- Reflection Lakes
- Sunrise

Following guidance from the IVUMC, the level of analysis that occurs during visitor use management planning and visitor capacity identification is determined on a sliding scale, depending on the complexity and context of the plan. The sliding scale of analysis is used to ensure that the investment of time, money, and other resources for identifying visitor capacity is commensurate with the complexity of the project and the consequences of the decision. The sliding scale focuses on four criteria: issue uncertainty, impact risk, stakeholder involvement, and level of controversy/potential for litigation (IVUMC 2016). The visitor capacities for the Nisqually to Paradise Corridor are on the moderate-to-high end of the sliding scale of analysis. Therefore, a more detailed analysis is necessary for this planning effort.

Future monitoring of use levels and indicators will inform the National Park Service if use levels are nearing visitor capacities. If so, adaptive management strategies, as outlined in this plan, will be taken.

REVIEW OF EXISTING DIRECTION AND KNOWLEDGE

During this step, the planning team reviewed existing direction and knowledge, including (1) applicable law and policy; (2) prior applicable planning and guidance; (3) existing conditions in the analysis area; (4) existing indicators, triggers, thresholds, and objectives; (5) applicable existing management strategies and actions; and (6) use patterns for commercial and other allocation categories. An overview of visitor use issues and current use levels for each key area can be found below under each analysis area.

The 1999 visitor carrying capacity analysis, the 2000 long range interpretive plan, the 2002 general management plan (GMP), 1999 resource management plan, 2003 long range interpretive plan, the 2005 commercial services plan, and the 2015 foundation document all provided important overarching guidance for managing the amounts, timing, distribution, and types of use throughout the Nisqually to Paradise Corridor, including providing some description of desired visitor experiences, resource conditions, and appropriate support facilities. The 1999 visitor carrying capacity analysis was prepared in advance of the general management plan as an input for the GMP planning effort and included an inventory of wilderness trails, wilderness areas and campsites served by trails, climbing routes to the summit of Mount Rainier, nonwilderness trails, and visitor facilities in the major activity areas. The results of the study also helped determine the required characteristics of transportation facilities and services that would be needed to

implement the GMP alternatives. The 2002 general management plan established a visitor capacity framework based on physical limitations of facilities and on visitor experience and resource indicators and standards; however, the framework did not set specific capacities for the park and associated implementation strategies. This plan updates the previous guidance provided by the general management plan by developing more specific visitor use management direction, consistent with IVUMC guidance, including indicators, thresholds, visitor capacity, and related management strategies for the Nisqually to Paradise Corridor.

As a part of this step, the planning team updated desired conditions and developed indicators and thresholds, with particular attention to conditions and values that must be protected and are most related to visitor use levels. The amount, timing, distribution, and types of visitor use in the corridor influence both resource conditions and visitor experiences. Mount Rainier grows in popularity each year and experienced a 30% increase in visitation from 2008 to 2018. In fact, 70% of annual visitation occurs between July and September, and most use is concentrated in a small number of destinations. Visitation is typically higher on weekends, particularly on clear, sunny days as opposed to cloudy, rainy days.

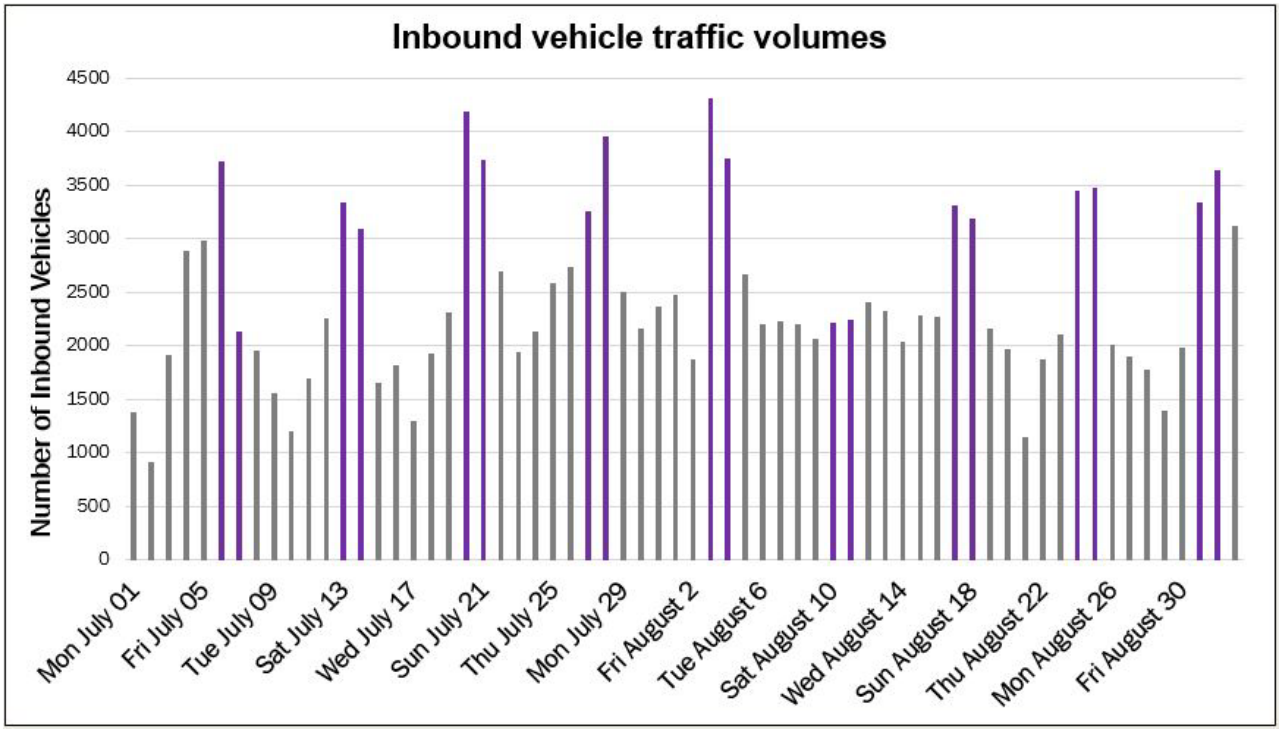

FIGURE C-1. DAILY INBOUND VEHICLE TRAFFIC VOLUMES, BY DATE – NISQUALLY AND STEVENS CANYON ENTRANCE STATIONS COMBINED, JULY 1, 2019 – SEPTEMBER 2, 2019 (LABOR DAY). THE GRAY COLUMNS REPRESENT WEEKDAY DAYS (MONDAY THROUGH FRIDAY), AND THE PURPLE COLUMNS REPRESENT WEEKEND DAYS (SATURDAY AND SUNDAY).

Visitor capacities are often expressed as people at one time and sometimes as vehicles at one time, depending on use types and primary issues at the analysis area. People at one time and vehicles at one time refers to the total number of people or vehicles that are present at a site at any given point in time. Delineations of sites may vary depending on the specific location, and monitoring can be done in a variety of ways, but should approximate as best as possible the total number of people present at a location. In some instances, visitors may more fluidly move from one site to

another. This determination approximates use levels that are likely to occur at one time within a general area that could easily be associated with each listed location.

For each analysis area description, indicators that will monitor the limiting attributes are listed. The selected indicators monitor the limiting attributes to track conditions over time that most inform management of when a change in action is needed and to ensure that desired conditions are maintained and/or achieved. The associated thresholds can also be found in the full description of the indicators and thresholds in appendix B.

METHODOLOGICAL CONSIDERATIONS

To determine the appropriate amount of use at one time for each analysis area, a variety of data were reviewed to understand current conditions compared to desired conditions. Annual visitation data collected by NPS staff includes levels of visitor use parkwide and by area. The park also collects visitor use data including traffic counts, trail counts, campground visitation, resource conditions, and other data. The traffic count data were converted into the number of people visiting by applying the person-per-vehicle multiplier of 2.8 for September through May and 3.0 for June through August.

A frequently referenced source was the 2011 transportation and visitor use study, conducted by the Resource Systems Group, Inc. (NPS 2014b). This study collected and analyzed transportation and visitor use data to inform transportation and visitor use planning in the Nisqually Corridor. The data were collected in the Nisqually to Paradise Corridor in summer 2011. The data most relevant to visitor capacity identification include vehicle traffic volume counts, parking counts in designated parking lots and overflow parking locations, and visitor use counts and hiking route surveys on selected trails. The analysis and modeling conducted as part of the study that informed visitor capacity identification included design day (i.e., typically busy day) vehicle traffic volumes and parking conditions, design day visitor use and crowding on selected trails, and computer simulation modeling of visitor use on Skyline Trail and Comet Falls Trail.

Results from the 2011 visitor study inform visitor capacity identifications. Where available, the regression models produced from the study have been updated with recent traffic data to approximate more recent use levels. In addition, annual reports from commercial operators are collected that track the number of visitors who were brought into the park through those services. Where necessary, approximations have been made. For instance, a persons-per-vehicle multiplier has been used to estimate the average number of people who come to a site by private vehicle. While some vehicles may include more or less people than the multiplier used, the persons-per-vehicle multiplier represents an average. If a site does not include delineated spaces, estimates have been made that assume vehicles would park perpendicular to the edge of the parking area.

TRAFx infrared trail counter data were used to estimate visitation to trails, where available. The most recent years when data were collected for various locations were used. Due to the COVID-19 pandemic and associated park operational changes and visitation pattern changes, data from 2020 were not used to inform the visitor capacity analysis. Where available, 2019 data were used.

IDENTIFY THE LIMITING ATTRIBUTE

The limiting attribute is specific resource or experiential attribute(s) that constrains the analysis area's ability to accommodate visitor use. The limiting or constraining attribute(s) may vary

across the analysis area and is described under each key area. This step is important given that a key area could experience a variety of challenges regarding visitor use issues. The project team considered potential attributes that would constrain the analysis area's ability to accommodate visitor use.

IDENTIFY VISITOR CAPACITY AND IMPLEMENTATION STRATEGIES

Visitor capacity has two parts: identifying the appropriate amounts and types of use at key areas and implementing additional management strategies and actions to manage use within the identified capacity. To identify visitor capacity, summaries from previous steps were reviewed to understand current conditions compared to desired conditions for the area. This review included the management strategies and actions in appendix B. Further analysis of the visitor capacity would be completed as a part of the design and planning process for areas where this action is being pursued. As a result of those planning processes and associated analyses, the visitor capacities might be adjusted for these areas. Information about visitor capacity monitoring and adaptive strategies related to implementing capacity are listed under each key area. Visitor capacities are year-round unless a specific winter capacity is identified.

After identifying visitor capacity, allocation occurs, which is the process of distributing visitor capacity among a variety of uses or opportunities to achieve or maintain desired conditions. A commercial allocation was identified in order to ensure appropriate access to key areas by both commercial and noncommercial visitors. For all analysis areas that are trailheads (Westside Road, Kautz Creek, Carter Falls, Comet Falls, Narada Falls, and Reflection Lakes, no more than 2 commercial vehicles can be parked at the trailhead at one time. Commercial groups would have 12 or fewer guides and clients for some activities and 5 or fewer for other activities (2005 commercial services plan).

Westside Road

Review of Existing Direction and Knowledge

Westside Road is about 1 mile beyond the Nisqually entrance, in the southwest corner of the park. The road is within the roaded multiuse zone, for which desired conditions include nonmotorized activities, such as hiking, biking, horseback riding, cross-country skiing, and snowshoeing, and a high degree of social interaction. Westside Road historically provided the only vehicle access to wilderness trailheads on the west side of Mount Rainier National Park. Due to several decades of severe flooding damage on Westside Road, private vehicle access has been restricted since 1989 and is now limited to a 3-mile section of Westside Road from Nisqually Road to Dry Creek. The analysis area includes the first 3 miles of the road, which are open to motor vehicles, as well as bicycles, from June through September, and the gate and small parking area at the end of this 3-mile section. The lot has approximately 8–10 spaces, and overnight parking is allowed. The road is closed to vehicles beyond the gate, but there are opportunities for biking and hiking beyond this point. The 9.25-mile stretch to Klapatche Point includes challenging climbs and many spectacular views. Recreational use is concentrated between the gate and Round Pass. A number of trails can be accessed off of Westside Road, including the Wonderland Trail.

In 2019, a trail counter at the Westside Road gate captured use from mid-June through September, with approximately 800–900 visitors in June and July and 600–700 visitors in August and September. Saturdays were the busiest days, with an average of 34 people per day, and

Sundays and Mondays saw an average of 30 people per day (figure C-2). In a handful of peak days throughout the summer (including weekends and weekdays), Westside Road had 60–90 visitors per day.

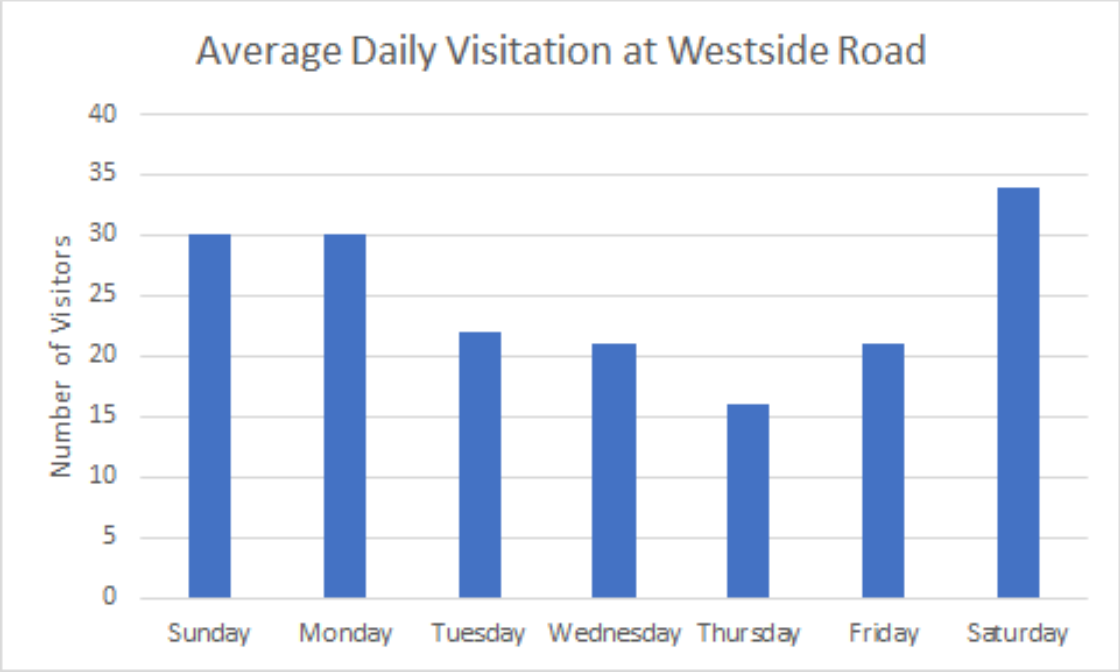

FIGURE C-2. AVERAGE DAILY VISITATION AT WESTSIDE ROAD (SOURCE: 2019 TRAFX DATA)

Trail use peaked in late morning and late afternoon with 5–6 visitors per hour (figure C-3). Because the counter captures out-and-back trail use, the morning and afternoon peaks likely reflect the outbound and return trips. Assuming an average length of stay of two hours, previous data at Westside Road suggest it received approximately 15 people at one time during typical peak periods. Commercial use does not currently occur in this area.

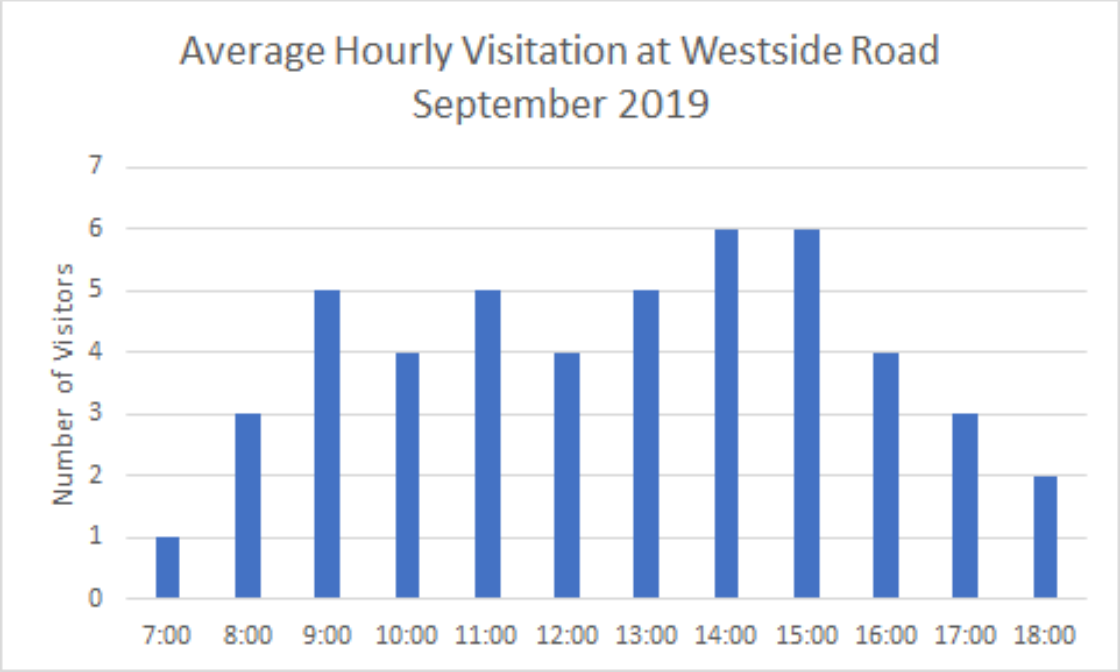

FIGURE C-3. AVERAGE HOURLY VISITATION AT WESTSIDE ROAD, SEPTEMBER 2019 (SOURCE: 2019 TRAFX DATA)

Limiting Attribute and Relevant Indicators

Westside Road has geohazards due to flooding and associated debris and landslides, which lead to frequent road closures and visitors stranded beyond the point of the road closure. This situation precludes significant transportation infrastructure improvements and visitor use. The road has only 8–10 parking spaces and the road is part of the NHL district; therefore, any actions to harden or widen the road to accommodate more use would negatively impact the cultural resource. The most relevant indicator to monitor parking conditions is vehicles at one time at Westside Road. Northern spotted owls have four territories along Westside Road and are a species listed on the US Fish and Wildlife Service (USFWS) threatened and endangered list. Lastly, since the road provides access to trails within wilderness, visitor use is constrained by the experience for solitude and low encounters (no more than 18 encounters per hour) on the adjacent trails.

Visitor Capacity and Implementation Strategies for All Action Alternatives

Current use levels at Westside Road, approximately 15 people at one time, are achieving and maintaining desired conditions for the roaded multiuse zone. Use levels are constrained by the geohazards along the road, the NHL district designation, the threatened and endangered species habitat, and spillover into the adjacent wilderness. In the assessment of current use levels in relation to the desired conditions of the area, park staff identified the opportunity to increase use levels at Westside Road. Given the limiting attribute of parking availability along the road within the NHL district, the area can accommodate a maximum of 10 vehicles at one time or 30 people at one time (using the people per vehicle multiplier for summer months) while achieving and maintaining desired conditions. Commercial use would not exceed 25% of total use.

Under all action alternatives, the National Park Service would continue to evaluate the condition of Westside Road, and if the road were determined safe for visitor vehicle use, would consider

commercial shuttle operations on Westside Road and options to manage public vehicle access through a timed-entry or day-reservation system for noncommercial vehicles in the future. The visitor capacity would remain the same at 30 people at one time and would be implemented through a reservation system.

Implementation Strategies:

- Maintain and encourage opportunities for bicyclists to enter the park at the Nisqually entrance and bike to Westside Road.
- Block or restore pullouts near the Westside Road intersection along Paradise Road to natural conditions.

Kautz Creek

Review of Existing Direction and Knowledge

Kautz Creek is the first destination point along the Nisqually Road after visitors enter the park at the Nisqually entrance. This analysis area includes a parking area (with approximately 35 spaces), a comfort station, and picnicking facilities on the south side of the road. On the north side of the road, there is an overlook area with views of Mount Rainier and the Kautz Creek Trailhead. The lot and overlook area are in the Visitor Facilities Zone and Kautz Creek Trail is in the wilderness Transition Trail Zone. Desired conditions for the Visitor Facilities Zone are highly structured opportunities to enjoy and learn about the park with many facilities, services, and much social interaction. Desired conditions for the Transition Trail Zone are a scenic wilderness experience with a high degree of social interaction without feeling crowded. The Kautz Creek area is used as a rest area with restroom/picnic facilities (frequented by road-based tours), a viewing area via the accessible trail, and wilderness access from the Kautz Creek Trail.

The 2011 transportation and visitor use study reported that about one-quarter of auto-touring visitors in the Nisqually to Paradise Corridor stop at Kautz Creek during their visit. During peak hours of a typically busy summer day, the parking lot was about two-thirds full (NPS 2014b). Park staff has observed some increases since 2011, with the lot nearing capacity on sunny weekends. Because the lot is usually a quick restroom/break stop, the lot has a high turnover and typically does not fill or overfill for extended periods of time. Therefore, the amount of vehicles at one time during peak use is approximately 35 (all endorsed spaces filled). When an average number of persons-per-vehicle is applied (3.0), 105 people at one time are at Kautz Creek during peak times.

Because visitors must cross Nisqually Road to access the overlook area and trailhead at Kautz Creek from the parking lot, the area has safety concerns and risks of vehicle pedestrian collisions.

A trail counter was in place about 0.5 miles up Kautz Creek Trail in the summers of 2015 and 2016. This counter would have captured hikers but not those who only visited the viewpoint at Kautz Creek. An average of approximately 300 hikers were on the trail each summer month (May to October), with peaks in May and August of 2015 with over 400 hikers. Weekends were the busiest days, with an average of 30–35 visitors on weekends and about half the visitation on weekdays (figures C-4 and C-5). Hourly visitation peaked in the morning and afternoon at 3 people per hour on average in 2016 (likely as a result of outbound and return trips).

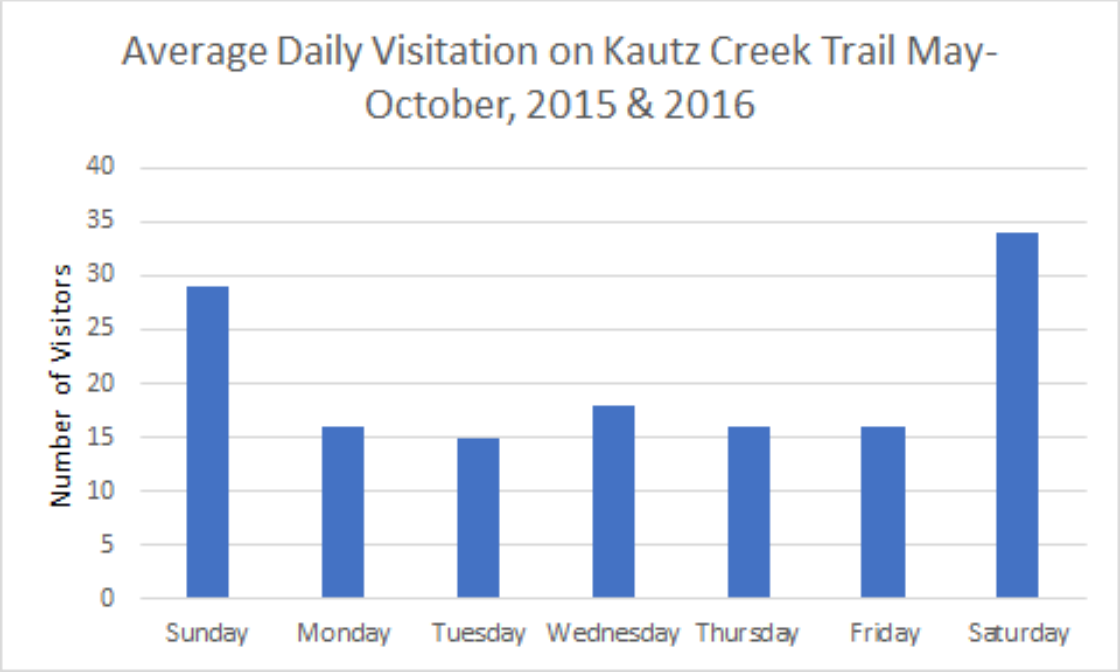

FIGURE C-4. AVERAGE DAILY VISITATION ON KAUTZ CREEK TRAIL, MAY–OCTOBER 2015 AND 2016 (SOURCE: 2015 AND 2016 TRAFX DATA)

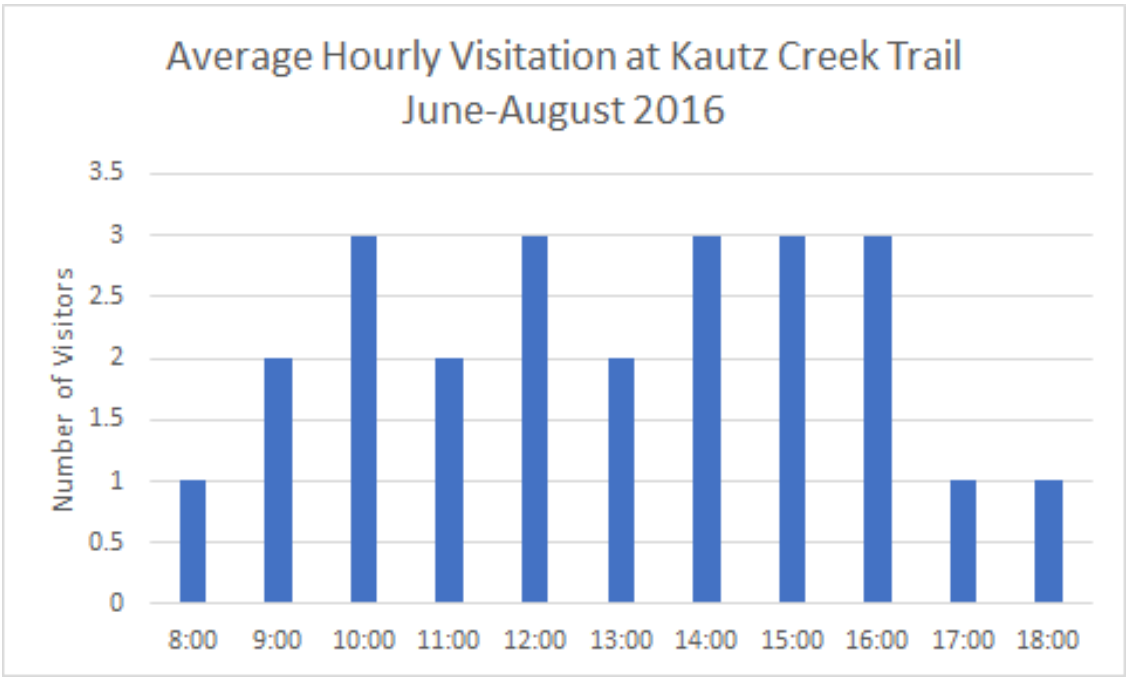

FIGURE C-5. AVERAGE HOURLY VISITATION AT KAUTZ CREEK TRAIL, JUNE–AUGUST 2016 (SOURCE: 2016 TRAFX DATA)

Limiting Attributes and Relevant Indicators

The limiting attributes specific to visitor use at Kautz Creek is the topography and dynamic landscape that results in limitations to infrastructure. Kautz Creek is situated at the end of an alluvial fan; therefore, expansion of the area to accommodate more visitor use is hindered by the

threat of flooding, the frequency and severity of which may increase with climate change. Another limiting attribute is the crowding and congestion at the viewpoint/lookout area. Since this area has a relatively small footprint and within the Transition Trail Zone with desired conditions for solitude opportunities, concerns related to crowding and congestion constrain the amount of people who can be accommodated at Kautz Creek while meeting desired conditions. The threshold for visitor encounters in the wilderness Transition Trail Zone is no more than 65 encounters per hour. Since the area provides access to a trail within the Transition Trail Zone, the visitor experience for solitude and lower visitor encounters are part of the limiting attributes at Kautz Creek. The most relevant indicator to monitor congestion at Kautz Creek is vehicles at one time.

Visitor Capacity and Implementation Strategies for All Action Alternatives

Current use levels at Kautz Creek are achieving and maintaining desired conditions for areas within the Visitor Facilities Zone. The geological and hydrological concerns associated with this area preclude additional infrastructure development to support increased use levels. Park staff identified the opportunity to increase use levels at Kautz Creek to 105 people at one time. Since there is high turnover at the lot and most visitors use the restroom and picnic facilities or the viewpoint, this level of use would achieve and maintain desired conditions for solitude on the Kautz Creek wilderness trail. Commercial use would not exceed 30% of total use.

Implementation Strategies:

- Create trail loop connections from between Kautz Creek and Longmire and between Kautz Creek and the Nisqually River.
- Maintain current picnic tables and evaluate a location for a covered picnic area.
- Eliminate and enforce any roadside parking along Paradise Road near Kautz Creek.

Longmire

Review of Existing Direction and Knowledge

Longmire, about 6 miles up Nisqually Road from the entrance station, is one of the first opportunities for visitors to obtain park information and orientation. Longmire is within the Visitor Facilities and Administrative Zones. Desired conditions for these zones include a wide array of facilities and services, a high level of social interaction, interpretive opportunities, and assistance from park staff. As the original park headquarters, Longmire is now a designated national historic district showcasing some of the "National Park Service Rustic" architecture from the early 20th century. The area is open year-round, with a museum, wilderness information center, and a historic concessioner-operated inn and restaurant. In addition to the day-use and overnight visitor facilities, the area also has administrative offices, maintenance facilities, and staff residences. Across the road from the National Park Inn is a 0.7-mile hardened loop trail. Longmire also provides access to several trails within the transition and semi-primitive trail wilderness zones. Longmire has approximately 180 parking spaces, 30 of which are for maintenance vehicles.

On a typical busy summer day in 2011, visitor parking was generally more than 50% full in the morning and filled beyond capacity (with visitors using administrative parking spaces) from late

morning through early evening. On average, day use visitors parked in Longmire for 1.5 to 2 hours (NPS 2014b).

The National Park Inn was near capacity in the months of July and August in 2019, with about 53 guests per night (figure C-6). Most guests use a private vehicle to access the inn.

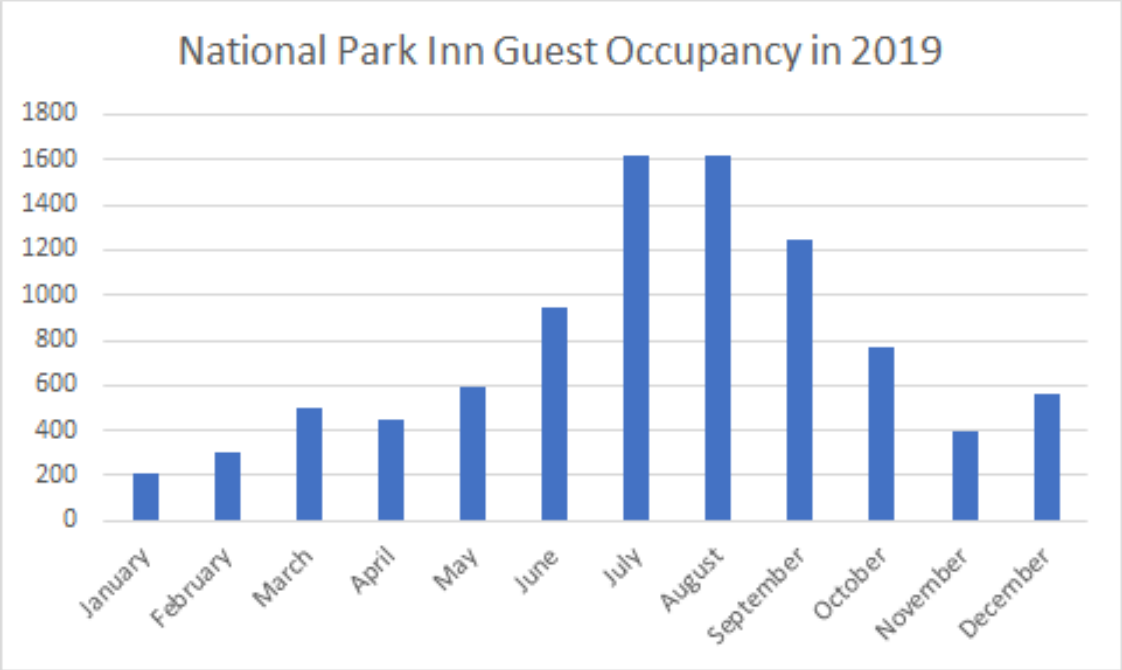

FIGURE C-6. NATIONAL PARK INN GUEST OCCUPANCY IN 2019 (SOURCE: 2019 NPS OPERATION USE REPORT)

During peak times, with approximately 150 of the visitor parking spaces full, there are approximately 450 people at one time at Longmire. Historically, in the winter, the lot and facilities would seldom completely fill; however, park staff has observed more frequent busy days (with lots full beyond designed capacities), especially on sunny days or when there is fresh snowfall. Due to snow banks obstructing spaces, the area has approximately 65 spaces full on peak winter days or approximately 200 people at one time.

Limiting Attribute and Relevant Indicators

Longmire serves as a key destination point for many visitors to Mount Rainier because of the trail network, associated facilities and services, and the NHL designation. The desired conditions on nearby trails and within Longmire are highly influential to assessing visitor capacity and determining the area's ability to accommodate visitor use. The threshold for visitor encounters on the Rampart Ridge Trail within the Transition Trail Zone at no more than 65 encounters per hour and the threshold on the Wonderland and Eagle Peak Trails within the Semi-Primitive Trail Zone at no more than 18 encounters per hour. Because Longmire is an NHL district, the landscape and associated buildings are sensitive cultural resources that could incur damage by high visitor use levels. This cultural landscape would also be negatively impacted by any major infrastructure changes; therefore, major modifications to accommodate additional visitor use are not desirable. Furthermore, there is northern spotted owl habitat near Longmire, a species listed under the Endangered Species Act, which is negatively impacted by increased visitor use. The area is also

subject to weather hazards, including flood risk from the nearby Nisqually River, and during the winter, snow reduces the availability of parking at Longmire.

Visitor Capacity and Implementation Strategies for All Action Alternatives

Current use levels at Longmire during the summer and winter are achieving and maintaining desired conditions. The conditions most influential to assessing visitor capacity for the area are the NHL district designation and associated contributing features, the threatened and endangered species habitat, and visitor use on trails within the adjacent wilderness. In the assessment of current use levels in relation to desired conditions for Longmire, park staff identified the need to maintain use levels during the summer season and the opportunity to increase use levels during the winter. Therefore, Longmire can accommodate a maximum of 450 people at one time in the summer and 250 people at one time in the winter season. A commercial allocation has not been established for Longmire because this area is a transition area with a high turnover rate where commercial users stop for a short period of time for information or to use the facilities.

Implementation Strategies:

- Improve the sense of arrival, wayfinding and signage, interpretation, and self-guided opportunities.
- Improve accessibility, per recommendations in the self-evaluation and transition plan (SETP).
- Add picnic tables or a sheltered picnic area near the gift shop or gas station.
- Rehabilitate the picnic area next to the National Park Inn, and formalize/harden the side trail to accessibility parking.
- Actively manage overnight parking at Longmire—Wonderland Trail overnight users park here. Relocate these users to the Maternity Curve lot. Manage RV parking.
- Restore informal pullouts near Longmire along Paradise Road to natural conditions.

Carter Falls Trailhead

Review of Existing Direction and Knowledge

Carter Falls is a viewpoint and trailhead area off of Nisqually Road, providing access to the Wonderland Trail to Carter Falls. The Carter Falls Trailhead and parking area are within the Visitor Facilities Zone, and the trail is in the wilderness Transition Trail Zone. Desired conditions for the Visitor Facilities Zone are highly structured opportunities to enjoy and learn about the park with many facilities, services, and much social interaction. Desired conditions for the Transition Trail Zone are for a scenic wilderness experience with a high degree of social interaction without feeling crowded. The lot has about 42 designated roadside spaces. The parking area is located near a sharp curve in Nisqually Road, which creates a risk to visitor safety, especially those who cross the road.

In 2011, Carter Falls had roughly 20 unoccupied spaces in the designated parking area during the peak hours of typically busy summer days (approximately 50% peak utilization); however, due to poor wayfinding, visitors park on roadside shoulders (NPS 2014b). Park staff has reported that

roadside parking along this area has degraded resources and caused a disturbance to the native vegetation within this confined area. A trail counter on the Wonderland Trail to Carter Falls recorded 1,300 to over 4,800 visitors per month in 2019, with July and August as the busiest months. Saturdays were the busiest day in 2019, with over 140 visitors per day on average, followed by over 110 visitors on average on Sundays (figure C-7).

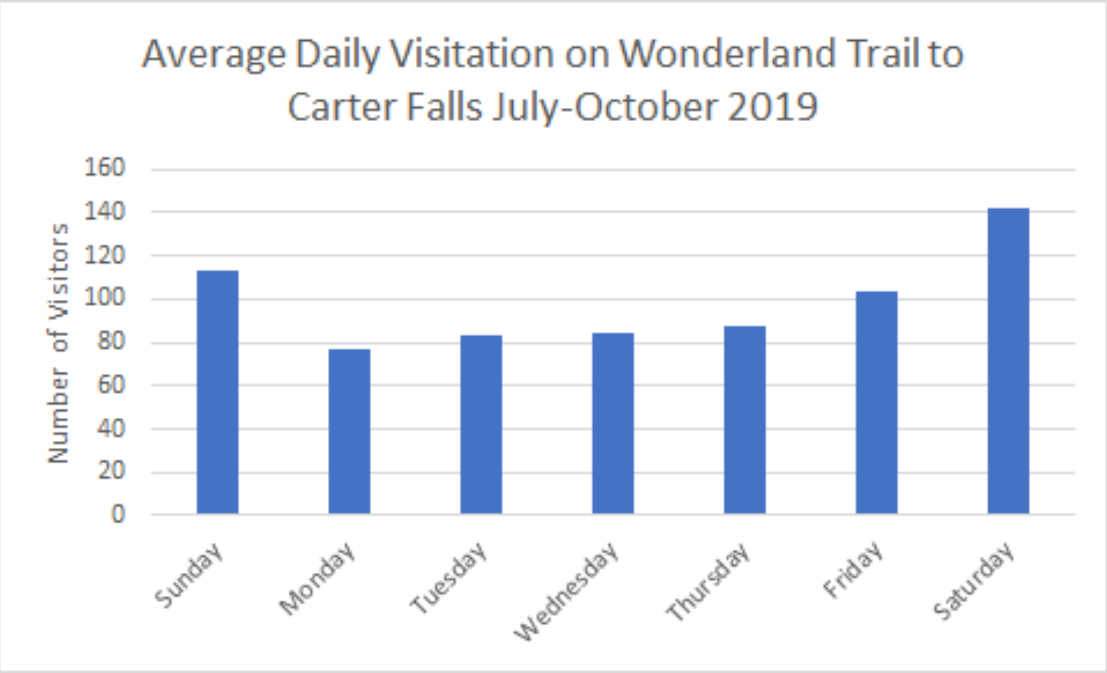

FIGURE C-7. AVERAGE DAILY VISITATION ON THE WONDERLAND TRAIL TO CARTER FALLS, JULY–OCTOBER 2019 (SOURCE: 2019 TRAFX DATA)

Trail use peaked between 11:00 a.m. and 12:00 p.m. and 2:00 p.m. to 4:00 p.m. at 23–25 visitors per hour on average (figure C-8). The morning and afternoon spikes are likely a result of outbound and return trips. Lot utilization from 2011 can be used to estimate approximately 60 people at one time during peak times. Assuming an average length of stay of 2 hours, 2019 trail counter data can be used to estimate about 70 people at one time during recent peak periods at the Carter Falls Trail.

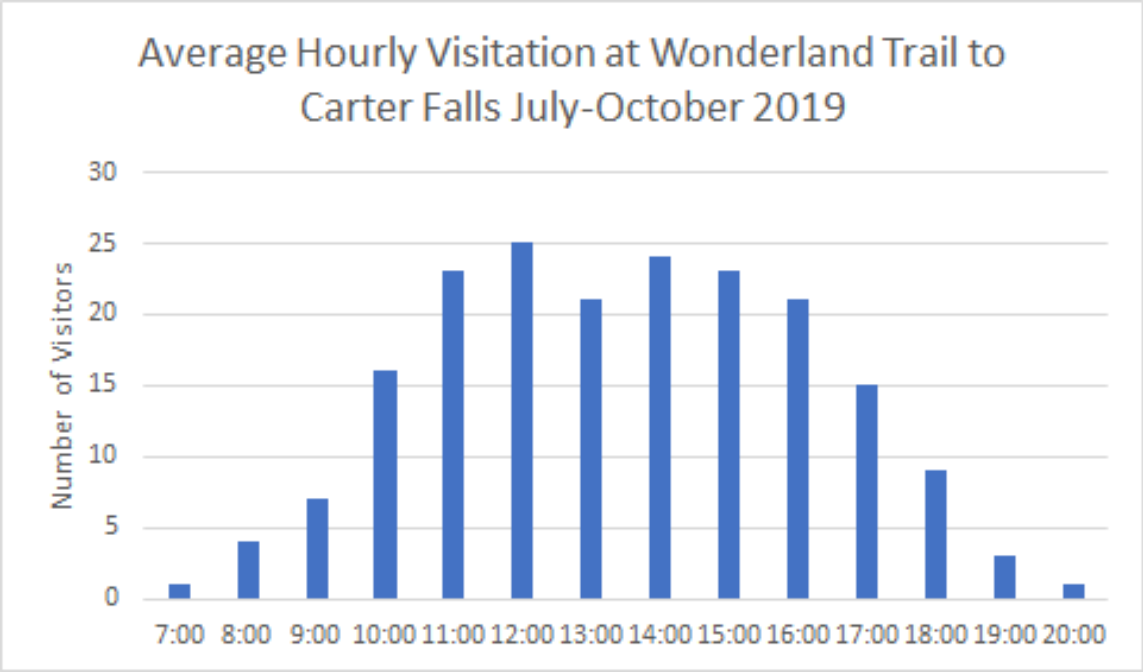

FIGURE C-8. AVERAGE HOURLY VISITATION AT WONDERLAND TRAIL TO CARTER FALLS, JULY–OCTOBER 2019 (2019 TRAFX DATA)

Limiting Attribute and Relevant Indicators

The forest and trees surrounding the Carter Falls are northern spotted owl habitat, a species listed on the USFWS threatened and endangered list, and thus are negatively impacted by increased visitor use and also preclude the possibility of significantly expanding the footprint of this area. The attribute that most informs identifying the area's visitor capacity is the experience on the Wonderland Trail to Cougar Falls. Because this trail is in the transition zone, the standard for visitor encounters is no more than 65 encounters per hour on peak summer days. The most relevant indicator to monitor the wilderness trail experience is encounter rates on the Wonderland Trail to Carter Falls.

Visitor Capacity and Implementation Strategies for All Action Alternatives

Current use levels at Carter Falls trailhead are achieving and maintaining desired conditions. Use levels are constrained by threatened and endangered species habitat and visitor experience on the Wonderland Trail in wilderness. In the assessment of current use levels in relation to desired conditions for Carter Falls trailhead, park staff identified the need to maintain use levels at 70 people at one time.

Implementation Strategies:

- Improve sense of arrival and safety (e.g., rumble strips to slow traffic, road crossings), wayfinding and signage, interpretation, and self-guided opportunities.

Cougar Rock

Review of Existing Direction and Knowledge

The Cougar Rock area comprises a parking lot and picnic area on the east side of the road and a campground on the west side of the road. Cougar Rock is within the Visitor Facilities Zone during the summer and the Sensitive Resource/Recreation Zone during the winter. Desired conditions for the Visitor Facilities Zone are highly structured opportunities to enjoy and learn about the park with many facilities, services, and much social interaction. Desired conditions for the Sensitive Resource/Recreation Zone are easily accessible resources near developed facilities with no special skills or knowledge needed; many people are present, but visitors can move freely along trails. The primary uses at Cougar Rock are picnicking and camping. The area has approximately 62 parking spaces at the picnic area and 178 camping sites at the campground. In 2019, July and August were the busiest months at the campground, with 16,757 and 18,492 total visitors each month, respectively. During peak days in August, over 700 visitors per day stayed at the campground. The Cougar Rock area is also used as trailhead parking for hiking on Wonderland Trail. In 2011, during peak hours of typically busy summer days, there are roughly 30 unoccupied spaces (approximately 50% peak utilization) at the picnic area (NPS 2014b). In recent years, park staff has observed about 80% of the parking lot empty during peak hours of weekend days. During peak times during the summer, an estimated 700 people visit the campground in addition to an estimated 12 vehicles, or 36 people at one time, who use the picnic area, indicating that about 736 people at one time visiting Cougar Rock during peak periods. The Cougar Rock Campground is open to winter camping, snowshoeing, and other recreational activities; however, visitors are unable to drive into the campground.

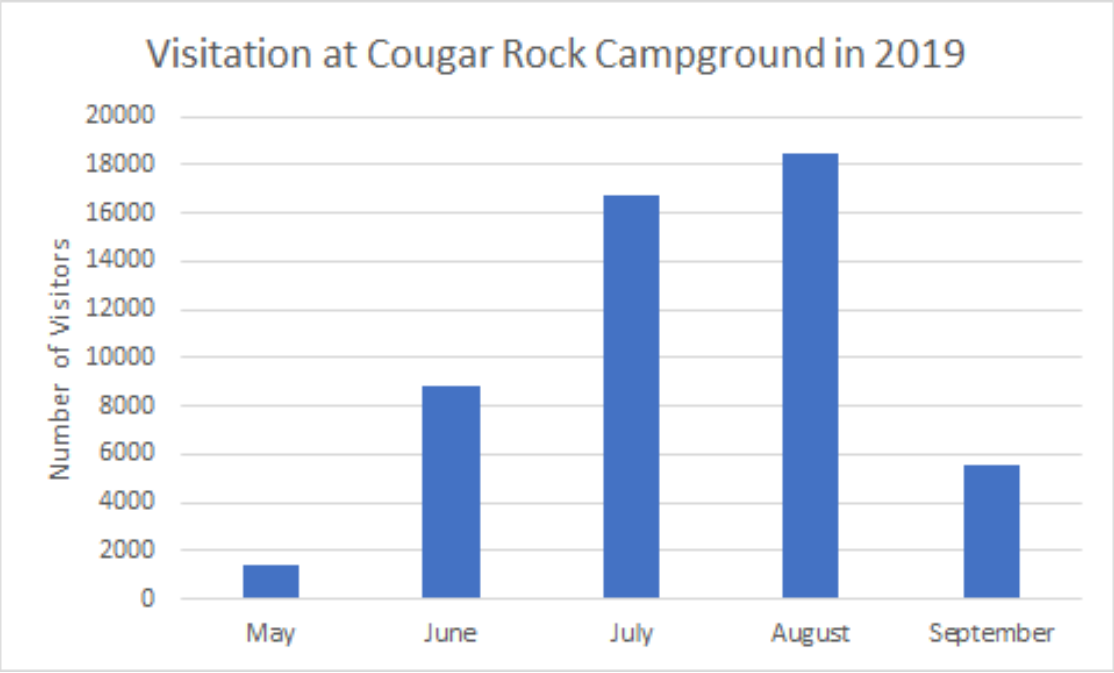

FIGURE C-9. VISITATION AT COUGAR ROCK CAMPGROUND IN 2019 (SOURCE: NPS DATA)

Limiting Attribute and Relevant Indicators

The Cougar Rock area is a Mission 66-era design with historic significance; therefore, substantial changes to the footprint and design to accommodate use would not be desirable. The area is also bordered by pristine and semi-primitive wilderness, further constraining the possibility for expansion. Because Cougar Rock Campground and picnic area is proximate to the Wonderland Trail and frequently used as trailhead parking, the desired visitor experience on the wilderness trail influences the visitor capacity identification. Since the trail is in the Transition Trail Zone, the threshold for visitor encounters is no more than 65 encounters per hour on peak summer days. The most relevant indicator to monitor congestion at Cougar Rock is vehicles at one time. During the winter, snow and associated operational constraints reduces the availability of parking at Cougar Rock. If plowing occurs in the winter, as proposed in chapter 2, it would only include approximately 32 spaces within the first parking lot of Cougar Rock picnic area to allow plows to maneuver.

Visitor Capacity and Implementation Strategies for All Action Alternatives

Current use levels at Cougar Rock are achieving and maintaining desired conditions for the preservation of the Mission 66 designation, nearby wilderness, and the experience on wilderness trails. In the assessment of current use levels in relation to desired conditions for Cougar Rock Picnic Area and campground, park staff identified the opportunity to increase use levels to 880 people at one time during the summer and 120 people at one time during the winter. In effect, this would maintain current peak use levels at the campground and increase use levels at the picnic area.

Implementation Strategies:

- Improve sense of arrival, wayfinding and signage, interpretation, and self-guided opportunities.
- Improve accessibility; refer to SETP recommendations.
- Install a gate along Paradise Road after Cougar Rock, opening the road to Cougar Rock in the winter and expanding winter access.
- Use the Cougar Rock Picnic Area as trailhead parking, and build a trail that follows the road to the Carter Falls and the Wonderland Trailhead.

Comet Falls Trailhead

Review of Existing Direction and Knowledge

The Comet Falls Trailhead and parking lot is located 4 miles east of Longmire on Nisqually Road. The trailhead provides access to a popular hiking route through designated wilderness to Comet Falls (approximately 1.8 miles) and Van Trump Park (approximately 3 miles). The trailhead and lots are within the Visitor Facilities Zone, with desired conditions for highly structured opportunities to enjoy and learn about the park with many facilities, services, and much social interaction. In contrast, the Comet Falls Trail is within the transition wilderness zone, with desired conditions for a scenic wilderness experience with a high degree of social interaction without feeling crowded. The Comet Falls Trailhead lot has 17 designated spaces. In 2011, the Comet Falls Trailhead parking lot filled beyond its capacity between 10:00 a.m. and 11:00 a.m.,

and the number of cars parked at the trailhead exceeded the designated capacity until about 5:00 p.m. When the designated parking spaces filled, visitors parked along Nisqually Road, often on shoulders with little space on the edge of a hill and protruding into the roadway. Parking in undesignated areas creates traffic and pedestrian safety issues, causes traffic congestion, impacts the quality of the visitor auto-touring experience on Nisqually Road, damages roadside park resources, and results in high levels of visitor use in the park's designated wilderness. In 2011, nearly 200 visitors hiked the Comet Falls Trail per day on average. A trail counter on Comet Falls Trail recorded 1400–4000 visitors per month from May to October in 2019. Peak months were July and August with 4100 and 3800 visitors, respectively. Saturdays were the busiest day in 2019, with over 140 visitors per day on average, followed by 130 visitors on average on Sundays (figure C-10). Trail use peaked from 12:00 p.m. to 1:00 p.m. at 35 visitors on average (figure C-11). Trail encounter monitoring from 2016 to 2018 recorded an average encounter rate of 21 people per hour on weekdays and 39 people per hour on weekends. Encounters were as high as 48 people per hour on weekdays and 77 people per hour on weekends.

During peak times, with all endorsed parking spaces filled and about 10 vehicles parked in unendorsed locations along the road, the area has approximately 90 people at one time.

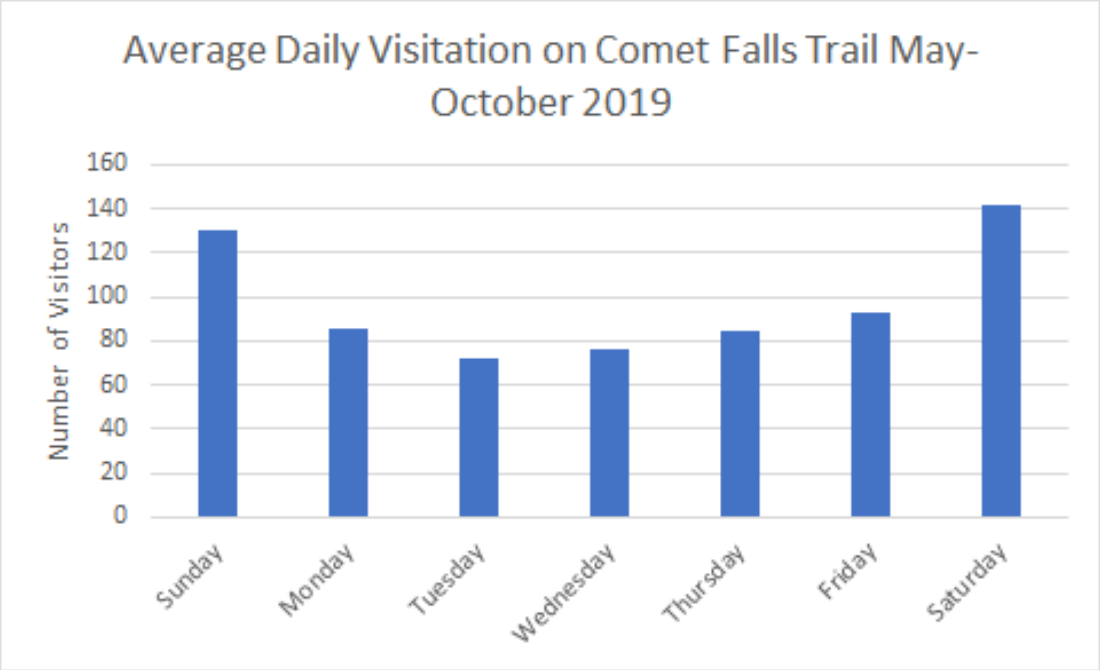

FIGURE C-10. AVERAGE DAILY VISITATION ON COMET FALLS TRAIL, MAY–OCTOBER 2019 (SOURCE: 2019 TRAFX DATA)

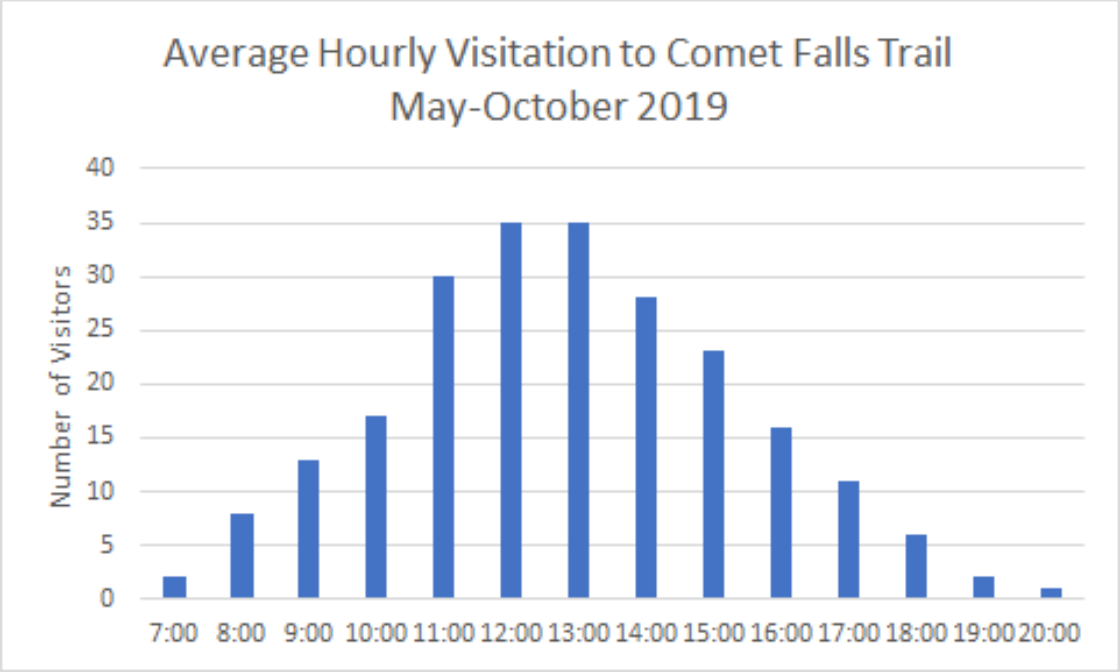

FIGURE C-11. AVERAGE HOURLY VISITATION TO COMET FALLS TRAIL, MAY–OCTOBER 2019 (SOURCE: 2019 TRAFX DATA)

Limiting Attribute

The lot and road are situated on a hillside, which precludes expansion. As described above, as soon as the lot reaches capacity, safety concerns arise due to cars parked precariously on the roadside/protruding into the roadway. The most relevant indicator to monitor parking congestion is vehicles at one time at the Comet Falls Trailhead. The most limiting attribute at this area is the experience for solitude within wilderness on the Comet Falls Trail. Within the Transition Trail Zone, the threshold for visitor encounters is no more than 65 encounters with other visitors per hour on peak summer days.

Visitor Capacity and Implementation Strategies for All Action Alternatives

Current use levels at the Comet Fall Trailhead are not achieving and maintaining desired conditions for visitor experience. During peak times, congestion on the roadway creates unsafe conditions and encounter rate thresholds are being exceeded. The limiting attribute for visitor capacity is influenced by the NHL district designation, safety concerns related to the historic design, and the visitor experience for solitude on the Comet Falls Trail. In the assessment of current use levels in relation to desired conditions for the Comet Falls Trailhead and Christine Falls, park staff identified the need to decrease use levels to 51 people at one time. Commercial use would not exceed 15% of total use.

Implementation Strategies:

- Block or restore informal pullouts/roadside parking on the south side of Paradise Road near the Comet Falls Trailhead to natural conditions.

Christine Falls

Review of Existing Direction and Knowledge

Christine Falls, located just 0.2 miles up the road from the Comet Falls Trailhead, is a small but popular attraction for auto-touring visitors in the Nisqually Corridor. Two small roadside pullouts are on Nisqually Road near Christine Falls, from which visitors walk a short distance along the road to view and take photographs of the falls. The lot and viewing area are within the Visitor Facilities Zone, with desired conditions for highly structured opportunities to enjoy and learn about the park with many facilities, services, and much social interaction. The Christine roadside pullouts have 13 designated spaces. In 2011, about one-quarter of all auto-touring visitors in the Nisqually to Paradise Corridor stopped at Christine Falls during their visit to the park. The pullouts were nearly full by 10:00 a.m. and remained at or beyond capacity from about 11:00 a.m. to 5:00 p.m. When the pullouts are full, visitors frequently stopped their vehicles in the middle of the road to look for a space, creating safety concerns. The Christine Falls viewing area is located along the road, and because of the historic design of the site, visitors must walk along a narrow road shoulder from the pullouts to the viewing area and are commonly seen walking or standing in the road to view and take photographs of the falls. Moreover, the falls is located on a sharp curve in the road, further increasing safety concerns for vehicle and vehicle-pedestrian collisions.

Limiting Attributes and Relevant Indicators

The road and parking area are situated on a hillside, which along with the historic resources associated with the NHL district designation of the roadway, preclude expansion to accommodate use. As described above, as soon as the lot reaches capacity, safety concerns are present with too many cars and pedestrians on the road. The most relevant indicator to monitor parking congestion is vehicles at one time at Christine Falls.

Visitor Capacity and Implementation Strategies

Current use levels at Christine Falls are achieving and maintaining desired conditions for preservation of the NHL district designation and the historic design. During peak times, congestion on the roadway creates unsafe conditions. In the assessment of current use levels in relation to desired conditions for Christine Falls, park staff identified the need to maintain use levels to 40 people at one time. Commercial use would not exceed 15% of total use.

Ricksecker Point

Review of Existing Direction and Knowledge

Ricksecker Point is accessed via a one-way scenic drive that loops off of Nisqually Road, roughly halfway between Longmire and Paradise. The point is within the Visitor Facilities Zone, with desired conditions for highly structured opportunities to enjoy and learn about the park with many facilities, services, and much social interaction. The area is primarily used for scenic viewing with an overlook area at Ricksecker Point that offers dramatic views of Mount Rainier and the Nisqually Glacier. There are 32 designated parking spaces along the road. In 2011, the number of cars parked did not exceed capacity, even during peak hours of typically busy summer days. A relatively small portion (10%) of auto-touring visitors in the Nisqually to Paradise Corridor stop at Ricksecker Point. The amount of space at the most popular overlook area is limited; consequently, some visitors stand in the road to view and take pictures of the mountain,

and others walk in areas not designated for visitor use where they cause trampling impacts on vegetation and soil. Peak parking lot utilization in 2011 (a Saturday in August at 2:00 p.m.) was 69% (NPS 2014b). However, visitors often park in the road and other undesignated areas close to the overlook rather than in designated parking spaces further from the overlook. This situation creates traffic bottlenecks, increases the risk of vehicle collisions, and results in many visitors walking or standing in the road with moving traffic. Use levels during peak times is approximately 66 people at one time.

Limiting Attribute

The limiting attribute specific to visitor use at Ricksecker Point is topography, as the lookout area has a large cliff face on one side and a cliff drop off on the other. In addition, Ricksecker is a contributing resource to the national historic landmark, and thus any changes to the historic landscape are not desirable. Impacts on resources and safety concerns associated with high-use levels also serve as a limiting attribute to accommodate use.

Visitor Capacity and Implementation Strategies for All Action Alternatives

Current use levels at Ricksecker Point are achieving and maintaining desired conditions. The limiting attributes that influence visitor capacity is the geography/topography of the surrounding area, the historic landscape, and resource and safety concerns. In the assessment of current use levels in relation to desired conditions, park staff identified the opportunity to increase use levels at Ricksecker Point to 100 people at one time. This action would suggest that all endorsed parking spaces at this location would be occupied. Commercial use would not exceed 45% of total use.

Implementation Strategies:

- Relocate picnic tables from Narada Falls to Ricksecker Point.
- Improve the angle and placement of the one-way road sign for visitor safety.
- Restore informal pullouts near Ricksecker Point along Paradise Road to natural conditions.

Narada Falls

Review of Existing Direction and Knowledge

Narada Falls is a popular overlook area for visitors enjoying scenic drives through the Nisqually to Paradise Corridor. The area is within the Visitor Facilities Zone, with desired conditions for highly structured opportunities to enjoy and learn about the park with many facilities, services, and much social interaction. The nearby trails, in the wilderness Semi-Primitive Trail and Sensitive Resource/Recreation Zones have desired conditions for moderate-to-high degree of social interaction and minor impact on natural resources. The area includes scenic viewing of Narada Falls, trailhead access to hiking connections to the Wonderland Trail and Paradise, picnicking, restrooms, skiing and snowshoeing in the winter, and overnight parking (to backpack on the Wonderland Trail). Narada has 67 designated spaces and 10–15 picnic tables available during high season. In 2011, parking demand approached, but did exceed, capacity during peak hours of the day. Peak lot utilization was 79% (NPS 2014b). Therefore, vehicles at one time during peak use is approximately 53. When an average number of persons per vehicle is applied (3.0), an estimated 159 people at one time are at Narada Falls.

During peak times, congestion in the lot creates unsafe conditions for vehicles and pedestrians due to lot circulation patterns. Some resource concerns exist in the area, including visitor-created trails below the viewpoint, root exposure and erosion on nearby trails, and habituated animals.

FIGURE C-12. ROOT EXPOSURE AND EROSION ON NEARBY WONDERLAND TRAIL SEGMENT

Limiting Attribute and Relevant Indicators

The limiting attribute specific to visitor use is the physical space in the area for scenic viewing and picnicking, as much of the overlook area is used for personal vehicle parking. Topography hinders opportunities for expansion at the overlook. The area is a contributing feature to the NHL district designation, so major changes to infrastructure to accommodate more use are undesirable. Safety concerns and associated resource damage from vehicle and pedestrian traffic during peak use times serve as an additional limiting attribute. The most relevant indicator to monitor parking congestion at Narada Falls is vehicles at one time.

Visitor Capacity and Implementation Strategies for All Action Alternatives

Current use levels at Narada Falls are achieving and maintaining desired conditions. Limiting attributes specific to visitor capacity include physical space on the overlook, topography, the cultural landscape, safety concerns, and resource damage. In the assessment of current use levels

in relation to desired conditions, park staff identified the need to maintain use levels at Narada Falls at 160 people at one time. Commercial use would not exceed 30% of total use.

Implementation Strategies:

- Stripe the Narada Falls parking lot.
- Relocate picnic tables from Narada Falls to Ricksecker.

Paradise

The visitor capacity for Paradise has been evaluated and identified for both the summer season and the winter season due to a change in zoning for the seasons. Per the general management plan, the application of summer zones usually would begin between the end of May and July, depending on the area, and would end when the roads could not be kept clear using snowplows. This situation usually occurs between late September and mid-October. Generally, the visitor experience of the management prescription would become more primitive in winter when snow covers facilities such as roads, restrooms, and picnic tables. Resource management concerns change seasonally, as soils and vegetation are protected by snow. Therefore, visitor capacity guidelines 2–4 are presented separately for the summer and winter season below.

Paradise – Summer Season

Review of Existing Direction and Knowledge

The Paradise analysis area includes the picnic area, the lower lot, the upper lot, Paradise Valley Road, and Paradise Meadows. During the summer, the lots, road, and adjacent facilities are within the Visitor Facilities Zone, with desired conditions for highly structured opportunities to enjoy and learn about the park with many facilities, services, and much social interaction. The meadow and trail system are within the Sensitive Resource/Recreation Zone, with desired conditions for easily accessible resources near developed facilities with no special skills or knowledge needed, many people present, but visitors can move freely along trails. According to a 2011 visitor survey, approximately 70% of all park visitor groups and 85% of Nisqually to Paradise Corridor visitor groups spent time at Paradise during their park visit, making it the park's most popular visitor destination. On typically busy summer days, 77% of Paradise visitors are day users, spending an average of 2 hours in the area. Just over 10% of visitors are overnight backpackers/mountaineers who spend an average of 2–3 nights. Less than 10% of Paradise users are Paradise Inn guests. Less than 1% of the users are concessioner staff employees, tour buses, and mountaineering tours, respectively (NPS 2014b).

Activities and Services

Activities and services at the Paradise area include hiking, lodging, picnicking, visitor orientation, and interpretation. The park's main visitor center, the Jackson Visitor Center, is located next to the upper lot, along with the Paradise Inn (a concessioner operated hotel, restaurant, and gift shop) and the Guide House (houses the Paradise Wilderness Information Center and concessioner employee housing). The historic Paradise Ranger Station is also in the upper lot, but it is no longer open to visitors and is used as an operating base for Paradise emergency medical responders. Commercial use at Paradise includes guided hikes; road-based tours stopping at this location; mountaineering training; commercial operations in the Jackson Visitor Center; the Paradise Inn, restaurant, and gift shop; and climbing concessioners. Special uses are also

permitted at Paradise, including weddings, scattering of ashes, and photography. During fiscal years 2017–2021, a total of 573 special permits were issued to locations within Paradise. The months with the highest number of issued permits to locations within Paradise during that time period were July (104) and August (149).

Traffic, Trail, Parking, and Operational Conditions

In July to September 2019, an average of 2,400 vehicles entered Mount Rainier National Park per day via the Nisqually and Stevens Canyon entrances. The weekend daily average was 3,350 vehicles while the weekday daily average was 2,070 vehicles (Field Operations Technical Support Center counter data). A very strong statistical relationship exists between the number of vehicles entering the park at the Nisqually and Stevens Canyon entrance stations and driving on Paradise Road per hour and per day, and the number of visitors on specific trail segments in Paradise Meadows (NPS 2013b) (map of Paradise trails: https://www.nps.gov/mora/planyourvisit/upload/2019-Paradise-Area-Trails_508.pdf).

In particular, inbound traffic volume at the Nisqually and Stevens Canyon entrances and on Paradise Road is a strong and stable predictor of visitor use on trails in Paradise Meadows (NPS 2013). On a typically busy day in 2019 (compare figures C-1 and C-2), there were approximately 2,370 hikers on Skyline Trail and use levels peaked at 2:00 p.m. with 320 people in one hour (based on hourly Paradise traffic counter and Resource Systems Group, Inc. regression equation). Congested trails lead to off-trail travel, visitor-created trails, and associated impacts on meadow vegetation.

The Paradise Inn was near capacity (99%) in July and August in 2019, with about 251 guests per night. The Paradise Inn was at 87% capacity in June and September, with about 221 guests per night.

FIGURE C-13. HIKERS IN PARADISE MEADOWS

FIGURE C-14. HIKERS DURING PEAK SUMMER CONDITIONS ON PARADISE MEADOWS TRAILS

The Paradise area has about 219 designated parking spaces in the picnic area lot, 230 in the lower lot, and 283 in the upper lot. Parking also occurs in unmarked areas along the road shoulders throughout the Paradise area. Anywhere from 300 to 400 vehicles have been observed parking along Valley Road (Upper and Lower) on most weekends from late June through September.

On peak weekend days and holidays, the lots fill to and beyond their capacity by mid-morning. On a peak day in 2019, staff recorded 498 vehicles in the picnic area lot, 296 vehicles in the lower lot, 77 vehicles on the road shoulder, 312 vehicles in the upper lot, and 256 vehicles along Paradise Valley Road. As compared to the endorsed (striped) parking inventory, the lots were parked at 151% their designed use level. Using the person-per-vehicle multiplier,[3] this equates to approximately 4,320 people at one time in Paradise. The number of visitors per day to Paradise in 2019 was estimated based on person-per-vehicle calculations and inbound traffic at the Nisqually and Stevens Canyon entrance stations. This analysis shows that weekend use is close to double weekday use (figure C-15).

3. The Mount Rainier National Park person-per-vehicle multiplier is 2.8 for September–May and 3.0 for June–August.

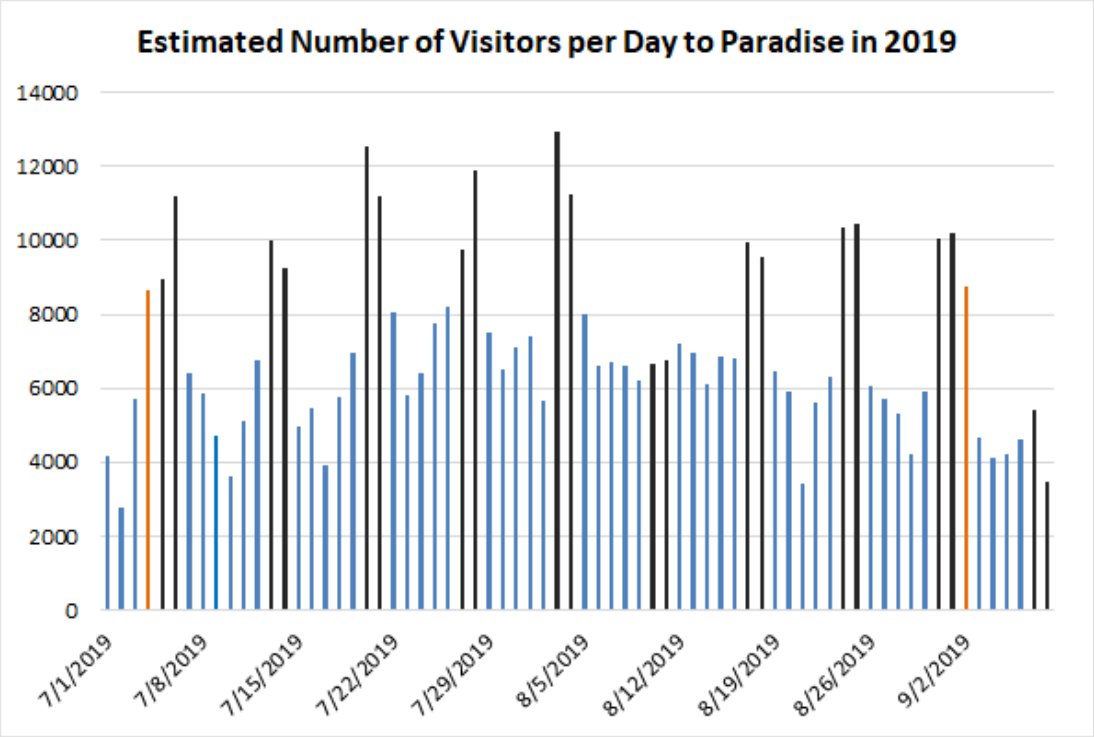

FIGURE C-15. ESTIMATED VISITORS PER DAY TO PARADISE BASED ON PERSON-PER-VEHICLE CALCULATIONS AND INBOUND TRAFFIC AT THE NISQUALLY AND STEVENS CANYON ENTRANCE STATIONS. THE GRAY COLUMNS REPRESENT WEEKEND DAYS (SATURDAY AND SUNDAY). THE ORANGE COLUMNS REPRESENT HOLIDAYS (4TH OF JULY AND LABOR DAY). THE DATA PRESENTED IS FROM JULY 1, 2019, TO SEPTEMBER 8, 2019.

Because use levels are high on weekends and holidays, park operations (the ability of park staff to meet all visitor and operational needs) become strained. Demand for parking far exceeds available parking supply, which in turn exacerbates vehicle congestion, visitor confusion, and safety issues. During these high-use days, parking lot congestion and crowding creates challenges for emergency response vehicles and search and rescue activities, as park staff has a limited number of simultaneous incidents (i.e., maintenance incidents, emergency medical services, congestion management, parking management) that they can reasonably respond to. The number of incidents per day at Paradise in 2019 were correlated with the number of visitors—as visitation increased, so did the number of incidents (figure C-16). During peak times, the visitor center and restrooms also experience longer wait times and custodial concerns.

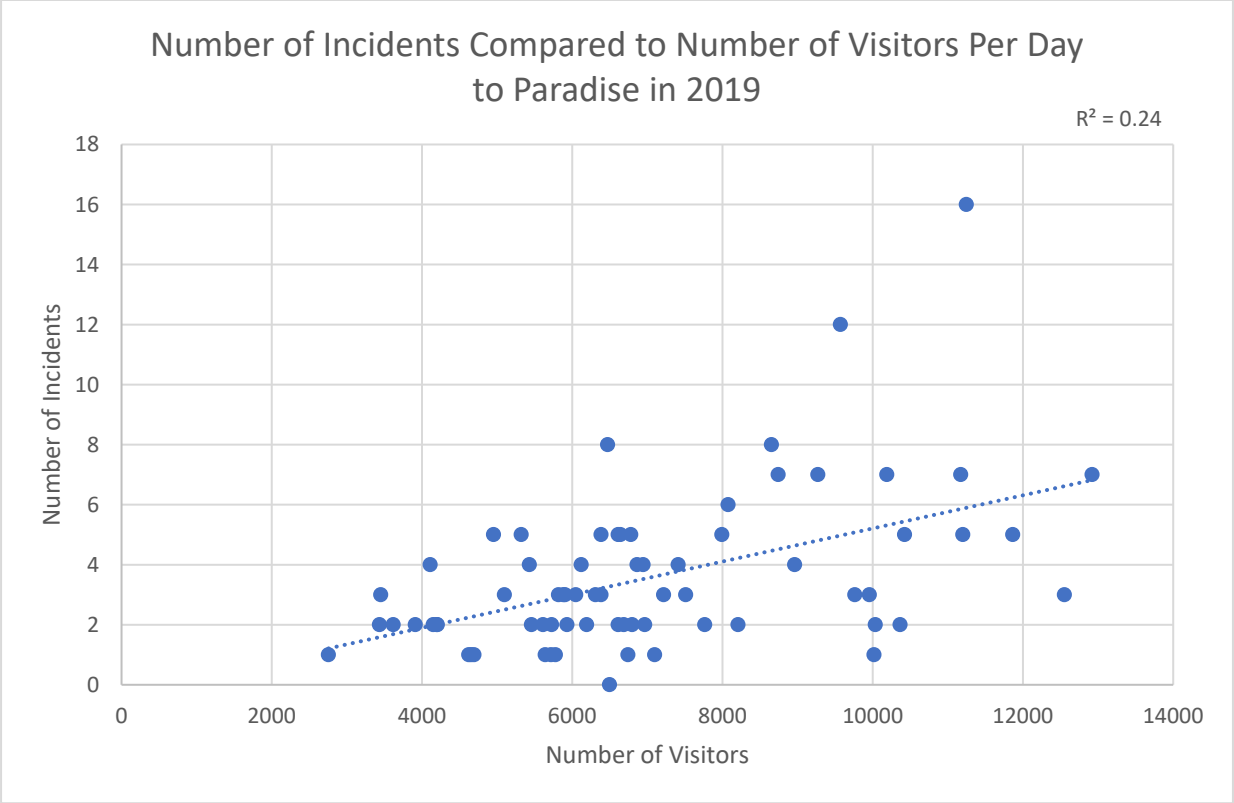

FIGURE C-16. NUMBER OF INCIDENTS AT PARADISE PER DAY COMPARED TO THE NUMBER OF VISITORS FROM JULY TO SEPTEMBER 2019

Visitor Perceptions of Conditions

Visitor studies completed in 2011 and 2012 provide insight into visitors' perceptions of conditions and crowding in Paradise (NPS 2013a, 2013c). Visitors often have difficulty finding a place to park at Paradise throughout the entire summer season, and the majority of Paradise visitors have difficulty finding parking there on peak summer days. About half of all auto-touring visitors at Paradise, and nearly three-quarters of those who visited on peak days, reported having difficulty finding a place to park at Paradise. Furthermore, nearly three-quarters of auto-touring visitors who visited Paradise on peak days reported feeling frustrated trying to find a place to park. As reported in the 2011 survey, a majority of auto-touring visitors at Paradise (63%) think the number of vehicles allowed to drive to Paradise should be limited to prevent parking congestion, even if it means they might have to take a park shuttle bus or change their plans about when to visit the site. However, the 2012 survey reported that if visitors had known the lots were completely full at Paradise, 32% of respondents would have still driven to Paradise anyway (NPS 2013a).

In a 1999 parkwide survey, three times as many respondents reported that the availability of self-guided trails is the most important factor for enjoyment of the park environment as compared to number of hikers on trails. This indicates that visitors are more concerned with being able to access and experience Paradise through self-guided trails and less concerned about the number of people on trails (Vande Kamp, Swanson, and Johnson 2002). In addition, we know from surveys at other major national park units that visitors are most concerned about damage to natural resources and secondarily concerned about public access (where none are turned away). When

presented with trade-offs, visitors are minimally concerned with a high number of people on the trail (which can be interpreted as people on defined and endorsed areas) (Bullock and Lawson 2003).

Limiting Attributes and Relevant Indicators

The limiting attributes for visitor use at Paradise during the summer are the social and resource conditions on the Paradise Meadows trails. When use levels increase, the desired condition for visitors to move along trails freely and not be impeded by others becomes compromised. Additionally, concentrated use levels lead to resource concerns of the sensitive subalpine environment along the trails. When the trails are crowded, visitors may need to step off the trail to pass or let others pass, trampling sensitive vegetation and creating bare ground. Paradise is an important cultural landscape at the park, and the meadows are included in the NHL district. Therefore, crowded conditions and actions to further harden or widen the trails to accommodate more use would negatively impact this cultural resource. The upper lot, lower lot, and picnic area are also part of the cultural landscape. Further, the lots are geographically constrained by steep slopes, hindering future expansion. The most relevant indicator to monitor social conditions on trails is people per viewshed, with a threshold of no more than 76 people per viewshed within view of the camera on the Skyline to Myrtle Falls Trail (to maintain at least 90-square-feet platoon-adjusted space on the trail per person). At the Skyline Trail to Glacier Vista in the upper Paradise trail system, the threshold is no more than 21 people per viewshed (to maintain at least 17 square feet per person). Other relevant indicators to monitor meadow conditions are percent of bare ground and largest patch index. Conditions in the parking lot would be monitored using the indicator vehicles at one time. See appendix A for more information about indicators and thresholds.

Visitor Capacity and Implementation Strategies

Peak use levels at Paradise during the summer—over 4,000 people at one time during peak times—are not consistently achieving and maintaining desired conditions. Social conditions on trails or the ability to move freely and not be impeded by others is often compromised at this level of use. For pedestrian facilities (like the paved trails at Paradise), pedestrian flows move from "unimpeded" to "impeded" travel when densities become less than 90-square-feet platoon-adjusted density per person. Trail crowding contributes to visitors stepping off-trail and damaging the sensitive alpine meadow resources, and high levels of crowding also negatively impact the NHL district designation and associated contributing features. Therefore, managing to the 90-square-foot per person standard for the trails also protects natural and cultural resources along those trail corridors by ensuring that travel remains on the trail. Further, peak conditions resulting in many more cars parked in the lots beyond their designed use levels create safety concerns and operational challenges. The lots cannot be expanded without compromising the cultural landscape due to geographic constraints.

Trail conditions are acceptable and park operations are sustainable on days when all Paradise lots are full. Based on available data, studies, and park staff observations, if this level of use were to prevail, it could be sustained without impacting resources or experiences in this area of the park. On days or times when this use level is exceeded, trail conditions begin to degrade, and other resources and systems in this area are impacted. Therefore, considering altogether these social, environmental, contextual, and operational factors, the National Park Service identified the need

to decrease use levels in order to maintain desired conditions. Capacities vary by alternative; see their respective identifications below.

Alternative 2

Under alternative 2, parking would be endorsed within designated lots, and overflow parking would be endorsed on Upper Valley Road (approximately 70 spaces). Parking would be prohibited along Lower Valley Road. The Paradise picnic lot would be redesigned for efficiency, shifting the number of spaces from approximately 220 to 260. This action would accommodate 840 vehicles at one time and 2,520 people at one time.

Alternative 3

Under alternative 3, parking would be endorsed within designated lots only. Parking would not be allowed on Upper Valley Road or Lower Valley Road. Access to the Paradise lots would be managed via a reservation/permit system. This action would accommodate 730 vehicles at one time. Paradise would also be accessed via a shuttle from Cougar Rock, resulting in a total of 2,500 people at one time.

Alternative 4

Under alternative 4, parking would be endorsed within designated lots only. Parking would not be allowed on Upper Valley Road or Lower Valley Road. Access to the Paradise lots would be managed via a timed-entry permit system. This action would accommodate 730 vehicles at one time and 2,200 people at one time.

Management strategies to implement visitor capacity common to all alternatives, in addition to the strategies discussed in chapter 2, include the following:

- Post signs (e.g., automated messaging system) to inform visitors that parking is at capacity at key locations.
- Provide forecast for parking conditions to help inform trip planning.
- Provide information on other visitor destinations within the corridor and encourage hikers to take certain routes during peak-use times.
- Actively manage and enforce parking at key destination lots to avoid unendorsed parking along roadways and pedestrian congestion.
- Implement temporary trail closures as necessary to prevent trail damage during the shoulder seasons when snowmelt and moisture are present on trails.

Paradise – Winter Season

Review of Existing Direction and Knowledge

During the winter, zones remain the same as in summer, with the exception of Paradise Valley Road (including parking areas) and the picnic area, which are zoned as primitive nonwilderness during the winter. In the winter, visitor access is not provided to the primitive nonwilderness zone.

Generally, the visitor experience becomes more primitive in winter when facilities such as roads, restrooms, trails, and picnic tables are covered by snow. Resource management concerns change seasonally, as soils and vegetation are protected by snow.

Access to Paradise in the winter is dependent upon road openings. During the winter season, the road between Longmire and Paradise closes nightly, though it may also remain closed during the day due to extreme weather or high avalanche danger. At Paradise, the Jackson Visitor Center is only open on weekends and holidays and the Paradise Inn is closed. The upper parking lot is used for day use parking, the lower lot is used for overnight parking, and the other lots (picnic area and Valley Road) are not plowed. Visitor activities include sledding and sliding (in a designated snow play area), snowshoeing, skiing and snowboarding, and snow camping.

On busy winter days, staff has observed over 400 vehicles in the upper lot and over 250 vehicles in the lower lot. Using the person-per-vehicle multiplier, this equates to approximately 1,950 people at one time in Paradise.

FIGURE C-17. PEAK WINTER CONDITIONS AT THE PARADISE UPPER LOT

Limiting Attributes and Relevant Indicators

Visitor access during the winter is typically influenced by weather conditions. For example, if there is too much snow, snow removal operations to open the road to Paradise are not possible and Paradise is inaccessible. Other times throughout the winter, large snowbanks are formed around the outside of parking areas, which physically reduces the number of vehicles able to park in the area. Since the picnic area and Paradise Valley Road are zoned as a primitive nonwilderness zone, visitor access is not provided to these areas in the winter, and therefore they are not plowed. Another limiting attribute is the social conditions for snow campers in the Paradise area. Since desired conditions for winter zones are a more primitive visitor experience during the winter, the limiting attribute for visitor capacity is influenced by the need to maintain a primitive snow

camping experience unimpeded by other visitors. Amounts and types of use and resource conditions would primarily be monitored by the indicators vehicles at one time. See appendix A for more information about indicators and thresholds.

Visitor Capacity and Implementation Strategies for All Action Alternatives

Current use levels at Paradise during the winter are not consistently achieving and maintaining desired conditions. Use levels during the winter are typically influenced by weather conditions and snowfall as well as social conditions for snow campers. Based on the assessment of current use levels and conditions in relation to desired conditions for Paradise, park staff identified the need to decrease use levels during the winter season to 1,540 people at one time (or approximately 510 vehicles at one time).

Winter visitor capacity implementation strategies include the following:

- Plow the upper and lower Paradise lots and the Cougar Rock Picnic Area to the extent feasible when snow removal is possible.
- Post signs (e.g., automated messaging system) to inform visitors that parking is at capacity at key locations.
- Provide a forecast for parking conditions to help inform trip planning.
- Encourage visitors to visit other areas of the park that provide winter use, such as Longmire or Cougar Rock.
- Implement temporary trail closures as necessary to prevent trail damage during the shoulder seasons when snowmelt and moisture is present on trails.

Reflection Lakes

Review of Existing Direction and Knowledge

Reflection Lakes, about a mile down Stevens Canyon Road from the turnoff to Paradise, offers iconic views of Mount Rainier. The lot is within the Visitor Facilities Zone with desired conditions for highly structured opportunities to enjoy and learn about the park with many facilities, services, and much social interaction. The lot has approximately 38 endorsed parking spaces. Nearby trails are within the transition trail wilderness zone, with desired conditions for a wilderness experience with relatively frequent opportunities for solitude interspersed with social interactions. Primary uses at Reflection Lakes include scenic viewing, trailhead access (to Paradise and Pinnacle Peak), and access to alpine climbing training and technical climbing. This area has resource concerns related to visitor use. A number of visitor-created trails exist (figure C-18), in part due to off-trail travel to photography spots. In addition, large, denuded patches and frequent litter surround the lake. The vegetation around the lakes is very sensitive.

FIGURE C-18. VISITOR-CREATED TRAILS AROUND REFLECTION LAKES

In 2019, monthly visitation to the Pinnacle Peak Trail was between 1,500 and 4,300 visitors, with September as the peak month. Saturdays were the busiest day in 2019, with over 150 visitors per day on average, followed by over 140 visitors on average on Sundays (figure C-19).

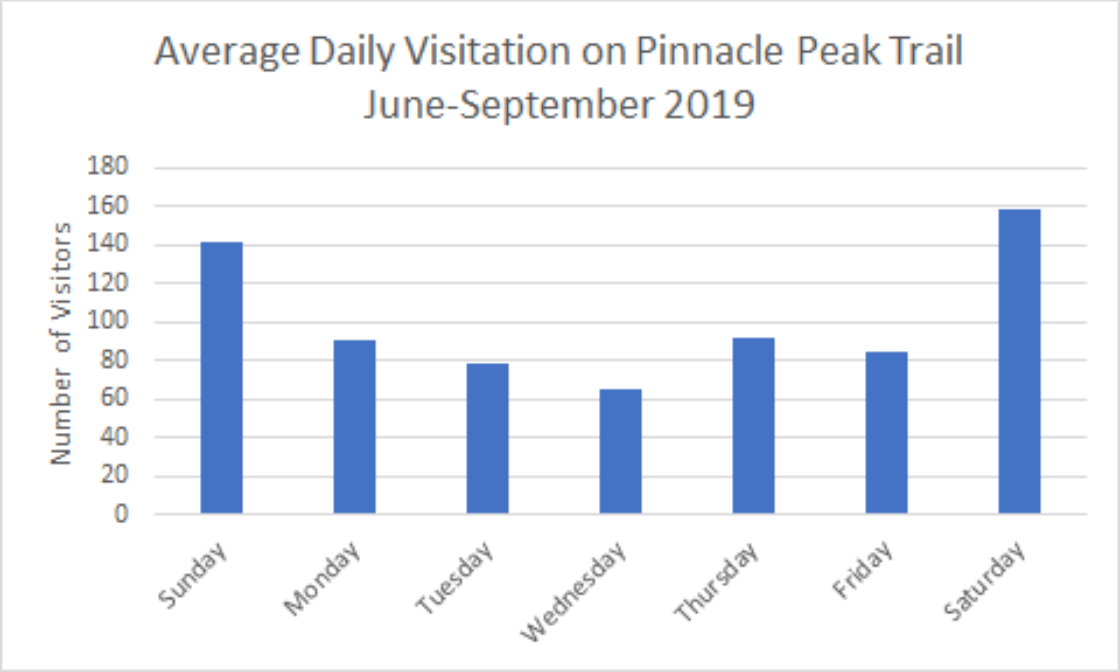

FIGURE C-19. AVERAGE DAILY VISITATION ON PINNACLE PEAK TRAIL, JUNE–SEPTEMBER 2019 (SOURCE: 2019 TRAFX DATA)

Trail use peaked at 2:00 p.m. with 26 visitors per hour on average (figure C-20). Trail encounter monitoring from 2016 to 2018 recorded an average encounter rate of 16 people per hour on weekdays and 31 people per hour on weekends. Encounters were as high as 42 people per hour on weekdays and 68 people per hour on weekends. Assuming an average length of stay of 2 hours, approximately 70 people at one time were present during typical peak periods at the Pinnacle Peak Trail. The parking area, with 38 spaces, typically fills during peak times, translating to approximately 115 people using the person-per-vehicle multiplier of 3.0. Therefore, about 115 people at one time are within the Reflection Lakes analysis area during peak times.

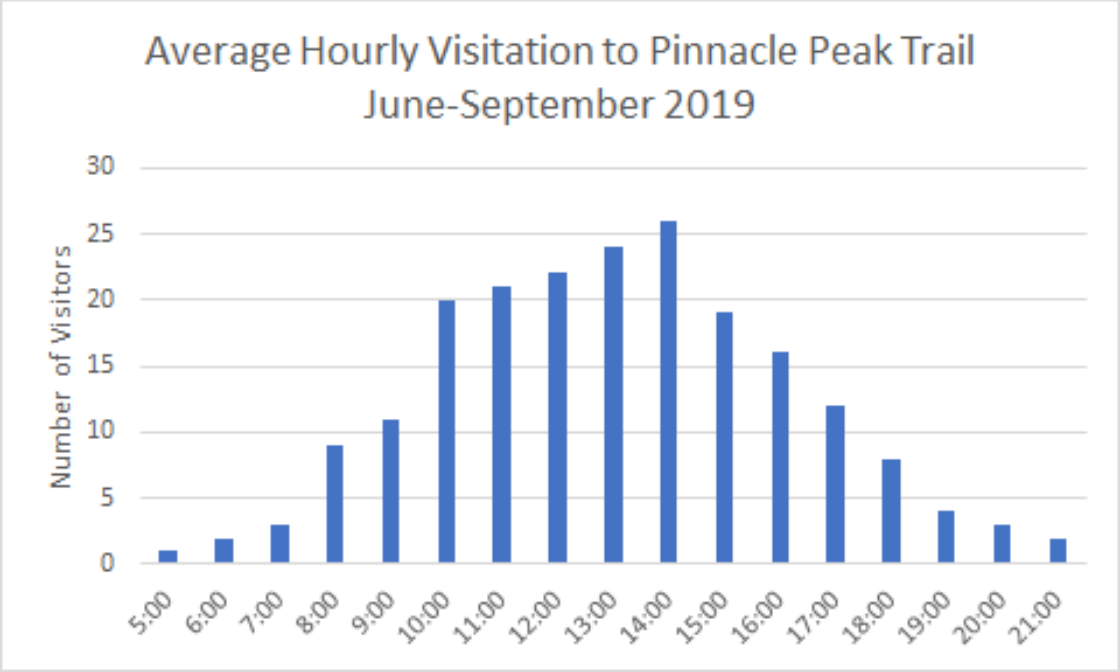

FIGURE C-20. AVERAGE HOURLY VISITATION TO PINNACLE PEAK TRAIL, JUNE–SEPTEMBER 2019 (SOURCE: 2019 TRAFX DATA)

Limiting Attribute and Relevant Indicators

The limiting attribute specific to visitor use is the protection of resources around the sensitive lake ecosystem associated with high levels of use. The most relevant indicator to monitor resource impacts around Reflection Lakes is largest patch index. The footprint of the developed area and parking lot cannot be expanded since it is a historic landscape. The experience on nearby wilderness trails constrains use levels. Within the Transition Trail Zone, the threshold for visitor encounters is no more than 65 encounters with other visitors per hour on peak summer days. The most relevant indicator to monitor the wilderness trail experience is encounter rates on the Pinnacle Peak Trail.

Visitor Capacity and Implementation Strategies

Current use levels at Reflection Lakes are achieving and maintaining desired conditions. Protecting natural resources, preserving the cultural landscape, and maintaining a desired experience on nearby trails most constrain this area's ability to accommodate use. In the assessment of current use levels in relation to desired conditions, park staff identified the need to maintain use levels at Reflection Lakes at 115 people at one time (38 vehicles at one time). This level of use would maintain desired conditions in the lot/viewing area as well as on Pinnacle Peak Trail. Commercial use would not exceed 15% of total use.

Implementation Strategies:

- Develop vault restroom facilities at Reflection Lake to reduce resource impacts from human waste.
- Designate photography spots (e.g., wayside-hardened pedestrian pull out, boardwalk).

- Block or restore informal pullouts near Reflection Lakes along Paradise Road to natural conditions.

Sunrise Corridor

The Sunrise developed area (formerly known as Yakima Park) is similar to Paradise in that vehicular circulation terminates here, making the area a major trailhead for trails on the eastern and northern slopes of the mountain. Visitors can experience beautiful views of the mountain across the interposed valley of the Inter Fork River and alpine meadows. Yakima Park was designed as a decentralized park village and is an unparalleled example of careful siting and response to topography in national park village design.

Review of Existing Direction and Knowledge

The Sunrise Corridor analysis area extends from the White River entrance station to Sunrise along Sunrise Road. Key destinations include the Owyhigh Lakes Trailhead, Summerland Trailhead, White River Campground, and the Sunrise area. The roadway, parking, and campground are within the Visitor Facilities Zone, and trails provide access to the Sensitive Resource/Recreation Zone, wilderness Transition Trail Zone, and wilderness Semi-Primitive Trail Zone. Desired conditions for the visitor facilities zone are highly structured opportunities to enjoy and learn about the park with many facilities, services, and much social interaction. Desired conditions for the Sensitive Resource/Recreation Zone are easily accessible resources near developed facilities with no special skills or knowledge needed and many people present, but visitors can move freely along trails. Desired conditions for the Transition Trail Wilderness Zone are for a scenic wilderness experience with a high degree of social interaction without feeling crowded, and the wilderness Semi-Primitive Trail Zone provides opportunities for a scenic wilderness experience with a moderate potential for social interaction.

The Owyhigh Lakes and Summerland Trailhead parking areas are small (7–15 spaces) and are often full. Because of the small parking areas, desired conditions for a wilderness experience, including solitude on the trails, are being met. The White River Campground is 5 miles up Sunrise Road from Highway 410. The campground is open from late June to late September (weather dependent) and there are 88 individual campsites.

Within the Sunrise area, there is the Sunrise Visitor Center; the Sunrise Day Lodge, offering food service and a gift shop; and a picnic area. The area is usually closed from mid-October until the Fourth of July weekend. The subalpine environment is characterized by large meadows with scattered groups of subalpine fir and whitebark pine. The Sunrise area offers park support services, information and interpretive facilities, views of the Mount Rainier summit, and an extensive network of hiking trails. The average visitor stays about two and a half hours (NPS 2002). The long mountain road to Sunrise ends in the parking lot with approximately 260 striped spaces. There is overflow parking for about 50 cars in a gravel area next to the parking lot.

Most days in the summer months of July–September, the White River Campground is full, with 150–300 people. Peak visitation at the White River Campground is around 300 people in one day. In July of 2019, there were over 320 people at the campground in one day, and in July of 2021, the peak day saw just under 300 people. A trailhead parking area at the White River Campground is often filled beyond endorsed parking capacity. Sunrise is also busy during the summer months, and parking demand exceeds availability on most weekends with over 400 cars parked in lots and

overflow parking in unendorsed lot and roadside areas. There are typically some overnight backpacker vehicles in the lot (about 50 vehicles), and hikers are arriving earlier and earlier (4:00 to 5:00 a.m.) to secure parking. There are issues with wayfinding at Sunrise, with a lack of signage and messaging for visitors to locate trailheads and with other visitor facilities in the area.

Parking lot congestion, overflow parking on road shoulders, and associated roadside resource and safety impacts are issues during peak visitation periods. Other resource impacts include vegetation trampling and trail widening, visitor-created trails, campsite expansion at Sunrise Camp, and human waste and toilet paper at Sunrise Point and Frozen Lake. According to a trail counter on the Wonderland Trail near Frozen Lake, there were an average of 126 visitors per day in the summer of 2019 (July–September) and an average of 17 visitors per hour from 10:00 a.m. to 2:00 p.m. On a peak day in August 2019, 360 visitors were captured on the trail counter.

When Sunrise is full, the National Park Service initiates a one-in, one-out metering system at the White River entrance station. This can lead to long lines along Sunrise Road that can back up all the way to Highway 410. On peak days in July and August of 2019, there were just over 2,000 vehicles in the Sunrise Corridor, recorded on the inbound traffic counter near the White River entrance station (see figure C-21a). As represented in figures C-21a and C-21b, visitation to Sunrise during the summer has increased by approximately 40% between 2105 and 2019. In 2021, summer visitation increased further by an additional 23% from 2019. On a Saturday in July 2021, there were over 2,400 vehicles in the corridor. Based on an accumulation analysis, peak vehicle accumulation in the corridor is between 8:00 a.m. and 10:00 a.m. with up to 530 vehicles at one time. Using the people-per-vehicle multiplier, this translates to approximately 1,600 people at one time in the Sunrise Corridor.

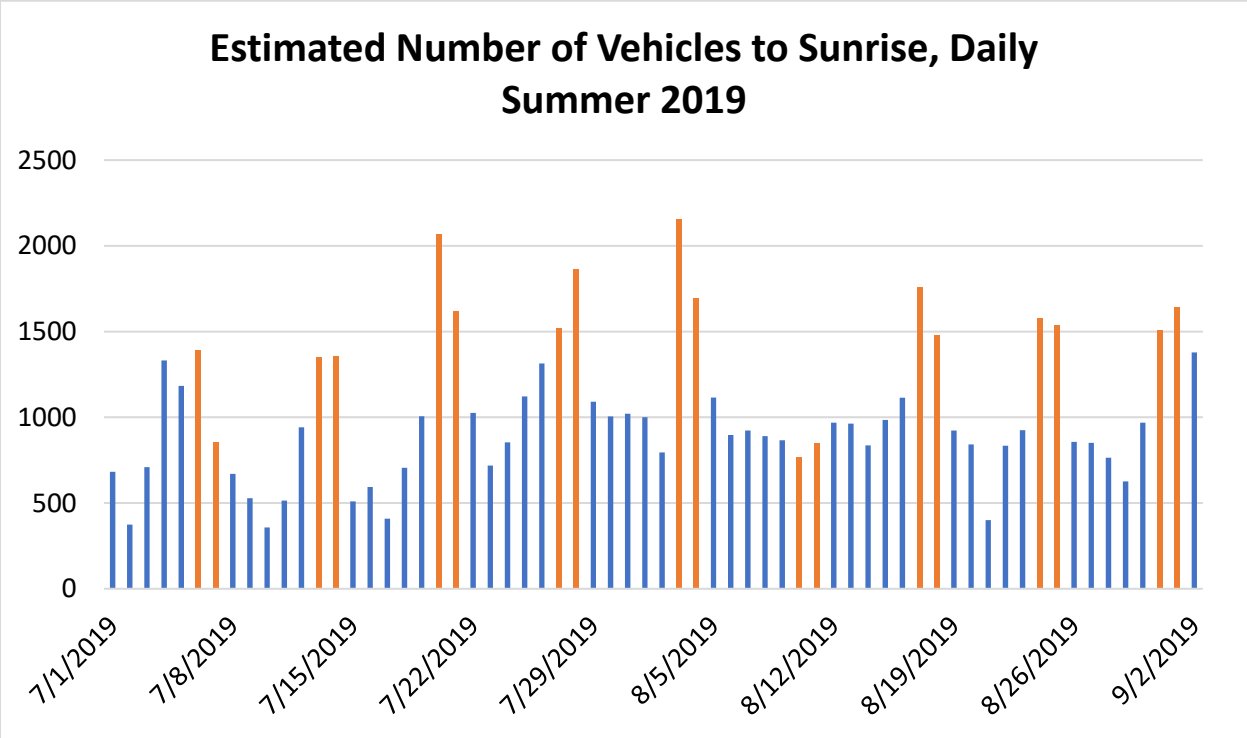

FIGURE C-21A: ESTIMATED DAILY NUMBER OF VEHICLES WITHIN THE SUNRISE CORRIDOR, BASED ON TRAFFIC COUNT DATA FROM 2019

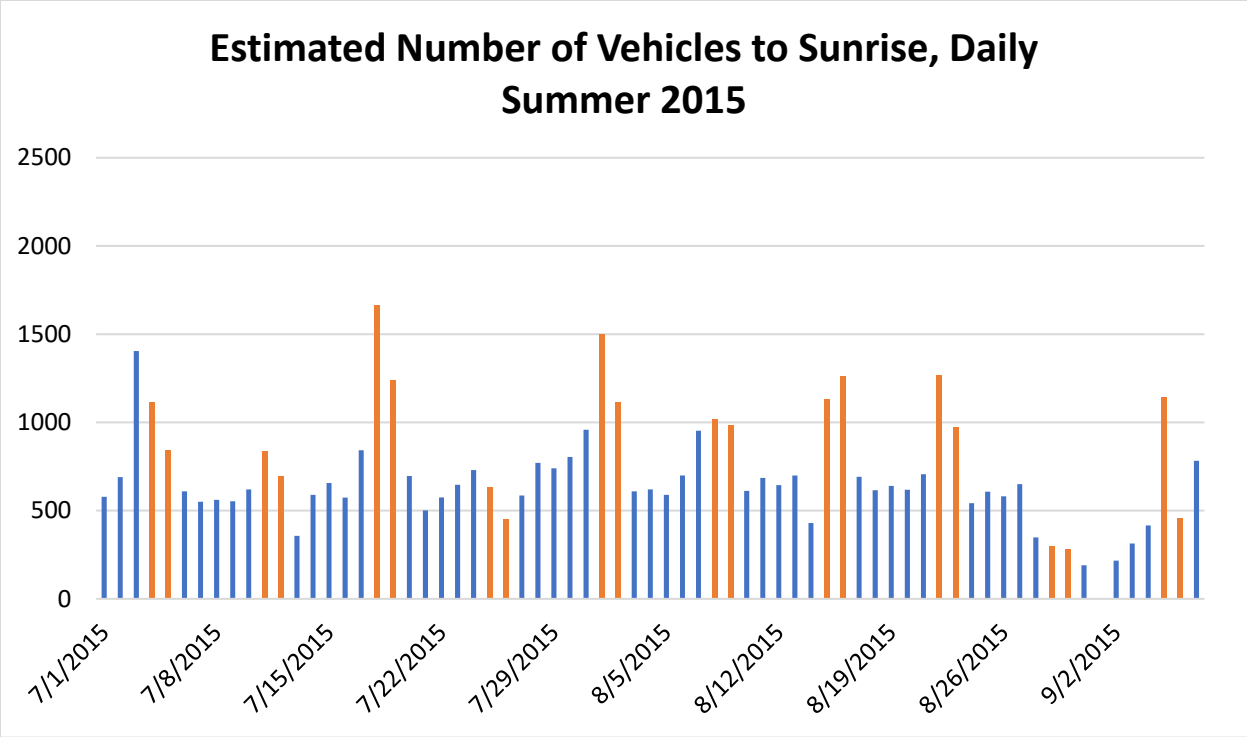

FIGURE C-21B: ESTIMATED DAILY NUMBER OF VEHICLES WITHIN THE SUNRISE CORRIDOR, BASED ON TRAFFIC COUNT DATA IN 2015

Limiting Attribute and Relevant Indicators

The primary attribute that constrains the Sunrise Corridor area's ability to accommodate use is the visitor experience and visitor safety associated with roadway congestion leading to the White River entrance station. During peak times when the National Park Service meters traffic on a one-in, one-out basis, a line forms at the entrance station that results in long wait times and visitor frustration. There are also safety concerns associated with the line extending out to Highway 410, including the inability for emergency vehicles and services to reach their destination in a timely manner and an increased risk of traffic accidents. The roadway is also within the Mount Rainier National Historic Landmark District, and roadway congestion negatively impacts the cultural landscape. Other limiting attributes include social conditions on Sunrise area trails related to crowding and the finite water availability at Sunrise for visitors and staff. The most relevant indicators the park would monitor related to these limiting attributes are vehicles at one time, people per viewshed on trails at Sunrise, number of times metering occurs, and number of times the White River entrance station is flushed. The entrance is occasionally flushed, meaning park staff allows a certain number of vehicles to enter without paying and in rapid succession to reduce the vehicle queue at the entrance. While it alleviates the wait time, it can lead to concentrated use on trails near the parking lot as visitors arrive within the same time frame, degrading the experience and impacting resources.

Visitor Capacity and Implementation Strategies

Current peak use levels within the Sunrise Corridor are not achieving and maintaining desired resource conditions and visitor experiences, such as when a line forms to the White River entrance station and backs up to Highway 410. The visitor experience and safety associated with

roadway congestion leading to the White River entrance station inform the amounts and types of use this area can accommodate, along with social conditions on trails and water resources. Park management assessed existing conditions relative to desired conditions and identified the need to decrease use levels across activity types by 15% from current use levels. Park staff determined that the 15% decrease to 1,350 people at one time would enable the park to achieve and maintain desired conditions.

Potential management strategies to implement visitor capacity include the following:

- Enforce no overflow parking (contracted or NPS tow and impound).
- Improve wayfinding and signage in the Sunrise area.
- Implement a visitor shuttle from Crystal Mountain.
- Implement a fee-free shuttle system from US Forest Service to the Sunrise area.
- Close the Sunrise parking lot overnight.

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2013c *Visitor Survey Report to Support Development of Visitor Facilities Zone Indicators and Standards, January 2013*. By Steve Lawson and Brett Kiser. Resource Systems Group, Inc. VT. Natural Resource Technical Report, NPS/NRTR— 2013/01 NPS D-105/117351 and PMIS 88348 – publication pending. Natural Resource Stewardship and Science, Fort Collins, Colorado.

2011 *Parking Congestion and Management at Sunrise*. Prepared by Christopher DeLorto, National Park Foundation Transportation Scholar.

APPENDIX D: ALTERNATIVES AND ACTIONS CONSIDERED BUT DISMISSED

While developing each alternative, the planning team determined that certain alternative concepts or actions were not feasible and/or not responsive to the purpose and need for action. These actions were dismissed from further analysis in the environmental assessment. Under each action, the rationale for dismissal is described.

SHUTTLE FROM ASHFORD OR OTHER GATEWAYS

In alternatives with shuttle service, consideration was given to establishing a park-and-ride service from the town of Ashford or other gateway communities to help manage parking issues at Paradise and other locations in the corridor during peak periods. However, this strategy was dismissed because it would not be able to be implemented within the park's existing land allocation and decision authority. Lastly, ridership data from the Ashford–Longmire shuttle service (implemented during construction of the Jackson Visitor Center, from 2007 to 2009) suggest there is not sufficient ridership demand for park-and-ride shuttle service from outside of the park to visitor destinations within the park.

PARADISE CIRCULATOR SHUTTLE

In alternatives with a shuttle service, consideration was given to establishing a new shuttle system that would help augment pedestrian circulation in the Paradise area by providing a ride to visitors from more distant parking locations to the visitor center area. The shuttle analyzed was designed to operate on a daily basis during the peak summer season with six stops throughout the Paradise campus area, including the three primary lots (picnic lot, lower lot, and upper lot), in addition to Upper and Lower Valley Road. The purpose of this shuttle was to provide vehicular transport via shuttle to visitors who park along the Lower Valley Road and to reduce the potential for visitor-vehicle conflict.

While this alternative would continue to provide spontaneous access to the Nisqually to Paradise Corridor for all visitors, the planning team determined that this alternative would not adequately manage access within visitor capacity to achieve desired conditions for visitor experience and resource protection. The Paradise Circulator Shuttle would likely result in continued congestion and crowding at Paradise and long queue lines at the Nisqually entrance. A preliminary financial analysis identified it would cost approximately $330,000 annually for operations of this shuttle alone from July 1st to Labor Day. This estimate does not consider other costs such as off-season maintenance, salary for drivers, or acquiring the shuttle fleet. Therefore, this preliminary alternative was dismissed from further consideration because it would fail to meet the plan's purpose and need and due to economic infeasibility.

RELOCATING THE NISQUALLY ENTRANCE TO A LOCATION WITHIN THE PARK BOUNDARY NEAR KAUTZ CREEK

This strategy was evaluated in a project scoping assessment completed by Facility Engineering Associates, which included the relocation of the Nisqually entrance station to Kautz Creek and the rehabilitation of the comfort station and utility systems in the area of the current entrance. The total conceptual project was estimated to have a net construction cost of over $7.7 million. Park management determined the cost of this project would not be a responsible use of the agency's funds. Significant safety and construction limitations also exist at Kautz. Finally, long-term feasibility is in question, with regard to geohazards, because Kautz is at the bottom of an alluvial fan. Lastly, this strategy would not meet this plan's need to address roadway congestion and minimize safety hazards, and protect culturally significant transportation assets.

EXPANDED ENTRANCES

Widening the Nisqually and/or Stevens Canyon entrance stations was considered as a strategy to reduce fee processing time, thereby reducing entrance station queue lengths and wait times. Construction of an additional lane at the Nisqually entrance was considered as a strategy to provide access to emergency vehicles, park staff, and annual/advanced purchase park pass holders without delays during peak periods. However, these strategies were dismissed because the entrance stations are located in the park's NHL district, and modifications of the type required to increase the footprint of the entrances would be an adverse effect on the NHL district and the historic character of the entrance. Further, the wilderness boundary closely abuts the roadway. New installations within designated wilderness are generally prohibited by the Wilderness Act. Finally, speeding up gate processing as a strategy on its own would not improve crowding and congestion within the park, since currently the queue functions as a meter for vehicles entering the park.

WINTER CAMPING/USE AT COUGAR ROCK

The National Park Service considered developing concession-run camping at the Cougar Rock Picnic Area, open year-round. This option would have entailed converting part of the Cougar Rock Picnic Area to camping, authorized "lot camping," or self-contained camping opportunities. This strategy was dismissed due to the inability to plow snow in this area. Since the lot is narrow, if cars are parked overnight, there would not be room for plows to remove snow in the morning. Lastly, the lack of infrastructure and staffing to provide for waste management at this site further dismissed this strategy.

ACCESS TO WESTERN AREA OF PARK

The general management plan identified the following action that has not been implemented: Make drive-in camping available at Sunshine Point Campground in the winter.

In 2006, the entire campground was washed out by a flood, making this campground no longer useable.

APPENDIX E: IMPACT TOPICS CONSIDERED BUT NOT CARRIED FORWARD FOR DETAILED ANALYSIS

IMPACT TOPICS CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS

The following impact topics are not analyzed because they do not exist in the project area; would not be affected by the proposal or the likelihood of impacts are not reasonably expected or through the application of mitigation measures there would be no potential for significant effects; and were not a subject of contention among the public and other agencies.

Air Quality

The Clean Air Act of 1963 was established to promote the public health and welfare by protecting and enhancing the nation's air quality. National Park Service *Management Policies 2006* directs parks to seek the best air quality possible to "preserve natural resources and systems; preserve cultural resources; and sustain visitor enjoyment, human health, and scenic vistas." Mount Rainier National Park is designated a class I area under the Clean Air Act (1977). Class I areas are afforded the highest degree of protection under the Clean Air Act.

Trail-related construction activities, including operating equipment and hauling materials, could result in temporary increases in vehicle exhaust and emissions as well as inhalable particulate matter. Their impact on air quality would not constitute violations of state or federal air quality regulations and would be rapidly dissipated through air movement, resulting in minimal and localized effects. In addition, the potential operation of shuttles would reduce the use of personal vehicles in the park, positively impacting air quality. Similarly, potentially implementing timed entrance to the park would disperse visitation over longer periods of time during the day, reducing bursts of high particulates in the park. Therefore, air quality was dismissed from further analysis as an impact topic.

Nonnative or Invasive Species

Nonnative or exotic species are species that have been transported to new places via human activity. The park has negligible known populations of exotic mammalian species (NPS 2014a). Among the park's 973 vascular plant species, 152 nonnative plant species have been observed, 26 of which are classified as noxious by Washington State and are considered a threat to park resources (NPS 2014a). The most widespread nonnative or exotic plant species include spotted knapweed (*Centaurea maculosa*), Canada thistle (*Cirsium arvense*), foxglove (*Digitalis purpurea*), common St. John's wort (*Hypericum perforatum*), ox-eye daisy (*Leucanthemum vulgare*), and birdsfoot trefoil (*Lotus corniculatus*) (NPS 2014a). Most of the documented sites for nonnative or exotic species are on the road from the Nisqually entrance to Paradise, as invasive species are often restricted to frequently disturbed areas, such as roads, trails, and administrative areas (NPS 2014a). Increases in visitation and the effects of climate change exacerbate the spread of nonnative or exotic species. However, the proposed actions in this plan are not anticipated to contribute to the increase of nonnative or exotic species in the park. By adhering to the construction-related mitigation measures outlined in appendix F, the presence of nonnative or invasive species in the park is not anticipated to increase. Therefore, nonnative or exotic species was dismissed from further analysis as an impact topic.

Viewsheds

As outlined in the park's draft vista and viewshed management plan (NPS 2015b), the Nisqually to Paradise Corridor provides access to several iconic scenic resources within Mount Rainier National Park, such as Christine Falls, Narada Falls, and Ricksecker Point and several overlook points that provide sweeping views of Mount Rainer. All views included in the 2015 plan are historic and considered as contributing views to the NHL district. The historic views along the Nisqually to Paradise Corridor "were designed as part of the sequential experience of the road, becoming wider and more dramatic with the climb, culminating at the meadows of Paradise" (NPS 2015b). The proposed actions in this visitor use management plan, such as the modification and/or installation of parking areas, picnicking areas, camping areas, trailheads and trails, shuttle stops, and photo spots, would not result in adverse aesthetic or obstructive visual effects for these scenic resources, viewsheds, or vistas. The proposed actions in this plan, however, may result in adverse impacts on the historic designed cultural landscapes associated with these scenic viewpoints, the road corridor itself, and the NHL district. Potential impacts on these resources have been retained under the cultural landscapes topics heading. Benefits and impacts associated with the visitor experiences of improved viewsheds are discussed in that topic area of chapter 3.

Archeological Resources

Although little of the total land area at Mount Rainier has been surveyed for archeological resources, there are a few archeological reports for the Nisqually to Paradise Corridor. These include an archeological inventory of the upper Stevens Canyon Road (NPS 2005a) and a damage survey of Sunshine Point, Kautz, and the Longmire Historic District (NPS 2008a). Other archeological reports have provided syntheses of developed areas, such as *Paradise Camp: Archaeology in the Paradise Developed Area* (NPS 2008b). The areas of potential effects on archeological resources for the project alternatives are expected to be concentrated in areas that have been previously developed and disturbed, such as picnic and parking areas proposed for expansion or modification. Anticipated impacts on archeological resources will be identified through the National Historic Preservation Act, section 106, process and tribal consultation. As appropriate, archeological monitoring would be conducted during ground disturbing activities. If, during construction, archeological resources were discovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed in consultation with the office of the State Historic Preservation Officer and associated American Indian tribes. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed. Based on these best management practices and mitigation measures, the topic of archeological resources was not carried forward for further analysis.

Ethnographic Resources

Ethnographic resources are traditional park sites, structures, objects, landscapes, and natural resource features that have significance due to their importance to the present way of life of members of a sociocultural group associated with the park (NPS 1998). Mount Rainier holds special sacred significance for several regional Native American tribes, including the Squaxin Island Tribe, Nisqually Indian Tribe, Muckleshoot Indian Tribe, Puyallup Tribe of Indians, Confederate Tribes and Bands of the Yakama Nation, and Cowlitz Indian Tribe. Ethnographic evidence supports

historical activity in the park, and their continued presence in their homelands and traditional places demonstrates ongoing contemporary use of the park. The park landscape and resources are important to Native American tribes for spiritual, ceremonial, and continued traditional lifeways. The National Park Service initiated consultation with the American Indian tribes traditionally associated with park lands to identify ethnographic resources that could potentially be affected by actions within this plan. No response was received from the associated tribes, and therefore, no beneficial or adverse impacts were identified for the proposed actions within this plan. Limitations to access described in the alternatives would not be applicable to tribes, and tribes would continue to have access for traditional activities. Should the tribes request consultation in the future for actions contained within this plan, the park will comply with this request.

Water Quality

The Clean Water Act of 1972 was established to regulate discharges of pollutants into US waters and regulate quality standards for surface waters. National Park Service *Management Policies 2006* requires protection of water quality consistent with the Clean Water Act. New trails would not compete with or dominate hydrologic activity, and erosion control methods would be used during ground-disturbing construction, which would minimize the amount of sediment that reaches the watershed. Areas of wetlands within the project areas would not be affected by the proposed action, which is described in the wetlands dismissal. Social trailing could impact water quality, which is assessed separately under the vegetation and soils impact topic. Water quality could be affected by stormwater runoff because of parking lot expansion where contaminants such as grease, oil, and antifreeze could be flushed into waterways by rainfall events. These impacts would have a localized effect and would be avoided or minimized by implementing the mitigation measures outlined in appendix C. Therefore, water quality was dismissed from further analysis as an impact topic. Upon final trail alignment, it will be determined if additional compliance to address water quality is needed.

Floodplains

Executive Order 11988, "Floodplain Management," requires that impacts on floodplains be addressed. Although some portions of developed areas affected by the proposed actions in this plan are considered floodplains, this plan does not involve any occupancy, modification, or development of floodplains. Proposed actions that have an unlikely potential to impact the floodplain are exempted under this executive order at picnic facilities, scenic overlooks, foot trails, and associated daytime parking facilities. Therefore, floodplains were dismissed from further analysis as an impact topic.

Wilderness

The wilderness qualities of Untrammeled and Other Features of Value were dismissed from further analysis, as follows:

- The untrammeled quality of wilderness represents places where the earth and its community of life are untrammeled by peoples and generally appear to have been affected primarily by the forces of nature. This definition refers to ecosystems that are unhindered and free from human control or manipulation. In other words, this wilderness quality can be degraded by human actions that control or manipulate components or processes of ecological systems within the wilderness area. Invasive species management activities have

degraded the untrammeled quality when they are implemented in wilderness areas. There would be no measurable difference in impacts on the untrammeled wilderness quality between alternatives; as a result, this wilderness character was dismissed from further analysis.

- The other features of value quality of wilderness applies to those values and features that are not fully covered in the other four qualities, including features of scientific or cultural value. In many cases, these values are often cultural resources that can teach us about the history and special significance of people's relationship to the land. Proposed actions and visitor use within recommended wilderness areas would avoid and protect other features of value. Any measurable impacts on cultural resources are analyzed in their respective impact topics. As a result, the other features of value quality of wilderness character was dismissed from further analysis.

Lightscape

In accordance with NPS *Management Policies 2006*, the National Park Service strives to preserve natural ambient lightscapes, which are natural resources and values that exist in the absence of human-caused light. The park strives to limit the use of artificial outdoor lighting to what is necessary for building security and human safety. The park also strives to ensure that all outdoor lighting is shielded to the maximum extent possible to keep light on the intended subject and out of the night sky. The proposed shuttle at Cougar Rock would require the development of a new shuttle stop, which would have light fixtures. The proposed shuttle would run until 7:00 or 8:00 p.m., after which point the lights at the shuttle stop would turn off. All new lights and fixtures would direct light at intended targets, would not overlight the area, and would be shielded to prevent light from scattering beyond horizontal lines of sight. Night construction may be allowed at select locations outside of suitable habitat or critical times of year for sensitive species. Night construction, if approved, would be subject to timing limitations for sensitive species, as described in "Appendix F: Mitigation Measures," and lights used for night construction activities would be shielded and directed downward to minimize impacts. The overall impact of these local night illuminations would have a negligible adverse effect on the night sky due to their short-term duration. As a result, lightscape was dismissed from further analysis.

Soundscape

In accordance with NPS *Management Policies 2006* and Director's Order 47: *Sound Preservation and Noise Management*, the National Park Service strives to preserve natural soundscapes associated with national park units. Ambient noise levels in the project area likely range from about 50 to 70 decibels, and the soundscape along the Nisqually to Paradise Corridor is influenced primarily by vehicle traffic. For example, in July, 35 decibels is exceeded at least 75% of the time in the corridor (NPS 2011a). Park operations, maintenance, and administration activities also contribute to the existing traffic and noise generated along the road. Traffic management under the action alternatives, including shifting transportation modes from privately owned vehicles to shuttles, a parking reservation permit system, and timed entry at park entrances, would result in less congestion, fewer miles traveled, and fewer cars circling or waiting for a parking space to become available, which would reduce vehicle-related acoustic impacts during peak visitation periods. Construction activities would generate noise averaging at 80 decibels, depending on the type of equipment or activity. Consideration of noise impacts is included in the discussion of northern spotted owl, marbled murrelet, and gray wolf. Night

construction, if authorized, would be limited by restrictions to protect species of concern as described in "Appendix F: Mitigation Measures." Construction noise would likely be buffered by natural terrain and distance, but noise levels would be monitored, and construction activities or schedules would be adjusted as needed to minimize visitor and resource impacts. Effects on the existing soundscape from work activities under the proposed actions would be local, short term, and minor. As a result, soundscape was dismissed from further analysis.

Nonprotected Wildlife Species

According to NPS *Management Policies 2006*, the National Park Service strives to maintain all components and processes of naturally evolving park unit ecosystems, including the natural abundance, diversity, and ecological integrity of animals. The following wildlife species were identified as having potential for impact as a result of the actions in this plan: Cascade red fox (*Vulpes vulpes cascadensis*), black bear (*Ursus americanus*), wolverine (*Gulo gulo*), fisher (*Pekania pennanti*), and the white-tailed ptarmigan (*Lagopus leucura*). Three federally listed species of concern, the northern spotted owl (*Strix occidentalis caurina*), marbled murrelet (*Brachyramphus marmoratus*), and gray wolves (*Canis lupus*), were carried forward as a separate impact topic.

Since the Cascade red fox and black bears can become habituated to food at areas of human congregation, the potential actions of developing new shuttle stops could result in an increase of habituation. Habituation of these species would be reduced by adhering to the mitigation measures outlined in appendix F, including controlling human food and attractants, enforcing food and trash storage violations, educating visitors, and staff training. Wolverines inhabit high-elevation coniferous forests and subalpine areas and have home ranges of up to 100 square miles. Wolverines were recently documented in the park but are unlikely to occur in the project area. Fisher inhabits mesic forests at low- to mid-elevations and had not been documented in the park since 1947 until the 2014 Fisher Restoration Plan reintroduced fisher into the park (NPS 2014c). Due to fisher's broad-scale habitat, they are likely to stay away from the road and therefore not be impacted by this plan. White-tailed ptarmigan is a ground-nesting species that can be found within high-elevation areas of the project area. The development of meadow overlooks has the potential to impact this species' habitat, which is addressed in the vegetation and soils analysis and would be subject to additional analysis prior to construction as needed.

Construction noise and activity may alter wildlife use of the area. As stated in the mitigation measures, vegetation clearing would be done outside the bird nesting season, so there would be minimal direct impacts on nesting birds. However, the loss of trees from site clearance would reduce the available nesting habitat in defined locations. The permanent removal of vegetation would minimally reduce habitat available for species reliant on this type of environment. However, there is an abundance of similar habitat adjacent to the project area, so adverse impacts from habitat loss are not expected to affect wildlife population viability. As a result, the topic of nonprotected wildlife species was dismissed from further analysis.

Wetlands

Executive Order 11990, "Wetlands Protection," requires that impacts on wetlands be addressed. Wetlands are present in several locations in and near the project area, including adjacent to streams, road culverts, and adjacent to the road. Wetland types include scrub-shrub wetlands, forested wetlands, open meadow wetlands, and seep wetlands. These wetlands support a variety

of vegetation species that are integral to wetland health and function. Available mapping indicates wetlands are present in scattered locations near the road but do not overlap with areas of proposed development (USFWS 2000). Two potential trails in the common to all action alternatives, the Kautz to Nisqually River Trail and the Cougar Rock to Carter Falls Trailhead, would be near wetlands, but the trail alignments would avoid any impacts on these wetlands. Increasing parking at the Cougar Rock picnic area under alternative 3 would similarly have no impact on wetlands. No jurisdictional wetlands will be affected as a result of the proposals in this plan. All potential impacts on wetlands would be reduced through the implementation of the mitigation measures outlined in appendix F, including standard avoidance of wetland impacts and conducting wetland surveying prior to ground disturbance. As a result, wetlands were dismissed from further analysis.

APPENDIX F: MITIGATION MEASURES

The National Park Service (NPS) places strong emphasis on avoiding, minimizing, and mitigating potentially adverse environmental impacts. Therefore, the National Park Service would implement mitigation measures and best management practices to protect the natural and cultural resources that plan implementation could affect. Unless otherwise specified below, the authority for these mitigations comes from the NPS Organic Act and NPS *Management Policies 2006*. Under all the alternatives evaluated in this plan/environmental assessment, the following mitigation measures would be applied to avoid and minimize potential adverse impacts on the fundamental resources and values of Mount Rainier National Park.

VISITOR USE AND EXPERIENCE

- Implement actions to reduce adverse effects of construction and development on visitor experience. Measures may include, but are not limited to, seasonality of projects, noise abatement, visual screening, and signs so that visitors can avoid construction activities.
- Conduct construction work at times that avoid peak visitor use (e.g., weekends, holidays) to the extent practicable to minimize inconveniences to visitors.
- Make information regarding the implementation of projects, including schedule and times, available to the public.
- Design trails to route people away from sensitive natural and cultural resources while allowing access to meaningful viewscapes.
- Collaborate with partners that operate within and outside of the park to proactively communicate with visitors through appropriate and strategic signage.
- Encourage park staff to limit administrative use of vehicles within the Nisqually to Paradise Corridor as much as possible.
- For any advanced reservation system, communicate with the public about when it would be in effect, and encourage visitors to download their reservation before visiting the park. Reevaluate the system frequently, and adjust the frequency, seasonality, and timing as necessary to meet desired conditions.

SOCIOECONOMICS

- When possible, NPS staff would work with local organizations to provide fee-free or fee-reduced days for underserved populations, consistent with agency policy direction.
- Continue to collaborate with commercial service providers and local business owners in gateway communities regarding visitation trends, proposed and ongoing projects, and any changes to timed entry or reservation systems.

CULTURAL RESOURCES

Cultural Landscapes

- Ensure that all new construction within or adjacent to historic sites, districts, and cultural landscapes would be compatible in terms of architectural elements, scale, massing, materials, and other character-defining features, in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*.
- Maintain selected vistas and other remarkable views through vegetation pruning to allow visitors to experience the intended scenic design of the historic road system without disrupting the integrity of the cultural landscape and consistent with the protection of other park resources and values.
- Manage appropriate visitor and administrative uses to minimize impacts on scenic views.
- Monitor visitor use areas for signs of vegetation trampling, social trailing, vandalism, and congestion and overuse, which could impact the cultural landscape.
- Conduct pre- and post-project monitoring in the project area to ensure successful revegetation to maintain the cultural landscape.
- Purchase and encourage the use of quiet fleet and transit vehicles, to the extent possible, to preserve the natural qualities of the cultural landscape.
- Consult with the Washington State Historic Preservation Office and Tribal Historic Preservation Officer(s) before undertaking actions that would affect the cultural landscape, per section 106 of the National Historic Preservation Act of 1966 as amended.

ETHNOGRAPHIC RESOURCES

- Consult with associated tribes and the Tribal Historic Preservation Officer(s) before undertaking actions that may impact ethnographic resources, per section 106 of the National Historic Preservation Act of 1966 as amended.

HISTORIC STRUCTURES

- The rehabilitation of historic buildings and structures would be undertaken in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (2017).
- Consider modifications to historic roads and infrastructure that maintain historic integrity but also mitigate the effects of anticipated increases in intensity and frequency of large vehicle (shuttle, bus) use, as applicable.
- Consult with the State Historic Preservation Office and Tribal Historic Preservation Officer(s) before undertaking actions that would affect historic structures, per section 106 of the National Historic Preservation Act of 1966 as amended.

ARCHEOLOGICAL RESOURCES

- Monitor known archeological sites to assess and document the effects of natural processes and human activities on the resources. Archeological resources would be left undisturbed and preserved in a stable condition to prevent degradation and loss of research values unless intervention could be justified based on compelling research, interpretation, site protection, or park development needs. Recovered archeological materials and associated records would be treated in accordance with 36 CFR Part 79, NPS *Management Policies 2006*, and the NPS *Museum Handbook*. All identified sites would be entered in the Cultural Resources Inventory System, and previous records would be updated.

- As necessary, archeological surveys would precede any construction, or archeological monitoring would be conducted during ground disturbing activities.

- During construction, significant archeological resources would be avoided to the greatest extent possible. If such resources could not be avoided, an appropriate mitigation strategy (e.g., the excavation, recordation, and mapping of cultural remains before disturbance) would be developed in consultation with the Washington State Historic Preservation Office and Tribal Historic Preservation Officer(s). The mitigation strategy would ensure that important archeological data is recovered and documented.

- If, during construction, previously unknown archeological resources are discovered, halt all work in the immediate vicinity of the discovery until the resources can be identified and documented. If the resources could not be preserved in situ, an appropriate mitigation strategy would be developed in consultation with the Washington State Historic Preservation Office and Tribal Historic Preservation Officer(s) of associated tribes. Archeological sites would be appropriately stabilized and protected from further disturbance. All project personnel would be briefed to stay out of areas with sensitive archeological resources.

WILDLIFE, SPECIAL STATUS SPECIES

- Park staff would inform construction personnel of the occurrence and status of special status species within the project area, the potential impacts construction activities may have to the species, and the potential penalties for taking or harming a special status species.

- Qualified biologists would conduct studies to determine if rare, threatened, or endangered state or federally listed species are present before construction projects are implemented to avoid disturbance and ensure appropriate locations and design of facilities.

- Park vegetation staff would be on-site during construction work near whitebark pines to avoid impacts on whitebark pine.

- Healthy trees of any size, which may serve as suitable habitat to the northern spotted owl or the marbled murrelet, based on the elevation associated with the species' specific suitable habitat, would only be removed when interfering with trail placement or traffic and when no reasonable alternatives for trail placement can be identified. If the removal

of any healthy trees 18 inches diameter breast height or larger is necessary under this plan, appropriate compliance and consultation would occur under a separate process.

- Any vista management actions and trail construction within suitable habitat would occur outside of the nesting season for northern spotted owl and marbled murrelet within suitable habitat (March 15–September 30).
- Marbled murrelet
    - Daytime construction work may begin two hours after sunrise and would cease two hours before sunset in suitable marbled murrelet habitat from April 1 to September 23. This restriction does not apply to daytime activities between September 23 and April 1.
    - No night work would be expected from construction activities associated with vista management, trail construction, and other related ground disturbing activities.
    - Additional consultation pursuant to section 7 of the Endangered Species Act would be initiated as needed.
- Northern spotted owl
    - For sites below 4,800 feet in elevation within 0.7 mile of spotted owl activity centers or unsurveyed spotted owl suitable nesting habitat, construction activities would occur after July 31 to minimize impacts on nesting spotted owls.
    - No project activities, other than hauling, may occur in protected activity centers from March 15 to July 31 unless the current year's surveys conclude there is no spotted owl activity occurring.
    - Should annual northern spotted owl surveys be suspended, no construction may occur in unsurveyed habitat from March 15 to July 31, and additional consultation pursuant to section 7 of the Endangered Species Act would be initiated as needed.
- Gray wolf
    - Construction would be limited within 1 mile of known denning and rendezvous sites.
    - If an active wolf den or rendezvous site becomes established, no ground disturbing work would occur within 0.25 mile, as needed, until wolves are no longer using the area.
    - Additional consultation pursuant to Section 7 of the Endangered Species Act would be initiated as needed.
- The following measures would be taken to limit noise and disturbance from vehicles and construction equipment:
    - All motor vehicles and equipment would have mufflers conforming to original manufacturer specifications that are in good working order and are in constant operation to prevent excessive or unusual noise.

    - Sound attenuation devices (such as rubber strips or sheeting) would be installed and maintained on all equipment. This action would include truck tail and other gate dampeners (both opening and closing) for all dump trucks on the project.
    - Use of unmuffled compression brakes would be prohibited within park boundaries.
    - The use of air horns within the park would not be allowed except for safety.
    - The contractor must use muffled pumping equipment for water withdrawals, water diversion, and other activities (i.e., pump and generator to reduce noise) to levels similar to that of the average ambient noise levels. No asphalt batch plants or rock crushing plants would be allowed within the park boundaries.

- If tree and shrub removal is required, nesting bird surveys would be done. If nesting migratory birds are present, tree removal would be conducted from September to February, outside of the nesting season for migratory birds, to avoid disturbing or taking a migratory bird nest.
- Any roadkill or wildlife collisions would be reported to the park immediately.
- Construction vehicle speeds would not exceed construction zone posted speed limits to decrease wildlife/vehicular incidents. Speed limits outside the construction zone would default to the posted speed limit.
- All food items would be stored inside vehicles, trailers, or trash dumpsters, except during actual use, to prevent unnatural attractants to wildlife.

VEGETATION, TRAIL DESIGN

- Removing or impacting native vegetation adjacent to trails would be minimized as much as possible to protect native plants and prevent the spread of nonnative species. The spread of invasive vegetation that results from removal of and impacts on native vegetation would be monitored and treated.
- Construction equipment would be inspected and properly cleaned to remove dirt and debris that may harbor nonnative species before being delivered to the park.
- If sensitive resources are discovered during trail construction, construction would cease, and the area would be surveyed in more detail so that impacts could be avoided or minimized and/or an alternate route established.
- All crew members and volunteers assisting in the trail work efforts would be educated about the importance of avoiding impacts on sensitive resources that have been flagged for avoidance.
- New and existing trails should avoid sensitive areas where a rare and/or endangered plant or animal species or its known habitat exist. Care would be taken not to disturb any other sensitive wildlife species (reptiles, migratory birds, raptors, and bats) found nesting, hibernating, estivating, or otherwise living in or immediately near the worksites. Resource

management personnel would be notified/consulted when wildlife must be disturbed or handled.

- Vegetation and tree removal work would be sensitive to seasonality to avoid impacts on roosting, breeding, and nesting species to the maximum extent practicable.

- Following completion of construction activities, all areas of disturbed soils and vegetation would be regraded and revegetated as soon as possible. Natural topographic features would be restored to the extent possible using local excavated soils or from other park projects or park-approved weed-free sources, and native species would be used in all revegetation efforts. Restoration efforts would be maximized by using salvaged topsoil and native vegetation and by monitoring revegetation success for several growing seasons, as appropriate. Undesirable species would be monitored, and control strategies initiated if needed.

- Soil conditions would be considered when determining the final layout of a trail, including soil type, susceptibility to erosion, drainage and permeability characteristics, and its compatibility for recreational use.

- Where trails are proposed in disturbed or previously developed areas of the park, considerations and verification of the following items should be included: presence of utilities, established right of ways, remaining structures, cultural or archeological significance, and the presence of hazardous materials or contaminated conditions. If any of these conditions exist on the proposed site, a determination of impact and trail alignment options would need to be developed to address the conditions present.

- Healthy trees of any size would only be removed when interfering with trail placement or traffic and when no reasonable alternatives for trail placement can be identified. The trail should be routed to avoid being placed within the area directly under the outer circumference of the tree branches (i.e., the dripline). When branches extend over the trail, the corridor would follow the vertical trail clearance standards.

- Comply with NPS soundscape preservation and noise management requirements (i.e., Director's Order 47: *Soundscape Preservation and Noise Management* and NPS *Management Policies 2006*).

- Implement standard noise abatement measures during construction.

- Vehicles and equipment idling times would be limited when parked to reduce emissions. Contractors would not leave vehicles idling for more than five minutes.

- Designate a washout area on the job site in a grassy or graveled area where pooled water can soak into the ground. Never wash out on a street or paved area or near a storm drain. If no washout area is available, wash out into a container (5-gallon bucket or wheelbarrow) and dispose of material properly.

- Construction equipment would be cleaned following a park-approved protocol before use in the park and before being used at other sites within the park to avoid the potential introduction of nonnative plants or pathogens or the transfer of soil organisms between sites. Example cleaning protocols include the Clean Equipment Protocol developed by the

Ontario Ministry of Natural Resources and Forestry (2016) and the US Forest Service's vehicle cleaning guidelines (USFS 2005).

- Staff would clean all personal equipment and personal gear (e.g., boots, packs, and pant cuffs) following a park-approved protocol before entering the park and before moving between sites.

- Construction would avoid the root zones of trees, as possible, and limit impacts on minimum area of the root zones necessary to complete work. For trees likely within a work zone, the structural root zones should be protected. The structural root zone is approximated as the dripline of the tree or, for trees greater than an 18-inch diameter, a 10-foot radius around stem, whichever is greater. For trees with a 40-inch diameter and greater, a 13-foot radius would be used to determine the structural root zone. For any trees not immediately within a work zone, materials staging and other impacts would avoid the entire critical root zone: 1 foot for every inch of tree diameter for trees less than 18 inches in diameter and 1.5 feet for every 1 inch of tree diameter for all trees greater than or equal to 18 inches or all whitebark pine individuals. Vegetation staff would be provided with a detailed map of the extent of site ground disturbances to follow up on treatments for any potential weed introductions in those areas.

WETLANDS, FLOODPLAINS

- Floodplains would be preserved through seasonal closure, structural flood protection measures, effective flood warning, and flood evacuation, as appropriate, per Executive Order 11988, "Floodplain Management."

- Mitigation measures would be applied to protect wetland resources. Once a management strategy has been selected, a survey would be performed to certify wetlands within the project area and to identify locations of wetlands and open water habitat more accurately. Wetlands would be delineated by qualified NPS staff or certified wetland specialists and marked before any construction starts. All pathway construction facilities would be sited to avoid wetlands, or if that were not feasible, to otherwise comply with Executive Order 11990, "Wetlands Protection," the Clean Water Act, and Director's Order 77-1: *Wetland Protection*. Additional mitigation measures would include the following, as appropriate:

    - Avoid wetlands during construction, using bridge crossings or retaining walls wherever possible. Increased caution would be exercised to protect these resources from damage caused by construction equipment, erosion, siltation, and other activities with the potential to affect wetlands. Measures would be taken to keep construction materials from escaping work areas, especially near streams or natural drainages.

    - Use elevated boardwalks over wetland sections where it is not feasible to avoid the wetland or apply feasible mitigation measures. Boardwalks on wetlands would be placed on helical piers or other elevated structures that can be periodically shifted toward the water to maintain the shoreline experience as isostatic rebound occurs.

    - Design footbridges in such a way as to completely span the channel and associated wetland habitat (i.e., no pilings, fill, or other support structures in the

wetland/stream habitat). If footbridges could not be designed in such a way as to avoid wetlands, then additional compliance (e.g., a wetland statement of findings) would be completed to assess impacts on wetlands and ensure no net loss of wetland area.

- Upon final design and if warranted, a formal delineation and any applicable Clean Water Act permitting would occur before groundbreaking.

WATER RESOURCES

The riparian buffer zones or setbacks of trails adjacent to or crossing rivers and streams would be considered during site planning. The contractor would be required to meet minimum federal and Washington State Department of Transportation soil erosion and sediment control standards for stream crossings (intermittent and perennial). Work areas, including material sources, would be separated by the use of a suitable barrier that would prevent sediment, petroleum products, chemicals, other liquids, or solid materials from entering the waters of the United States. Barriers would be constructed and removed to avoid discharge of material into the waters of the United States. Sediment or other material collected by the barrier would be removed and properly disposed of. Establish staging areas (used for construction equipment storage, vehicle storage, fueling, servicing, and hazardous material storage), if possible, at least 150 feet away from streams in a location and manner that would preclude erosion into or contamination of streams or wetlands. For storage of equipment and materials at designated staging areas within 150 feet of streams and wetlands, appropriate erosion protection measures would be implemented to protect water resources. Structurally adequate debris shields would be constructed to contain debris within the construction limits and prevent debris from entering waterways, travel lanes open to public traffic, or areas designated not to be disturbed. Treated wood used for bridges or other structures would meet or exceed the standards established in the most current edition of "Best management Practices for the Use of Treated Wood in Aquatic Environments," developed by the Western Wood Preservers Institute. Trails should have minimal river/stream crossings along a segment, which should be avoided, where possible, to minimize impacts on the stream. Where a crossing is necessary, the evaluation of the stream quality and resource sensitivity should inform the design and location of the crossing. Stream crossings should be located at riffle areas instead of at pools or meanders, as riffles are relatively stable, have the coarsest substrate, and can best accommodate a crossing (IMBA 2004). All stream crossings would be evaluated in compliance with Director's Order 77: *NPS Benefits Sharing*.

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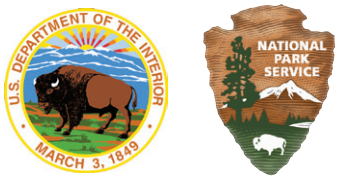

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving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

MORA 105/188061
April 2023

Nisqually to Paradise Draft Corridor Management Plan and Environmental Assessment

April 2023