



State of the Park Report

Kenai Fjords National Park

Alaska



2017

On the cover: View of Exit Creek and the toe of Exit Glacier. Photo taken on August 29, 2016. NPS Photo by Travis Fulton.

Disclaimer. This State of the Park report summarizes the current condition of park resources, visitor experience, and park infrastructure as assessed by a combination of available factual information and the expert opinion and professional judgment of park staff and subject matter experts. The [internet version](#) of this report provides the associated workshop summary report and additional details and sources of information about the findings summarized in the report, including references, accounts on the origin and quality of the data, and the methods and analytic approaches used in data collection and assessments of condition. This report provides evaluations of status and trends based on interpretation by NPS scientists and managers of both quantitative and non-quantitative assessments and observations. Future condition ratings may differ from findings in this report as new data and knowledge become available. The park superintendent approved the publication of this report.

Executive Summary

The mission of the National Park Service is to preserve unimpaired the natural and cultural resources and values of national parks for the enjoyment, education, and inspiration of this and future generations. NPS Management Policies (2006) state that “The Service will also strive to ensure that park resources and values are passed on to future generations in a condition that is as good as, or better than, the conditions that exist today.” As part of the stewardship of national parks for the American people, the NPS has begun to develop State of the Park reports to assess the overall status and trends of each park’s resources. The NPS will use this information to improve park priority setting and to synthesize and communicate complex park condition information to the public in a clear and simple way.

The purpose of this State of the Park report is to:

- Provide to visitors and the American public a snapshot of the status and trend in the condition of a park’s priority resources and values;
- Summarize and communicate complex scientific, scholarly, and park operations factual information and expert opinion using non-technical language and a visual format;
- Highlight park stewardship activities and accomplishments to maintain or improve the State of the Park;
- Identify key issues and challenges facing the park to help inform park management planning.

The purpose of Kenai Fjords National Park (KEFJ) is to preserve the scenic and environmental integrity of an interconnected icefield, glacier, and coastal fjord ecosystem. Specifically, Section 201 of the Alaska National Interest Lands Conservation Act (ANILCA) states that the park shall be managed for the following purposes, among others:

- To maintain unimpaired the scenic and environmental integrity of the Harding Icefield, its outflowing glaciers, and coastal fjords and islands in their natural state;
- And to protect seals, sea lions, other marine mammals, and marine and other birds and to maintain their hauling and breeding areas in their natural state, free of human activity, which is disruptive to their natural processes.

The summary table, below, and the supporting information that follows, provide an overall assessment of the condition of priority resources and values at Kenai Fjords National Park based on scientific and scholarly studies and expert opinion. The internet version of this report, available at <http://www.nps.gov/stateoftheparks/kefj/>, provides additional detail and sources of information about the resources summarized in this report, including references, accounts on the origin and quality of the data, and the methods and analytical approaches used in the assessments. Reference conditions that represent “healthy” ecosystem parameters, and regulatory standards (such as those related to air or water quality) provide the rationale to describe current resource status. In coming years, rapidly evolving information regarding climate change and associated effects will inform goals for managing resources, and may alter how the park measures the trend in condition of resources. Thus, reference conditions, regulatory standards, and/or best judgment about resource status or trend may evolve as the rate of climate change accelerates and the preserve responds to novel conditions. In this context, the status and trends documented here provide a useful point-in-time baseline to inform understanding of emerging change, as well as a synthesis to share as the park builds broader climate change response strategies with partners.

The status and trend symbols used in the summary table below and throughout this report are summarized in the following key. The background color represents the current condition status, the direction of the arrow summarizes the trend in condition, and the thickness of the outside line represents the degree of confidence in the assessment. In some cases, the arrow is omitted because data are not sufficient for calculating a trend (e.g., data from a one-time inventory or insufficient sample size).

Condition Status		Trend in Condition		Confidence in Assessment	
	Warrants Significant Concern		Condition is Improving		High
	Warrants Moderate Concern		Condition is Unchanging		Medium
	Resource is in Good Condition		Condition is Deteriorating		Low

State of the Park Summary Table

Priority Resource or Value	Condition Status/Trend	Rationale
Natural Resources		web ▶
Air Quality		Overall air quality at KEFJ is in good condition. Park scenic views are rarely affected by air pollution and haze. Airborne toxics, including mercury, can deposit with rain or snow and accumulate in birds, mammals, amphibians, and fish, resulting in reduced foraging efficiency, survival, and reproductive success. Some vegetation communities and surface water in the park may be susceptible to acidification and nutrient enrichment effects of excess sulfur and nitrogen deposition.
Geologic Features		With the park's steep terrain and glacial features, geologic hazards including glacial lake outbursts, landslides, and avalanches can occur in the park. Abandoned mines in the park impact resources through contaminants and deteriorating structures. Paleontological resources are present. Coastal features including caves form a unique coastline.
Glacial Features		KEFJ was established in 1980 to “maintain unimpaired the scenic and environmental integrity of the Harding Icefield, its outflowing glaciers and coastal fjords and islands...” Glaciers throughout KEFJ have been in widespread recession since the Little Ice Age maxima (late 1700s through late 1800s). Over the second half of the 20th century, the glacier covered area decreased 11% (from 2,326 km ² to 2,074 km ²) and the total glacier volume is estimated to have reduced by 15% (74.5 km ³) (Loso et al. 2014).
Hydrology		Limited data is available for hydrology in the park. Some data for temperature and outlet discharge are available for Desire and Delight Lakes in McCarty Fjord. Exit Creek turbidity was monitored in 2004, 2008, and 2009 and was within normal range for glacial streams.

Priority Resource or Value	Condition Status/Trend	Rationale
<p>Fish and Wildlife</p>		<p>Thirteen out of sixteen freshwater fish species were confirmed in a 2005 freshwater fish inventory (Jones et al. 2005). A total of 56 fish species, including 29 tide pool or estuarine species, could potentially be found within KEFJ boundaries (Jones et al. 2005). Forage fish such as herring and capelin are important components of the marine food web and can be affected by oil spills. Salmon species are a significant resource in the park. Coho salmon are distributed throughout the park and coho salmon from the Resurrection River drainage help support one of the state’s largest sport fisheries in Resurrection Bay outside of the park. In the southern part of the park, Alaska Department of Fish and Game (ADF&G) annual escapement goals for sockeye salmon in Delight Lake and Desire Lake have been met on the low end for nearly 2/3 of the 38 years monitored.</p> <p>Bald eagles are iconic in the park, and are actively monitored. Bald eagle nest occupancy and number of young on the Kenai Fjords coastline was measured annually between 2009 and 2016 and was above the threshold considered stable for a population. Limited information exists on bears, moose, and mountain goats.</p>
<p>Plant Communities and Ecosystem Processes</p>		<p>Native plant communities range from old growth coastal forest to rocky alpine nunataks. Receding glaciers are giving way to a rapid plant succession of newly established vegetation. A number of rare species, including lichens and mosses, are present in the park. Invasive exotic plants are actively monitored and controlled, and efforts to contain the spread of these species are ongoing. Surveys for <i>Elodea</i> are recommended in Desire, Delight, and Addison lakes, as the damaging invasive species is known to exist in Anchorage, Cordova, and dispersed locations on the Kenai Peninsula. The environmental consequences of <i>Elodea</i> infestation are high, and the park continues to closely monitor for it.</p>
<p>Marine Nearshore Environment and Animals</p>		<p>Marine nearshore communities are a vital component of the KEFJ coastal ecosystem. Research studies and long-term monitoring of several components of this ecosystem have aided KEFJ and other collaborators in understanding these communities. KEFJ also monitors several species that are part of the nearshore food web. This important food web is fueled by kelps, algae, and seagrasses with benthic invertebrates transferring that energy to high level predators. Active monitoring for marine invasive species is ongoing during nearshore monitoring. To date, no marine invasive species have been documented.</p> <p>Populations of higher trophic level organisms—such as sea otters, black oystercatchers, and some nearshore seabirds—seem relatively stable over the past 9 years, although highly variable in some cases. However, some marine mammals and pelagic seabirds have shown declines over time. Steller sea lions within KEFJ are federally listed as endangered. Continued loss of glacial ice will have unknown impacts on harbor seals, a species that relies on the ice.</p> <p>Declines of some pelagic seabird species have been documented across the Gulf and further work should be done in KEFJ. Impacts from climate change such as temperature, pH, and salinity as well as increased potential for further anthropogenic stressors including increased visitation, pollution, oil spills, shipping traffic, and marine debris are unknown at this point and will likely disrupt these marine food webs. A rapidly changing environment further stresses the need for continued efforts to understand mechanisms of change in this environment.</p>

Priority Resource or Value	Condition Status/Trend	Rationale
Dark Night Sky		A photic environment is described as the physical amount and character of light at a particular location, irrespective of human perception. The NPS Night Sky Program characterizes a park's photic environment by measuring both anthropogenic and natural light. While no ground-based or modeled data are available for KEFJ, 2012 visible infrared imaging radiometer (VIIRS) satellite data, which uses a broadband imaging detector with high sensitivity, indicates that there is no visible upward radiance within the park boundary. The most significant sources of upward radiance in the region originate from cities of Seward, Kenai, and Anchorage, whose light may impact the photic environment of the park.
Acoustic Environment		The quality of the acoustic environment affects park resources including wildlife, cultural resources, the visitor experience, and landscapes. The condition of the acoustic environment is assessed by determining how much man-made noise sources contribute to the acoustic environment through the use of a national noise pollution model. This measure is referred to as the mean acoustic impact level. Impact is measured in A-weighted decibels (dBA). The mean acoustic impact level at the park is 1.1 dBA, meaning that the acoustic environment is in good condition. Overall, long-term projected increases in ground-based and aircraft traffic indicate a deteriorating trend in the quality of acoustic resources at this location, as does an increase in development and steady tourism pressure throughout the state of Alaska.
Cultural Resources web ▶		
Archeological Resources		Prehistoric and historic times are represented in the archeological record in KEFJ. A number of major surveys to identify sites have taken place in coordination with the Smithsonian Institute's Arctic Studies Center. Coastal ownership is complex within park boundaries and the 10 sites represented in this report are cared for by the NPS.
Cultural Anthropology		Cultural anthropology is the study of the peoples and their ways of life. For KEFJ, there have been two important studies. One was for Port Graham Village and Nanwalek, two affiliated native villages for the park. The other was for use of the Exit Glacier area by local Seward residents.
Cultural Landscapes		Cultural landscapes reflect history, cultural richness, developmental patterns, and changing relationships between people and the environment. Within its boundaries, KEFJ contains one cultural landscape, Nuka Bay Historic Mining District, which exemplifies the significance of hard rock mining in that area.
Historic Structures		Most of the park's historic structures are associated with the Nuka Bay Historic Mining District cultural landscape. 100% of historic structures have National Register Determination of Eligibility (DOE) documentation and have not been formally nominated to the National Register as contributing elements to the Nuka Bay Historic District. 100% of KEFJ structures are listed in List of Classified Structures.
History		Two history documents have been created for KEFJ. Research at KEFJ supports management of the cultural resource program by identifying cultural resource sites and assessing their condition. 60% of the park's historic resources have been evaluated for eligibility in the National Register.

Priority Resource or Value	Condition Status/Trend	Rationale
Museum Collections		The park’s museum collection has more than 224,000 objects. KEFJ does not maintain a collection storage facility onsite and its collections are curated at the NPS Alaska Regional Curatorial Center in Anchorage.
Visitor Experience web ▶		
Number of Visitors		The peak of the visitation season at KEFJ is May through September. Since 2000, park visitation is increasing in the shoulder months of May and September. Overall park visitation increased from 2000 to 2010. Since 2010, it remains stable at approximately 296,000 visitors annually. Increased visitation has led to periods of very crowded visitor centers and crowded trails in popular park areas.
Visitor Satisfaction		Visitor satisfaction remains exceptional near 100% over the last 5 years (Visitor Survey Card Data Reports, NPS Scorecard).
Interpretive and Education Programs – Talks, Tours, and Special Events		The number of special events and formal ranger programs—including boat tours, beach walks, and Exit Glacier guided walks and hikes—has remained stable over the past decade and are experiencing an increase in participation. Education programs and Junior Ranger program offerings are increasing with the addition of the park’s distance learning program, “Every 4th Grader in a Park” initiative, and a newly developed Explorer Journal (KEFJ Servicewide Interpretive Report).
Interpretive Media – Brochures, Exhibits, Signs, and Website		KEFJ is replacing outdated exhibits in the Exit Glacier area and the Seward Visitor Center. In 2013–2015, park staff worked closely with the Climate Change Response Program to develop exhibits that speak to the effects of climate change on park resources and global sea level rise. In 2016, the park began designing extensive new interpretive exhibits for the renovation of the Visitor Center at the Seward harbor.
Recreational Opportunities		Recreation opportunities in Kenai Fjords National Park are both positively and negatively influenced by the dynamic nature of the landscape. Specifically, the retreat of glaciers impacts the opportunity for accessing and viewing the glaciers. Increased visitation in the Exit Glacier and Aialik Bay areas are causing trails to be more crowded than in the past with some impacts to visitor experience.
Scenic Resources		Many visitors come to Kenai Fjords National Park to see the exceptional scenery, especially related to glacial fjords. While glaciers are retreating overall, the scenic views are still relatively pristine at this time.
Accessibility		<p>The park received an accessibility report in 2010. The park’s visitor center deficiencies will be eliminated by the upcoming renovation of the facility. Universal design principles are applied to all new projects.</p> <p>Until the issue of public transportation is addressed, parking lot overcrowding in the Exit Glacier area during high season continues.</p>

Priority Resource or Value	Condition Status/Trend	Rationale
Safety		The safety of visitors is a park priority. The park works quickly to identify and mitigate potential hazards, and the number of accidents is very low. When accidents occur, the response time may be delayed due to the challenge of managing a large, remote park in Alaska that includes access by air, water, and limited vehicle access.
Partnerships		Reported volunteer hours decreased due to the administrative shift in 2015 where hours from Student Conservation Association interns are no longer included in volunteer hour counts. The park has numerous partners that enhance visitor experience. Numbers of ranger programs offered in conjunction with partners decreased slightly in 2016.
Park Infrastructure web ▶		
Overall Facility Condition Index		The facility portfolio as a whole at KEFJ is in good condition. The Facilities and Maintenance Team maintains more than 100 built assets with a total Current Replacement Value of approximately \$59 million.
Wilderness Character and Stewardship web ▶		
Overall Wilderness Character		KEFJ's wilderness character qualities are mostly intact and stable. The ecological integrity of KEFJ's wilderness is in good condition, showcasing a duality of mountain/icefield and coastal landscapes. With more than 569,600 acres of wilderness often in terrain that is difficult to access, the KEFJ wilderness is generally undeveloped. The few human "improvements" are primarily cabins, anti-bear food lockers, and scientific installations. One potential effect on solitude is that there appears to be an increase outside of the park's boundary in boats using Resurrection Bay and Aialik Bay, as well as in increase in regular helicopter use near Bear Glacier.
Wilderness Stewardship		Key information continues to be added to the wilderness documentation at the park. In 2016, a Wilderness Character Narrative was finished for Kenai Fjords National Park. In 2013, a wilderness area map was completed, clearly showing where the wilderness and non-wilderness areas were for the park. The park's interdisciplinary wilderness team currently uses the Science in Wilderness Framework and a Minimum Requirements Analysis for administrative actions in wilderness. Commercial filming and other special uses are permitted only after considering impacts to wilderness character. The park has no record of wilderness training, but is tentatively planning to offer staff wilderness training in 2018.

Summary of Stewardship Activities and Key Accomplishments to Maintain or Improve Priority Resource Condition

The list below provides examples of stewardship activities and accomplishments by park staff and partners to maintain or improve the condition of priority park resources and values for this and future generations:

Natural Resources

- 2016 marked the 7th consecutive water year that glacier mass balance monitoring occurred, information which was used during the 2015 Obama Presidential visit related to climate change.
- Exit Glacier terminus monitoring continues to document glacier melt at lower elevations. The glacier retreated 252 ft (76.8 m) from September 2015 to September 2016. This is a retreat of 0.27 mi (0.44 km) since annual measurements began in 2003.
- Vital Signs long-term monitoring for nearshore (kelps and eelgrass, intertidal invertebrates, marine water quality, marine birds, black oystercatchers and sea otters), bald eagles, spruce-hemlock forest, weather, and lake water quality was successfully implemented for the park.
- A lichen inventory initiated in 2015 has yielded at least two species new to North America. Species determinations are ongoing, and alpine surveys occurred in 2016.
- The park has assisted with marine debris removal:
 - Since 2009, more than 17 tons of marine debris was removed across 19 beaches in partnership with Resurrection Bay Conservation Alliance.
 - In 2015, Kenai Fjords led the effort for a five-park marine debris removal project that included helicopter removals of marine debris caches along the remote outer coast that totaled 2.66 tons.

Cultural Resources

- Since 2001, KEFJ partnered with the Smithsonian Institute's Arctic Studies Center to complete the Kenai Fjords oral history and archeology projects. The oral history project used an interdisciplinary approach, which combined archeology, ethno-history, geomorphology, and glaciology to document Alutiiq tradition sites in Aialik Bay. Archeological projects were done to improve understanding and for site management.
- The park is in the process of acquiring spatial information for cultural sites; this spatial information is critical to determining whether any potential impacts would occur to the sites during activity reviews.
- The 2009–2013 Exit Glacier Traditional Use Activities Project, a partner project with University of Alaska Fairbanks and Portland State University, interviewed long-time Seward residents about their use in the Exit Glacier area prior to park establishment.
- A historic town parcel known as "Shea Lot" was deemed necessary for the park's parking lot; archeological data recovery and publication of a historic book for the public was completed as part of the historic mitigation process.
- The park successfully completed archival of 150 linear feet of documents, photographs, and oral history recordings, thereby documenting 35 years of the park's operations and research.
- Two Determination of Eligibility site reports were submitted to the State Historic Preservation Office in 2016. The park is currently nominating these archeological sites to the National Register of Historic Places.

Visitor Experience

- In 2015, KEFJ competed and was awarded significant funding to design and build new interpretive media for the park's visitor center. These will be the park's first professional exhibits to communicate the purpose and significance of the park since its establishment in 1980. The project is scheduled to be finished in May 2018.
- The park's first-ever film project was completed in 2015 and debuted on the 99th birthday of the National Park Service. It is fully accessible and is a stunning visual of the park's resources.
- The park's climate change efforts were highlighted during the President's historic visit to Seward in September 2015. The president chose the park to see the firsthand effects of climate change and reach new audiences with his message.
- The park's education team has expanded opportunities through technology and met key education initiatives. In March 2015, KEFJ launched the first distance learning program. The program received a Pinnacle Award from the Center for Interactive Learning and Collaboration.

Park Infrastructure

- In 2016, KEFJ raised a ¾ mile segment on Exit Glacier road by 5 feet and added five large box culverts in an area that had routinely experienced flooding. The flooding commonly damaged the road and prevented vehicles from accessing the Exit Glacier area during the busy visitor season. The completion of this project should alleviate future road closures along this portion of road.
- In 2017 and 2018, KEFJ will do a complete interior remodel of the park’s visitor center, originally built in 1986. It will convert the first floor to exhibit space and retrofit the second floor to accommodate office space needs. The rehabilitation will address Accessibility and National Fire Protection Agency code deficiencies.
- In 2012, KEFJ rehabilitated “Old Solly’s” into the park headquarters building. This project replaced two leased administrative facilities with 6,670 square feet of repurposed space owned by the NPS in Seward, AK.
- In 2013, KEFJ improved sections of the Harding Icefield Trail. The park replaced a large bridge on the Harding Icefield Trail that had become a safety hazard. The bridge is critical to accessing most of the trail and the icefield. The park also re-routed and rehabilitated a highly impacted portion of the trail.
- In 2011, KEFJ rehabilitated Exit Glacier Campground to meet accessibility standards. The park made two of its 12 campsites accessible, hardened the trails to accessibility standards, and created dedicated accessible parking.

Wilderness

- In 2016, KEFJ completed a Wilderness Character Narrative.

Key Issues and Challenges for Consideration in Management Planning

In many ways, Kenai Fjords National Park has three fairly distinct areas for management with some overlap. The Exit Glacier area is the single-most visited area in the park due to its accessibility to automobiles and the only park road. The coastal areas of Kenai Fjords, on the other hand, stretch across 545 miles of shoreline and are only accessible by boat or plane. Coastal land ownership is complex with various surface and subsurface ownerships interspersed with NPS-lands. The third area blanketing the higher elevations of the Kenai Mountains consists of the Harding Icefield and the Grewingk-Yalik Ice Complex with their outflowing glaciers. Managing these three fairly distinct areas poses unique challenges for current and future park staff; working closely with partners, stakeholders, and future generations will ensure that Kenai Fjords National Park continues to protect intact ecosystems and provides for numerous recreational opportunities. Key issues and challenges in Kenai Fjords pertain to visitor experience, facilities, land ownership, climate change, and human impacts.

Visitor Experience

Kenai Fjords National Park is accessible by automobile and is the closest national park unit to the City of Anchorage, a major transportation hub. This has led to Kenai Fjords being the third-most visited national park in Alaska, with the majority of visitation occurring within park boundaries at Exit Glacier and on tour boats viewing the park’s coastal areas. Even with this large visitation number, the park has not had a visitor center in Seward; this need is starting to be addressed with the multi-year rehabilitation and exhibit projects that began in 2016.

At Exit Glacier, the only part of Kenai Fjords accessible by automobile, visitation has increased by approximately 25% since 2004 and has exceeded the visitor experience descriptions from the 2004 Exit Glacier Management Plan. This has led to increasing numbers of people occupying trails and parking lots exceeding their capacity during the peak season. In recent years, the weather in the shoulder seasons has been milder, leading to higher number of visitors in the shoulder season.

Facilities

The park experiences impacts to facilities due to flooding. The Aialik Bay Ranger Station (ABRS) is located in a flood zone, and flooding of the road to Exit Glacier previously prevented vehicles from accessing Exit Glacier during peak season. KEFJ has mitigated flood impacts to the only park-owned and maintained road to Exit Glacier.

Land Ownership

There are a number of parcels within park boundaries that are not owned by the park. Surface and subsurface ownership also varies through the park on many parcels. It is critical to maintain and improve partnerships across these complicated land ownerships to protect cultural and natural resources within the park boundary.

Climate Change

As discussed in this report, climate change is impacting a number of park resources. Retreating glaciers and longer growing seasons present clear evidence of the park's changing climate, and current models predict that the park's climate will warm over the coming century. Long-term monitoring of critical resources such as glaciers, wildlife, nearshore resources, and landscape processes will be vital to understanding the health of the park's ecosystems. Glacier recession will likely affect downstream river dynamics, alter existing geohazards, and create new terrestrial and marine landscapes. Coastal and downstream archeological sites will also be negatively impacted by these climate-driven events. The effects of ocean acidification are not clear at this time, but there is some evidence that tidewater glaciers may cause the marine environment to be less resilient to ocean acidification. Should ocean acidification affect marine invertebrates and fish populations, effects cascading across the ecological food web could be catastrophic. Increasing temperatures may also increase the potential for expansion and long-term establishment of non-native invasive species such as green crab and smooth brome. Kenai Fjords is especially concerned about park resources and effects from climate change going forward; close monitoring of these resources and potential changes will be critical to informing management decisions.

While Kenai Fjords cannot control the climate or the impacts the park experiences from climate change (within or external to the park), there are actions the park can take to adapt to and mitigate its effects. Park infrastructure must be planned with adaptive management strategies in this rapidly changing environment. Determining innovative ways to monitor geohazards will be key to increasing visitor and park staff safety in key high use areas such as Bear Glacier and Exit Creek. One of the ways the park has already responded to this issue is by shifting away from building large infrastructure to view Exit Glacier, given that Exit Glacier is constantly changing. The rapid retreat of Exit Glacier has changed the quality of the visitor experience, and the park is actively managing visitor expectations. The glacier retreat has also caused infrastructure issues; trails that were once extended regularly to the edge of the glacier may now have reached a hillside slope where trail extension is no longer feasible. The park has a strong education and interpretation role to increase awareness among the public about the changes being seen. This was clearly demonstrated when President Obama chose to deliver his climate change message in front of Exit Glacier in September 2015.

Human Impacts

While many of the coastal areas of Kenai Fjords are fairly remote, evidence of human impact is still present. Marine debris continues to arrive on park shores (in 2015, more than 2.66 tons of marine debris was removed from four bays on the park's outer coast). Kenai Fjords was also one of the parks greatly impacted by the Exxon Valdez Oil Spill of 1989, and vessel traffic off park shores continues to be a concern for fuel leaks, oil spills, and debris sources. Evidence of mining activities is still present in Nuka Bay, a remote location in the southwestern part of the park; a number of structures associated with mines continue to deteriorate and pose potential safety hazards. Visitors are also arriving with dogs onto park shores, and these dogs have been documented to cause black oystercatcher nest mortalities and likely impact other coastal wildlife.

Chapter 1. Introduction

The purpose of this State of the Park report for Kenai Fjords National Park (KEFJ, “the park”) is to assess the overall condition of the park’s priority resources and values, to communicate complex park condition information to visitors and the American public in a clear and simple way, and to inform visitors and other stakeholders about stewardship actions being taken by park staff to maintain or improve the condition of priority park resources for future generations. The State of the Park report uses a standardized approach to focus attention on the priority resources and values of the park based on the park’s purpose and significance, as described in the park’s Foundation Document or General Management Plan. The report:

- Provides to visitors and the American public a snapshot of the status and trend in the condition of a park’s priority resources and values.
- Summarizes and communicates complex scientific, scholarly, and park operations factual information and expert opinion using non-technical language and a visual format.
- Highlights park stewardship activities and accomplishments to maintain or improve the state of the park.
- Identifies key issues and challenges facing the park to inform park management planning.

The process of identifying priority park resources by park staff and partners, tracking their condition, organizing and synthesizing data and information, and communicating the results will be closely coordinated with the park planning process, including natural and cultural resource condition assessments and Resource Stewardship Strategy development. The term “priority resources” is used to identify the fundamental and other important resources and values for the park, based on a park’s purpose and significance within the National Park System, as documented in the park’s foundation document and other planning documents. This report summarizes and communicates the overall condition of priority park resources and values based on the available scientific and scholarly information and expert opinion, irrespective of the ability of the park superintendent or the National Park Service to influence it.

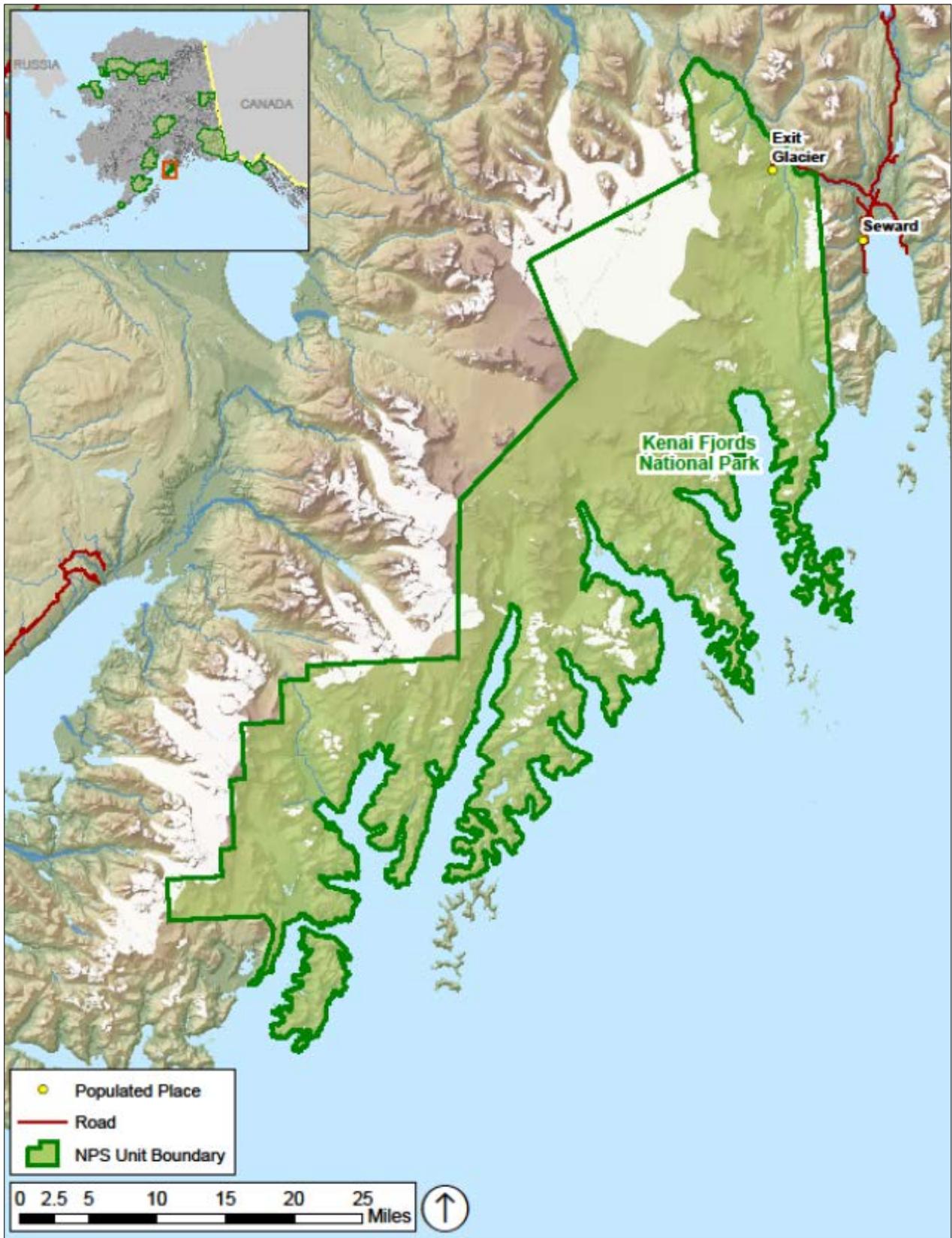
Prior to Alaska becoming a state in 1959, nearly all land was federal. The Alaska Statehood Act granted the state the right to select 104 million acres of federal land. Within a few years, the state land selection process began to include lands traditionally used by Alaska Natives. This led to objections that eventually resulted in a freeze on further state land selections pending Congressional settlement of the Native claims.

In 1971, Native claims were resolved by passage of the Alaska Native Claims Settlement Act (ANCSA). In addition to providing Native land claims, this act also provided for withdrawal of 80 million acres for possible designation as national parks, fish and wildlife refuges, national forests, and wild and scenic rivers. Kenai Fjords National Park was established under the Alaska National Interest Lands Conservation Act (ANILCA), which was adopted on December 2, 1980. ANILCA’s passage culminated more than 20 years of deliberation on federal land claims after Alaska statehood. ANILCA mandates the specific purposes for each park established. Providing for ANILCA’s mandates and special uses makes management of Alaska parks unique within the national park system.

The purpose of Kenai Fjords National Park is to preserve the scenic and environmental integrity of an interconnected icefield, glacier, and coastal fjord ecosystem.

Significance statements express why the park unit’s resources and values are important enough to warrant national park unit designation. Kenai Fjords National Park is significant because:

- Kenai Fjords National Park protects the Harding Icefield and its outflowing glaciers, where the maritime climate and mountainous topography result in the formation and persistence of glacier ice.
- Kenai Fjords National Park protects wild and scenic fjords that open to the Gulf of Alaska where rich currents meet glacial outwash to sustain an abundance of marine life.
- Kenai Fjords National Park protects an outstanding example of a coastal mountain range with steep-sided fjords, drowned cirques, and jagged islands.
- Kenai Fjords National Park protects a rich diversity of terrestrial and marine life in their natural state.
- Kenai Fjords National Park provides opportunities to experience, understand, and appreciate the scenic and wild values of the Harding Icefield, outflowing glaciers, coastal fjords, and wildlife and to comprehend environmental change in a human context.



Map of the Park

Chapter 2. State of the Park

The State of the Park is summarized below for six categories—Natural Resources, Cultural Resources, Visitor Experience, Park Infrastructure, Wilderness Character, and Subsistence—based on a synthesis of the park’s monitoring, evaluation, management, and information programs, and expert opinion. Brief resource summaries are provided below for a selection of the priority resources and values of the park. Clicking on the [web](#) symbol found in the tables and resource briefs below will take the reader to the internet site that contains content associated with specific topics in the report.

The scientific and scholarly reports, publications, datasets, methodologies, and other information that were used as the basis for the assessments of resource condition are referenced and linked throughout the report and through the [internet version of this report](#) that is linked to the NPS [IRMA data system](#) (Integrated Resource Management Applications). The internet version of each report, and the associated workshop summary report available from the internet site, provide additional detail and sources of information about the findings summarized in the report, including references, accounts on the origin and quality of the data, and the methods and analytical approaches used in data collection and the assessments of condition. Resource condition assessments reported in this State of the Park report involve expert opinion and the professional judgment of park staff and subject matter experts involved in developing the report. This expert opinion and professional judgment is derived from the in-depth knowledge and expertise of park and regional staff involved in the day-to-day practice of all aspects of park stewardship and from the professional experience of subject matter experts. This expert opinion and professional judgment utilized available factual information for the analyses and conclusions presented in this report. This State of the Park report was developed in a park-convened workshop.

The status and trends documented in Chapter 2 provide a useful point-in-time baseline measured against reference conditions that represent “healthy” ecosystem parameters, or regulatory standards (such as those related to air or water quality). Note that climate change adaptation requires park managers to continue to learn from the past, but attempting to manage for conditions based on an understanding of the historical “natural” range of variation will be increasingly futile in many locations. Thus, these reference conditions, and/or judgment about resource condition or trend may evolve as the rate of climate change accelerates and park managers respond to novel conditions.

Climate impacts many aspects of park management, from ecological systems to park infrastructure. The climate is changing and human influence is now detectable in nearly all major components of the climate system, including the atmosphere and oceans, snow and ice, and various aspects of the water cycle ([IPCC 2013](#)). Global patterns of change demonstrate that the human effects on climate are even more pronounced in high latitudes and Polar Regions ([Larsen et al. 2014](#)). As a region, Alaska has warmed more than twice as rapidly as the rest of the United States over the past 60 years, with average annual air temperature increasing by 3 °F and average winter temperature by 6 °F ([Chapin et al. 2014](#)). The observed impacts of a warming climate in Alaska include declining sea ice, shrinking glaciers, thawing permafrost, changing ocean temperatures and chemistry, increased coastal erosion, and more extensive insect outbreaks and wildfire (e.g., [Larsen et al. 2014](#), [Chapin et al. 2014](#), [Markon et al. 2012](#)).

Even with multiple lines of evidence that Alaska is warming, interpreting temperature trends and other climatic indicators is complicated. Climate in Alaska is dynamic and nonlinear, with strong linkages to atmospheric and oceanic processes, such as the position of the polar jet stream or the frequency of El Niño events (Papineau 2001). An important climate pattern, evident in the relatively few long-term climate stations located in parks, is the Pacific Decadal Oscillation (PDO). Much of the warming that has occurred since the middle of the 20th century occurred in 1976 as a stepwise shift, attributed to a climatic transition from a cool to a warm phase in the PDO ([Chapin et al. 2014](#), [Bieniek et al. 2014](#)). In the early 2000s, the PDO shifted back to a cooler phase resulting in statewide temperatures that were cooler than the previous decades ([Bieniek et al. 2014](#)). The most recent years have seen yet another shift back to a warm phase that may or may not persist, but has resulted in two of the warmest years on record for Alaska in 2014 and 2015 ([NOAA 2016](#)). The north slope of Alaska has continued to warm despite changes in the PDO. Nonlinear responses and regional variations are expected to continue to occur as the planet adjusts to global scale change ([IPCC 2013](#), [Larsen et al. 2014](#)). Recent studies suggest that warming Arctic temperatures weaken the temperature gradient between the poles and lower latitudes leading to a wavier jet stream, which results in more persistent weather patterns and extreme conditions such as cold spells, heat waves, droughts, and flooding ([Francis and Vavrus 2015](#)).

The effects of warming climate on Alaska park resources can be dramatic in the form of melting glaciers and permafrost, more frequent fires, and changes in vegetation. The need for a better understanding of these changes and how they will impact natural resources is recognized as a national priority ([National Climate Assessment 2014](#)). The data and information gathered from Alaska’s national parks provide an important piece of the puzzle for understanding the drivers and effects of climate change locally and regionally and underscore the importance of science in national parks.

Climate is a significant driver of all ecosystem processes in Kenai Fjords National Park, and climate change effects are particularly easy to perceive in this park. This was clearly demonstrated during President Obama’s visit in 2015, when the president talked about climate change standing in front of Exit Glacier. Exit Glacier is the most visited area of the park and change in the terminus of Exit

Glacier has been documented ([Kurtz and Baker 2016](#)); many return visitors have commented about their first-hand experience of Exit Glacier receding since their previous visit. Repeat photos of the coastal glaciers across the park throughout the years also display how much the glaciers have changed. Another aspect of climate change that directly affects the park is related to temperatures and precipitation forms. Because winter temperatures in Seward hover around 32 degrees Fahrenheit, a few degrees warmer or colder can make a significant difference in amount of snow or rain falling in the season. This directly affects various park resources and winter recreational activities at the park. Changes in effects to hydrology may also result from climate change, especially if there are increased or more extreme precipitation events. These hydrologic effects can directly impact park infrastructure, as much of the infrastructure across the park is located in floodplains.

Park management must be even more “forward looking,” to anticipate plausible but unprecedented conditions, also recognizing there will be surprises. In this context, the park will incorporate climate considerations into decision processes and management planning as it considers adaptation options that may deviate from traditional practices.

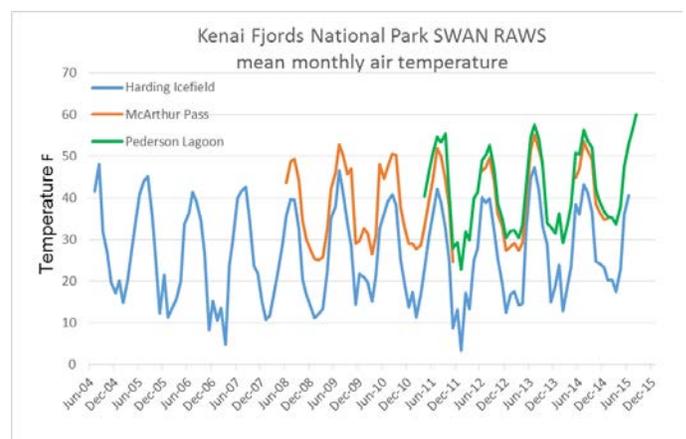
2.1. Natural Resources

Air Quality  web ▶			
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Visibility	Haze Index		Visibility is in good condition. This status is based on NPS Air Resource Division benchmarks and the 2010–2014 estimated visibility on mid-range days of 1.5 deciviews (dv) above estimated natural conditions of 5.5 dv. Data from the nearest IMPROVE (Interagency Monitoring of Protected Visual Environments) station roughly 110 miles to the west (Site ID: TUXE1, AK; NPS-ARD 2015), show the trend in visibility remained relatively unchanged between 2005 and 2014 for both the 20% clearest days and 20% haziest days. The degree of confidence in the visibility status and trend at Kenai Fjords NP is moderate.

Resource Brief: Climate at Kenai Fjords

Kenai Fjords is geographically located in the northern Gulf of Alaska and exhibits a range of climates, from the moderate and ecologically productive coastal zone to the ice-covered expanse of the Kenai Mountains, where sub-freezing temperatures and deep snow-packs sustain southwest Alaska’s largest icefield. Examples of how elevation and proximity to the ocean affect air temperature can be seen in data recorded at climate stations found at three different elevations; temperatures drop and the accumulation of snow (versus rain) increases with altitude. Of the three climate stations in the park, Pederson Lagoon is the lowest at 500 feet, McArthur Pass is at 1,100 feet, and Harding Icefield is over 4,000 feet.

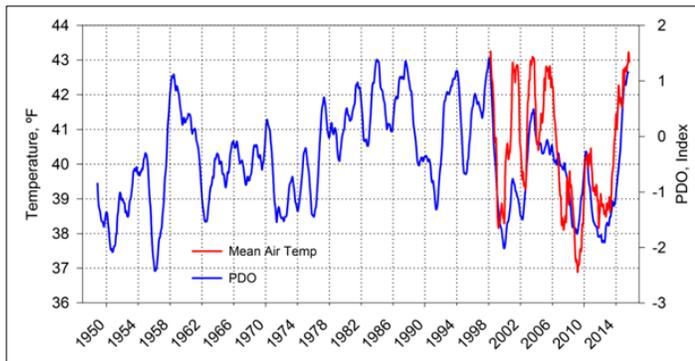
Sea surface temperatures of the northern Pacific that mediate the transfer of heat and water vapor to and from the atmosphere are an important influence on the park’s climate. One index of changes in sea surface temperature—known as the Pacific Decadal Oscillation (PDO)—shows multi-decadal patterns of approximately 10 to 30 years, which are characterized by the distribution of warm vs. cool water in the central and coastal regions of the northern Pacific ([Mantua 2002](#)). The PDO shifts from cool to warm phases and influences the land-surface temperatures of Alaska in general and the



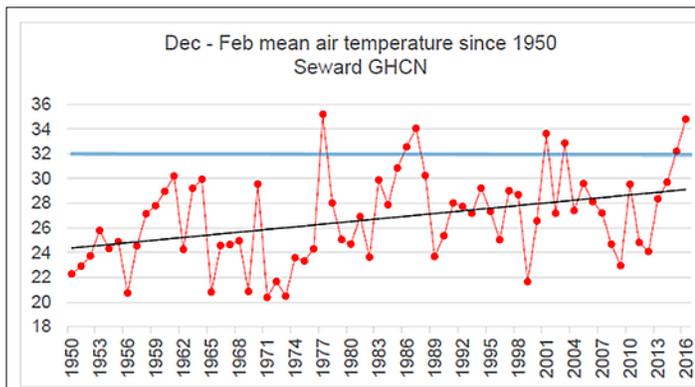
Mean monthly air temperatures from NPS remote automated weather stations (RAWS) in Kenai Fjords show climatic differences due to elevation where temperatures decrease with elevation and wintertime lows become more extreme. (Data available from Western Regional Climate Center).

Resource Brief: Climate at Kenai Fjords (continued)

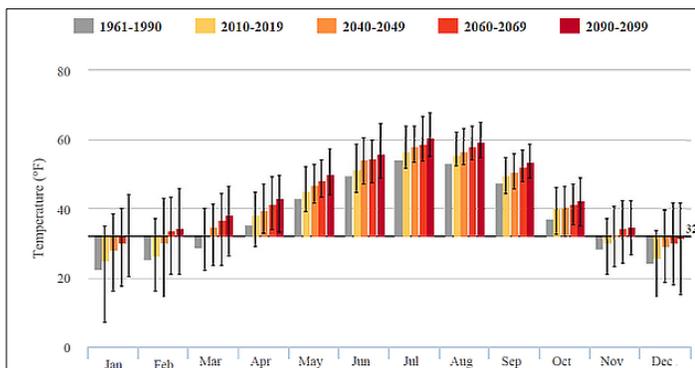
Kenai Fjords region specifically. The phase of the multi-decadal PDO shifted abruptly in the late 1970s to a warm phase and has recently shifted to less coherent shorter oscillations of warm and cool phases. These shifts influence precipitation and air temperature in Kenai Fjords and can mask the effects of a long-term warming trend in the cool phase years.



One year running mean of Seward Global Historical Network mean monthly air temperature and PDO index, PDO date source National Climate Data Center (Smith et. al. 2008).



The mean of daily min max temperature data since 1950 demonstrates a long-term trend of warming air temperature with a greater frequency of winter means above freezing (data from NOAA, Global Historical Climate Network).



100 years of average monthly temperature changes, and quantified ranges, based on modeled climate projections (Scenarios Network for Alaska and Arctic Planning, 2016).

the observed trends. Thus, over the long term, precipitation will fall more frequently as rain (vs. snow), snow elevations will rise, and snow will melt earlier and more often—a pattern seen in much of southwest Alaska during the winters of 2014, 2015, and 2016.

Long-term land surface temperature records in the Kenai Fjords region are rare. Seward weather stations provide a long term record because they have been intermittently monitored since 1908; however, continuous records from a single station location (Seward Airport) are only available starting in 1998. Long term data for Seward have been normalized and provided as the Global Historical Climatology Network record compiled and quality assured by the National Centers for Environmental Information (NCDC 2016). When a yearly running mean of Seward Airport air temperatures are compared to the PDO trends, there is a coherent signal from the PDO in recent years.

Temperatures recorded at Seward Airport indicate that 2016 was the warmest water year on record with a mean annual air temperature of 44.6 °F (7 °C), 4.1 °F (2.3 °C) above the 30-year climate normal of 40.5 °F (4.7 °C). A significant driver of these record temperatures and an important indicator of potential ecosystem impacts are winter temperatures. The winter months of the 2014, 2015, 2016 water years each had 12 record-high daily temperatures over the three-winter-month period. The combined effects of these patterns have the greatest impact on precipitation phase (whether precipitation falls as rain or snow) as well as when and how frequently snow melts.

Due to the difficulty of accurately measuring the amount of precipitation and the lack of historic data, predictions for precipitation are more difficult to make than those for temperature. However, there is general consensus among models that there will be slight increases in precipitation over the coming century with less predictability in timing and amounts (SNAP 2009, 2016). However, the greatest impact a warming Alaska climate has on precipitation is the amount that falls as snow and the length of time it stays before melting. Shifts in this process can occur over many ecological gradients including elevation, latitude, and continental vs. maritime. The change in precipitation and melt has profound implications for park resources including the extent of iconic features, such as glaciers, and the location and phenology of plant and animal species (Stewart et al. 2013). Winter temperatures (December–February) from Seward Global Historical Climatology Network, with continuous record since 1950, show an increase in the number of years with mean winter temperatures above freezing.

Predictions of future climate, based on conservative model projections, indicate a 3–6 °F (1.5–3 °C) warming trend over the next 100 years, in addition to the warming trend already observed (Monahan and Fisichelli 2014, SNAP 2016). The most warming is predicted to occur during the winter months and will continue to increase the number of days when the temperature is at or above 32 °F (0 °C) and is consistent with

Geologic Features


[web](#) ▶

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Mineral Resources	Potential for Active Mining in the Park		<p>There are lands within KEFJ where NPS owns the surface lands, and does not own the subsurface lands. There is potential for subsurface mining to occur in these locations, and the park received a request for subsurface mineral testing by subsurface owners in May 2016.</p>
Abandoned Mines and Lands (AML)	Presence of Mining Related Infrastructure and Contaminants		<p>KEFJ contains the Nuka Bay Historic Mining District, located in the remote southwestern part of the park. By 2010, all mining claims within the park had reverted to federal ownership, with the exception of a number of historic mines that are owned by Alaska Native Claims Settlement Act (ANCSA) corporations.</p> <p>Tailings at some mill sites contain high arsenic concentrations due to the prevalence of arsenopyrite in the ore rock. In the late 1990s, the NPS contracted a tailings stabilization project at the Glass-Heifner site to contain the arsenic-rich tailings. Tailings at the Kinney Mine also contain potential contaminants and are not currently monitored. Although vegetation has stabilized the tailings, which contain elevated arsenic and mercury, an adjacent creek threatens to erode into the tailings. Debris cleanup and removal of dilapidated non-historic structures remains a park priority. This area is very remote and has low visitor use. In 2016, the park worked to look at the various mines from natural and cultural resource perspectives for recommendations.</p>
Paleontological Resources	Presence		<p>Fossils occur in the McHugh Complex, a geological unit found within the boundaries of KEFJ. In 1991 and 2003, rocks with Permian age (250–300 million years ago) bivalve, crinoid, and fusulinid fossils were found just outside of the park’s boundary within mélangé of the McHugh Complex. These fossils are exotic to North America and the Western Hemisphere. A reconnaissance paleontological survey in 2016 found similar fossils near the Yalik Glacier, within the park boundary, but not in situ. A follow-up paleontological survey of the surrounding mountains may identify more fossil localities.</p>
Coastal Features	Caves		<p>KEFJ’s 2013 foundation statement identifies scenery as one of the fundamental resources and values of the park. Erosional processes driven by wind and water have formed numerous features along the rocky coast that add to the scenic beauty of the coastal areas of the park. In 2015, park researchers documented 829 natural features along the coast including caves, shelters, arches, stacks, and other unique features (Markus and Kurtz 2015). The caves also provide habitat for seabirds and other nearshore species.</p>

Geologic Features (continued)

[web](#) ▶

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Coastal Features (continued)	Land Uplift		The Kenai Peninsula is among a small percentage of the world's coastline experiencing a decrease in relative sea level due to uplift of the land through post-seismic adjustments (Brown et al. 1977, Freymueller et al. 2008). Between the 1964 Good Friday Earthquake and the turn of the century, researchers measured 40 cm (15.7 inches) of uplift along some of the park's coast (Cohen and Freymueller 2004). Current active uplift is at a rate of approximately 10mm/year ((Larsen et al. 2003) reported a 10.4+/-1.1 mm/year uplift rate at the Seward tide gauge for the year 2000). However, in the long-term (300+ years), the coast is subsiding due to earthquakes.
Geologic Hazards	Landslides and Avalanches		The steep slopes of KEFJ have high potential for landslides and avalanches. Wells et al. (2014) identify 38.6% of the park as areas with potential for "mass wasting and landslide, avalanche." The upper third of the Harding Icefield Trail traverses numerous avalanche paths and is where the greatest number of visitors is exposed to avalanche terrain. Changes in winter temperature and precipitation will impact the frequency of avalanches. With warmer winters, and heavier wet snow at higher elevations, avalanche frequency may be increasing.
	Seismic Activity		Small earthquakes are common in KEFJ and southwest Alaska and large, catastrophic earthquakes have occurred in the region on an interval of 330–880 years (Carver and Plafker 2008, Hutchinson and Crowell 2007). In 1964, a 9.2 magnitude earthquake in Prince William Sound resulted in subsidence of 1–2 m in KEFJ's coastal areas, saline intrusions that killed coastal forests ("ghost forests"), and tsunamis (Crowell and Mann 1998, Kelsey et al. 2015, Stark et al. 2015 , Plafker 1969). Smaller scale earthquakes can also have local impacts in the park. On July 28, 2015, a 6.3 magnitude earthquake occurred approximately 120 miles west of Bear Glacier, causing landslides on the outer coast and a significant calving event at the terminus of Bear Glacier. The USGS Earthquake Hazards Program monitors earthquake activity in Alaska.

Glacial Features



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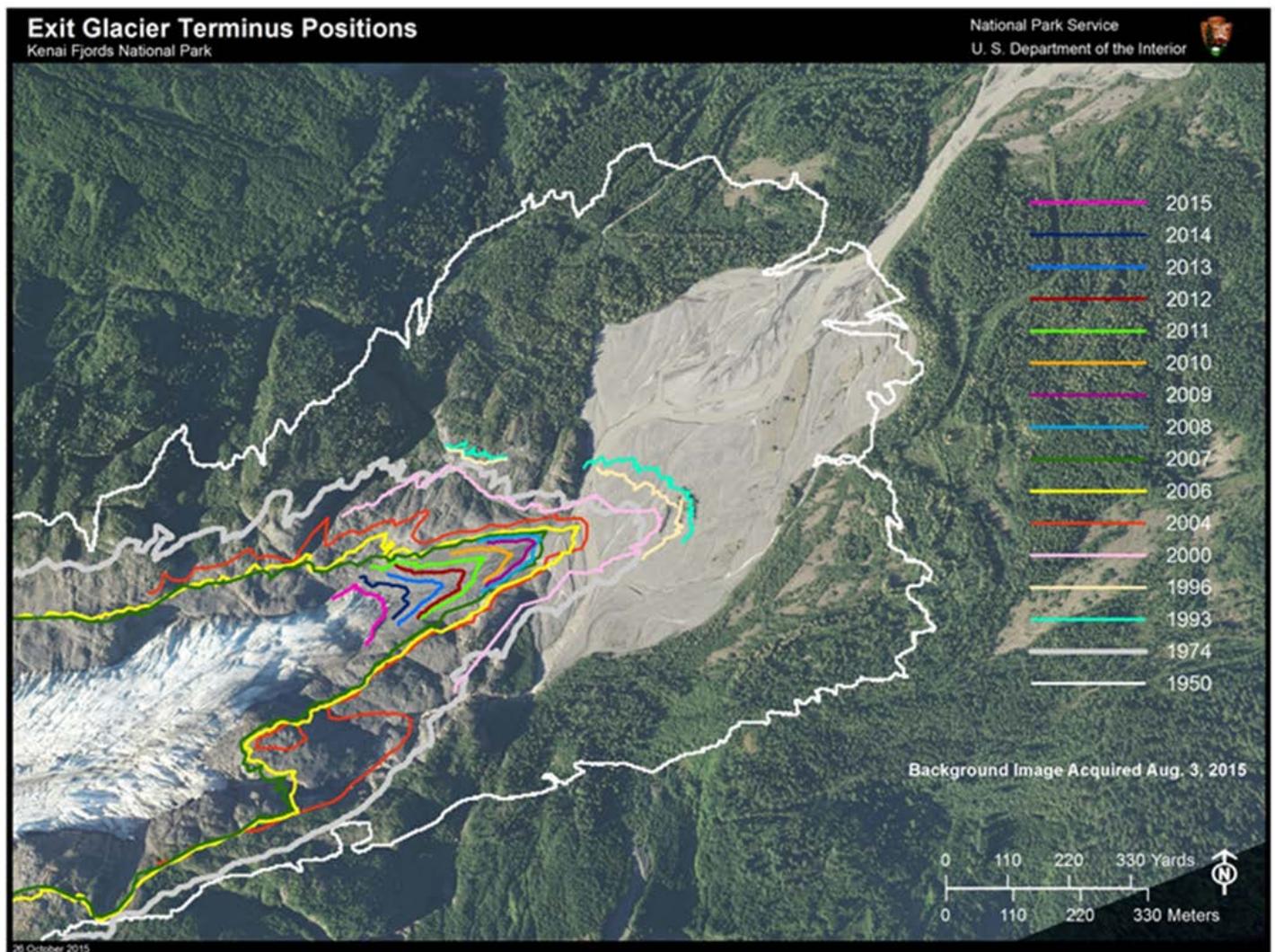
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
<p>Glacial Extent</p>	<p>Overall Area Extent and Exit Glacier Terminus</p>		<p>KEFJ was established to “maintain unimpaired the scenic and environmental integrity of the Harding Icefield, its outflowing glaciers and coastal fjords and islands...” KEFJ is a steward of the area’s ice and its legacy: glaciers, icefields, and coastal fjords. Glaciers throughout KEFJ have been in widespread recession since the Little Ice Age maxima (late 1700s through late 1800s) (Wiles 1992).</p> <p>Since the 1950s, the glacier-covered area of KEFJ has decreased from approximately 2,326 km² to 2,074 km² (11% decrease). The total glacier volume is estimated to have decreased by 74.5 km³ or 15% (Loso et al. 2014). Glacier area decreased more at the lower elevations, and particularly in tidewater glaciers. Glacial retreat is resulting in reduced calving and iceberg production.</p> <p>As of 2016, the Exit Glacier terminus, a popular visitor spot, had retreated 2.5 km (more than 1.6 miles) since 1815 (Ahlstrand 1983; Wiles 1992; Cusick 2001; Kurtz and Baker 2016).</p>
	<p>Ice Volume (Mass Balance)</p>		<p>Since the 1950s, ice volume has decreased on the Harding Icefield (Loso et al. 2014, Adalgeirsdóttir et al. 1998, Truffer 2014). This impacts glacial extent, ice thickness, meltwater discharge, and adjacent ecosystems.</p>
	<p>Ice Surface Elevation</p>		<p>During the second half of the 20th century (mid 1950s–mid-1990s), elevation of the Harding Icefield decreased by approximately 69 ft (21 m) (Adalgeirsdóttir et al. 1998).</p>

Resource Brief: Changing Glaciers in Kenai Fjords National Park

Glaciers of Kenai Fjords National Park, including those wholly or partly inside its boundary, have an ice-covered area of approximately 2,080 km², and cover 48% of the lands administered by the park (Loso et al. 2014). The glaciers in the park range from small glaciers, of less than 1 km², to Bear Glacier at 143 km². The average glacier area is 7.5 km². The only road accessing the park ends near Exit Glacier, an outlet of the approximately 750 km² Harding Icefield. Exit Glacier is one of the most visited glaciers in Alaska (Loso et al. 2014).

Glacier changes, in all of Alaska's National Parks, have been inventoried using topographic maps from the 1950–60s and modern satellite imagery (Loso et al. 2014, Giffen et al. 2014). The glacial-covered area decreased from 2,326 km² to 2,074 km², or -11% and the total glacier volume is estimated to have reduced by 74.5 km³ or 15% during the 1950s to 1990s.

The loss of glacier cover is dominated by terminus retreat, which is distributed fairly evenly throughout all large glaciers in the park. The rate of retreat of Exit Glacier, the most accessible and visited glacier in the park, has the most detailed documentation. Exit Glacier terminus has retreated 2.5 km since leaving its Little Ice Age maximum extent in 1815 (Kurtz and Baker 2016). Past terminus positions evident from recessional moraines were identified by Ahlstrand (1983), Wiles (1992), and Cusick (2001) using a combination of field techniques, photogrammetry, tree core analysis, and radiocarbon dating. A series of aerial photography and satellite imagery beginning in 1950 provide additional documentation of the glacier's historical positions. In 2006, park staff began documenting biannual terminus positions with a GPS and calculating seasonal change.



The terminus of Exit Glacier over the years. NPS Photo.

Hydrology


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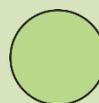
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Lake Water Quality	Lake Water Temperature		Delight and Desire Lakes in McCarty Fjord are a critical component of the park's ecosystem. Limited lake temperature data are available for Delight and Desire Lakes. Point measurements in 2014 showed that temperatures were within the State of Alaska's surface water quality threshold of 15 °C (NPS unpublished data; ADEC 2016). Historical point measurements indicate exceedances of those thresholds (Edmundson et al. 2001, Bennett 2005). A lack of continuous time series prohibits estimations of trends in lake water temperature.
Lake Water Quantity	Lake Discharge (volume per unit time)		Discharge is the technical term for volume per unit time (cubic feet per second is the typical unit of measure). Edmundson et al. (2001) measured discharge at the outlets of Delight and Desire Lakes during the summer of 1997. York and Milner (1996) estimated discharge at the outlet of Delusion Lake during the summer of 1993. Neither study generated long enough time series to quantify trends. The lakes are a critical component of the park's ecosystem. Monitoring of lake health requires partnership and coordination with both the Port Graham Corporation and the State of Alaska.
Stream Water Quality	Stream Water Temperature at Exit Creek		Stream water temperatures are only taken at Exit Creek. Hourly water temperatures from June through September in Exit Creek ranged from -0.3 to 4.8 °C in 2008, and from -0.1 to 4.2 °C in 2009 (Shearer and Moore 2010). Maximum temperatures in 2008 and 2009 were similar to discrete measurements in June 2004, taken at an Exit Creek overflow channel (range = 4.5–4.8 °C; Bennett 2005). None of these measurements exceeded the State of Alaska's surface water quality thresholds for temperature (ADEC 2016). Not enough data exist to adequately characterize a trend in water temperature.
	Stream Water Turbidity at Exit Creek		Turbidity measures how cloudy water is. The State of Alaska's water quality threshold for turbidity is defined in terms of an increase above "natural conditions" (ADEC 2016). Without additional data with which to set this baseline, it is difficult to quantify status. Quantifying trend in turbidity is not possible without a longer time series. Exit Creek turbidity was monitored between May and September in 2004, 2008, and 2009. Measurements ranged from 5.1 to 143.6 NTU (Nephelometric Turbidity Units) in 2004 (Bennett 2005), 0.0 to 717.4 in 2008 (Shearer and Moore 2009), and 18.3 to 611.8 in 2009 (Shearer and Moore 2010).

Hydrology (continued)

[web](#) ▶

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
<p>Flooding Events</p>	<p>Glacial outburst floods</p>		<p>Glacial lake outburst floods resulting from the release of water from an ice-dammed lake adjacent to Bear Glacier were documented several times in the past decade, often draining in late summer. Since 2008, NPS staff and NPS-funded researchers have documented lake drainage through repeat photography and in-situ measurements (Wilcox et al. 2013). During the summer of 2012, a sudden outburst of water along a small channel exiting from the side of Aialik Glacier’s terminus flooded the adjacent alluvial fan and beach, ripping out alder trees and chasing groups of guided kayakers off the beach. The high flow from the event continued for most of the summer, indicating a rerouting of internal glacial hydrology rather than drainage of a stable body of water within or under the glacier.</p>
	<p>Flooding at Exit Creek and Aialik Bay</p>		<p>Two developed sites in KEFJ have experienced flooding in the past five years: the Exit Glacier area and the Aialik Bay Ranger Station.</p> <p>Recent flooding (2009–2014) due to rain events and shifting of the stream channel have closed the Herman Leirer Road and prevented access to the Exit Glacier Visitor Center. Discharge measurements at all except the lowest flows prove to be problematic in this constantly changing, braided system. In 2016, an extensive Federal Highways project elevated the road and installed culverts to mitigate road flooding.</p> <p>Active hydrological processes from a proglacial stream in Aialik Bay provide an increased stream sediment load allowing deposition of sediments and alluvial fan expansion into the developed area.</p>

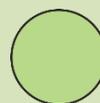
Fish and Wildlife


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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Coho Salmon	Distribution		<p>Coho salmon are distributed throughout the park (Stark et al. 2015) and coho salmon from the Resurrection River drainage help support one of the state's largest sport fisheries outside of the park in Resurrection Bay. In 2014, the park conducted a study to determine the spawning distribution of coho salmon in the Resurrection River drainage. Adult coho salmon captured during their upstream migration were radio tagged, released, and tracked to spawning areas. Tagged fish migrated to two primary spawning areas with most spawning in the upper watershed. Other potential spawning areas in the park have not yet been studied.</p>
Sockeye Salmon	Abundance		<p>Salmon are recognized as a critical component of the park's ecosystem. The number of migrating adult salmon that "escape" the fishery to spawn is known as <i>escapement</i>, and is a common method for counting adult abundance.</p> <p>Alaska Department of Fish and Game (ADF&G) estimated annual sockeye salmon escapement in Delight and Desire Lakes from 1976 to 2013 (Otis et al. 2013). In Delight Lake, ADF&G estimates ranged from 1,200 in 1988 to 44,000 in 2007. In Desire Lake, estimates ranged from 4,000 in 2000 to 18,600 in 2006. ADF&G annual escapement goals for sockeye salmon are 7,500–17,650 in Delight Lake and 8,800–15,200 in Desire Lake (Otis et al. 2013). At Delight Lake, the low end of these goals has been met or exceeded in 25 of the 38 years on record (66%). At Desire Lake, the low end of these goals has been met or exceeded in 29 of 38 years (76%).</p>
Bald Eagle	Nest Occupancy & Productivity (Number of Young)		<p>Bald eagle nest occupancy and productivity for the Kenai Fjords coastline was measured annually between 2009 and 2016 and was above the threshold considered stable for a population (Sprunt et al. 1973 and Wilson et al. 2014). Previous monitoring conducted by KEFJ from 1986–2002 suggested a stable population and some decrease in productivity in years with high levels of precipitation in April–May (Tetreau 2000).</p>
Black Bears	Population Size and Distribution		<p>There is limited knowledge about black bear population size or trends in population; however, the population is thought to be healthy (Robinson et al. 2007). Seasonal activities of black bears are concentrated in low elevation, coastal areas (French 2003).</p>

Fish and Wildlife (continued)[web](#) ▶

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Brown Bears	Distribution and Corridor Use		The brown bear population on Kenai Peninsula is estimated at 42/1,000 km ² in suitable habitat (Morton et al. 2015), and park-specific estimates are not available. KEFJ appears to have limited suitable habitat to support brown bears due to the Harding Icefield. A number of sightings have been recorded in the Resurrection River corridor and Nuka Bay (KEFJ wildlife observation database).
Moose	Seasonal Occurrence at Exit Glacier		KEFJ has a small population of moose in the Resurrection and Nuka River corridors. Moose use the Exit Glacier Developed Area, and there is concern that increased winter recreational activities at Exit Glacier could be stressing or displacing moose.
Mountain Goats	Distribution and Population Size		Limited aerial surveys for goats conducted in the 1980s suggested a minimum population size of 850 individuals and since then the ADF&G has assumed a population in the park of 1,000 individuals, although no recent surveys have been conducted to confirm this number. Overall population declines on the Kenai Peninsula are of concern (McDonough & Selinger 2008).
Black Oystercatcher, Marine Birds, Sea Otters, Seals, Sea Lions			See the “Marine Nearshore Environment and Animals” section for descriptions of the status of these species.

Plant Communities and Ecosystem Processes[web](#) ▶

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Forest Condition	Epiphytic Lichen Communities		Baseline epiphytic (tree-dwelling) lichen inventories were completed in 2012 (Miller & Walton 2014). Additional inventories completed in 2015 have shown high lichen species diversity and resulted in at least two species new to North America (see “Lichen Inventory of Kenai Fjords National Park” resource brief, below). Most species collected were characteristic of old-growth coastal forest, and included many species sensitive to airborne pollutants. Prominence of these pollution-sensitive species and a low abundance of nitrogen-loving species indicate pristine air quality in the park (Geiser & Nietlich 2007).

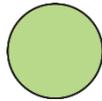
Plant Communities and Ecosystem Processes (continued)

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Forest Regeneration	Tree Seedling Density		Tree seedling densities provide an indication of the future condition of a forest and the extent to which trees are successfully reproducing. Seedling densities are variable in forest monitoring plots and are high enough to support a stable population of spruce and hemlock through time (Miller & Walton 2014). The highest seedling densities are in areas where the canopy has opened and downed trees are providing nurse logs for germination.
Invasive Plant Species	Number of Invasive Plant Species		21 invasive species have been identified within the park boundaries since monitoring began in 2004. In total, nine species were present in the park in 2015. Five species of invasive plants were in the coastal fjords and all nine species were found in the Exit Glacier area (Stover and Kriedeman 2015). Invasive plant management is an ongoing process. Surveying and monitoring annually helps the park discover new invasive plant populations as well as assess the effectiveness of invasive plant control efforts. By containing, reducing, and eradicating invasive plant populations, KEFJ helps to maintain the ecological integrity and diversity of the park (Frank 2014).
	Invasiveness Ranking		14 of the 21 invasive plant species that have been found in the park since 2004 have Alaska-specific invasiveness rankings of 50 or higher (Scale 0–100, higher rank indicates greater invasiveness). Species with higher invasiveness ranking spread faster, have more significant ecological impacts, and are of greater management concern. From surveys completed in 2015, six of the nine invasive plant species found in the park have invasiveness rankings of 50 or higher.
	<i>Elodea</i> Presence/Absence		The aquatic invasive plant <i>Elodea</i> has become a major concern in Alaska. It is present in lakes around the state, including Fairbanks, Cordova, the Kenai Peninsula, and in Anchorage at the largest floatplane hub in the state. It can spread easily from a single plant fragment and can impact freshwater lakes and slow-moving water bodies by displacing native plants and animals, degrading fish habitat, decreasing flow and increasing sedimentation. It can cause safety issues by fouling boat propellers and floatplane rudders. Due to its high invasiveness and likelihood of spread of <i>Elodea</i> , conducting surveys in these lakes is a priority for the park. In 2016, the park conducted preliminary <i>Elodea</i> surveys in Delight Lake and no specimens were found (C. Kriedeman, pers. comm.).

Plant Communities and Ecosystem Processes (continued)

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Forest Insect Pests	Presence/Absence of Indicator Species		<p>The park has been conducting Asian gypsy moth (<i>Lymantria japonica</i>) and European gypsy moth (<i>L. dispar</i>) monitoring annually since 2011 in coordination with the Alaska Division of Agriculture. No gypsy moths have been observed where traps have been placed in the Exit Glacier area.</p> <p>An infestation of spruce aphid (<i>Elatobium abietinum</i>) was discovered in Kachemak Bay/Halibut Cove in 2015 and in Seward in the spring of 2016. Previously, the nearest known populations were in Southeast Alaska. The U.S. Forest Service will continue to survey for the aphid on the Kenai Peninsula and the coast of KEFJ into the future.</p>
Sensitive Rare Plant Communities and Species	Nunatak Monitoring		Nunataks, isolated mountainous ridges that rise above ice-covered areas, are of interest because they may support species that survived the last glacial advance. In 2005, NPS collected baseline data on the plant communities at five nunataks in KEFJ. Four of the five sites were revisited in 2016. Four rare species were found and there are currently no known direct threats to these populations (Miller et al. 2006).
	Species of Conservation Concern		Plant inventories in KEFJ identified eight globally or regionally restricted plant taxa (Carlson et al. 2005, Miller et al. 2006). Moss, liverwort, and lichen surveys in 2012 yielded three additional rare species (Walton et al. 2014). Information regarding population trends is lacking. There are currently no known direct threats to these populations.

Resource Brief: Lichen Inventory of Kenai Fjords National Park



Lichen species *Stereocaulon saviczii* is a new species identified in KEFJ. NPS Photo by J. Walton

Lichens form diverse communities and are good subjects for monitoring due to their environmental sensitivity. In July 2015, cooperators from Oregon State University, University of Bergen (Norway), University of Hamburg (Germany), the Bureau of Land Management, and the National Park Service conducted the first known comprehensive lichen inventory of Kenai Fjords.

The five-member team collected lichens in the old-growth forests, riparian areas, and rocky shorelines of Nuka Bay and McCarty Fjord, Harris Bay and Granite Passage, Aialik Bay, and in the alpine near the Exit Glacier, Skilak Glacier, and Bear Glacier. Preliminary discoveries include two lichen species new to North America, *Ephebe multispora* and *Jamesiella scotica*, which were both found in Coleman Bay. *E. multispora* was previously known only from Greenland and northern Sweden, while *J. scotica* was previously known only from the British Isles. A new species for the United States, *Ameliella andreaeicola*, was found near the Harding Icefield Trail. It was previously known from southern British Columbia, Canada. New records were also made of the uncommon amphi-beringian lichen, *Stereocaulon saviczii*. Several outstanding additional discoveries are currently being identified, including a number of species new to the park and/or Alaska.

Plant Communities and Ecosystem Processes (continued)

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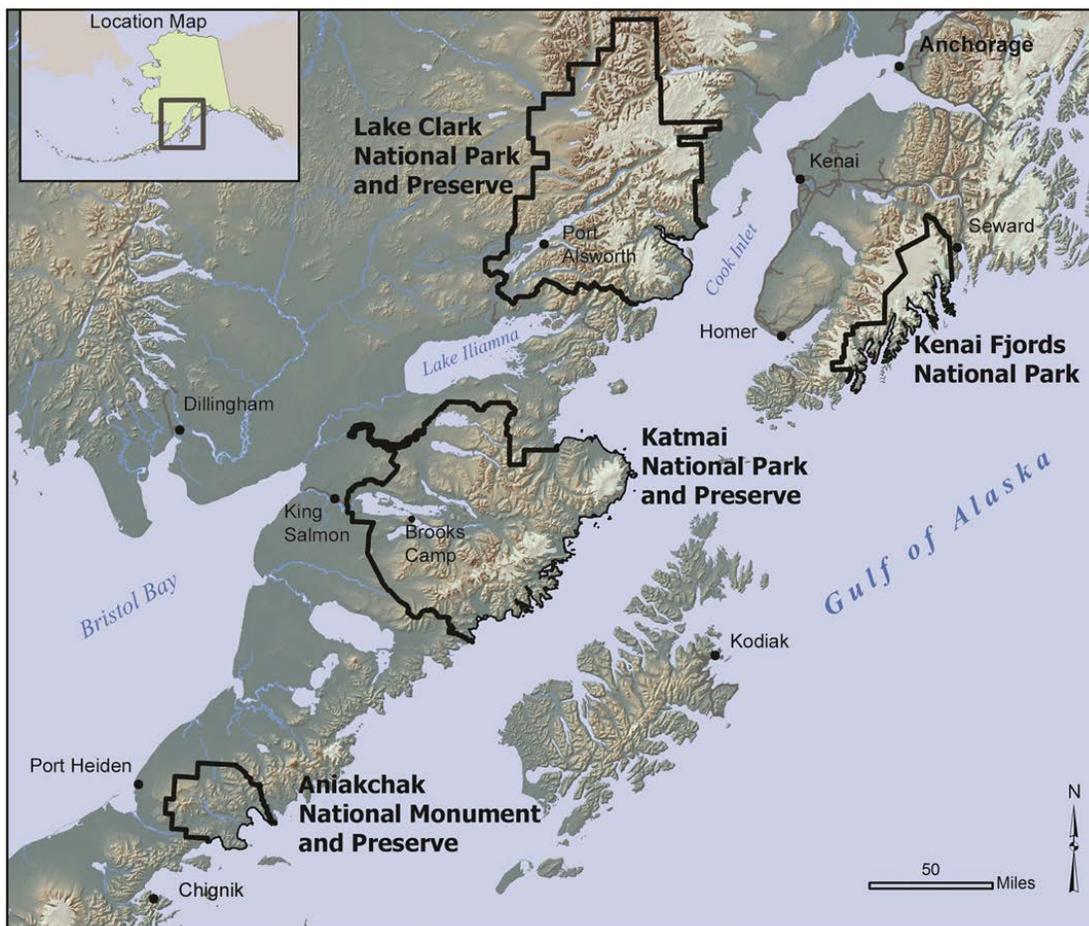
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Succession	Shrub Density		<p>Interpretation of historical air photos (1951–2005) and a repeat photo study in KEFJ (1993–2008) show an increase in shrub cover and shrub height in recently deglaciated areas and old landslides in the outer fjords (Boucher et al. 2010). Areas classified as tall shrub have shown little change in canopy cover, and an increase in shrub height. Over the last 50 years, shrub cover has increased in roughly 10% of the park (NPS unpublished data), and some areas—e.g., steep, active slopes and recently deglaciated sites—have shown larger increases in shrub cover, primarily thinleaf alder (<i>Alnus viridis</i> ssp. <i>sinuata</i>) and salmonberry (<i>Rubus spectabilis</i>) (Boucher et al. 2010).</p>
	Soils and Land Cover Classifications		<p>A soils inventory was completed in KEFJ in 2013 as part of an ecological land survey (ELS) and soils landscape mapping effort (Wells et al. 2014). Since most of KEFJ has been relatively recently deglaciated, soils are young and poorly-developed in most of the park and bedrock is often present at or near the surface. Soil development is most advanced in the more outer fjords where the landscape has been deglaciated the longest. The most common revised ecological systems were Snow and Ice (48.3% of park), Tall Shrub (9.3%), Sparse Vegetation Ridge and Cliff (8.2%), and Alpine Herbaceous (5.7%). As glaciers continue to shrink in KEFJ, the percentages of ecological systems and physiographic classes will change.</p>

Resource Brief: Vital Signs – Tracking Indicators of Ecological Condition

An understanding of natural resource condition in the parks is crucial to the agency’s ability to protect and manage NPS lands. The NPS Inventory and Monitoring (I&M) Program was established to meet this need for ecological information, and to bridge the gap between science and management. The national I&M Program monitors indicators of ecological condition across 32 networks (groups) of parks, collecting and disseminating data to each network’s constituent parks. Likewise, the parks provide valuable support to the networks through a variety of means, including information sharing and in-kind support.

The NPS Southwest Alaska Network (SWAN) covers Kenai Fjords National Park and four other parks—Lake Clark National Park and Preserve, Katmai National Park and Preserve, Alagnak Wild River, and Aniakchak National Monument and Preserve. These parks were grouped together because they are clustered geographically and are ecologically similar.

SWAN monitors a number of ecological indicators (“vital signs”) in Kenai Fjords, including climate, glacier extent, coastal forests, bald eagles, and a suite of nearshore marine indicators (e.g., sea otters, black oystercatchers, seabirds, bivalves, marine contaminants). The partnership between KEFJ and SWAN is essential to the monitoring of these indicators. For example, support for bald eagle surveys is shared by park and network staff: the park is integral in data collection, while the network is responsible for data management and analysis. The SWAN nearshore program also exemplifies the collaboration among park, network, and interagency cooperators (e.g., USGS, NOAA). For example, sea otters, a nearshore indicator, are a keystone predator in the nearshore ecosystem and a priority species for conservation based on park enabling legislation. A two-year study of sea otter foraging behavior completed in 2015 found that sea otters in Kenai Fjords consume a diet high in mussels relative to otters in other areas of Alaska. Because mussel abundance varies considerably from year to year and mussels have low caloric content compared to other prey items, sea otters in Kenai Fjords may be gaining fewer nutrients and energy from their diet, and thus be more susceptible to disease, severe weather, vessel traffic, and other stressors.



NPS Parklands part of the NPS Southwest Alaska Network that share scientists and expertise.

Marine Nearshore Environment and Animals


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For the coastal areas of the park, the official boundary of Kenai Fjords National Park ends at mean high tide (half of the high tides are located within park boundaries and half are not). This line exists for land ownership, but does not have ecological significance. Instead, these tidal areas and corresponding nearshore environment are the critical connection between the terrestrial and oceanic environments. When closely monitored, the marine nearshore can inform the conditions for both environments (Coletti et al. 2016a). The catastrophic consequences of the 1989 Exxon Valdez Oil Spill that cascaded across the coastal food web in Kenai Fjords illustrate the importance of the marine nearshore environment.

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Bivalves	Biomass		Several species of bivalves (primarily clams and mussels) provide critical food resources for shorebirds, ducks, fish, bears, sea otters, and other marine invertebrate predators such as sea stars. Biomass of clams and mussels sampled at soft sediment sites in KEFJ has remained stable since biennial sampling began in 2007. This does not include biomass data from 2015, where increases in mussel cover were observed (Coletti et al. 2014, Ballachey et al. 2014, Ballachey et al. 2015).
	Mussel Bed size		Overall bed sizes have declined since establishment in 2008, and declines slowed since 2013, with subsequent recovery through 2015 (Bodkin et al. 2016, <i>in review</i>). In comparison to other regions (Katmai National Park and Western Prince William Sound), KEFJ mussel bed sizes are significantly larger (Coletti et al. 2014, Konar et al. 2015, Monson et al. 2015).
Black Oystercatcher	Active Nest Density; Nest Productivity		Black oystercatchers, considered a “Management Indicator Species” by the Chugach National Forest (U.S. Forest Service 2003) and a species of concern by the Alaska Shorebird Working Group, are widely recognized as a species representative of nearshore habitats. NPS data shows that since 2007, productivity is highly variable and declined through 2012, but seems to have recovered to 2007 levels. However, nest density (or density of active breeding pairs) has remained relatively stable since 2007 (Coletti et al. 2014). There is some concern regarding increasing visitor use in areas of high nest density (Morse et al. 2006). Also, as the climate continues to change and have influence over ocean conditions, there may be changes in prey availability for these birds that rely almost exclusively on intertidal invertebrates for food (Carney et al. 2013, Robinson et al. 2015 a and b).
Marine Birds	Kittlitz’s Murrelet Abundance		Kittlitz’s murrelets are of management concern because of population declines observed in coastal Alaska. In KEFJ, surveys conducted between 1976 and 2002 suggested that the population of Kittlitz’s murrelets declined by as much as 83 percent during that time (Van Pelt and Piatt 2003), while surveys in 2006–2008 suggested populations may have stabilized (Arimitsu et al. 2010).

Marine Nearshore Environment and Animals (continued)

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
<p>Marine Birds (continued)</p>	<p>Density of Nearshore Marine Birds</p>		<p>KEFJ monitors species of marine birds that are relatively abundant and linked through the nearshore food web including cormorants, glaucous-winged gulls, black-legged kittiwakes, harlequin ducks, pigeon guillemots, mergansers, and scoters. Surveys conducted between 2007 and 2015 show marine bird densities are variable, but relatively stable through time (Coletti et al. through 2014; unpublished NPS data through 2015). However, researchers observed large increases in common murren during the summer of 2015 relative to previous years. This increase in numbers is most likely a function of changed distribution. In poor conditions, these long-lived birds will readily defer breeding; therefore they are not tied to colonies and thus ended up nearshore, likely searching for food. KEFJ does have common murre colonies; however the park still has evidence of an increase of these birds moving into coastal areas not associated with colonies. KEFJ documentation of unusual murre distributions corresponds to observations of large die-offs of murren throughout the north Pacific in winter 2015–2016. KEFJ speculates that high water temperature may have disrupted prey abundance or availability, leading to changes in murre distribution, behavior, condition, and mortality rates. KEFJ results contribute to observations across Gulf Watch Alaska components that demonstrate that 2015 was an anomalous year (Coletti et al. 2016). Analyses of 2016 data are in progress.</p>
	<p>Abundance of Seabirds at Colonies and Distribution of Colonies</p>		<p>Surveys of seabird colonies along the Kenai Fjords coast were conducted early in the park’s history (1976 and 1987) and more recently in 2007–2013 by KEFJ in cooperation with the USFWS.</p> <p>The number of glaucous-winged gulls in Kenai Fjords appears qualitatively to have increased between 1976 and 2007 and has remained relatively stable since 2007 (Weiss et al. 2013).</p> <p>Apparent declines in the number of horned puffins nesting in the park may be due to differences in census techniques between 1976 and 2007–2011 (Parsons et al. 2012). However, at-sea surveys in Prince William Sound have documented a 79% decline in the number of horned puffins observed from 1972 to 1998, which may also provide insight into the possible decline in Kenai Fjords (Denlinger 2006).</p> <p>Coastline surveys in 2011 detected 18 new seabird colonies and the lack of breeding at 7 historical colony sites (Parsons et al. 2012).</p>

Resource Brief: Why Monitor Seabird Colonies – Seabird Surveys at Kenai Fjords

In 1976, U.S. Fish and Wildlife Service biologist E.P. Bailey surveyed the southern coastline of the Kenai Peninsula. He documented large concentrations of breeding seabirds, which verified the abundance of wildlife along the Kenai Fjords coastline and supported the establishment of Kenai Fjords National Park. In 1980, the park was formed under the Alaska National Interest Land Conservation Act, which states that in addition to preserving the environmental integrity of the Harding Icefield, the park would be managed to protect “marine and other birds” and their breeding areas. Fulfilling this mission requires understanding the health and status of seabird populations in the Kenai Fjords area.

In 2007, Kenai Fjords National Park, in partnership with the Alaska Maritime National Wildlife Refuge, began surveying breeding seabirds within the park and refuge. Surveys have been conducted annually since 2007 that focus on black-legged kittiwakes; glaucous-winged gulls; common murres; horned and tufted puffins; and red-faced, pelagic, and double-crested cormorants.

Park biologists are currently refining survey protocols to maximize efficiency and funding. In contrast to previous years, park biologists in 2011 and 2012 counted the number of birds present on each colony on multiple days to compensate for the varying daily number of adult birds present on a colony. Park biologists visited colonies on as many as ten different days to determine the average number of birds present. These repeated counts will help determine the minimum number of times a colony needs to be counted to obtain an accurate estimate of the number of breeding birds. Colonies are also divided into sections so that in the future, if it is not feasible to count entire colonies, these smaller plots could be used to determine trends in colony size.

The number of birds attending a colony can vary within a day and throughout the breeding season. Prior to 2011, breeding seabird colonies were counted only once annually. While this single count could be an accurate number of seabirds in the colony, it could also be influenced by time of day or when the survey occurred during the breeding season. Because of this variability, counting a seabird colony once annually is unreliable for detecting local scale population trends. Park biologists therefore must be cautious drawing conclusions about breeding seabird population trends on the Kenai Fjords coastline. The glaucous-winged gull breeding population appears to have increased between the 1976 and 2007 surveys and then stabilized from 2007 to 2011. Kittiwake and cormorant populations appear relatively stable and horned puffin numbers appear to have declined since 1976. Current intensive studies with University of Alaska Fairbanks are developing protocols that identify the fine scale seabird population trends in the future.



**Park biologists count a glaucous-winged gull colony on the outer coast.
NPS Photo.**

Marine Nearshore Environment and Animals (continued)

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Sea Otters	Abundance and Energy Recovery Rates		<p>Sea otters are a keystone species that can dramatically affect the structure and complexity of their nearshore ecological community. Sea otters cause cascading effects on community structure by altering abundance of prey, which can in turn alter abundance of lower levels in the food web. Aerial surveys for abundance were conducted along the KEFJ coast in 2002, 2007, and 2010. Counts indicated an increase from 2002, and stability between 2007 and 2010 (Coletti et al. 2011, Coletti et al. 2016a).</p> <p>Energy recovery rates (kcal/min) examined from 2007–2014 have shown a slight decline. A decline in energy recovery rates essentially means that an animal is getting less calories than it did previously for a given time period. The current energy recovery rates for KEFJ sea otters are similar to regions in AK with stable (not increasing) populations. Taking in account the abundance estimates and the energy recovery data the population is likely at carrying capacity and not likely to increase significantly (Coletti et al. 2014, Coletti et al. 2016a).</p>
Harbor Seals	Abundance		<p>In KEFJ, harbor seals use glacial ice extensively to rest, molt, and give birth. With glaciers diminishing in extent, this also decreases the availability of ice habitats. The number of harbor seals at two glacial haul outs (areas where harbor seals rest on glacial ice) in KEFJ have recently experienced a large decline that coincided with a wider population decline observed elsewhere in the Gulf of Alaska and Aleutian Islands (Small et al. 2008). Continued declines in harbor seal populations, particularly in pup production, raises concerns over the future of harbor seals in previously important glacial pupping habitats in KEFJ (Hoover-Miller et al. 2011).</p>
Steller Sea Lions	Abundance		<p>From 2012–2015, there has been an increase in number of pups born on Chiswell Island (Maniscalco et al. 2015). Respectively, 78, 98, 114, and 127 pups were born in 2012, 2013, 2014, and 2015. It appears that the eastern Gulf of Alaska Steller sea lion population is also increasing steadily. The population may be recovering, and is still listed as an endangered species (Maniscalco et al. 2015).</p>

Marine Nearshore Environment and Animals (continued)

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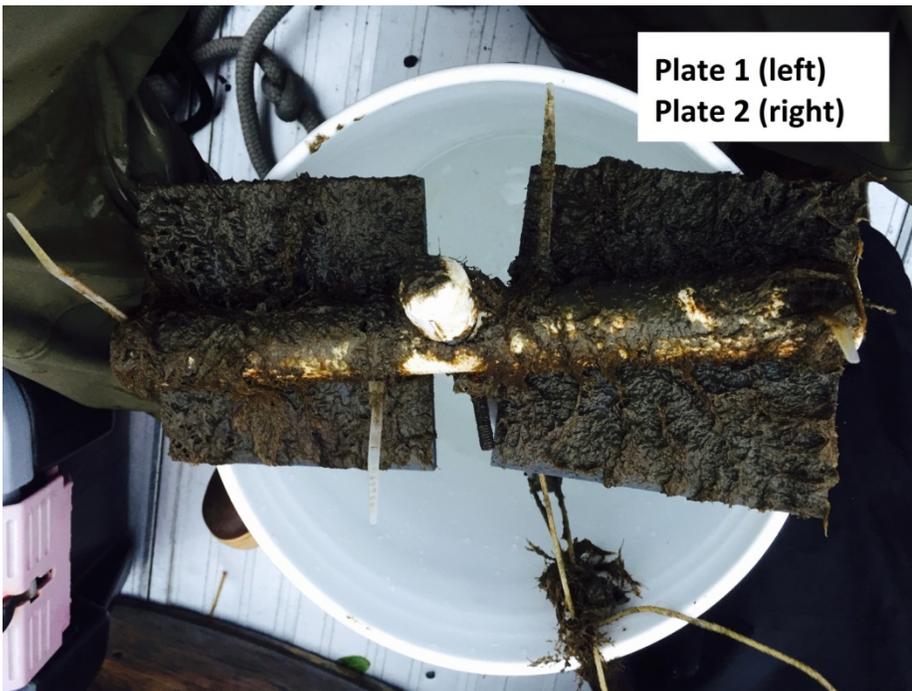
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Marine Water Quality	Contaminant Concentrations		The NOAA Status and Trend Program started a national contaminant monitoring program, “Mussel Watch,” in 1986, which analyzes bivalves for a variety of contaminants along U.S. coastlines. In 2007, mussels were collected from 5 sites along the KEFJ coastline. None of the concentrations of either organics or metals were sufficiently high to be indicative of local or region-wide sources of contamination that are of ecological concern (Coletti et al. 2009). More recent analysis has not been conducted.
Ocean Acidification	Ocean Acidification		<p>Seawater is becoming more acidic in Seward (Evans et. al. 2015) due to atmospheric CO₂ dissolving in the ocean. All shell-bearing organisms in the ocean have a harder time making shells in more acidic water because the main component of their shells, calcium carbonate, is less available (Feely et al. 2004).</p> <p>Research in Glacier Bay found that freshwater from seasonal runoff and melting tidewater glaciers further exacerbates the problem faced by shell-bearing organisms by reducing the saturation state of calcium carbonate, further limiting its availability (Reisdorph and Mathis 2014). This process likely occurs in all fjords with tidewater glaciers, including those in KEFJ. This phenomenon is a nearshore impact that does not occur in the open ocean.</p> <p>Shell building organisms, such as shellfish and many forms of plankton, are major food sources for fish, birds, and mammals. Many of these organisms are important for subsistence and commercial use. These impacts could have far reaching socioeconomic and ecological consequences (Mathis et al. 2015).</p>
Pristine Beaches	Marine Debris (amount and type)		Marine debris is a recurring issue on many of KEFJ’s beaches. Specific beach areas in Resurrection Bay, Aialik Bay, and Harris Bay have been established in the park as NOAA marine debris monitoring plots, which will be revisited annually to document marine debris accumulation rates over time. Partnership debris removal efforts are also conducted on “keeper beaches” (beaches that collect a lot of marine debris frequently located in unprotected areas and subject to high energy winter storms and currents) as often as logistically possible, typically every 1–3 years, across the coastal bays.
	Monitoring of Oil Persistence from Exxon Valdez Oil Spill		Oil from the Exxon Valdez oil spill can still be found in KEFJ and a USGS long-term project to measure oil persistence will likely continue (Irvine 2011).

Marine Nearshore Environment and Animals (continued)

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Marine Invasive Animals	Presence/Absence of Indicator Species		<p>Marine invasive species have the potential for altering nearshore habitats and causing detrimental impacts to native species. The park has been monitoring for green crabs and tunicates (sea squirts) annually at Aialik Bay Ranger Station for a number of years. While present in other places on the Kenai Peninsula, neither species has been found at KEFJ. The NPS nearshore program is monitoring species composition at several sites across the park on an annual basis.</p>

Resource Brief: 2015 Marine Invasive Report



Tunicate collection plates after June–September deployment.
NPS Photo by Elisa Weiss.

Marine invasive species were monitored in Aialik Bay at Aialik Bay Ranger Station over the past five years. KEFJ chose to conduct monitoring at Aialik Bay due to the higher level of marine vessel traffic compared to other areas of the park. Marine vessels and marine debris are known vectors of marine invasive species. Monitoring efforts focused on nonnative European green crabs (*Carcinus maenas*) and nonnative invertebrate fouling species (various tunicate species). Tunicates have been detected elsewhere in the state including Sitka, Ketchikan, and Homer. Both of these invasive species are a concern for the western coast of North America.

2015 is the fifth year park staff surveyed for European green crabs. 2015 is the fourth year that the park has monitored tunicates at Aialik Bay Ranger Station. No invasive green crabs or tunicates have been detected in KEFJ at Aialik Bay.

Dark Night Sky

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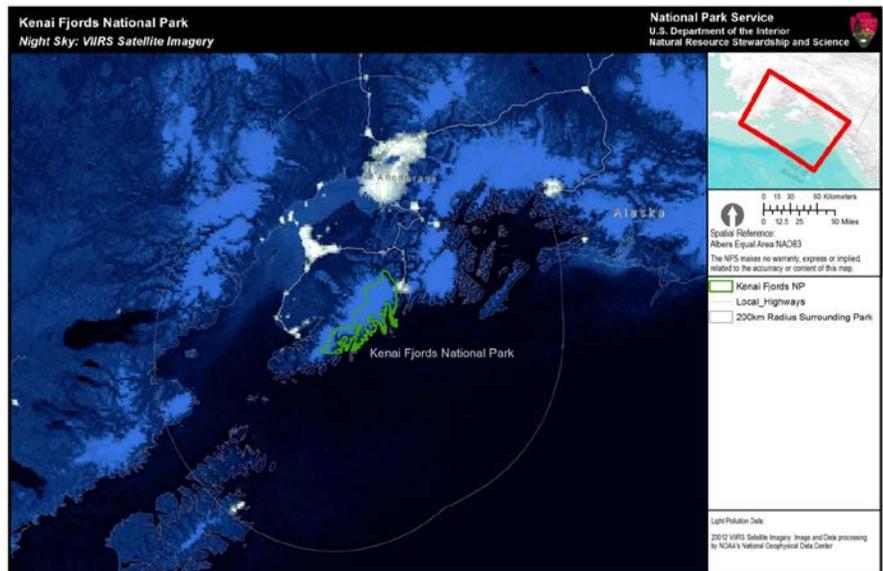
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Anthropogenic Light	Anthropogenic Light Ratio (ALR) – Average Anthropogenic Sky Glow: Average Natural Sky Luminance		A photic environment is described as the physical amount and character of light at a particular location, irrespective of human perception. The NPS Night Sky Program characterizes a park’s photic environment by measuring both anthropogenic and natural light. While no ground based or modeled data are available for Kenai Fjords National Park, 2012 visible infrared imaging radiometer (VIIRS) satellite data, which uses a broadband imaging detector with high sensitivity, indicates that there is no visible upward radiance within the park boundary. The most significant sources of upward radiance in the region originate from Seward, Kenai, and Anchorage, whose light domes may impact the photic environment of the park.

Resource Brief: Night Sky Resources at Kenai Fjords National Park

The night sky has been a source of wonder, inspiration, and knowledge for thousands of years. Unfettered night skies with naturally occurring cycles of light and dark are integral to ecosystem function as evident by the fact that nearly half the species on earth are nocturnal. The quality of the nighttime environment is relevant to nearly every unit of the NPS system as the nighttime photic environment and its perception of it by humans (the lightscape) are both a natural and a cultural resource and are critical aspects of scenery, visitor enjoyment, and wilderness character.

Condition and Functional Consequences

Night sky quality at Kenai Fjords National Park is in good condition. 2012 visible infrared imaging radiometer (VIIRS) satellite data, which uses a broadband imaging detector with high sensitivity, suitable for detecting anthropogenic sources of light on the earth’s surface, reveals no upward light within the park, and very little anthropogenic light is detected in an area within 200km radius around the park except for substantial upward radiance from Seward, Kenai, and Anchorage AK. Light domes created by these cities may have a detrimental impact to the photic environment of the park. Despite these external threats, the absence of anthropogenic light originating within the park boundaries, the photic environment of Kenai Fjords National Park is subject to the natural regime of dark/light patterns allowing visitors to experience pristine night sky resources. At these light levels, most observers feel they are in a natural environment. Learn more in the document [Recommended Indicators of Night Sky Quality](#), and the NPS Natural Sounds & Night Skies Division [website](#).



Created by NPS Natural Sounds & Night Skies Division and NPS Inventory and Monitoring Program MAS Group on 20151130

Regional view of anthropogenic light near Kenai Fjords National Park. White and red represents more environmental influence from artificial lights while blues and black represent natural conditions. This scale shows regional context and how far-reaching the impacts of artificial lighting can be. With no visible upward radiance originating within the park boundary and limited visible upward radiance within 200km of the park, Kenai Fjords National Park serves as a harbor of dark skies.

Acoustic Environment


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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Acoustic Impact Level	A modeled measure of the noise (in dBA) contributed to the acoustic environment by man-made sources		The condition of the acoustic environment is assessed by determining how much noise man-made sources contribute to the environment through the use of a national noise pollution model (see “Acoustic Environment at Kenai Fjords National Park” resource brief below). The mean acoustic impact level at the park is 1.1 dBA, meaning that the acoustic environment is in good condition. Acoustic conditions in national parks are largely driven by transportation activity, and increased visitor use, boat and helicopter traffic near Seward are consistent with overall, long-term projected increases in ground-based (Federal Highway Administration 2013) and aircraft traffic (Federal Aviation Administration 2010). The increased visitor traffic suggests a deteriorating trend in the quality of acoustic resources at this location.
Soundscape Impacts at High Use Areas	Exit Glacier – % time audible, noise free intervals, and dBA levels		Acoustic monitoring was conducted in the park from 2008–2009 to characterize current sound levels, estimate natural ambient sound levels, and identify audible sound sources (see “Acoustic Environment at Kenai Fjords National Park” resource brief below for more information).
	Coastal Areas – % time audible, noise free intervals, and dBA levels		There appears to be a potential increase over time in boat and helicopter traffic on the coast that could be changing the park’s coastal soundscape. No coastal sound monitoring has occurred in the park. Many of the sound sources operate outside of the park and the park would likely have little control over use.

Resource Brief: Acoustic Environment at Kenai Fjords National Park

The quality of the acoustic environment affects visitor experience and ecological health. Acoustic resource condition, both natural and cultural, should be evaluated in relation to visitor enjoyment, wilderness character, ecosystem health, and wildlife interactions. To characterize the acoustic environment, the National Park Service has developed a national model of noise pollution (Mennitt et al. 2014; [Turina et al. 2013](#)). This model predicts the increase in sound level due to human activity on an average summer day. Because the model does not take into account intermittent seasonal noise such as boats, snowmobiles, and train whistles, additional on-site monitoring is important to determine these impermanent yet potentially impacting noises.

Acoustical monitoring was conducted in the park from 2008–2009 to characterize current sound levels, estimate natural ambient sound levels, and identify audible sound sources ([NPS 2013a](#)). Four acoustical monitoring stations were deployed during the summer of 2008 and two acoustical monitoring stations were deployed during the winter of 2009 in the Exit Glacier area to collect acoustic data from selected management zones. Over all hours of the day, human-caused sounds were audible between four and six percent of the time in the backcountry and between 21.8 percent and 59 percent of the time in the front country during the summer. During the winter, human caused sounds were heard 19.5 percent of the time in the front country and 7.8 percent in the backcountry. Over-snow vehicles were the dominant non-natural sound heard between 3.3 and 12.2 percent of the time. The mean noise free interval was around nine and a half minutes at both sites. In the summer, the mean noise free interval ranged from two and a half to five and a half minutes in the backcountry and was six to forty-eight seconds in the front country.

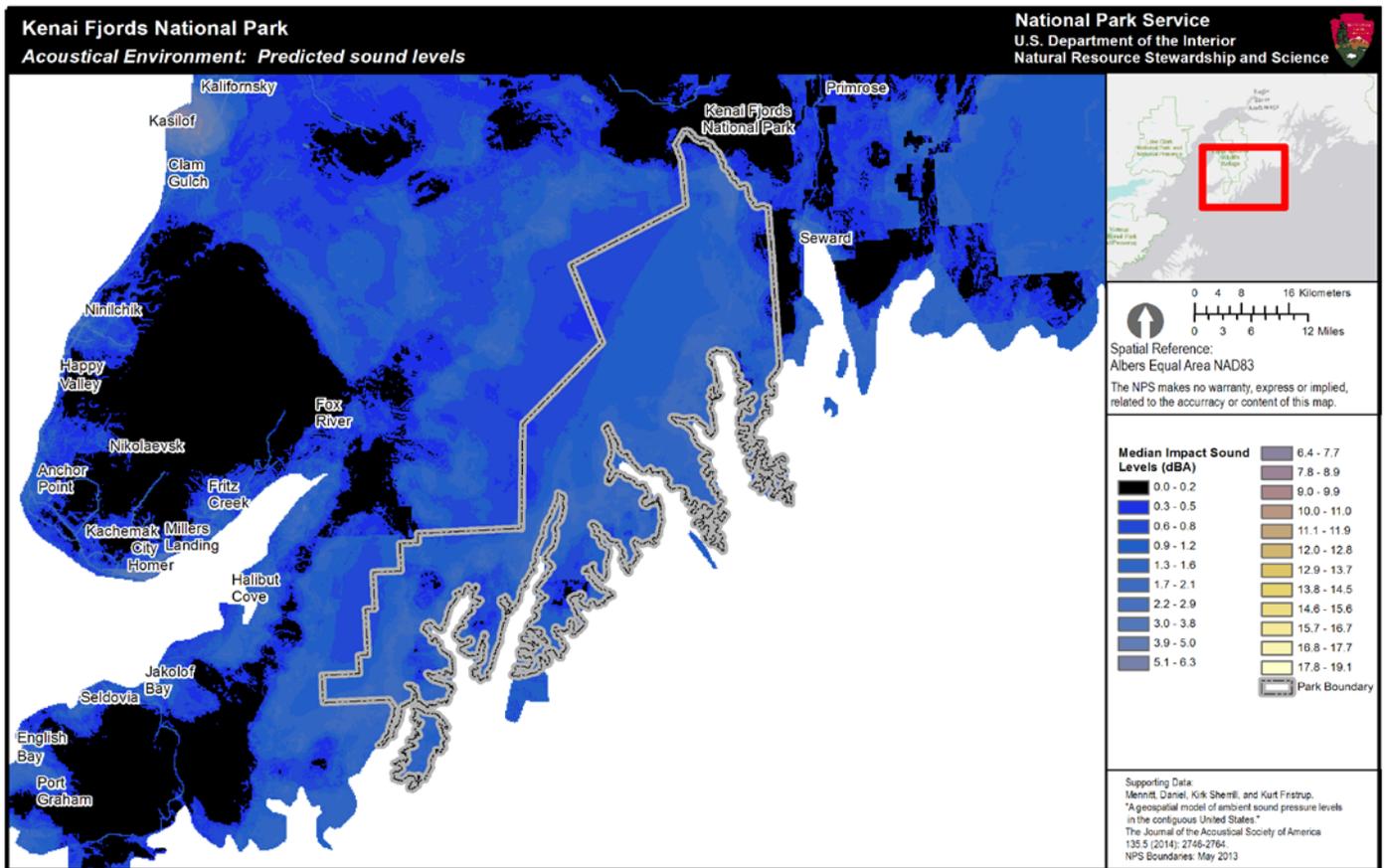
Resource Brief: Acoustic Environment at Kenai Fjords National Park (continued)

Criteria for Condition Status/Trend

For State of the Park Reports, NPS has established acoustic standards (green, amber, red) and two sets of impact criteria for urban parks and non-urban parks. A park's status (urban or non-urban) is based on data from the U.S. Census Bureau ([U.S. Census 2010](#)). Parks outside designated urban areas typically possess lower sound levels, and exhibit less divergence between existing sound levels and predicted natural sound levels. These quiet areas are susceptible to even subtle noise intrusions, so care should be taken to maintain low impact conditions in these places. Park units inside designated urban areas typically experience more interference from noise sources. Based on these assumptions, all Alaska parks will be assessed using the non-urban criteria. Condition thresholds are listed in the table below. Just as smog limits one's ability to survey a landscape, noise reduces the area in which important sound cues can be heard. Therefore, thresholds in the table are also explained in terms of listening area.

Indicator	Threshold (dBA)
Acoustic Impact Level A modeled measure of the noise (in dBA) contributed to the acoustic environment by man-made sources.	Threshold ≤ 1.5 <i>Listening area reduced by $\leq 30\%$</i>
	$1.5 < \text{Threshold} \leq 3.0$ <i>Listening area reduced by 30 – 50%</i>
	$3.0 < \text{Threshold}$ <i>Listening area reduced by $> 50\%$</i>

Condition thresholds for the acoustic environment in non-urban parks



NPS Natural Sounds & Night Skies Division and NPS Inventory and Monitoring Program MAS Group 20151124

Map of predicted acoustic impact levels in the park for an average summer day. The color scale indicates how much man-made noise increases the sound level (in A-weighted decibels, or dBA), with 250 meter resolution. Black or dark blue colors indicate low impacts while yellow or colors indicate greater impacts. White areas (ocean) lack data. Note that this graphic may not reflect recent localized changes such as new access roads or development.

2.2. Cultural Resources

Archeological Resources  web 			
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Knowledge	Sufficient research is conducted to understand the relationship of the park's archeological resources to the historic contexts for the park.		KEFJ continues to contribute toward the understanding of park archeological sites within a number of historic contexts, including the Alutiiq maritime culture of its coastlines, and hard rock mining era of Nuka Bay in the early 20th century. KEFJ's research is sufficient in limited areas of the park to identify and evaluate these sites. Less information is known about more remote areas (outer coast). The park recognizes research is not static, and new theories lend to its understanding of its cultural resources.
	Scope of archeological resources in the park is understood and a determination has been made whether or not they are a fundamental or other important resource.		Archeological research is conducted primarily as a result of park development actions, Section 106 compliance activities, and cooperation with the Smithsonian Institution and other partners (see "Working with the Smithsonian Institution for an Interdisciplinary Approach to Archeology" resource brief). Pedestrian (surface) surveys with limited testing have been completed for nearly the entire coastline (Crowell & Mann 1998). Limited pedestrian surveys have been conducted in the Resurrection River Valley and the higher elevations of the Harding Icefield Trail (Reynolds 1983, Trepal 2011). Extensive testing has been conducted on park-owned property in the City of Seward (NPS 2013c, Harges 2014).
	Percentage of archeology baseline documents with current and complete information.		80% (4 of 5) of the park's five baseline documents are current and complete. The Archeological Overview and Assessment (Kovac et al. 2005) is in need of revision.
	The distribution and types of archeology sites is understood.		Three basic types of archeological sites are present in KEFJ: prehistoric sites, coastal hard rock mining, and riverine mining and trapping. The distribution is somewhat predictable, and some sites have not been documented spatially.
	The mechanisms affecting site stability from the physical and social environment and taphonomic influences is understood.		The mechanisms affecting site stability of archeological resources at historic mining sites is not well understood and needs to be evaluated to inform a future management plan for the sites. Coastal archeological sites may be at risk due to erosive forces and potential climate change effects that may be influenced by isostatic rebound. Taphonomic (fossilization processes) influences are not considered a major factor in this park.

Archeological Resources (continued)

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Inventory	Percentage of park intensively surveyed.		Half of the park is covered in ice, and there is low likelihood that there are archeological sites in these areas. Park-owned lands have been surveyed on the fjords coast, the Resurrection River Valley, and the Exit Glacier area. This includes the mine sites of the Nuka Bay area. Some unsurveyed lands within the administrative boundaries of the park are not owned by the National Park Service. 100% of the park-owned lots in the Seward and the KEFJ maintenance lot on Old Exit Glacier Road have been archeologically tested.
	Percentage of survey data included in the Geographic Information System (GIS) meeting current standards.		In 2014, KEFJ began working with the Smithsonian Institution to spatially document archeological sites to assist with park management needs. The park plans to complete this effort in 2017. It is unclear what percentage of existing survey data meets standards at this point.
	Percentage of archeological resources with complete, accurate, and reliable State site forms.		100% of the park's archeological State of Alaska site information forms are accurate and reliable. All need review for completeness or updates.
	Percentage of archeological resources with complete, accurate, and reliable data in the Archeological Sites Management Information System (ASMIS).		100% of the park's 10 sites are recorded in ASMIS with required, accurate, and reliable data. Data is collected regularly and annually updated. In 2015, the park removed 25 sites from the ASMIS; these 25 sites belong to Alaska Native Claims Settlement Act (ANCSA) corporations instead of NPS.
Documentation	Percentage of known sites with adequate National Register documentation.		0% (0 of 10) of the recorded sites in the park are adequately documented for National Register purposes. Two nominations will be submitted in 2017.
	Percentage of known sites with Determination of Eligibility (DOE) documentation.		60% (6 of ten) of the recorded sites have been evaluated for eligibility. Four (40%) of the ten recorded sites in the park have been determined eligible. Two were determined ineligible by State Historic Preservation Officer. Two (20%) are listed as contributing elements in the Nuka Bay Mining District. The nominations will be updated in 2017.
	Percentage of archeological materials cleaned, conserved, studied, cataloged, and properly stored.		100% of archeological materials have been cleaned, conserved, and cataloged. Some may need updated archival housing. The value of all artifacts can be enhanced by further study. In 2016, the park returned non-NPS artifacts owned by the ANCSA corporations that had been in KEFJ's collection for decades.

Archeological Resources (continued)

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
<p>Documentation (continued)</p>	<p>Percentage of records documenting archeological resource conservation, cataloging, and storage maintained as a part of the archeological collection.</p>		<p>100% of the records received from researchers associated with archeological work are cataloged in the archive module of the Interior Collections Management System (ICMS) and noted as being associated with specific accessioned and cataloged museum collections.</p>
	<p>Percentage or number of sites without assessed and defined threats and damages.</p>		<p>100% of KEFJ's sites have condition assessments that include threats and damages as defined in ASMIS.</p>
<p>Certified Condition</p>	<p>Percentage of archeological resources certified as complete, accurate, and reliable in the Archeological Sites Management Information System (ASMIS) in good condition.</p>		<p>Only three of the ten sites (30%) listed in the ASMIS database are in good condition. Environmental conditions such as inundation and erosion are affecting some of the sites.</p>

Resource Brief: Working with the Smithsonian Institution for an Interdisciplinary Approach to Archeology



A researcher using surveying equipment to document the location of a test area. NPS Photo.

Little was known about Kenai Fjords National Park's (KEFJ) archeological and ethnographic resources when the park was established in 1980. The 1989 *Exxon Valdez* oil spill precipitated reconnaissance surveys that identified a number of previously unknown sites along the park's western coastline. It was not until the 1993 National Park Service Systemwide Archeological Inventory Program (SAIP) that an in-depth survey was initiated on the park's east side. The Smithsonian Institute's Arctic Studies Center led the SAIP project. This began a KEFJ and Smithsonian partnership that has spanned over 20 years.

The SAIP project partners included the National Park Service (NPS), the Smithsonian Institute, U.S. Geological Survey, and the University of Alaska, Fairbanks (UAF). The team took an interdisciplinary approach to locating, documenting, and interpreting cultural sites in KEFJ. The SAIP team developed models for identifying areas where a high probability for archeological sites existed. It discovered and investigated village sites that dated from about AD 1200 to AD 1920. Geologic evidence for an AD 1170 earthquake was identified, and this finding was confirmed by the absence of coastal archeological sites predating the seismic event. The project's findings were ground-breaking for the park.

In 2001 the *Kenai Fjords Oral History and Archeology Project* was launched to research Alutiiq tradition sites located in the park. English Bay Corporation and Port Graham Corporation gave the project their support. Ancestors of Alutiiq residents from the villages of Nanwalek, Port Graham, and Seldovia had lived along the Gulf of Alaska coast; current residents were invited to share their oral traditions and local knowledge and assist in the project's interpretation of the archeological sites and artifacts. Village presentations, consultation, and site visits were funded by the Alaska Humanities Forum. The Pratt Museum in Homer supported high school student volunteers from Homer, Seward, Port Graham, and Nanwalek through its intern program.

In 2007, the Smithsonian led a survey of the Nuka Bay area on the west side of the park for coastal archeology sites. Again, researchers enlisted support from the Native corporations, the villages of Nanwalek and Port Graham, and the Pratt Museum. The project's two primary objectives were to: (1) test hypotheses regarding human responses to climatic and

ecosystem change; and (2) look for archeological evidence associated with the historic period beginning with Russian-Alutiiq contact and extending through late 19th-century American occupation. While the project was able to link traditional place names with two sites, the absence of Western trade goods still left the duration of Alutiiq occupation in Nuka Bay in question.

In 2015, another project was initiated with the Smithsonian Institution, University of Alaska (UAF), and KEFJ and funded by Coastal Settlement Funds provided by the National Park Foundation. During the 2015 summer field season, researchers undertook an archeological survey, which included KEFJ's McCarty Fjord and Harris Bay. The interdisciplinary project included investigations of unsurveyed areas, determining glacial and sea level histories, performing vulnerability assessments of coastal archeological sites believed to be actively eroding into the intertidal zone, and creating archeological site polygons using GPS units and Geographic Information System (GIS) to aid with future resource management. The project garnered the support of the park's affiliated tribes and corporations. The research crew was led by the Smithsonian Institution and included NPS staff, UAF staff, and Alaska Native student interns. Among the project's accomplishments were the new discoveries of two prehistoric sites, and soil core sampling of glacial moraines and tidal lagoons.

Cultural Anthropology



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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Knowledge	Sufficient research is conducted to understand the relationship of the park's ethnographic resources to the historic context(s) for the park.		KEFJ has two baseline documents related to cultural anthropology and they include information that is current and complete. An Ethnographic Overview and Assessment of Nanwalek and Port Graham (Stanek 1998) was completed in 1999. The recently completed study of traditional activities in the Exit Glacier Area (Deur et al. 2013) highlights the area's use between 1950 and 2013. More discussions and partnerships with affiliated native villages and ANCSA corporations would increase understanding of ethnographic changes that have occurred over time. During the 2016 Cultural Conversations symposium, KEFJ and its partners discussed future projects including the creation of a KEFJ place name map.
Inventory	Appropriate studies and consultations document resources and uses, traditionally associated people, and other affected groups, and cultural affiliations.		The park works cooperatively with the Native villages of Nanwalek, Port Graham, and Seldovia. It also works with the ANCSA village corporations of English Bay and Port Graham; and the regional Native corporation, Chugach Alaska Corporation, which own land and resources in the park, both surface and subsurface. A Cultural Conversations symposium took place in 2016. The park continues to consult with tribes and corporations on cultural resource topics, as well as maintenance and research projects.

Resource Brief: Exit Glacier Traditional Activities Project



Harding Icefield camping trip. NPS Photo by Keith Knighten.

In 2013, a study on traditional activities in the Exit Glacier area of Kenai Fjords National Park ([Deur et al. 2013](#)) documented the thirty-year history of the Exit Glacier area prior to park establishment (1950–1980), based on the accounts of long-term residents of Seward, Alaska. There were two primary objectives: 1) to preserve local and park history through oral interviews, and 2) to identify what constitutes traditional activities in and around Seward. The oral histories revealed the Harding Icefield and Exit Glacier area hosted a rich variety of use related to hunting, gathering, and recreation. The research provided interpretive insight into these 20th-century activities and described uses that may be defined as traditional.

The oral history interviews, photographs, and interactive maps were collected by University of Alaska Fairbanks and NPS ethnographers. These interviews and pictures can be explored on [Project Jukebox](#), a digital oral history program made available online through the University of Alaska, Fairbanks.

Cultural Landscapes

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Knowledge	Sufficient research exists to understand the relationship of the park’s cultural landscapes to the historic context(s) for the park.		The only defined “cultural landscape” in the park is the early 20th-century hard rock mining era district in Nuka Bay. A Cultural Landscape Inventory for the Nuka Bay Mining District was completed in 2004. KEFJ constantly contributes to its understanding of the cultural landscape and determined that a Cultural Landscape Report (CLR) is needed to address management of the district. The CLR project will require the coordination of the district’s multiple landowners and stakeholders.
Inventory	Percentage of landscapes eligible for the National Register in the Cultural Landscapes Inventory (CLI) with certified complete, accurate, and reliable data.		100%. Nuka Bay Mining District data is certified complete, accurate, and reliable. Coordination between multiple landowners is needed for National Register of Historic Places nomination to move forward. The park is also planning to propose a Cultural Landscapes Inventory for the Aialik Bay Archeological District in the future.
	Percentage of Cultural Landscapes Inventory (CLI) data included in the Geographic Information System (GIS) meeting current standards.		100%. Nuka Bay Historic District CLI data is included in the GIS and meets current cultural resource standards.
Documentation	Percentage of cultural landscapes with adequate National Register documentation.		The park’s Nuka Bay Historic District has been determined eligible for the National Register of Historic Places, but has not been nominated for the National Register. Coordination between multiple landowners is needed for the National Register nomination to move forward.
	Percentage of cultural landscapes with Determination of Eligibility (DOE) documentation.		100% of the park’s cultural landscapes are eligible for the National Register. The nomination requires updating to incorporate new information. Consultation with ANCSA corporations who own a number of contributing sites is needed.
Certified Condition	Percentage of cultural landscapes certified as complete, accurate, and reliable in the Cultural Landscapes Inventory (CLI) in good condition.		0%. The park’s CLI was assessed as “fair” in 2016. The future mine management strategies document will assist in addressing this issue. The CLI included mines owned by NPS and ANCSA corporations, and will require consultation. “Good” is defined as indicating the inventory unit shows no clear evidence of major negative disturbance and deterioration by natural and /or human forces. “Fair” is defined as indicating the unit shows evidence of minor disturbance and deterioration and some degree of corrective action is needed within 3–5 years to prevent further harm to its cultural and/or natural values.

Resource Brief: Nuka Bay Historic District

Nuka Bay is located on the southern coast of Kenai Fjords National Park and was actively used by miners prior to the mid-20th century for hard rock mining activities. In 2002, the mining sites in Nuka Bay were inventoried and evaluated as a cultural landscape called the Nuka Bay Historic District. This cultural landscape was determined eligible for the National Register of Historic Places in 2004. The core historic sites for the district are 1920–1940 mining sites typical of lode gold mining technology. The cultural landscape is recognized as significant for its role in the mining history of the southern Kenai Peninsula, much of which resides in Kenai Fjords National Park.

The Nuka Bay Historic District includes mine sites now owned by ANCSA corporations and the National Park Service. The National Park Service owns four mines within this historic district: Sonny Fox Mine (circa 1926–1940), Waterfield-Goyne (circa 1930–1940), Glass-Heifner Mine (circa 1924–1940), and Harrington Mine (circa 1924–1940). Further work in these areas will require consultation and partnering with the ANCSA corporations.



Sonny Fox ore cart. NPS Photo by S. Kovac.

Historic Structures



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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Knowledge	Sufficient research is conducted to understand the relationship of the park's historic structures to the historic context(s) for the park.		The historic structures have been identified and evaluated within the historical context of the Nuka Bay Mining District for the Cultural Landscape Inventory. KEFJ constantly contributes to its understanding of its historic structures, many of which are also listed as contributing to its cultural landscape.
	Adequate research exists to document and preserve the historic structure's physical attributes that contribute to historical significance.		Historic structures continue to deteriorate in KEFJ and are located in remote areas difficult to access and maintain. The future Cultural Landscape Report will assist in addressing this issue. Mines owned by ANCSA corporations would require consultation and partnerships.

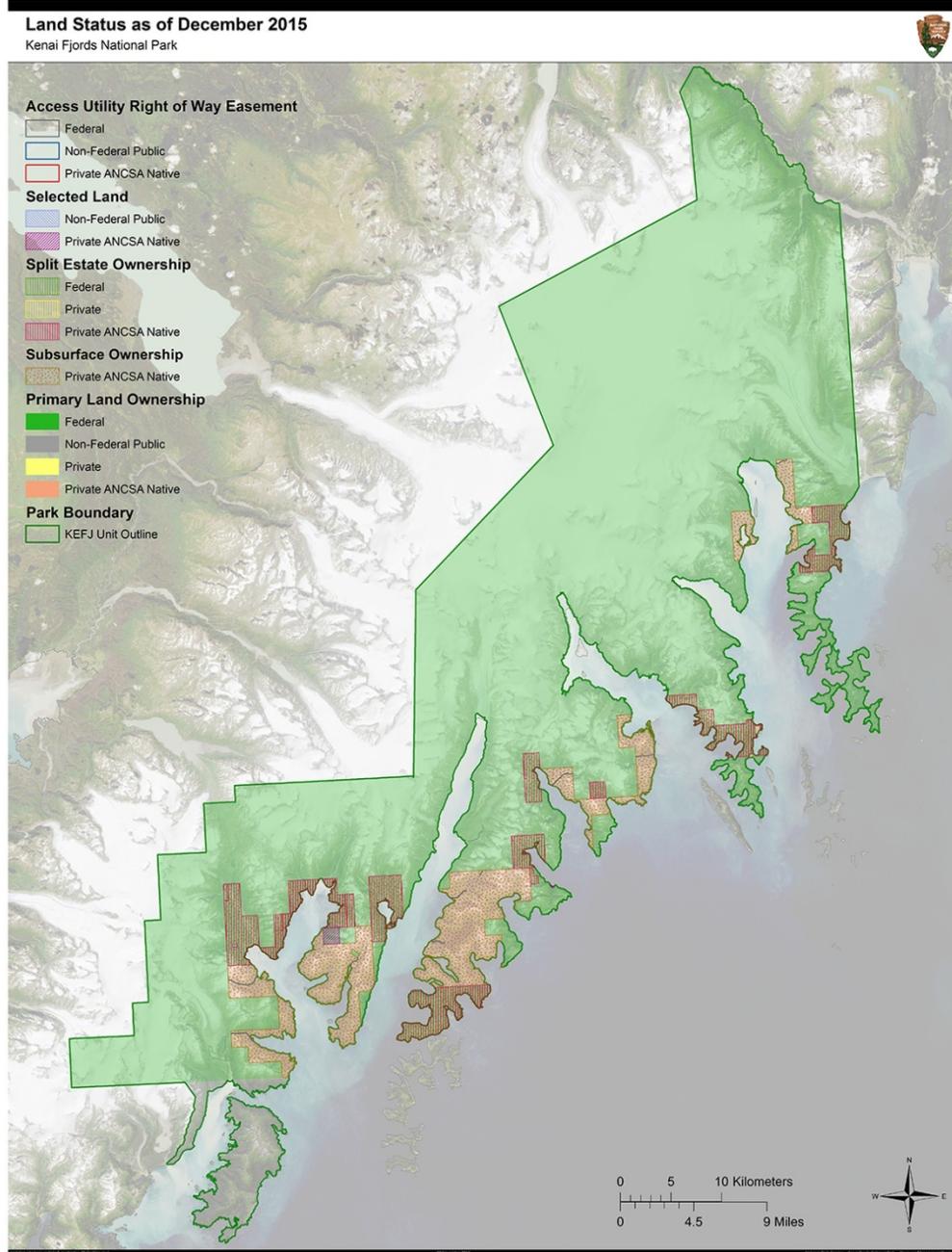
Historic Structures (continued)

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Inventory	Percentage of historic structures eligible for the National Register in the List of Classified Structures (LCS) with accurate, complete, and reliable data.		100% of the 8 eligible structures have accurate, complete, and reliable data.
Documentation	Percentage of historic structures with adequate National Register documentation.		100% of historic structures have Determination of Eligibility documentation and have not been formally nominated to the National Register as contributing elements to the Nuka Bay Historic District. Consultation with the ANCSA corporations who own one of the structures is needed prior to submission.
Certified Condition	Percentage of historic structures certified as complete, accurate, and reliable in the List of Classified Structures (LCS) in good condition.		33% of the historic structures in the LCS are in good condition. “Good” is defined as the structure and significant features are intact, structurally sound, and performing their intended purpose. Some structures that no longer meet the definition of a structure will be removed from the LCS, which will likely increase the percentage of historic structures in good condition.
	Percentage of historic structures in the Facility Management Software System (FMSS) with a Facility Condition Index (FCI) indicating good condition.		100% of the three structures listed in FMSS are listed in good condition. “Good” is defined as the cost of upkeep and maintenance is significantly less than the cost of replacing the structure.

History  web 			
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Knowledge	Sufficient research is conducted to establish the reasons for park establishment and a history of the NPS at the site.		<i>A Fragile Beauty: An Administrative History of KEFJ</i> (Catton 2010) documents discussions and rationale for park creation. <i>A Stern and Rockbound Coast</i> (Cook and Norris 1998) documents known historic properties and addresses their eligibility to the National Register.
	Research supports cultural resource management.		Research, such as the 2015 archeological survey of the west side of the KEFJ, supports management of the cultural resource program by identifying cultural resource sites and assessing their condition. This type of research informs park staff of threats and disturbances enabling proactive management decisions to protect and preserve resources as needed.
	Research at the appropriate level of investigation precedes planning decisions involving cultural resources.		Basic historical research and cultural resource surveys at KEFJ are often reactive and concentrate on complying with Section 106 of the National Historic Preservation Act (NHPA). This ensures cultural resources that may be affected by park actions and projects are identified and protected when possible.
Inventory	Cultural resources are inventoried and evaluated in consultation with State Historic Preservation Officers (SHPOs).		KEFJ consults the Alaska SHPO in matters that may affect cultural resources such as Section 106 of the NHPA, and Determinations of Eligibility for the National Register.
	Percentage of cultural resources listed in appropriate Service-wide inventories, including the National Register.		100% of KEFJ archeological resources are documented in ASMIS. 100% of KEFJ structures are listed in the LCS. 0% of KEFJ cultural resources are listed on the National Register.
	Research data are accessioned as part of the park's museum collection.		All researchers using the NPS Research Permitting System (NRPS) are assigned a museum collection accession number prior to the research permit being signed. Upon each project's completion, project related materials are submitted for curation in KEFJ's museum collection.
Documentation	Percentage of historic properties with adequate Determinations of Eligibility (DOE) documentation.		60% of the park's historic resources have been evaluated for eligibility to the National Register. The park plans to nominate two archeological sites in 2017.

Resource Brief: Cultural Resource and Land Ownership



Kenai Fjords National Park’s land ownership history is complex. The State of Alaska, Alaska Native Claims Settlement Act (ANCSA) corporations, Native allottees and private citizens all own land and resources within the park’s boundary. The specific types of property ownership and the park’s relationship with its partner-owners dictate the park’s ability to manage cultural resources within its boundaries.

When KEFJ was established in 1980, land ownership within the park’s boundaries was uncertain as a result of land entitlements under the Alaska Statehood Act, the Native Allotment Act, and ANCSA. In accordance with ANCSA, Native village corporations had selected lands within the park that had not yet been conveyed. Once the lands were transferred, English Bay and Port Graham corporations owned much of the surface area of the KEFJ coastline. The regional Native corporation, Chugach Alaska Corporation, became the subsurface estate owner of these village corporation lands, as well as the owner of one tract of land selected per ANCSA’s Section 14 (h) (1) cemetery sites and historic places provision. Pursuant to the Alaska Statehood Act, the State of Alaska received title to all of Nuka Island and lands around Nuka Passage. Other private parcels include two native allotments and one private parcel in Aialik Bay.

Beginning in 1997, English Bay Corporation entered into a sale and purchase agreement with the United States for its corporation lands within KEFJ. These purchases were funded by the Exxon Valdez Oil Spill Trustee Council, and resulted in the former English Bay Corporation lands becoming part of the park. When English Bay Corporation sold its lands to the United States in three transfers—in 1997, 2001, and 2012—the Warranty Deeds noted that the village corporation retained ownership of “all historic and prehistoric archeological and cultural artifacts...” In effect, the NPS now owned the surface estate excluding the cultural resources. Chugach Alaska Corporation remained the subsurface estate owner of these purchased lands. Port Graham Corporation retained all of the lands conveyed to it within KEFJ boundaries, as did the State of Alaska. Three blocks of unpatented mining claims (located in Surprise Bay and Beauty Bay) reverted to the United States.

KEFJ’s commitment to the protection and preservation of NPS cultural resources continues to be a priority. Maintaining good partnership relationships with its affiliated Alaska Native tribes and corporations will afford the park direction in providing protection to *all* cultural resources on park lands, or in the NPS curatorial center, if the tribes and corporations so desire.

Museum Collections



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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Knowledge	Sufficient research and analysis exists to understand the relationship of the park's museum collection to the historic context(s) for the park.		The documentation and cataloging of KEFJ's museum collection exceeds minimum requirements for the national Interior Collections Management System database. As new information about the collections becomes available, catalog records are updated.
	Scope of museum collection in the park is understood and a determination has been made whether or not they are a fundamental or other important resource.		There are more than 228,000 objects in the museum collection. Additions to the park's museum collection are made in accordance with KEFJ's Scope of Collection Statement (which provides guidance on the diversity of objects added to the collection) to ensure that acquisition of museum objects is consistent with the park purpose. This document is revised every five years to ensure relevancy to the park's mission. The Scope of Collections Statement is in need of updating.
	Percentage of museum collection baseline documents with current and complete information.		42% of baseline documents are current and complete. Baseline documents cover basic management issues related to the park's museum operations. These needs are covered in the Housekeeping Plan, the park's Integrated Pest Management Plan, and its Structural Fire Plan. Updates are needed for two primary plans: the Scope of Collections Statement and the Museum Management Plan.
	Affected Native Americans are consulted concerning items of cultural affiliation.		KEFJ consults with its affiliated Alaska Native tribes and corporations regarding all artifacts of cultural affiliation. In the spring of 2016, KEFJ returned artifacts that it had been curating to the affiliated corporations where the surface and subsurface owners agreed to final disposition.
Inventory	Archival and manuscript collections are surveyed and described in the Interior Collections Management System (ICMS) and finding aids are produced.		Approximately 95% of KEFJ's archives are cataloged with a finding aid. Concern has been noted that the finding aid is not user friendly.
	Percentage of existing collection that is accessioned and cataloged.		95.10% of the park's objects are accessioned and cataloged.

Museum Collections (continued)

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Documentation	Accession and deaccession files are complete with all appropriate signatures.		KEFJ accession and deaccession documentation is complete and signed by the park superintendent.
Certified Condition	Percentage of museum collection storage facilities in the Facility Management Software System (FMSS) with a Facility Condition Index (FCI) indicating good condition.	N/A	KEFJ does not maintain a collection storage facility. Its collections are curated at the NPS Alaska Regional Curatorial Center in Anchorage.

2.3. Visitor Experience

Visitor Numbers and Visitor Satisfaction

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Number of Visitors	Number of visitors per year		The busiest months of the year at KEFJ are May through September. The park has seen a large increase in the number of shoulder season visitors in May and September. Visitation in May 2015 increased 31% from May 2012. This increase may be due to increasing numbers of cruise ships in Seward (14% increase between 2014 and 2015) and the lack of snow in the Exit Glacier area. Overall, visitation has increased since early 2000. Visitation numbers increased 4.5% from 2014 to 2015 (NPS Stats). With the increase in shoulder season use, the park may need to increase staffing and visitor center hours. Increased visitation can also lead to crowded visitor centers and more visitor interactions along trails.
Visitor Satisfaction	Percent of visitors who were satisfied with their visit		Based on the standard visitor satisfaction survey conducted each year, the percentage of visitors satisfied in 2014 was 99%. The percent of satisfied visitors has been 99% for the past 3 years and has always been above 95% (Visitor Survey Card Data Report, NPS Scorecard).

Resource Brief: Facilitated Dialogue Programs



**Park discussion.
NPS Photo.**

In 2015, a new interpretive program engaged visitors in a new way and allowed them to share their ocean experiences and discuss ocean issues. The first program, titled *Our Role in Ocean Stewardship: A Facilitated Dialogue*, launched on Friday, June 19, 2015. The program used several dialogic techniques to engage participants in a meaningful conversation about the mutual influence between people and the ocean and society's role in ocean stewardship.

In September 2014, the park hosted the first Facilitated Dialogue training program in Alaska. The workshop was led by Harpers Ferry Center training specialists and the International Coalition of Sites of Conscience (ICSC). Interpretive professionals from nearly every park site in the region attended the five-day workshop that explored audience-centered interpretation as a new way of getting people civically engaged in issues. Participants developed their own programs and presented to the larger group on topics including: wilderness, climate change, ocean issues, and cultural history.

Following the September workshop, the park's education team developed a marine debris facilitated dialogue arc to engage high school and college level students. The program was delivered throughout the winter and spring in classrooms and through distance learning technology. In March 2015, the program was shared with SCA/NPS Academy students learning about career opportunities in the National Park Service. The program helped to highlight the work of interpretation to engage visitors in civic dialogue and provided them with ideas on how they could help with marine debris issues on beaches throughout Alaska. In May 2015, Kenai Fjords was the first site to pilot a shortened Facilitated Dialogue workshop for seasonal staff. The one day course kicked off by engaging trainees as participants in the *Our Role in Ocean Stewardship* dialogue. After experiencing a facilitated dialogue first hand, the students engaged in a half-day video teleconference with the ICSC to learn how to create an arc of dialogue to elicit meaningful conversations amongst visitors. In the afternoon, trainees practiced dialogic techniques and worked together to practice creating their own arcs.

Facilitated dialogue, by co-developing programs with the audience, provides opportunities for all to participate and is a great way to lead the National Park Service into the 2nd century of service! The Interpretation Team received the 2015 Achieving Relevance in Interpretation team award for their work on audience-centered experiences.

Interpretive and Education Programs – Talks, Tours, and Special Events



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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Education Programs	Number and quality of programs, and number of participants		The quality of education programs has increased over time. The park began its distance-learning program in 2015 and received the Pinnacle Award for Excellence from the Center for Interactive Learning and Collaboration. The number of participants has increased due to the Centennial initiative to bring 4th graders to the park.
Ranger Programs	Number and quality of programs and attendance		The number of programs the park provides remains stable at just over 1,440. This number is for formal programs that include boat tours, beach walks, presentations (Fox Island, visitor center), Exit Glacier guided walks, and hikes. The number of visitors attending programs also remains stable at approximately 90,000. In 2015, there was a 4% increase of visitors attending programs over 2014 (2010–2015 Service-wide Interpretive reports).
Junior Ranger Programs	Number of programs and attendance		In 2015, 5,385 people participated in park Junior Ranger programs. This included completion of the Junior Ranger Adventure Guide, Explorer Journal, Fjord Junior Ranger walk, and Discovery Pack program. Participation in Junior Ranger programs is steadily increasing with increasing visitation. In 2015, participation increased due to the addition of a new Explorer Journal for ages 13+.
Special Events	Variety and longevity of events, community involvement		KEFJ regularly participates in job fairs, community meetings, and the Seward Music & Arts Festival. The park's National Park Week Art for Parks event brings local artists into classrooms and culminates in a juried art show for the First Friday Art Walk in May. In 2015, the park staffed a downtown booth on the Fourth of July and presented a resume building workshop for the villages of Port Graham and Nanwalek. In 2016, the park held a Centennial event to unveil the park mural on the headquarters building.

Resource Brief: Distance Learning Program

In 2015, Kenai Fjords National Park earned a coveted Pinnacle Award for the 2014–2015 school year from the Center for Interactive Learning and Collaboration (CILC) for their newly established distance learning program. CILC is recognized nationally and internationally as the leader in content aggregation, consulting, and support services that assist organizations with the utilization of videoconferencing and other collaborative technologies.



Park Ranger starting up a virtual link. NPS Photo.

The Pinnacle Award is given annually, by the CILC, to organizations that receive outstanding scores on program evaluations submitted by educators and end users. Receiving the award indicates remarkable quality of educational content and exceptional skill at program delivery.

According to Jan Zanetis, CILC Managing Director, “The Pinnacle Award is highly regarded by providers as it is an objective measure of their ability to meet the needs of students of all ages. CILC is gratified to see the growing ranks of Pinnacle awardees year after year.”

Darin Trobaugh, Alaska SeaLife Center Education Specialist, adds, “Content providers always welcome feedback on their programs. The CILC Pinnacle Award is a way for educators to let providers know that they’re doing a great job!” The Pinnacle Award was first awarded in 2008 and has become a CILC tradition.

Interpretive Media – Brochures, Exhibits, Signs, and Website



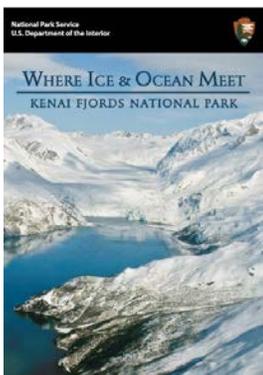
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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Wayside Signs	Condition and currency of signs		The currency of the content of waysides is good. In 2016, new waysides communicating climate change were added to the stone kiosk at Exit Glacier and the visitor center plaza. A new wayside providing a large area orientation map was also installed in the plaza. The conditions of several of existing wayside panels in the Exit Glacier area are poor and need replacing. All outdoor exhibits are exposed to extreme conditions resulting in a need for cyclic replacement.
Park Directional Signs (off-site)	Usefulness, quantity, and placement		To improve directional signage to the park’s visitor center, the park should consider collaborating with the City of Seward to install strategically located signs along the Seward Highway and in the harbor.
Exhibits	Exit Glacier Nature Center		New exhibits in the Exit Glacier Nature Center were installed in May 2012. They are in good condition and communicate current issues and park significance.
	Visitor Center		The park received funding for the addition of interpretive media in the park’s visitor center. Installation completion is scheduled for 2018.

Interpretive Media – Brochures, Exhibits, Signs, and Website (continued)

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Print Media	Accuracy and availability of primary park publications		The park brochure was completely revised in 2015 and the park received 50,000 copies. The park recently updated the KEFJ rack card and Seward map.
Audio-visual Media	Orientation Film		In 2015, the park completed and debuted its first ever park film. Three short films on orca research, temperate rainforest ecology, and glacier research were completed and added as a sales item in the Alaska Geographic outlet.
	Other AV material		The park has a social media presence—on YouTube (9,000 views in 2015), Facebook, Flickr, Pinterest, Instagram, and Twitter—where the park shares short in-house video and media. The creation of an Explorer Journal App is near completion and will be available by 2017 on Apple and Android phones and tablets.
Websites	Currency and scope of website; number of website visitors		The park’s website is current and has an appropriate depth of information. There are more than a half million website visitors annually. The website was updated and the new “look and feel” debuted for National Park Service Centennial in 2016. A Content Management Strategy will be completed in winter of 2016/2017 to provide better direction for the website.
Social Media	Social media: Facebook updates and “likes,” overall activity		The park’s Facebook page started in December 2012. It has steadily increased its viewers since that time. The park staff posts every day throughout the summer and the park has had several posts go viral in mainstream media. Total likes to date are 31,867 (as of October 2016).
	Social media: YouTube, Instagram, Twitter, Flickr, Pinterest		The park has an increasing social media presence with Twitter and Instagram showing significant growth in 2016. Park staff added Instagram to its portfolio in 2015, with much success (more than 6,100 followers as of October 2016).



Resource Brief: Kenai Fjords National Park Film

Kenai Fjords National Park debuted its first ever national park film in August 2015. *Where Ice and Ocean Meet* introduces the dynamic world of Kenai Fjords National Park, a landscape sculpted by ice. The film explores the richness of the fjords’ wildlife, from black oystercatchers to sea otters, black bears, and massive humpback whales.

Audiences see the park from the perspective of a wilderness kayaker, a marine ecologist, and a Supiaq family, whose ancestors called these fjords home for thousands of years.

Towering above it all is the glaciers’ story—how they have shaped the park, how they have changed over the last 100 years, and what the future may hold.

Where Ice and Ocean Meet is a gorgeous visual exploration of the unique, beautiful, and ever-changing place that is Kenai Fjords National Park.

Recreational Opportunities



[web](#) ▶

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Camping	Front country and Exit Glacier: percentage of campsites filled		There is a 12-site accessible, tents-only campground in the Exit Glacier area. There has been an increase in camping in the Exit Glacier campground in 2014 and 2015. Campground is often full on weekends during peak season.
	Backcountry camping: quality of experience		Backcountry camping is primitive, and bear food storage lockers are provided in some high use areas. There are other opportunities for backcountry camping in unimproved areas. More information is needed to see if visitor expectations are being met.
Hiking Trails	Quality of experience		Increasing visitation in the Exit Glacier area has led to decreased quality of experience due to crowding on Exit Glacier area trails, including the Harding Icefield Trail.
Wildlife Viewing	Exit Glacier: range and quality of experience		Wildlife sightings in the Exit Glacier area have remained stable. Mountain goats, black and brown bears, moose, voles, and birds are regularly seen.
	Fjord: range and quality of experience		Whale sightings in Resurrection and Aialik Bay have increased, while sightings of other marine mammals (sea lions, seals, otters) have remained stable.

Resource Brief: Human Waste on Exit Glacier



A bag of human waste emerging from the edge of Exit Glacier. NPS Photo.

Beginning in 2013, the park's backcountry ranger staff surveyed the northern edge of Exit Glacier from the Harding Icefield down, for human and expedition waste. The survey resulted in the mapping and removal of 14 bags of trash—most containing human waste and hygienic products. In 2014, the survey continued with an additional 6 bags found in the same areas as before. An additional area beyond the terminus of the Harding Icefield trail was surveyed with no significant findings. All bags were marked on GPS, and a map was made to show where concentration of waste is being found. It appears that most parties probably carried their trash with them while on the ice, and only dropped their bags—into crevasses or buried into the snow—as they were leaving the ice.

In 2014, park regulations on human waste were modified in the superintendent's compendium to address the issue. Backcountry rangers continue to pick up litter and anything that is not a natural component of the ecosystem that can be easily removed. Education of park visitors includes wilderness ethics, including Leave No Trace principles for garbage and human waste.

Recreational Opportunities (continued)

[web](#) ▶

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Glacier Visitor Access and Viewing	Exit Glacier access		Since 2010, the park has made extensive efforts to maintain the quality of glacier viewing in the Exit Glacier area by building spur trails to get visitors closer to the ice. As the glacier continues to recede and the options for building trail extensions diminish, the visitor experience is decreasing. The distance to the toe of Exit Glacier is increasing and it has become more difficult to access due to changes in creek flow. Every year, park staff receives a number of visitor comments about the declining visitor experience in the Exit Glacier area.
	Fjord glacier viewing		The quality of glacier viewing in the fjords has decreased due to rapid changes in glaciers.
Non-motorized Boating	Quality of experience		Aialik Bay, Bear Glacier Lagoon, and Pedersen Lagoons have experienced increased use and potentially a decrease in the quality of experience due to impacts to solitude and wilderness feeling.
Commercial Use Authorized Operators	Range of experiences		Commercial operators provide transportation into remote areas of the park. The range of tour offerings has increased over the past 5 years.
	Quality of experiences		Remote areas represent the bulk of the park, and only a small fraction of the number of visitors. Increasing visitation has led to more people on the trails and resource impacts in some areas of the park.
Winter Recreational Opportunities	Range of experiences		Winter recreation in the park fluctuates with variable winter weather. The range of winter recreational opportunities has increased with the addition of fat tire bikes. The Willow public use cabin continues to be available and other winter recreational experiences (dogsledding, snowmachining, skiing) continue to take place.
	Quality of experiences		The quality of the experience for winter recreational opportunities has been adversely affected by a decrease in snow cover in recent years.

Resource Brief: 2015 President Barack Obama Visit

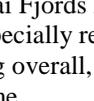
On Tuesday, September 1, 2015, Kenai Fjords National Park hosted President Barack Obama during his historic visit to Alaska. The weather cooperated, and the park’s stunning scenery provided a spectacular backdrop for photo and filming opportunities during the President’s hike to the Exit Glacier and a boat trip to view Bear Glacier. The park’s diminishing glaciers are textbook examples of the impacts of climate change in Alaska, and graphic illustrations of the President’s goal to address these issues on a global scale.



Exit Glacier over the shoulder of President Obama. NPS Photo.

Park staff was first notified of a potential visit earlier in the summer, and planning kicked into high gear as more definite plans began to take shape. A regional Incident Management Team was requested to assist park staff in working with the White House and Secret Service to plan for and implement the day’s activities, which also included filming a segment for Bear Grylls’ “Running Wild” program and launching the National Park Service’s *Every Kid in a Park* campaign with a local Seward 4th grader and her teacher.

Many Kenai Fjords National Park staff spent extended time with the President. More than 60 staff members were involved, which included staff from several other national parks in Alaska and the Pacific West Region Special Events (SET) team.

Scenic Resources  web ▶			
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Scenic Views	Scenic views quality & protection		Many visitors come to Kenai Fjords National Park to see the exceptional scenery, especially related to glacial fjords. While glaciers are retreating overall, the scenic views are still extraordinary at this time.

Accessibility

[web](#) ▶

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Mobility	ADA compliance		Most of KEFJ visitor facilities and programs are mobility accessible. The park’s ranger walks are available for mobility-impaired participants and are planned with enough flexibility to accommodate all visitors regardless of ability. The absence of accessible parking adjacent to the visitor center is being addressed through collaboration with the City of Seward.
Visual Accommodation	ADA compliance		The park’s new film is ADA compliant, including open captions and audio description for the visually impaired. The new park map is translated into braille.
Auditory Accommodation	ADA compliance		The park is using assisted listening devices for hearing-impaired visitors at park facilities and all ranger programs.
Transportation	Access to park/coastline/fjords		Many sections of the park are remote, and more expensive to access than Exit Glacier. During the summer, there are various boat tours, water taxis, and float planes that provide public access to the coastal fjords.
	Access to Exit Glacier		While Exit Glacier is accessible by automobile, there is no public transportation available at the park. In peak hours during the summer, this appears to have led to parking lot overcrowding in the Exit Glacier area. There is one company that offers regular van service and several taxi companies that offer transportation in the summer. A large number of tour buses, including those related to cruise ships, bring passengers to Exit Glacier.
Multi-lingual Resources	Audio and print materials in multiple languages, bi-lingual staff		The park map was updated in 2015, but the park does not have print materials available in other languages. KEFJ currently has staff that speaks Spanish, German, French, and Mandarin.



Kayaks used at Spirit Camp. NPS Photo.

Resource Brief: Nuciik Spirit Camp

On the shores of Nuchek Island, an 800-acre island in Prince William Sound, children and elders of the Chugach people spend time together to relive their heritage at Spirit Camp. The camp is designed to raise awareness of the origin and history of the people in the Prince William Sound and to heighten awareness of their history and culture. Activities during the two weeks include preparing subsistence foods, language lessons, woodcarving, beading, traditional singing and dancing, and a Visitor’s Day.

In 2015 on Visitor’s Day, Kenai Fjords National Park, Alaska Regional NPS Office, and Chugach National Forest staffs were invited to join the approximately 150 people on the island. The opportunity allowed for building relationships and connecting the past to the present. The team exchanged with elders and children from local communities and staff from Chugach Alaska Corporation. The diverse cultural past of the old village of Nuciik was explored and the beauty, history, and cultural pride of the Chugach people were shared.

Safety



[web](#) ▶

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Visitor Safety	Recordable incidents		<p>The safety of visitors is a park priority. The park works to quickly identify and mitigate potential hazards, and the number of accidents is very low. On average, staff responds to 3 basic life support calls per month during high season. Most injuries are a result of slips, trips, and falls. There is an average of 3 incidents annually that require transport to a hospital. Recorded incidents of crimes against people are low in number.</p>
Staff Safety and Training	Number of staff trained		<p>As of the end of 2015, Operational Leadership Training has been completed by 100% of park staff. In 2015, 46 park staff completed the 16-hour Operational Leadership Training. All staff working in the Exit Glacier area completes Wilderness First Aid training. Staff is engaged in a culture of safety and individual team members receive peer safety awards each year.</p> <p>There were 200 person-days of Search and Rescue/Glacier Travel training in 2016. The park had 2 trauma-related basic life support incidents and 29 first aid only incidents in 2015.</p> <p>Job Hazard Analyses are completed before jobs throughout the park. Regular training, drills, and safety messages are given and distributed to staff members from the interdisciplinary safety committee.</p>
Number of Law Enforcement Incidents plus Accidents or Injuries	Number of incidents		<p>Verbal warnings are a common occurrence with regards to traffic, parking, resource protection, pets, food storage violations, drone operations, illegal camping, and wildlife harassment.</p> <p>There are ≈ 600 verbal warnings given on average per year. Staff responds to an average of twelve lost person reports per year. Law enforcement rangers are especially important in managing traffic at Exit Glacier, where there is a high number of seasonal visitors.</p>

Resource Brief: Visitor and Resource Protection



Rangers practicing for technical rescue on ice. NPS Photo.

The Visitor and Resource Protection (VRP) Team is dedicated to the preservation of park resources, protection of visitors and employees, and enhancement of public understanding, appreciation, and enjoyment of the park. The VRP Team supports the mission of Kenai Fjords National Park by providing for law enforcement, emergency medical services, search & rescue, physical security, fire protection, and education. VRP works cooperatively with all teams at KEFJ to support the mission, develops strong working relationships with neighboring law enforcement and emergency services agencies, and provides mutual aid.

VRP supports the park by providing instructors for CPR, Operational Leadership (risk management), and the Motorboat Operator Certification Course (MOCC). VRP also provides instructors for Firearms, Use of Force, and Physical Exercise Battery (PEB) testing throughout Alaska Region. VRP staff participates on the park’s safety committee, the Science in Wilderness Working Group, the Bear Incident Response Team, Web Team Committee, Green Team Committee, Coastal

Operations Working Group, and the Exit Glacier Working Group. VRP is the liaison with the alarm companies that provide physical security monitoring to facilities. VRP provides assistance to the Resource Management team during Coastal Observation and Seabird Survey Team (COASST) surveys and marine debris clean-up work, and assists in collection of daily weather data at Exit Glacier. VRP provides park-wide assistance with the management of the park aviation program, issuance of special use permits, and coordination of park radio inventory. VRP also provides park-wide oversight of the Continuity of Operations Plan, Occupant Emergency Plan, Emergency Operations Plan, Emergency Medical Services Plan, and Search and Rescue Plan.

Safety (continued)

[web](#) ▶

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
<p>Bear-Human Interactions</p>	<p>Number of Incidents</p>		<p>In 2015, only 3 bear-human incidents occurred with no damage to humans, bears, or property. By securing the trashcans to the ground and buying additional bear-proof trashcans, the park was able to prevent the bear-food access incidents that occurred in 2012–2013.</p>

Resource Brief: Interagency Coastal Patrols



Patrolling the park's coastal areas. NPS Photo.

As budgets become increasingly tight among government agencies, the park is continually looking for partnership opportunities to accomplish work objectives. The park coordinates and implements interagency coastal patrols. KEFJ staff conducts multi-day patrols with agents from the NOAA's National Marine Fisheries Service and the United States Coast Guard. The base for the operations is the park's vessel, M/V *Serac*. The *Serac* hauls extra fuel to support the *Chinook Wind*, a patrol vessel operated by NOAA, and provides overnight accommodations. This allows the team to reach places and conduct work across jurisdictions that may not have been possible if working as a single resource. The patrols also provide an invaluable information-sharing opportunity and a chance to learn more about each other's work. The park is hopeful that more agencies can participate in these interagency coastal patrols.

Partnerships



[web](#) ▶

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Volunteers	Number and hours contributed		<p>Student Conservation Association (SCA) and volunteer numbers have remained stable. In 2015, SCAs were no longer counted as volunteers. As a result, the park's reported volunteer hours plummeted from more than 7,000 to less than 3,000 (a 45% decrease) (<i>Volunteer Annual Activity and Expense Report 2010–2015</i>).</p> <p>Recruitment of new volunteers will be addressed for continued success of the program.</p>
Visitor Experience Partnerships	Quality of park partnerships		<p>The park has numerous partners that enhance visitor experience. KEFJ's cooperating association connects people to parks by creating park-specific products to extend the visitor experience.</p> <p>Communication and consultation with native corporations and tribal villages has improved significantly in the park.</p>
	Number of ranger programs offered in conjunction with partners		<p>Partnerships with local boat companies remained stable over the past decade, but will experience a slight decrease in 2016 due to discontinuation of an evening boat tour and Alaska-wide ocean research programs at the Alaska SeaLife Center.</p>

Resource Brief: Ocean Alaska Science and Learning Center

The [Ocean Alaska Science and Learning Center \(OASLC\)](#) is one of 18 Research Learning Centers throughout the National Park Service, tasked with increasing the effectiveness and communication of science in national parks. The OASLC was established at KEFJ in 2001 and evolved to engage all eleven coastal parks in Alaska on the ocean resources that connect them. With no facilities on site to engage partners, the OASLC conducts most of its activities in the parks, in the field, or in conjunction with valued partners, such as the Alaska SeaLife Center. A Director/Research Coordinator, an Education Coordinator, and a Science Communication Specialist staff the OASLC.

OASLC efforts to address marine debris in Kenai Fjords National park illustrate the scope of activities in which the Research Learning Center engages. Marine debris includes derelict fishing gear, building materials, plastics, and any other non-natural debris that is intentionally or unintentionally released into the ocean. In years past the OASLC awarded funding to the Resurrection Bay

Conservation Alliance (RBCA) to help its annual effort to remove marine debris from several beaches in and around the park. In 2009, the OASLC Education Coordinator, made an award-winning short video about RBCA's efforts, which has been shown in many venues and is available on the KEFJ YouTube channel. In 2015, the OASLC designed a facilitated dialogue presentation on marine debris that was delivered daily to visitors at the Alaska SeaLife Center during the summer tourist season. That same summer, the OASLC gave financial and technical support to a large-scale marine debris cleanup effort in KEFJ and four other parks that removed 23,762 pounds of debris from park beaches. OASLC is developing resource briefs to communicate more about marine debris.

The OASLC is proud of its work with many partners and audiences, which includes a popular annual teacher workshop, science education outreach to rural villages, and a college media summer internship focused on communicating science conducted in the parks. OASLC interns have produced award-winning photos and videos, and one photo was recently turned into a mural at the KEFJ headquarters building. The OASLC continues to promote stewardship of the ocean connecting national parks in Alaska through these and many other efforts to facilitate and communicate science.



OASLC Education Coordinator Jim Pfeifferberger films a coho salmon research project in the Resurrection River.
NPS Photo by Erin Kunsich.

2.4. Park Infrastructure

Overall Facility Condition Index



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The National Park Service uses a facility condition index (FCI) to indicate the condition of its facilities and infrastructure. FCI is the cost of repairing an asset, such as a building, road, trail, or water system, divided by the cost of replacing it. The lower the FCI number, the better the condition of the asset. The condition of the buildings and other infrastructure assets at each park is determined by regular facility inspections, or “condition assessments,” including daily informal inspections and formal yearly inspections. Deficiencies identified from these assessments are documented in the NPS Facility Management Software System and the cost for each repair determined. Repairs that cannot be completed within the year count against the condition of a structure. The total cost of these deferred repairs divided by the total cost to replace the structure results in the FCI, with values between 0 and 1 (the lower the decimal number, the better the condition). The FCI is assigned a condition category of Good, Fair, Poor, or Serious based on industry and NPS standards. Deferred maintenance projects that require additional funding are identified based on FCI. Planned preventive maintenance on critical components occurs during the year, using a park’s base budget. For additional information about how park managers use information about the condition of facilities and infrastructure to make decisions about the efficient use of funding for maintenance and restoration activities at the park, [Click Here](#).

Asset Category	Number of Assets 2010 / 2015	FCI 2010 / 2015	Condition Status/Trend	Rationale
Buildings	43 / 53	0.108 / 0.093		Buildings in KEFJ are generally in good condition. Overall FCI fluctuates to some degree depending on the timing of the data snapshot. The number of buildings has only increased by four since 2010 (Pavilion, HQ, Maintenance Lunchroom, and Pole Barn). The remaining increase in number of assets between 2010 and 2015 reflects buildings that are in disrepair and planned for demolition (abandoned mine buildings in Nuka Bay) and were not previously listed in the park’s portfolio.
Campgrounds	1 / 2	0.179 / 0.000		The park has one visitor use campground and one campground used by Student Conservation Association and trail maintenance crews. Both are in good condition.
Trails	4 / 7	0.038 / 0.045		Park trails are generally in good condition. The park has not added any trails in recent years, and has broken them up in the maintenance database to more accurately record total cost of ownership. The change in FCI reflects work identified that will be mitigated in the next 5 years.
Waste Water Systems	2 / 2	0.000 / 0.000		No deficiencies in the waste water systems have been identified, and they are functional. Exit Glacier Septic System has not had a recent thorough professional inspection.
Water Systems	4 / 2	0.000 / 0.000		Water systems are in good condition. Change in number of assets between 2010 and 2015 reflects change in categorization in the database of hand pump systems as “equipment” instead of as “water systems.”

Resource Brief: Environmentally Friendly Headquarters

In July 2013, the park completed a major rehab of one of its downtown properties, making it into an administrative headquarters building. The new facility at 411 Washington Street in downtown Seward has three floors with a total square footage of 8,132 square feet. A number of sustainable principles were put into the design for improved efficiency. These include:

- high insulative (R-values) properties in the walls (R-30) including exterior siding, and the roof (R-50);
- high efficiency windows with insulative blinds;
- more than 50% construction waste was diverted from the landfill;
- each room has motion sensing switches; and
- LED and fluorescent lighting.

Materials used in the project met Leadership in Energy & Environmental Design (LEED) standards, such as low volatile organic compound (VOC) paints and adhesives, 67% recycled content carpet, peanut oil elevator, etc. Additionally, the building meets all Architectural Barriers Act requirements for accessibility. This building has allowed the park to move out of costly and inefficient leased space, and also allows the park to lower its downtown footprint by excessing three other buildings/properties (Harbor Dinner Club, Mai House, and Legends).

Overall Facility Condition Index (continued)

[web](#) ▶

Asset Category	Number of Assets 2010 / 2015	FCI 2010 / 2015	Condition Status/Trend	Rationale
Unpaved Roads	2 / 1	0.000 / 0.000		Unpaved roads are in good condition. The change in the number of assets between 2010 and 2015 is due to a road being moved from “unpaved” to “paved.”
Paved Roads	9 / 10	0.005 / 0.062		Paved roads in the park are generally in good condition. A project completed in 2016 made the road into Exit Glacier less susceptible to flood damage, and resurfaced all pavement (see the “Exit Creek and the Park Road” resource brief).
All Others	26 / 26	0.016 / 0.118		This category includes park facilities such as interpretive media, fuel systems, electrical systems, picnic areas, abandoned mine adits, and landscaped areas. The largest item included in this category FCI is the newly funded Visitor Center exhibits, which are currently being designed and will be installed in 2018.

Resource Brief: Exit Creek and the Park Road

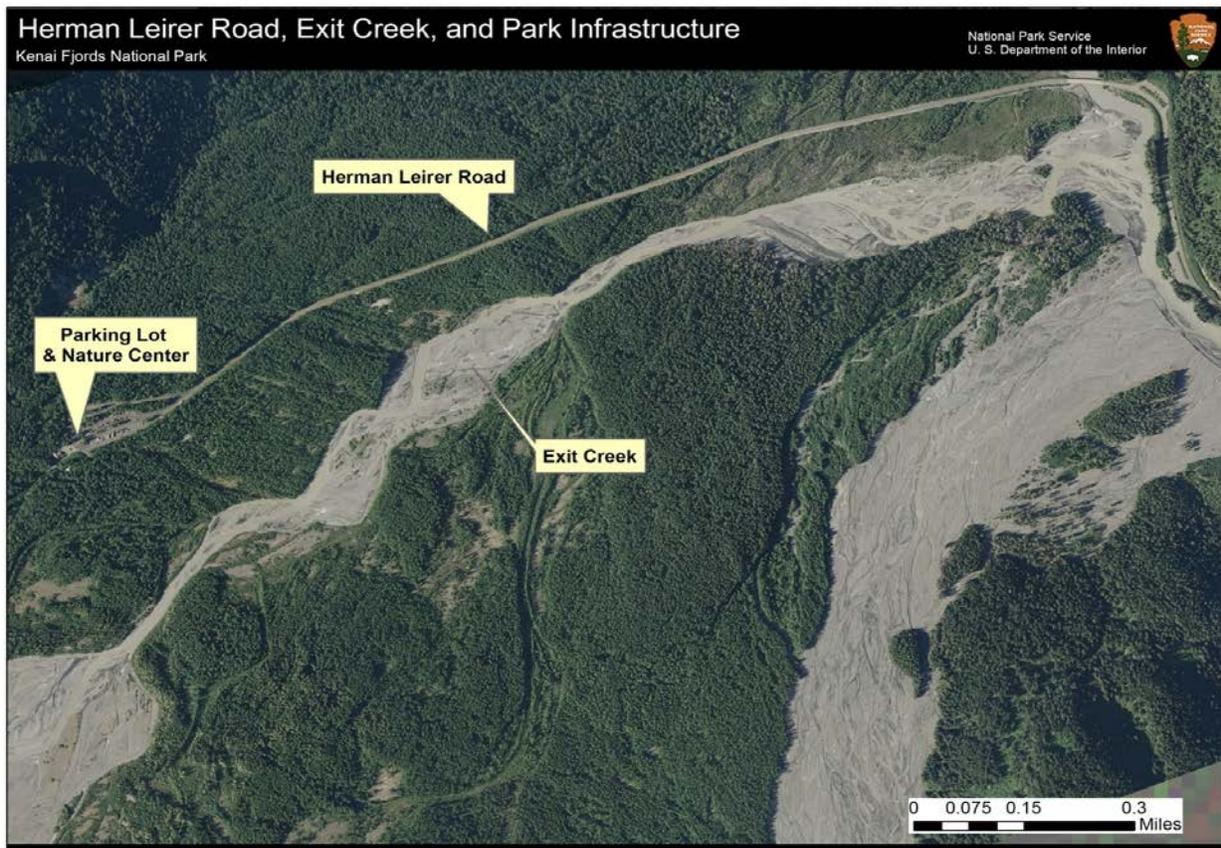
The Herman Leirer Road is the only road into the Exit Glacier area of the park, which is the most visited part of the park with a 5-year average of 48,840 vehicles using the road during the months of May through September. In the park, the road connects the Resurrection River Bridge and the Exit Glacier visitor area. The park's Exit Glacier visitor infrastructure includes an interpretive center, trails, a parking lot, restrooms, and a campground. Exit Creek flows from Exit Glacier and parallels the Herman Leirer Road in the park. Unusually high volume of water in Exit Creek can lead to flooding across the road; this is concerning for the park because the Herman Leirer Road is the only road to access the park's Exit Glacier area.

Frequency of flood events for Exit Creek and rainfall duration in late summer has increased significantly as follows:

- River flood events are occurring in the Resurrection River watershed with increasing frequency. Five of Resurrection River Bridge #1390 gauge's ten highest crests since 1995 (when the gauge was installed) have occurred since 2008.
- Seward has experienced more than 20 days of rain per month in at least one of the months of August, September, or October in 2011, 2012, 2013, and 2014, which is more rainy days than any late summer of the last 20 years.
- Total monthly rainfall exceeds 10 inches more frequently, which is significantly above the monthly average for any late summer month from 1995 to 2014 (Janet Curran, USGS, pers. comm.).

Maximum recorded water levels in Exit Creek in 2008 and 2009 ranged from 3.05 ft to 3.62 ft, with the maxima occurring in September and July, respectively (Shearer and Moore 2009, 2010). In each year, peak water levels followed precipitation events. Additionally, like other glacier streams, Exit Creek deposits sediment and the creek channel moves along the braided floodplain. From 2008–2012, up to 2 meters deep of sediment was deposited in areas along the Exit Creek channel (Janet Curran, USGS, pers. comm.).

During the summer of 2016, Federal Highways Administration and KEFJ raised the road to maintain summer vehicular access to the Exit Glacier visitor use area even during high creek flooding events. The project raised the road five feet and installed five box culverts to move water across the floodplain and improve the hydrologic function of the floodplain area.



Exit Creek and Herman Leirer Road within park boundaries leading to Exit Glacier area infrastructure.

Resource Brief: Green Parks Plan

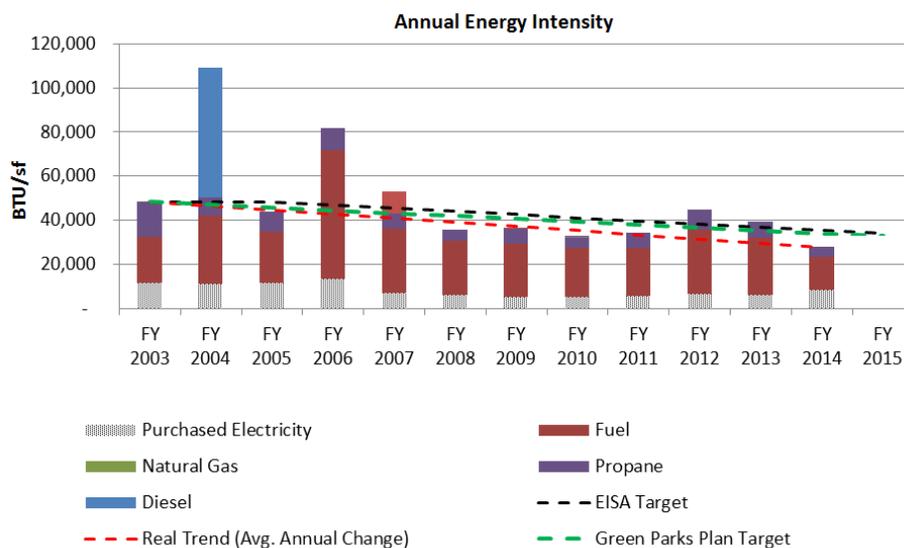
The NPS manages the largest number of constructed assets of any civilian agency in the Federal Government. It operates more than 67,000 structures that account for more than 50 million square feet of constructed space such as visitor centers and historic structures. The [Green Parks Plan](#) (GPP) defines a collective vision and a long-term strategic plan for sustainable management of NPS operations. A critical component of the implementation of the GPP will be informing and engaging parks’ staff, visitors, and community partners about climate change and sustainability to broaden opportunities to foster change.

The vision defined in the GPP is, “The NPS will preserve park resources unimpaired for the enjoyment of current and future generations by reducing its environmental impact through sustainable operations, design, decisions, and management at every level of the organization.” The plan is based on nine strategic goals that focus on the impact of facilities on the environment and human welfare. Two of those goals are closely aligned with park infrastructure as defined in this State of the Park report. Those are:

- Be Energy Smart: The NPS will improve facility energy performance and increase reliance on renewable energy; and
- Be Water Wise: The NPS will improve facility water use efficiency.

For energy, one of the performance objectives is to reduce service-wide building energy intensity by 35 percent by 2016 from the 2003 baseline, where energy intensity is energy consumption per square foot of building space. For water, one of the performance objectives is to reduce potable water use intensity by 30 percent by 2020 from the 2007 baseline.

Historical data for energy consumption reported by KEFJ and available in the Energy Data Reporting Tool (EDRT) is shown below. Data for water use at KEFJ is not available.



Kenai Fjords National Park is committed to excellence in environmental stewardship, which is key to the NPS mission. The park strives to make everything more sustainable and actively looks for ways to save energy. KEFJ incorporates best environmental management practices, pollution prevention, waste reduction, and environmentally preferable purchasing in all park operations and strives for continual improvement in each of these areas.

Highlights for KEFJ environmental stewardship include:

- Installed renewable energy and improved efficiency of power generation at Exit Glacier—the park has utilized evolving fuel cell technology, propane generators, and most recently solar voltaics as part of a highbred “remote” power generation solution, significantly lowering fossil fuel consumption and lowering emissions.
- Installed solar voltaic systems at the Aialik Bay Ranger Station and Exit Glacier Nature Center.
- Installed motion-sensing lights in park administrative facilities to reduce energy use.
- Installed LED and high-efficiency fluorescent lights in all facilities.
- Performed analysis, found most efficient running speed for the 53' park research vessel, the M/V *Serac*, and created standard operating procedures for operating the vessel at the most efficient speeds to reduce annual fuel consumption.

2.5. Wilderness Character and Stewardship

The Wilderness Act of 1964 requires the NPS to maintain wilderness character, including the qualities of being “...untrammelled by man...undeveloped...natural,” and allowing for “...solitude or primitive and unconfined recreation.” A summary of wilderness character for the park is presented below.

While the park has no designated wilderness areas, Kenai Fjords National Park has approximately 569,600 acres of eligible wilderness. Non-NPS parcels within the legislated park boundary and the Exit Glacier Developed Area (as defined in 36 CFR 13.1318), combined with the Pedestrian and Summer Hiker Management Zones presented in the [Exit Glacier Area Plan \(2004\)](#) that extends the non-wilderness area up Harding Icefield Trail, are ineligible wilderness areas. The majority of the park, however, is eligible wilderness and is managed similarly to designated wilderness as per [NPS Policy 6.3 Wilderness Resource Management](#).

Overall Wilderness Character  web ▶			
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Wilderness Character Qualities	Natural		The ecological integrity of KEFJ’s wilderness is in good condition, showcasing a duality of mountain/icefield and coastal landscapes. This wilderness encompasses a rich and diverse habitat home to many native terrestrial and marine species. High elevation ridges and nunataks serve as areas of glacial refugia and host unique alpine plants including the rare <i>Douglasia alaskana</i> (Alaska rock jasmine), <i>Thlaspia arcticum</i> , and <i>Carex phaeocephala</i> . In contrast, the coastal lands of this wilderness include the northernmost edge of the temperate rainforest, dominated by Sitka spruce and western hemlock, Sitka alders and understory vegetation such as devil’s club and several species of blueberries. This landscape also includes more than 800 unique coastal features including caves, arches, and sea stacks. Invasive plants and wildlife species continue to be managed through exotic species monitoring and treatment where feasible. Furthermore, there are no major sources of air or water pollution to harm the naturalness of this wilderness.

Overall Wilderness Character (continued)

[web](#) ▶

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
<p>Wilderness Character Qualities (continued)</p>	<p>Undeveloped</p>		<p>With more than 569,600 acres of wilderness often in terrain that is difficult to access, the KEFJ wilderness is generally undeveloped. Numerous rivers and streams extend from the Harding Icefield without impediment. Evidence of past inhabitants of the area is visible in the abandoned mines and associated infrastructure that dot the landscape, mostly located in the Nuka Bay area. On the coast, the park also has a number of Alaska Native Claims Settlement Act (ANCSA) 17(b) easement trails across Port Graham Corporation lands that access wilderness.</p> <p>The few human “improvements” are primarily cabins, bear-resistant food lockers, and scientific installations. The Aialik Bay Ranger Station, located in wilderness on the east side of Aialik Bay, is used each summer by park staff. Holgate Public Use Cabin (PUC) is one of two coastal PUCs and is located in wilderness. There are approximately 15 bear-resistant food lockers that have been installed in known coastal camping areas. The wilderness hosts three weather stations and six glacier monitoring sites where one-inch metal stakes are inserted into the ice; temporary seismic equipment installations and one radio repeater, used for administrative purposes, are also located in the wilderness.</p> <p>For park staff, helicopters are the primary means of access to the scientific installations, and are also occasionally used for surveys to monitor wildlife, glaciers, and vegetation.</p>
	<p>Untrammeled</p>		<p>Kenai Fjords is an excellent example of untrammeled land featuring glacial processes. The interplay of water, rock, and glacial ice in the KEFJ wilderness results in a highly dynamic environment. Hazards like flooding, channel migration, landslides, avalanches, glacier retreat and calving, and glacial lake outburst floods, are intentionally not manipulated—spreading across the wilderness landscape and demonstrating the full expression of the untrammeled quality of wilderness character.</p>

Overall Wilderness Character (continued)

[web](#) ▶

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
<p>Wilderness Character Qualities (continued)</p>	<p>Solitude or Primitive and Unconfined Recreation Opportunity</p>		<p>The rugged wilderness at KEFJ is a vast tract of trail-less terrain that beckons those seeking quiet, solitude, and challenge. The primary access to the Harding Icefield is through the Harding Icefield Trail that begins off the trail to the edge of Exit Glacier; the Harding Icefield Trail is located outside of wilderness, but provides the hiker access to the vast wilderness expanse of the icefield. Despite being as close as four miles from the Nature Center, those who venture onto the Harding Icefield, even via the popular Harding Icefield Trail, are unlikely to encounter other visitors once on the icefield. Visitors to the Harding Icefield can roam freely, experiencing unconfined recreation at its simplest.</p> <p>The coast offers its own versions of true wilderness experiences. The majority of sight-seeing boats that skirt the park’s coastline near Aialik Bay and Bear Glacier Lagoon provide only a glimpse of the wilderness experience that the park provides. Recreational structures diminish the solitude and primitive quality of Aialik Bay, including the Holgate Public Use Cabin and Aialik Bay Ranger Station. The 15 bear-resistant food lockers may have attracted visitors seeking a “safer” experience, somewhat diminishing opportunities for solitude and primitiveness at these beaches (bear boxes were added after bear-human incidents occurred where bears had obtained food and were damaging camping equipment). In addition to an increased likelihood of encountering fellow visitors, a trip to the wilderness coast of KEFJ will likely include the sounds—if not sights—of boats that weave through the park’s fjords and greater Resurrection Bay, hoping to catch views of marine and terrestrial wildlife and calving tidewater glaciers. Other boat traffic that can be heard frequently in the park, especially from Resurrection Bay to Harris Bay, includes charter fishing boats, water taxis, and personal recreational boats. Fewer boats typically venture south of Harris Bay. More recently, there have been an increasing number of helicopters regularly transporting visitors to state land abutting the park near the terminus of Bear Glacier.</p>

Overall Wilderness Character (continued)

[web](#) ▶

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
<p>Wilderness Character Qualities (continued)</p>	<p>Other Features and Values</p>		<p>Wilderness in KEFJ is a unique place for public learning and scientific research of glaciology and the effects of climate change. The Harding Icefield, encompassing more than 700 square miles, is almost entirely within the park and Kenai National Wildlife Refuge boundaries, most of which is considered wilderness. This is the largest icefield located completely within the borders of the United States, providing a one-of-a-kind opportunity for scientific inquiry related to glacier research and monitoring.</p> <p>The story of the KEFJ wilderness is interwoven with the lives of historic, prehistoric, and contemporary peoples who once resided in or currently reside near this place. Several historic and prehistoric cultural resources in the wilderness are eligible for the National Register of Historic Places, including the Nuka Bay Historic District—a unique landscape illustrating early 20th-century hard rock mineral mining on the Kenai Peninsula. Today, the park’s affiliated tribes and ANCSA corporations maintain a connection to the coastal landscape, which retains evidence of Sugpiaq settlement patterns and marine resource use.</p>

Wilderness Stewardship  web 			
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Stewardship to Preserve Wilderness Character	Key Information		Key information continues to be added to the wilderness documentation at the park. In 2016, a Wilderness Character Narrative was finished for Kenai Fjords National Park. In 2013, a wilderness area map was completed, clearly showing where the wilderness and non-wilderness areas were for the park; the Harding Icefield Trail and surrounds related to non-wilderness had been in discussion since the early 2000s and was resolved through this map.
	Management Operations		KEFJ continues to increase awareness of wilderness law, regulation, and policy both with staff and with the general public. The park's interdisciplinary wilderness team currently uses the Science in Wilderness Framework and a Minimum Requirements Analysis for administrative actions in wilderness. Commercial filming and other special uses are permitted only after considering impacts to wilderness character. The park regularly participates in the regional Backcountry Wilderness Advisory Group.
	Status of Plans		There are no current wilderness stewardship plans for the park.
	Completed Training		There has been significant turnover in park staff in 2014–2016. The park has no record of wilderness training, but is tentatively planning to hold a wilderness training workshop in 2018.

2.6 Subsistence

While Kenai Fjords National Park is an Alaska National Interest Lands Conservation (ANILCA) park, there was no allowance of subsistence activities in the park's enabling legislation. Subsistence uses are prohibited and the subsistence provisions in Title 36 of the Code of Federal Regulations, part 13, subpart F do not apply. Furthermore, no lands within Kenai Fjords National Park were designated as "Preserve" lands, and no hunting is allowed on park lands. Non-commercial fishing is permitted in Kenai Fjords in accordance with applicable state and federal laws and regulations.

There is one exception for subsistence in Kenai Fjords National Park specific to a reserved property right. Subsistence uses are a reserved property right on a tract in the Nuka Bay area (KEFJ 04-168 [7963.31 acres]). This property right was reserved in a 1997 deed from the English Bay Corporation to the United States. In accordance with the terms of the deed, the taking of fish and wildlife on this tract is governed by the laws of the United States and the State of Alaska in the same manner as though the granted lands were privately owned and not part of Kenai Fjords National Park, and is not governed by Title VIII of ANILCA.

Chapter 3. Summary of Key Stewardship Activities and Accomplishments

Activities and Accomplishments

The list below provides examples of stewardship activities and accomplishments by park staff and partners to maintain or improve the condition of priority park resources and values for this and future generations:

Natural Resources

Hydrology Monitoring

- A two-year partner project with a U.S. Geological Survey hydrologist was initiated to understand hydro-geomorphic changes to Exit Creek influencing mid-summer flooding for the park road. This directly influenced road construction plans that occurred in 2016.

Glacier Monitoring

- 2016 marked the 7th consecutive water year that glacier mass balance monitoring occurred. This information was used during the Obama Presidential visit related to climate change.
- New georeferenced aerial photography was acquired for Exit Glacier in 2015.
- Exit Glacier terminus monitoring continues to document glacier melt at lower elevations. The glacier retreated 252 ft (76.8 m) from September 2015 to September 2016. This is a retreat of .27 mi (.44 km) since annual measurements began in 2005.

Vital Signs Monitoring through the NPS Southwest Alaska Inventory and Monitoring Network (SWAN)

- Long-term monitoring of vital signs to determine the health of the park's ecosystems is in full implementation.
 - Vital signs monitored are nearshore assemblage (kelps and eelgrass, intertidal invertebrates, marine water quality, marine birds, black oystercatchers, and sea otters), bald eagles, spruce-hemlock forest, remote automated weather stations, and lake water quality was successfully implemented for the park.

Marine Debris Removals

- Since 2009, more than 17 tons of marine debris was removed across 19 beaches in partnership with Resurrection Bay Conservation Alliance.
- In 2015, Kenai Fjords led the effort for a five-park marine debris removal project that included helicopter removal of marine debris caches along the remote outer coast that totaled 2.66 tons.

Exotic Plant Management Team Program (EPMT)

- The EPMT Program continues to actively control plant infestations through manual methods (since 2003) and through herbicide application (since 2011).
- The EPMT program has provided quality resource internships for high school Youth Conservation Corps and Student Conservation Association youths every year.

Inventories

- A coastal cave inventory project in 2015 documented 829 caves and other unique coastal features.
- Lichen inventory throughout southwest Alaska was conducted in 2015 by cooperators from Oregon State University, University of Bergen (Norway), University of Hamburg (Germany), and the Bureau of Land Management. So far, inventory results documented two new species to North America.
- A soils inventory was conducted at the park, which included both park and Port Graham Corporation lands.

Fish and Wildlife Studies

- A coho salmon study looking at distribution along the Resurrection River was implemented in partnership with U.S. Forest Service and State of Alaska; this was the first time that the Resurrection coho have been formally studied.
- Two University of Alaska Fairbanks graduate student partnerships were conducted—one focusing on determining the best method for monitoring seabirds and another determining black oystercatcher chick provisioning efforts. A different University of Alaska Anchorage research study examined adult black oystercatcher diet in KEFJ. This work as well as the chick provisioning study has management implications in terms of black oystercatcher sensitivity to a changing prey base in KEFJ, and also documented issues with dogs preying on black oystercatcher chicks.
- A two-year sea otter foraging project occurred in partnership with U.S. Geological Survey to determine the diet of sea otters, how reliant sea otters are on available resources, and what that might mean for the sea otter population in KEFJ.
- Black bear research projects in the mid-2000s included work on genetics, habitat use, and visitor disturbance.

Other Monitoring

- Visitor impact monitoring continued for backcountry “campsite” monitoring, Harding Icefield Trail hiker encounters, and Harding Trail register.
- Gulf Watch Alaska expanded NPS long-term nearshore monitoring to include Prince William Sound and Kachemak Bay and has brought additional support and added value to park research from a range of cooperators including U.S. Geological Survey and NOAA.
- Coastal forest monitoring plots were established in old-growth forest in 2013.

Cultural Resources

Archeology and National Register of Historic Places

- From 2001–2006 and 2014–2015, KEFJ partnered with the Smithsonian Institute’s Arctic Studies Center to complete the Kenai Fjords Oral History and Archeology project (Crowell 2006). This project used an interdisciplinary approach, which combined archeology, ethno-history, geomorphology, and glaciology to document Alutiiq tradition sites in Aialik Bay (Crowell et al. 2008).
- The park is in the process of acquiring spatial information for cultural sites; this spatial information is critical to determine whether any potential impacts would occur to the sites during activity reviews.
- A historic town parcel known as “Shea Lot” was deemed necessary for the park’s parking lot and archeological data recovery and publication of a historic book for the public was completed as part of the historic mitigation process.
- Determination of Eligibility (DOE) forms were completed for Aialik Bay’s archeological sites. DOE forms for sites owned by NPS were approved by the State Historic Preservation Officer and will be sent to National Register of Historic Places in 2016.

Tribal Consultation

- Tribal and ANCSA corporation consultation activities were greatly increased starting in 2014.
- In March 2016, KEFJ hosted the first “Cultural Conversations” workshop that brought together seven affiliated tribal groups (Village of Nanwalek, Port Graham Village, Village of Seldovia, Qutekcak, Port Graham Corporation, English Bay Corporation, and Chugach Alaska Corporation) to discuss partnership opportunities.

History

- The Exit Glacier Traditional Use Activities Project was a 2009–2013 partner project with University of Alaska Fairbanks and Portland State University that interviewed long-time Seward residents about their use in the Exit Glacier area prior to park establishment.

Museum Collections

- Park museum collections were moved to the NPS Alaska Regional Curatorial Center in Anchorage.
- The park successfully completed archival of 150 linear feet of documents, photographs, and oral history recordings documenting 35 years of the park’s operations and research.
- Starting in 2016, KEFJ is in the process of inventorying and returning archeological collections belonging to its affiliated ANCSA corporations.
- Museum conservation surveys at University of Alaska Fairbanks were started.
- The park partnered with University of Alaska Fairbanks to curate KEFJ’s natural history collections.

Visitor Experience

Outreach

- A resource management blog occurred from 2012–2015.
- An annual resource management newsletter has been available to visiting public and web visitors for the past 5 years.
- A video on the glacier mass balance project was produced in 2015.
- In 2015, the park designed and printed an **Explorer Journal** to engage visitors ages 13+ in reflecting about their personal experience in the park.
- To celebrate the NPS Centennial, the park collaborated with the Seward Mural Society, Harmon Construction, and artist Byron Birdsall to create a mural that captures the significance of the park.
- Press releases are regularly distributed to provide updated and breaking news to a wide variety of audiences. This serves to increase the park's visibility within the local community and engages an international community.
- KEFJ revised and updated the park map to improve content, imagery, and map detail.

Visitor Center

- In 2016, KEFJ began designing and building new interpretive media for the park's visitor center; these exhibits will be the first professional visitor center exhibits communicating the purpose and significance of the park since its establishment in 1980.

Park Film

- The first-ever park film project was completed in 2015 and debuted on the 99th birthday of the National Park Service. The film is fully accessible and is a stunning visual representation of the park's resources.

Climate Change Communication

- KEFJ has led the National Park Service in climate change interpretation for the past decade.
 - Climate change messages are incorporated into all park programs and newly developed exhibits, including the 2012 installation of exhibits in the Exit Glacier Nature Center.
 - In 2015, the park completed work as a pilot in developing service-wide climate change exhibits in partnership with the Climate Change Response Program.
 - The park's climate change communication efforts were highlighted during President Obama's historic visit to Seward in September 2015. The president chose the park to see the effects of climate change and reach new audiences with his message.

Facilitated Dialogue

- KEFJ has led the National Park Service in Facilitated Dialogue programs.
 - KEFJ has provided distance learning and in-person programs, including a summer Facilitated Dialogue program on ocean stewardship.
 - The KEFJ Interpretation Team received the regional Achieving Relevance Interpretive Team award for work on integrating facilitated dialogue and dialogic techniques into park programs.

Education

- KEFJ has expanded opportunities through technology and met key education initiatives. Highlights include:
 - In March 2015, KEFJ launched the first distance learning program. The program received a highly coveted Pinnacle Award from the Center for Interactive Learning and Collaboration.
 - Every year, the park reaches more than 4,500 K–12 students annually through relevant classroom and field trip programs.
 - President Obama assisted in launching the national Every Kid in a Park program at the Exit Glacier Nature Center during his historic visit on September 1, 2015. As a part of the Every Kid in a Park initiative, the park brought 300 underserved 4th grade students from Anchorage School District for a park experience.

Partnerships and Career Opportunities

- Partnerships enable the park to provide meaningful experiences for more than 70,000 visitors who would otherwise not have contact with KEFJ staff. The park continues to look for opportunities to expand these partnerships.

- A career ladder that ranges from Youth Conservation Corps high school students to permanent employees was established at the park in 2013. As a result of developing a career ladder, the park has been able to grow more than ten diverse, local youth into paid positions with the NPS.
- Park staff has been supporting internship opportunities for diverse youth through hosting the NPS Academy since 2013. The NPS Academy brings high potential diverse Alaskan youth to learn about National Park Service careers and mission for a one-week training. These students are then placed in positions throughout the Alaska Region during the following summer.

Interpretation

- KEFJ interpretation staff works with the national training and development team on the revision of National Park Service Interpretation curriculum that incorporates an audience-centered approach.

Park Infrastructure

Exit Glacier Infrastructure

- In 2016, KEFJ raised a ¾ mile segment on Exit Glacier road by 5 feet and added five large box culverts in an area that had routinely experienced flooding. The flooding commonly damaged the road and prevented vehicles from accessing the Exit Glacier area during the busy visitor season. The completion of this project should alleviate future road closures along this portion of road.
- In 2013, KEFJ improved sections of the Harding Icefield Trail. The park replaced a large bridge on the Harding Icefield Trail that had become a safety hazard. The bridge is critical to accessing most of the trail and the icefield. The park also re-routed and rehabilitated a highly impacted portion of the trail.
- In 2011, KEFJ rehabilitated Exit Glacier Campground to meet accessibility standards. The park made two of its 12 campsites accessible, hardened the trails to accessibility standards, and created dedicated accessible parking.
- KEFJ has installed, updated, and repaired signage throughout the park.
- The park recently replaced the entrance sign at Exit Glacier entrance sign.
- KEFJ constructed new education Pavilion at Exit Glacier, an American Recovery and Reinvestment Act project.
- The park repainted all facilities at Exit Glacier, an American Recovery and Reinvestment Act project.
- KEFJ replaced windows at Exit Glacier housing for higher efficiency, an American Recovery and Reinvestment Act project.
- The park constructed a small maintenance facility at the Exit Glacier Area to reduce the amount of trips to the larger KEFJ maintenance facility 7 miles away. This has reduced fuel consumption by approximately 100 gallons per year.

Seward Infrastructure

- In 2017 and 2018, KEFJ will do a complete interior remodel of the park's visitor center, originally built in 1986. It will convert the first floor to exhibit space and retrofit the second floor to accommodate office space needs. The rehabilitation will address Accessibility and National Fire Protection Agency code deficiencies.
- In 2012, KEFJ rehabilitated "Old Solly's" into the park headquarters building. This project replaced two leased administrative facilities with 6,670 square feet of repurposed space owned by the NPS in Seward, AK.
- KEFJ rehabilitated the storage facility in downtown Seward (Shea building, 208 3rd Ave.).
- The park completed new landscaping and beautification of Visitor Center plaza.

Maintenance Facilities

- The park installed a new roof and siding on the maintenance facility.
- KEFJ constructed pole barn for boat, equipment, and fleet storage.

Coastal Infrastructure

- KEFJ installed a new photovoltaic system at Aialik Bay Ranger Station.
- KEFJ installed new roofs and completed a remodel of two coastal Public Use Cabins (Aialik and Holgate).
- The park replaced high mileage, low efficiency fleet vehicles with new high efficiency vehicles to reduce carbon footprint.
- The KEFJ Bike Fleet was expanded to increase the availability of bikes for park employees.
- The park uses an electric vehicle for in-town commuting, effectively eliminating one gas consuming vehicle from the park fleet.

- KEFJ encourages many carpooling initiatives—sharing cars and boats, as well as coordinating travel to other locations throughout the state.
- The park implemented the KEFJ Green Team to prioritize and execute environmentally friendly practices throughout the park. Successes include:
 - Defaulted park printers to two sided print and black & white printer to reduce use of paper and toner.
 - Created Integrated Solid Waste Alternative Plan to promote recycling and a reduction of solid waste going to the landfill.
 - Implemented “paperless” meetings.
 - Installed bottle filling stations at key visitor facilities (Exit Glacier Nature Center and Visitor Center).
 - Removed all 2-stroke outboards boat motors from inventory and replaced with higher efficiency, lower emission 4-stroke outboards.
 - Replaced old 2-stroke snowmachines with new 4-stroke versions.

Wilderness Character and Stewardship

- In 2016, KEFJ completed a Wilderness Character Narrative.

Chapter 4. Key Issues and Challenges for Consideration in Management Planning

Visitor Experience

- Kenai Fjords National Park has the third-highest national park site visitation in Alaska. The Seward Chamber of Commerce estimated a 22% increase in visitation to the Seward area in 2015.
- The park is currently planning a rehabilitation of the Kenai Fjords National Park Visitor Center, including exhibits, for better relevancy and accessibility for more than one million annual Seward harbor visitors.
- The park will consider collaborating with the State of Alaska and City of Seward to install strategically located signs along the Seward Highway and in the harbor to improve directional signage to the park's visitor center at the harbor.
- Visitation increases in the Exit Glacier area have led to parking lot issues, crowding on the trails, greater participation in ranger programs, and unmet needs in the off-season. The rapid retreat of Exit Glacier has changed the quality of the visitor experience, and the park is actively managing visitor expectations.
- The park will begin a new management plan in 2018 for the Exit Glacier area.
- With the 2016 interagency bear management project, the park will work closer with U.S. Forest Service and Alaska State Troopers for bear-human interactions and other related issues.

Facilities

- The park has mitigated the only park-owned and maintained road to Exit Glacier that receives recent annual flooding and prevents vehicles accessing Exit Glacier area during the busy season.
- There is limited housing available to purchase or rent in Seward. NPS housing is occupied by seasonal staff. Additional housing with other agencies (U.S. Forest Service/Alaska's Institute of Technology/etc.) cannot be depended on from year to year. Housing has the potential to affect the operation of the park through recruitment and retention of permanent, seasonal, volunteer, and intern positions. The park's Housing Needs Assessment document states that the park is one bed short of its need, but this assessment did not account for any of the park's internships or volunteer positions. An upcoming project to rehabilitate the Cottonwood Cabin at Exit Glacier will provide an additional bedroom.
- Aialik Bay Ranger Station (ABRS) is located in a flood zone and may be imminently threatened.

Land Ownership

- Because Kenai Fjords is an ANILCA-created park, there are a number of parcels within park boundaries that are not owned by the park. Surface and subsurface ownership also varies on many parcels throughout the park. It will be critical to maintain and improve partnerships across these complicated land ownerships to protect cultural and natural resources within the park boundary.

Emerging Issues

Climate Change

- It is important that the park continues to monitor critical resources:
 - Continuing long-term monitoring for glacier trends across the Harding Icefield and ecological responses to those changes is important locally, regionally, and globally because changes in glacier extent can be seen dramatically in Kenai Fjords. Glacier-dependent wildlife such as Kittlitz's murrelet and harbor seals may be greatly affected.
 - Continuing long-term vital signs monitoring of park resources, such as bald eagles, marine birds, forest communities, and weather, will also be increasingly important to determine park resource condition and trends in this changing climate.
 - Continuing to survey, record, and monitor coastal archeological sites is important, as sites may be at risk to increasing erosive forces from climate change effects and earthquake-related subsidence.
- Rising levels of ocean acidification are of great concern to the park due to the potential effects across trophic levels, ranging from plankton to terrestrial vertebrates. Effects on salmon, for example, would affect park wildlife and also affect recreational opportunities for park visitors. There is also some evidence that tidewater glaciers may cause the marine environment to be less resilient to ocean acidification (Reisdorph and Mathis 2014).

- Continuing to inventory, contain, and/or eradicate invasive species that have the potential to change local ecological communities, such as the aquatic weed, *Elodea*, and green crabs in addition to other invasive terrestrial plant species. Increasing temperatures due to climate change raises the potential for expansion and establishment of non-native invasive species.
- Planning for climate change impacts to park infrastructure will be necessary for park management, including consideration of facility placement, trail maintenance, and trail extension or alternative trail experiences.
- Continuing to look for innovative ways to monitor and provide warnings in key high use areas—such as Bear Glacier Lagoon and Exit Creek—for increasing potential catastrophic geohazards is important. Continued warming can trigger these geohazards, such as flooding and avalanches, and have the potential to affect areas of employee and visitor use.
- Warmer temperatures may also lead to increased visitor use in shoulder seasons.

Human Impacts

- Removing human impacts from the coast, such as marine debris, and monitoring existing coastal conditions, will continue to be important to provide clear baselines of natural condition in case of oil spills, fuel leaks, changes in vessel traffic, and potential increases in visitation and tourism.
- It will also be important to remove debris and dilapidated non-historic structures at the Nuka Bay Historic Mining District, and collaborate with partners and multiple landowners on a cultural landscape report of this district.
- Understanding potential ramifications of proposed and existing developments outside of the park that may affect park resources (e.g., air quality from development in other countries, LNG pipeline) is essential.
- Illegal dogs have been documented in coastal areas disturbing black oystercatcher nests, and presumably other ground-nesting birds.
- Human waste near Exit Glacier and at coastal campsites should be discouraged through use of “wag bags.”

References

See the [State of the Park Report for the Park website](#) for a more complete list of references to documents and data sets upon which the assessments in this State of the Park report are based. References for several of the key documents cited in this report are as follows:

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See Also:

[Collection of Natural Resource-Related References](#)

[Collection of Cultural Resource-Related References](#)

[Collection of Visitor Experience-Related References](#)

[Collection of Wilderness Character-Related References](#)

Glossary

See the [State of the Parks home page](#) for a link to a complete glossary of terms used in State of the Park reports. Definitions of key terms used in this report are as follows:

Americans with Disabilities Act (ADA) and American Barriers Act (ABA)	Laws enacted by the federal government that include provisions to remove barriers that limit a disabled person's ability to engage in normal daily activity in the physical, public environment.
Archeological Sites Management Information System (ASMIS)	The National Park Service's standardized database for the basic registration and management of park prehistoric and historical archeological resources. ASMIS site records contain data on condition, threats and disturbances, site location, date of site discovery and documentation, description, proposed treatments, and management actions for known park archeological sites. It serves as a tool to support improved archeological resources preservation, protection, planning, and decision-making by parks, centers, regional offices, and the national program offices.
Baseline Documentation	Baseline documentation records the physical condition of a structure, object, or landscape at a specific point in time. A baseline provides a starting point against which future changes can be measured.
Carbon Footprint	Carbon footprint is generally defined as the total set of greenhouse gas emissions caused by an organization, event, product, or person.
Climate Friendly Park	The NPS Climate Friendly Park designation requires meeting three milestones: completing an application; completing a comprehensive greenhouse gas (GHG) inventory; and completing a Climate Action Plan, which is the actions, policies, programs, and measures a park will put into place to reduce its GHG emissions.
Cultural Landscapes Inventory (CLI)	A Cultural Landscapes Inventory describes historically significant landscapes within a park. The inventory identifies and documents each landscape's location, size, physical development, condition, characteristics, and features, as well as other information useful to park management.
Cultural Landscape Report (CLR)	A Cultural Landscape Report is the principal treatment document for cultural landscapes and the primary tool for long-term management of those landscapes. It guides management and treatment decisions about a landscape's physical attributes, biotic systems, and use when that use contributes to historical significance.
Curation	National parks are the stewards of numerous types of objects, field notes, publications, maps, artifacts, photographs, and more. The assemblage of these materials comprises a museum collection. Curation is the process of managing, preserving, and safeguarding a collection according to professional museum and archival practices.
Exotic Plant Management Team (EPMT)	One of the ways the NPS is combating invasive plants is through the Exotic Plant Management Team Program. The program supports 16 Exotic Plant Management Teams working in more than 225 park units. EPMTs are led by individuals with specialized knowledge and experience in invasive plant management and control. Each field-based team operates over a wide geographic area and serves multiple parks.
Facility Condition Index (FCI)	FCI is the cost of repairing an asset (e.g., a building, road, bridge, or trail) divided by the cost of replacing it. The lower the FCI number, the better the condition of the resource.

Foundation Document	A park Foundation Document summarizes a park’s purpose, significance, resources and values, primary interpretive themes, and special mandates. The document identifies a park’s unique characteristics and what is most important about a park. The Foundation Document is fundamental to guiding park management and is an important component of a park’s General Management Plan.
Fundamental and Other Important Resources and Values	Fundamental resources and values are the particular systems, processes, experiences, scenery, sounds, and other features that are key to achieving the park’s purposes and maintaining its significance. Other important resources and values are those attributes that are determined to be particularly important to park management and planning, although they are not central to the park’s purpose and significance. These priority resources are identified in the Park Foundation Document and/or General Management Plan. The short-cut name that will be used for this will be Priority Resources.
General Management Plan (GMP)	A General Management Plan is a strategic planning document that outlines the future management of a National Park Service site for the next 15 to 20 years. The plan will set the basic philosophy and broad guidance for management decisions that affect the park’s resources and the visitor’s experience.
Green Parks Plan (GPP)	The Green Parks Plan defines a collective vision and a long-term strategic plan for sustainable management of NPS operations. A critical component of the implementation of the GPP will be informing and engaging park staff, visitors, and community partners about climate change and sustainability to broaden opportunities to foster change.
Historic Integrity	Historic Integrity is the assemblage of physical values of a site, building, structure, or object and is a key element in assessing historical value and significance. The assessment of integrity is required to determine the eligibility of a property for listing in the National Register.
Indicator of Condition	A selected subset of components or elements of a Priority Resource that are particularly “information rich” and that represent or “indicate” the overall condition of the Priority Resource. There may be one or several Indicators of Condition for a particular Priority Resource.
Integrated Resource Management Applications (IRMA)	The NPS-wide repository for documents, publications, and data sets that are related to NPS natural and cultural resources.
Interpretation	Interpretation is the explanation of the major features and significance of a park to visitors. Interpretation can include field trips, presentations, exhibits, and publications, as well as informal conversations with park visitors. A key feature of successful interpretation is allowing a person to form his or her own personal connection with the meaning and significance inherent in a resource.
Invasive Species	Invasive species are non-indigenous (or non-native) plants or animals that can spread widely and cause harm to an area, habitat, or bioregion. Invasive species can dominate a region or habitat, out-compete native or beneficial species, and threaten biological diversity.
List of Classified Structures (LCS)	LCS is an inventory system that records and tracks the condition of the approximately 27,000 historic structures listed in the National Register of Historic Places that are the responsibility of NPS.

Museum Collection	NPS is the steward of the largest network of museums in the United States. NPS museum collections document American, tribal, and ethnic histories; park cultural and natural resources; park histories; and other aspects of human experience. Collections are managed by professionally-trained NPS staff, who ensure long-term maintenance of collections in specialized facilities.
National Register of Historic Places (NRHP)	The National Register of Historic Places is the official list of the Nation’s historic properties worthy of preservation. Authorized by the National Historic Preservation Act of 1966, the National Park Service’s National Register of Historic Places is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America’s historic and archeological resources. Listing in the National Register of Historic Places provides formal recognition of a property’s historical, architectural, or archeological significance based on national standards used by every state. The National Register is a public, searchable database about the places.
Priority Resource or Value	This term refers to the Fundamental and Other Important Resources and Values of a park. These can include natural, cultural, and historic resources as well as opportunities for learning, discovery, and enjoyment. Priority Resources or Values include features that have been identified in park Foundation Documents, as well as other park assets or values that have been developed or recognized over the course of park operations. Priority Resources or Values warrant primary consideration during park planning and management because they are critical to a park’s purpose and significance.
Resource Management	The term “resources” in NPS encompasses the many natural, cultural, historical, or sociological features and assets associated with parks. Resource management includes the knowledge, understanding, and long-term stewardship and preservation of these resources.
Southwest Alaska Network (SWAN)	One of 32 I&M networks established as part of the NPS Inventory and Monitoring Program . The Southwest Alaska Network provides scientific data and expertise for natural resources in five parks located in Alaska
Specific Measure of Condition	One or more specific measurements used to quantify or qualitatively evaluate the condition of an Indicator at a particular place and time. There may be one or more Specific Measures of Condition for each Indicator of Condition.
Visitor and Resource Protection (VRP)	VRP includes, among other responsibilities, protecting and preserving park natural and cultural resources, enforcing laws that protect people and the parks, fire management, search and rescue, managing large-scale incidents, and on-the-ground customer service.
Wilderness	A designation applied to certain federal lands set aside for preservation and protection in their natural condition, in accordance with the Wilderness Act of 1964 .