

National Park Service
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Wrangell-St. Elias National Park and Preserve



Kennicott Glacier Interpretive Concept Plan

February 2020



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INTRODUCTION

KENNICOTT GLACIER is a prominent feature of the Kennecott Mines National Historic Landmark. Over the centuries, the glacier has shaped the landscape and continues to do so today. The historic mining townsite and modern-day communities grew up along the glacier's margin and visitors to the valley can access the glacier from park trails. Of the thousands of glaciers in Alaska, Kennicott Glacier is one of the most easily accessible to visitors. It is dynamic and shrinking rapidly, which presents an opportunity, if not an imperative, to interpret these changes and their drivers (e.g., climate change).

Current interpretation and park signage do not address the glacier; this presents a major gap in the visitor experience as well as outreach to a larger community. Upon entering the valley, visitors get their first unobstructed views of the glacier as they cross a footbridge over the Kennicott River that drains proglacial Kennicott Lake at the toe of the glacier. It is clear, from the construction of the bridge and the character of the river, that there are powerful hydrologic processes at work. As the glacier recedes and the lake enlarges, the potential for flooding (*jökulhlaups*) increases. We have both an opportunity and responsibility to interpret this process and inform residents and visitors alike.

At the historic mining townsite, the rocky debris-covered ice of the glacier terminus fills the valley floor. By comparison, in the mining era, the glacier was a wall of ice towering over the townsite. Visitors often mistake today's massive,

rocky pile for mine tailings. Without interpretation, they leave with a mistaken impression. The trails through the townsite to the glacier provide easy access but will inevitably get longer as the glacier recedes. For the tours and groups that visit to explore the glacier, we have the opportunity to enrich this experience with what we know from our research about the glacier and how it is changing over time. Because Kennicott Glacier is so accessible, and the changes it is undergoing are generally typical of other non-tidewater glaciers in the state, it can also be a proxy to talk about what we are learning about glaciers in Alaska generally.

For these reasons, this plan focuses on providing park visitors with an understanding of the extent, nature, and consequences of glacier change in Alaska and the Kennicott Glacier, specifically. It is not intended to address all interpretive needs within the Kennicott Valley, but rather focus on the glacier in a way that is integrated with existing interpretive approaches and infrastructure. It is organized into two parts:

Part One lays the foundation.

It describes the purpose and significance of the plan, identifies the intended audiences, and introduces interpretive themes.

Part Two describes the interpretive opportunities. These opportunities are geographically based within the existing (or planned) infrastructure of the valley. It includes both on-site interpretive opportunities as well as off-site (or virtual, web-based) outreach, personally delivered and self-directed.

The Foundation

Alaska's Kennicott Glacier is shrinking rapidly. Among Alaska's many glaciers, the 28-mile-long Kennicott Glacier in Wrangell-St. Elias National Park and Preserve (WRST) is the largest that is easily accessible. It is also the most developed, owing largely to early 20th century copper mining adjacent to the glacier margin. Many buildings and infrastructure associated with those mines are now managed by the National Park Service (NPS) as the Kennecott Mines National Historic Landmark (NHL). Since acquisition of the NHL in 1998, several million dollars have been spent on rehabilitation and new infrastructure that interprets the mining townsite and history but does not include interpretation of the glacier that dominates the view of the valley.

Visitation to the historic site is growing. A recent study of visitors found that only 22% were interested solely in mining history; the remainder expressed interest in more traditional national park activities: sightseeing, camping, taking nature walks, and, of course, experiencing glaciers. This plan builds on the foundation of and supports the park's Long-Range Interpretive Plan (prepared by Harper's Ferry in 2005) and the Kennecott Mines National Historic Landmark Interpretive Concept Plan (2011).

The Planning Process

The Kennicott Glacier Interpretive Concept Plan has as its foundation the Wrangell-St. Elias National Park and Preserve Purpose Statement, which states that WRST was created, in part, to

maintain the natural scenic beauty of the diverse geologic, glacial, and riparian dominated landscapes. . .

From that is derived Significance Statement #2:

Wrangell-St. Elias National Park encompasses the nation's largest protected active glacial complex.

That statement directs park staff to ensure

the opportunity to explore, learn from, and add to the body of scientific research in regards to glacial systems

and highlights as an interpretive theme the park's

dynamic natural landscapes provide opportunities to study and witness . . . the dynamic forces of weather, water, glaciers, plate tectonics, and volcanism.

The mandate for interpretation of glacial phenomena is strong even in the 2011 Kennecott Mines NHL Interpretive Concept Plan, which, though focused primarily on the mining history of the NHL, clearly identifies glaciers and glacier change as important interpretive themes in and around the NHL:

- Primary Theme 1: Change, including *natural succession of plant life; the dynamic natural processes of glaciation, hydrology, erosion, and deposition; and high-energy events such as floods.*
- Primary Theme 2: Kennicott Valley and Kennecott Mine, including *the Kennicott Valley landscape continues to overshadow and directly affect human developments within it.*

Pertinent to interpreting glacier change this plan also takes direction from the 2005 WRST Long-Range Interpretive Plan, which states in part:

The potential and demonstrated effects of climate change, commercial fisheries, exotic plant species, containments, altered landscapes, and other natural or human-caused changes will be interpreted.

Per that mandate, the exhibits proposed and implemented under this plan will include within their messaging, based on the best-available science, references to the underlying role of anthropogenic climate change in accelerating modern glacier change.

To promote the development of this interpretive concept plan, in addition to other glacier-change related work, WRST staff wrote a successful proposal (PMIS 158232) that funded development of this project during fiscal years 2018, 2019, and 2020.

We assembled a diverse team to develop this plan. Under PMIS 158232, Geologist Michael Loso has been working with seasonal Geoscientist-in-the-Parks Guest Scientists to collect and develop

Project Justification

PMIS 158232 Mitigating and Interpreting the Ongoing Consequences of Kennicott Glacier Retreat

We further propose a comprehensive interpretive program focused on the role of glacier change and changes in the cultural and ecological history of Kennicott Valley. This item is a significant and critical extension of this project beyond any work completed previously. Since acquisition of the NHL, federal spending in the Kennicott Valley has been largely focused on mining structures and mining history, but the glacier's story is a missed opportunity. One of the most common questions asked of interpretive staff in Kennecott is typically accompanied by a finger pointed at the broad rocky terminus of the glacier: *Are those mining tailings?* The persistence of the question demonstrates that visitors to the park are drawing vitally important, but wrong, conclusions about the roles of both mining and glacier change in the evolution of the natural environment in the Kennicott Valley. Interpretive rangers do their best to alleviate these misconceptions, but their efforts are hampered by a lack of access to clear and accessible information about the glacier. There has to date been no systematic effort to collect and present to these staff, or directly to the visitors themselves, a coherent, accessible, and accurate depiction of the central role that the Kennicott Glacier plays, and has played, in the cultural and ecological history of the Kennicott Valley. The valley provides an exceptional opportunity to interpret the role that climate change is playing in the evolution of other, less accessible landscapes throughout the National Park System.

scientific content pertinent to glacier interpretation. While doing so, he enlisted the leadership of the WRST Interpretive Staff, primarily including Jamie Hart (WRST South District Interpreter) and Margie Steigerwald (Chief of Interpretation and Education) to develop this plan. Towards development of the plan, we assembled a core working team that also included Nina Chambers (Alaska Regional Office [AKRO] Science Communication Specialist), Rosemarie Salazar (AKRO Interpretive Specialist). We have received significant input and support from Stephens Harper (WRST South District Ranger), Mark Miller (Team Lead for Resource Stewardship and Science), and Morgan Gantz (WRST Compliance Coordinator). The core team held planning meetings, mostly by teleconference, but also with a multi-day gathering in the Kennicott Valley during summer 2019, to assemble and revise the interpretive themes and opportunities described below. These were vetted through multiple public meetings and in cooperation with local enthusiasts during the summer of 2019 and with repeated requests for input from park staff. This plan reflects all that input.

This concept plan is an important early step toward full implementation of a comprehensive Kennicott Glacier interpretation effort. It does not, by itself, mandate nor fund any on-the-ground developments. Rather, it identifies a comprehensive strategy that has been approved by the WRST Leadership Team to serve as a directive for subsequent efforts to fund and implement the

individual plan components. Those efforts, whether implemented in one large group or several smaller ones, will likely follow a sequence like the following: (1) write a proposal and acquire funding for planning and construction, (2) develop a detailed implementation plan, (3) vet that detailed plan with park staff and perform required compliance, (4) revise plan as necessary, (5) perform final design, either internally or through contracted assistance, and (6) construct/build/implement the plan.

Purpose and Significance

The rocky terminus of the Kennicott Glacier is the most prominent natural feature of the Kennicott Valley, the setting and surrounding landscape of the Kennecott Mines NHL. The easily accessible glacier provides an exceptional opportunity to interpret glacier change and the connections to the surrounding landscape, including the rivers and lakes, plants and animals, and the towns of Kennecott and McCarthy. More broadly, the glacier provides an opportunity to interpret glacier dynamics and the role that climate change is playing in the evolution of other, less-accessible landscapes throughout Alaska and, by extension, general dynamics of glaciers in the National Park System. An understanding of the Kennicott Glacier's past and likely future response to climate change is informative for both visitors and local residents.

This interpretive concept plan focuses on glacier change within the Kennicott Valley and the geologic, ecological, and social context in which it exists. The plan outlines interpretive themes, key messages, and suggested actions to

deliver those messages. Funding and implementation of the plan is a separate project that will follow from the guidance of this plan, once adopted.

Interpretive Themes

The thematic framework proposed for the interpretive products includes an overarching idea and several themes that flow from that idea.

The primary purpose of interpretation is to enrich a visitor's experience and enjoyment of a place; preserve and protect resources; and inspire social and environmental consciousness (derived from Interpretation for the 21st Century, 2017). The interpretive theme and associated messages of this plan are intended to inform, inspire, and guide dialogue.

Overarching Theme

Rapid changes in and around the Kennicott Glacier affect the entire landscape and reflect similar changes occurring at thousands of other Alaskan glaciers.

Primary Themes

- Kennicott Glacier has changed over short and long timescales in response to both natural and anthropogenic climate change.
- Ongoing glacier retreat is made conspicuous by the fact that the entire mining-era infrastructure of the Kennicott Valley was built at what was then the edge of the now-retreating glacier, and by the ongoing relationship between local residents, repeat visitors, and the changing glacier margin.
- The glacier's response to climate change is largely predictable and can be described in terms of variables like glacier size (extent and volume), ice velocity, and terminus position.
- Indirect consequences of glacier change are less predictable and include surprising effects on diverse processes.
- Rivers that enter and emerge from the glacier are highly dynamic and have profoundly impacted human development in the valley.
- Development of new ecological communities has occurred, and continues to occur, on the land adjacent to the glacier margin.
- Changes in the Kennicott Valley are representative of changes in other places and environments within Alaska, and in other glaciated regions of the planet.



Interpretive program
given to visitors
in Kennecott.

Audiences

This plan intends to broaden the existing interpretive story to include some of the questions most frequently asked by existing audiences. We will do so with new onsite interpretive products and will extend reach to new audiences with virtual opportunities through the park website and social media platforms.

In 2019, Wrangell-St. Elias National Park and Preserve had approximately 79,000 recreation visits and about 11,000 people stopped in at the Kennecott Visitor Center between Memorial Day and Labor Day. The park's Long-Range Interpretive Plan (2005) references a visitor study conducted in July 1995 under the Visitor Services Project. It found that most visitors (61%) stayed more than one day and the largest group of visitors from the US were from Alaska (31%), while 11% of all visitors were international.

The most common activities were scenic driving (82%), wildlife viewing (57%), walking around Kennecott (51%), and day hiking around the park, including Nabesna (49%). The NHL audience can be grouped into two broad categories:

Residents of the park and surrounding area, including Alaskan Native tribal members and elders—it's their backyard. Local people may hold specific cultural values and knowledge related to this place and a longer historic use of the area.

Independent families and small-group travelers who fly or drive to the valley. These visitors tend to learn about the site before their visit. Most spend at least one night, spending a good amount of time at the site. Some are accompanied by a guide and are often visiting as part of a group (e.g., church, youth, non-profit, school).



Kennicott Glacier



**Campers near
Root Glacier.**

PART TWO

Interpretive Opportunities

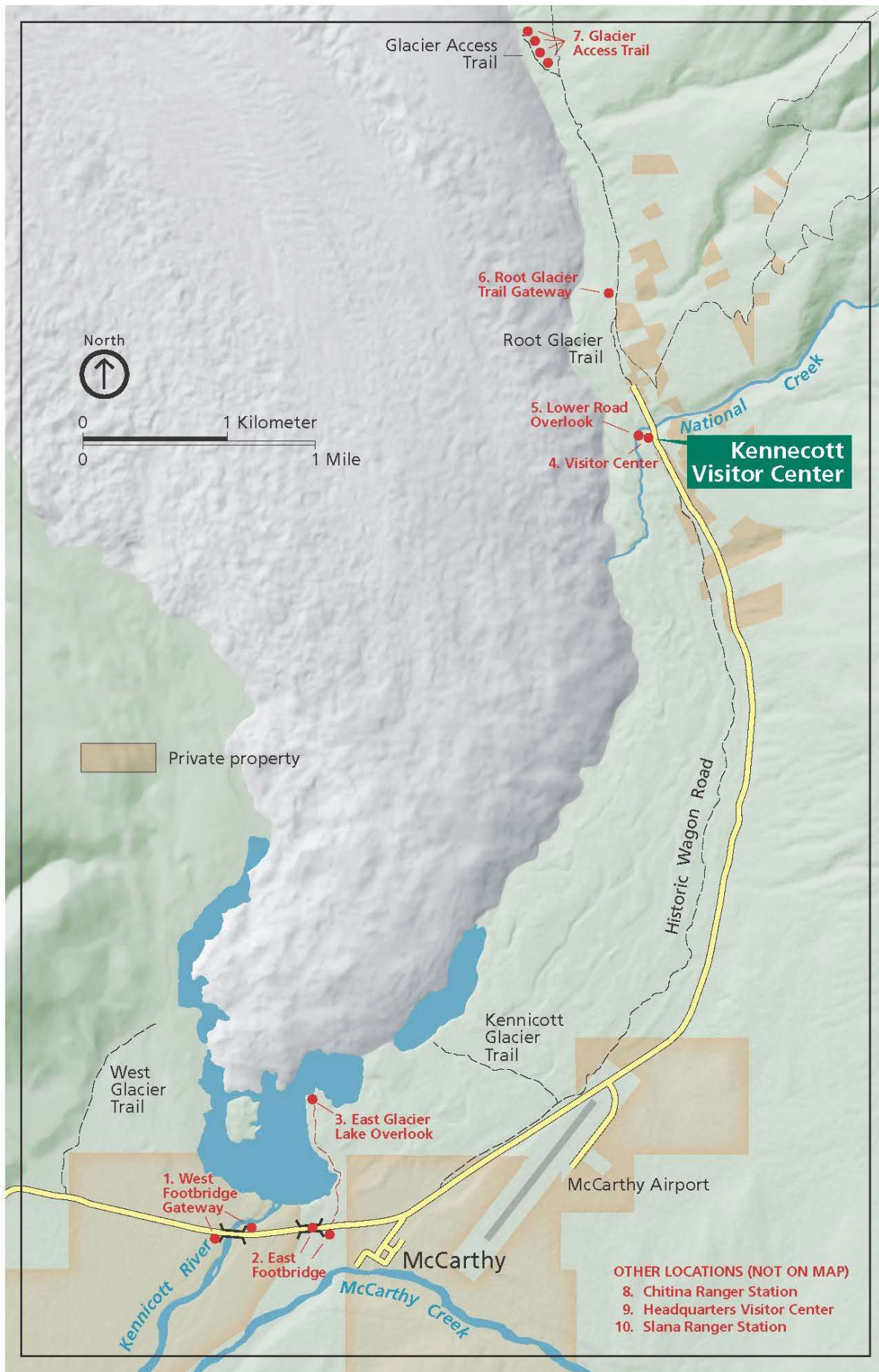
This section describes the interpretive opportunities envisioned for design and implementation, recognizing that park staff will be responsive to changing conditions and adapt as appropriate. Opportunities are presented in two groups. The first describes location-based sites for installation of exhibits. The second group describes virtual interpretive opportunities such as web-based outreach products and personal services suitable for implementation in multiple non-specific settings.

Site Opportunities by Location
Interpretive opportunities take advantage of a site's characteristics to tell stories of glacier dynamics and the changing landscape. Within the Kennicott Valley, there are several discrete locations, each having multiple sites. They are numbered in both the text and in the facing map for clarity. [See a summary of all interpretive opportunities in the Appendix.]

The only existing panel at Kennecott Mines NHL that talks about Kennicott Glacier.



Map of the Kennicott Valley Interpretive Opportunity sites.



Entering the Kennicott Valley

For most visitors, the gateway to the Kennicott Valley is the McCarthy Road and eventually, the footbridge over the Kennicott River. The West Footbridge crosses the active west channel of the Kennicott River. Here visitors get their first striking views of Kennicott River, proglacial Lake Kennicott, and the Kennicott Glacier. The East Footbridge crosses a dry channel of the Kennicott River. After crossing the footbridges, visitors have many options, but most spend some time walking the area between the West Footbridge and

McCarthy. In this area, NPS land is interspersed with a significant amount of private land. Any interpretative opportunities must respect private property and maintain a “light touch” relative to the more NPS-focused experiences available in the NHL. Suggested interpretive opportunities in this area are designed for visitors newly arrived in the valley or who are spending time in McCarthy and looking for natural history-oriented activities.

NPS/ROSEMARIE SALAZAR



**The West Footbridge
over the Kennicott
River to McCarthy.**

Interpretive Opportunities: Entering Kennicott Valley

Site	Messages	Products
1. West Footbridge Gateway	• Orient to first view of the Kennicott Glacier and river • Identify glacier features; moraines, lakes, debris-covered ice, etc. • Introduce concept of a “glacial landscape” • Introduce the “jökulhlaup” (glacier outburst flood); • Highlight opportunities in the valley to learn more	• Three interpretive wayside panels, each mounted either on footbridge side rail or in-ground on east side with a low-profile base.
2. East Footbridge	• “How ice impacts the landscape.” Glacier change has big impacts on rivers and landscapes. • “The challenge of getting to McCarthy.” The human history of the valley (especially access to town) has been shaped by such changes. • “Trailhead info” providing a map and information about the route to the East Glacier Lake Overlook.	• Two interpretive wayside panels, each mounted on the footbridge or in-ground with a low-profile base near the outhouses on the east side of the footbridge.
3. East Glacier Lake Overlook	• Trail orientation at trailhead to highlight views of surrounding mountains and Stairway Icefall up valley • “How surficial debris accumulates and affects melt” The dynamics of glacier retreat include exposure of new lands, some of which undergo plant succession while others are “over deepened” and fill up with meltwater. • Debris cover slows and complicates the glacier’s retreat. • Terminus “retreat” goes hand-in-hand with glacier thinning • Map showing historic shrinkage of the glacier, growth of the lake, and changes in river position. • Historic photographs, combined with a citizen science activity where visitors can set their phone on a designated point, take a picture, then later upload it for comparison with other photos. • Develop App content for the self-guided trail and glacier.	• One upright interpretive panel at the trailhead • Two interpretive panels in-ground with a low-profile base and inconspicuous from a distance • One citizen science post to capture photos • Other potential services: • Low rustic benches • Picnic table

Site 1. West Footbridge Gateway

This footbridge is a busy junction for visitors, local businesses, shuttle buses, and private vehicles, as well as campground traffic. The footbridge is located on the state road right-of-way and is administered by the Department of Transportation (DOT).

The interpretive goal at this site is to capture the visitor's attention. To introduce them to the opportunities in the area and to the Kennicott Glacier. The Visitor Preferences for Interpretation in the Kennecott Mill Town, Final Report (November 2005) noted that most visitors arrive by vehicle and over 75% are visiting for the first time. NPS is evaluating the possibility of establishing a contact station on leased private land near the West Footbridge. However, any interpretation on the west side of the footbridge would compete with many distractions. An alternative would be the east side of the

footbridge, near the shuttle bus stop. DOT concurrence may be necessary, and another consideration is that the land on either side of the footbridge borders private property.

Site 2. East Footbridge

Just past the West Footbridge, before the town of McCarthy, the East Footbridge crosses a mostly dry channel of the Kennicott River. This river channel was abruptly abandoned in 1997 due to changes in the Kennicott Glacier's hydrology. Unfortunately, this change happened just after construction of the East Footbridge. Also, at this site are visible signs of previous river channel crossing mechanisms such as pilings from previous bridges and the cable from the old tram.

This site offers a great opportunity to interpret how glacier changes have influenced the river's course and how humans have adapted to those changes. This site is also

NPS/NINA CHAMBERS



Kiosk at the West Footbridge to McCarthy.

adjacent to outhouses and an “informal” (not-maintained) trail that emerges onto the edge of the proglacial Kennicott Lake. There is an opportunity for this site to tie into site #3 East Glacier Lake Overlook (noted below). Trail maintenance, a map, and directions would be necessary.

Site 3. East Glacier Lake Overlook

Throughout Alaska, viewpoints, visitor contact stations, and waysides exhibits were built at locations to highlight a scenic view, like a glacier. Over time, they found that rapid glacier change left the facility without a view or the view obstructed by the encroachment of vegetation due to the retreating glacier. The East Glacier Lake Overlook is on a hill that rises above the growing glacial lake and is likely to remain dry and accessible with lasting views of the glacier terminus as it retreats back from the edge of the lake.

Development of an interpretive opportunity here would require, at minimum, formalization of the existing informal trail from the East Footbridge. This trail has potential to tie into the proposed East Kennicott Glacier Trail. Existing topography and vegetation can shield the site and trail from the viewshed of nearby private land.

This site would provide a unique opportunity (in the McCarthy area) for visitors to get away from busy roads and businesses and experience public land in a wild (but not wilderness) setting with only a short walk from the road.



A bundle of kiosks on the West Footbridge.



Overlooking a portion of the proglacial Lake Kennicott.

Kennecott Mines NHL Area

Kennecott Mines NHL, and specifically the Kennecott townsite, is the primary visitor destination. Visitors typically arrive via privately owned vehicle shuttle services or by foot or bicycle. Many continue beyond the NHL on a network of hiking trails that also support occasional ATV use. A comprehensive package of mostly mining history- focused exhibits was completed in the NHL in 2017. This plan is designed to complement, not replace or compete with, those exhibits.

The NHL provides fabulous glacier views and is the primary access to the Root Glacier, a tributary of the Kennicott. For those reasons, visitors

ask for glacier-related information. To balance the visitor request for glacier information against the appropriate focus on NHL mining history, this plan proposes glacier-related exhibits in two sites: in and adjacent to the Kennecott Visitor Center (where there is already a precedent for natural history interpretation) and at a viewpoint on the north edge of the townsite, well removed from the historic buildings. This plan further aims to reflect the importance of the NHL by requiring these exhibits to comply with existing guidelines for signage and interpretation, including the 2015 “Visual Communication Guidelines” for the NHL.

NPS/KAYLA KIMBALL



Kennecott Mines NHL townsite.

Interpretive Opportunities: Kennecott Mines NHL Area

Site	Messages	Products
4. Visitor Center (VC)	<u>Kennecott Visitor Center (VC)</u> • This is the first exposure to Kennecott Mines NHL for most visitors • Views of the Kennicott valley and surrounding mountains • Maps, diverse displays, and interpretive staff available. • Area orientation <u>VC Deck and Vicinity</u> • Glacier then and now <u>Day Use Parking Area</u> • “Is that mine tailings?” No. Explain debris formation. • “How a glacier works”. Mass balance and flow. • “Is this glacier shrinking?” Yes. And so are most others. Show visually how the townsite, railroad, McCarthy, and footbridges (railroad grade) all were placed on the edge of the now-retreated glacier. • Terminus “retreat” goes hand-in-hand with glacier thinning, and the historic landscape provides a benchmark from which we can measure change.	<u>Kennecott Visitor Center (VC)</u> • Interactive exhibits inside VC: • Flat-screen videos about natural history and glaciers. • Perhaps in this location or in the Depot, Park Rangers could provide Virtual Reality goggles to show what the valley looked like in the mining era: look around and see the historic buildings at the peak of development, the glacier towering over the townsite, etc. • Booklet, poster board, or electronic display with multiple historic photos of Kennicott Glacier, showing changes. • Interpretive panel providing statistics for shrinkage of glaciers statewide, placing Kennicott’s changes (typical) in context of the rest of the state. • Others as developed for presentation directly by interpretive staff. <u>VC Deck and Vicinity</u> • A mobile exhibit, on wheels, that may “live” outside or inside at the Kennecott Visitor Center. It could be made of weatherproof material to stay outside on the deck or near the parking area. On occasion, it could be shared with other visitor contact stations (Chitina, HQ, Slana): • 3D scale topographic model of the Kennicott Valley with the modern glacier in it. • “Shells” of additional glacier ice that fit over the modern glacier and show the size and volume of the larger glacier during the mining era, during the peak of the Little Ice Age, and during the Last Glacial Maximum. These can be added and subtracted. <u>Day Use Parking Area</u> • Interpretive panel including or replacing existing glacier-focused panel on the railing • 1-2 panel interpretive wayside exhibits mounted here.

Interpretive Opportunities: Kennecott Mines NHL Area, *continued*

Site	Messages	Products
5. Lower Road Overlook	• Unimpeded views of the Kennicott Glacier and valley; thinning of glacier clearly visible • Sharp boundary between cultural and natural landscapes • Much glacier retreat occurs through thinning, and it is particularly visible here.	• Interpretive panels at this site could be porcelain or built into clear plexiglass tops of 2-4 new picnic tables, avoiding any standing panels that obscure the view, but enhance the existing picnic area with more tables and information for picnickers. • “Fireweed Mountain used to be invisible from here.” Photos, digital elevation models (DEMs), and anecdotes to convey the amazing fact that Fireweed Mountain was invisible from Kennecott during the mining era. • A citizen science activity where visitors can set their phone on a designated point, take a picture, then later upload it for comparison with other photos. • Potentially, “Trailhead Info” providing a map and information about the route down to the glacier margin towards McCarthy, if the trail is developed.

NPS/ROSEMARIE SALAZAR



View of the rock covered Kennicott Glacier looking down valley from the over-look, toward the glacier toe.

Site 4. Visitor Center (VC)

Located at the south entrance to the townsite, the VC complex includes an NPS-owned shuttle turnaround (temporarily used at present as a parking area), the Blackburn School (houses Kennecott Visitor Center), an outdoor deck with outhouse, benches, and exhibits, as well as an adjacent privately owned shuttle turnaround. Most visitors stop at this site when they arrive and, like at most VCs, the questions are diverse: mining history, commercial tour opportunities, directions, regulations pertinent to hiking and camping, schedules of NPS interpretive presentations, and natural history topics. Excellent views of and across the Kennicott Valley are available, but views from the Kennecott Visitor Center, the deck, and from the parking area are currently obscured by vegetation.

Site 5. Lower Road Overlook

This location is presently marked by a picnic table that sits immediately above a steep tailings pile that drops away towards the historic dump. The exact site should be situated further north, between the picnic table and the existing cement mixer artifact. It is close to the lower edges of some popular visitor destinations including: the Recreation Hall (with outhouses), the Kennicott Wilderness Guides, and the Meatza Wagon food truck. People commonly congregate in this general area to rest, picnic, and view the spectacular views up valley to Mt. Blackburn, across the valley, and toward the glacier toe. If the East Glacier Trail is developed, this will also be the northern trailhead for that route.



The deck outside the Kennecott Visitor Center near day use parking.



The picnic table is a popular spot to enjoy the views of the valley, townsite, and the glacier.

Root Glacier Trail

Most visitors to Kennecott take at least a short walk beyond the townsite, and many continue to the easily accessible Root Glacier (a tributary of the Kennicott Glacier). Several commercial outfitters offer guided hikes onto the ice and hardy travelers can also camp near the glacier edge or continue further into the backcountry for multi-day trips. These trails all start at a common trailhead on the north edge of the townsite before splitting into the steeply climbing Bonanza and Jumbo Mine trails (no exhibits planned for this area).

The Root Glacier Trail also starts here and heads toward Erie Mine with a junction for the heavily used glacier access trail. Hikers on these trails are leaving the historic mine site behind and have expectations of a more natural experience in a wild setting. We propose two exhibits for this area: a well-developed one on a prominent overlook just after hikers leave the developed mine site area, and an unobtrusive exhibit closer to the glacier edge.

NPS/JACOB W. FRANK



Hikers on Root Glacier Trail.

Interpretive Opportunities: Root Glacier Trail

Site	Messages	Products
6. Root Glacier Trail Gateway	• The glacier “anatomy” is visible and understandable here. • The landscape around the glacier is an artifact of glacier activity and reflects that activity in landforms and ecological succession. • Medial moraines reflect the junctions of many tributaries up near the great icefalls. • Glaciers can be traversed safely--with proper precautions. • “Plant succession reveals the timing of glacier retreat.” Identify common plants that are associated with different phases of plant succession, and the subtler response of animals, including spruce beetles. • “Lateral moraines reveal the geometry of glacier retreat.” Point out lateral moraines and trimlines, including the one where the exhibit is located, and describe the material they’re made of (glacial till). Give special attention to the big erratics further along the trail. • “The glacier is born in the accumulation zone and dies in the ablation zone.” Point out the perennial snows of Mt. Blackburn and the bare ice of the terminus area and explain how they are related. • “Each medial moraine is the product of two glaciers coming together.” Identify the main moraine that separates Root and Kennicott Glaciers and use it to explain the dynamics of medial moraines and how they relate to debris cover. Include a map showing all tributaries of the Kennicott. • “Safe travel in a glacier environment.” Talk about loose moraines, slippery ice, moulins, etc.	• These items will be determined in the future, but the main idea is to have a landscaped overlook with benches, clear views, good footing, and a pavilion with multiple interpretive panels with multiple messages.
7. Glacier Access Trail	• Glacier thinning is occurring rapidly here, fast enough to require annual trail adjustments.	• A single, dispersed exhibit marking the retreat of the glacier edge at this location: • Inconspicuous ground-mounted markers (perhaps small tastefully painted boulders, or small low wooden stakes) with dates on them, showing approximately when, in the 20th century, the clean white glacier ice was at certain locations where hikers of the day could have gotten onto the ice margin. • A single, low, small exhibit sign mounted inconspicuously alongside the trail at the start of the monuments, near the location of the sign for the food cache (where the trail levels out after emerging from the brush). This sign would explain the exhibits further along.

Site 6. Root Glacier Trail Gateway

This site will introduce glacier interpretation of the Kennicott Valley. It is alongside the most-hiked trail in the park, on the way to the most-visited glacier, and is in such a way as to cater to visitors who have chosen to leave the NHL en route to the glacier. It is just beyond the townsite, before the final outhouses as one leaves the NHL; local guides have indicated that this would be an attractive and well-used site for them to pause with their groups and

orient them to the glacier landscape before continuing the walk to the glacier edge. It is close enough to the townsite to be accessible to those without the strength or time to reach the glacier and would be located on a natural high point about 50 feet west of the main trail, along the crest of an existing lateral moraine. We suggest creation of a short, hardpack wheelchair accessible trail and then a cleared area with benches and signs, creating an overlook with room for numerous hikers to rest, learn, and then if desired, continue.

NPS/ROSEMARIE SALAZAR



The Root Glacier trail begins in the forest.

Site 7. Glacier Access Trail

This trail section is very popular; it leads steeply downhill across loose glacier moraine to the glacier edge. As the glacier continues to retreat and thin, the trail is getting longer and descending further into the valley before it meets the ice edge. This continual change is a striking feature of the trail section for locals and frequent visitors. We propose a modest exhibit that has little visual impact on the wild glacial landscape but allows new visitors to appreciate the rate of geologic change. The idea is similar to Exit Glacier at Kenai Fjords National Park (signposts with dates marking the glacier terminus), but here we are emphasizing thinning rather than terminus retreat. The exhibit is also modest in construction cost and easily movable, should the day arrive when it becomes necessary to substantially reroute the trail in response to more dramatic glacier change.



NPS/ROSEMARIE SALAZAR

From Root Glacier trail, visitors can experience the moraine, rock-covered ice, and white ice of the glacier.



JAMIE HART

The trail is cut into the rocky glacial moraine.

Off-site Locations

This interpretive concept plan is focused on the Kennicott Valley but provides an opportunity to consider adding to or enhancing existing interpretation efforts in other parts of the park. The amount of space available for interpretive exhibits in these other locations has not been well established, so the proposals for these areas are more speculative. In any case, we wish for this project to offer other park contact stations the opportunity to enhance interpretation efforts, if so desired, and as such propose here

for each site a combination of “basic” interpretation messages common to each site and a single attribute or trait unique to each site that could afford an opportunity for a unique message. Though not annotated specifically at each site below, we also note the possibility of having one or more glacier exhibits from the Kennecott Mines NHL be available for loan to the other contact stations. Notable examples are the 3D Kennicott Glacier model and the Virtual Reality goggles.

NPS/NEAL HERBERT



Getting a different perspective of Kennicott Glacier from a distance.

Interpretive Opportunities: Off-site Locations

Site	Messages	Products
8. Chitina Ranger Station	• The basics of glacier formation and flow-- what is a glacier and how does it work? • Lake Atna was a glacier-dammed lake of superlative proportions and gave the Copper Basin its distinct topography. • Glacial rivers have unique characteristics, and can host major salmon runs	• Basic interpretive panels, subject to local space constraints, sharing content with other contact stations: • "How a glacier works." Mass balance and flow. • Statistics for shrinkage of park glaciers statewide. • "Lake Atna" Explanation of the geomorphology of an ice-dammed lake. • "Glaciers and salmon" Describe characteristics of glacier rivers and how salmon depend on them. • Others as developed for presentation directly by interpretive staff.
9. Copper Center Visitor Center	• The basics of glacier formation and flow-- what is a glacier and how does it work? • Glaciers, volcanoes, and water are a common, but dangerous, mix. • Glaciers of WRST are globally exceptional, but in many ways typical of thousands of others throughout the state.	• Basic interpretive panels, subject to local space constraints, sharing content with other contact stations: • "How a glacier works." Mass balance and flow. • Statistics for shrinkage of park glaciers statewide. • "Lahars and outburst floods." Geohazards associated with glaciers. • Others as developed for presentation directly by interpretive staff.
10. Slana Ranger Station	• The basics of glacier formation and flow-- what is a glacier and how does it work? • Glacial rivers have unique characteristics, and can host major salmon runs • Lake Atna was a glacier-dammed lake of superlative proportions and gave the Copper Basin its distinct topography.	• Basic interpretive panels, subject to local space constraints, sharing content with other contact stations: • "How a glacier works." Mass balance and flow. • "Glaciers and salmon" Describe characteristics of glacier rivers and how salmon depend on them. • Statistics for shrinkage of park glaciers statewide. • "Lake Atna" Explanation of the geomorphology of an ice-dammed lake. • Others as developed for presentation directly by interpretive staff.

Site 8. Chitina Ranger Station

The Chitina Ranger Station is a small roadside visitor contact station in the town of Chitina, 60 miles from the Kennecott Mines NHL. It is not adjacent to direct glacier viewpoints and is open only seasonally. It is mostly used by visitors as an informational resource before continuing down the McCarthy Road, or before salmon fishing. It is very close to the Copper River bridge and offers a chance to discuss the nature of this massive glacial river.

Site 9. Copper Center Visitor Center

The Copper Center Visitor Center is the largest visitor center in WRST and it is located alongside the Richardson Highway on the edge of the park. It receives a large number of visitors, by local standards,

many of whom are visiting the park only briefly. It has a relatively large and well-developed exhibit space, as well as a visitor contact station and a theater. A short interpretive trail walk near the visitor center has excellent views, on a clear day, of big glaciated volcanoes.

Site 10. Slana Ranger Station

The Slana Ranger Station is a small, road-side visitor contact station near the dispersed town of Slana. It is not adjacent to direct glacier viewpoints and is open only seasonally. The Nabesna Road does not, in general, provide as good a view of glacial features as the Kennicott Area, but the station is an appropriate place for general glacier exhibits and provides an opportunity to interpret nearby, conspicuous Lake Atna features.

NPS



The park's visitor center in Copper Center reaches people who may not travel to Kennecott Mines NHL.

Outreach and Personal Services

There are many ways to interpret the changes to the Kennicott Glacier. Several personal and non-personal services may be used within and outside the Kennicott Valley.

Interpretive Opportunities: Outreach

Type	Outreach Media	Description
Personal Interpretive Services	Formal and Informal Interpretive Programming	Audience Centered Experience (ACE) ranger-led discussions may focus on the glacier, change, and our impacts on the climate. Perhaps provide outreach to cruise ships and at park lodges. The use of virtual reality goggles may assist interpreters in helping visitors to understand the glacier monitoring, what it entails, as well as what it's like to see the glacier from above and by foot. This may be a valuable endeavor for those that are not able to make those trips. It's recommended that the park create a Communications Plan for interpreting glacier change and climate change.
Personal Interpretive Services	Outreach and Training	Provide hands-on training that includes presentations and fact sheets to inform all NPS staff, shuttle bus drivers, pilots, and local guides.
Personal Interpretive Services	Education and Outreach – Educational Curricula	Provide curriculum-based programs and information to assist visiting school groups, help youth make a greater connection with the environment.
Non-Personal Interpretive Services	Self-Guided Walking Tours	Multiple self-guided walking tours, including topics such as Glaciers 101, Glacier Changes, Geology, and Glacier Features. The new WRST NPS App interface allows for the visitor with a mobile device to follow a predetermined "tour" that staff create.
Non-Personal Interpretive Services	National and Regional Outreach – Websites	Use the park and regional websites to interpret the Kennicott Glacier changes.

Personal Interpretive Services

Personal services are those that are delivered in person. They include ranger talks, presentations, training, and school programs. These services encourage a dialogue and engagement of the target audience with park interpretive staff.

Interpretive Programming

Personal services can be defined as services in which staff interact with visitors, such as informal contacts or ranger programs. Through personal services, the main focus will be on providing the scientific data that shows how the Kennicott Glacier is changing over time. Interpreters can relate the Kennicott Glacier change to climatic change, greenhouse gas emissions, and personal choices (including air travel). Audience Centered Experience (ACE) ranger-led discussions may focus on the glacier, change, and our impacts on the climate. Perhaps provide outreach to cruise ships and at park lodges. The use of virtual reality goggles may assist interpreters in helping visitors to understand

the glacier monitoring, what it entails, as well as what it's like to see the glacier from above and by foot. This may be a valuable endeavor for those that are not able to make those trips. It's recommended that the park create a Communications Plan for interpreting glacier change and climate change. These ranger-led experiences could occur in a variety of locations in the Kennicott Valley area, as well as other areas through the park.

Outreach and Training

Identify and develop tools and messages to better interpret the Kennicott Glacier changes during formal and informal interpretation. Provide hands-on training that includes presentations and fact sheets to inform all NPS staff, shuttle bus drivers, pilots, and local guides. This is likely to occur at our park headquarters area during seasonal interpretive training or at the Kennicott Valley area during training for park staff.

NPS/JAMIE HART



Ranger talks are a good way to personally engage the audience in a topic and encourage dialogue.



NPS/JAMIE HART

Using virtual reality goggles to view a video is a very personal experience.

Educational Curricula and School Programs

Work with local Copper Basin and state-wide educators to develop curriculum products that can be used both in and out of the classroom, as well as distance learning nationwide.

Non-Personal Services

Non-personal services are self-guided educational experiences. They include self-directed exploration of a topic using interpretive materials such as videos, self-guided tours, brochures, and web-based information.

Self-guided Tours

There may be an opportunity to provide multiple self-guided walking tours, including topics such as Glaciers 101, Glacier Changes, Geology, and Glacier Features. These topics could be interpreted along the proposed East Glacier Trail, through the Kennecott

Mines NHL, and along the Erie Mine and Root Glacier Trail. Self-guided tour pamphlets could be available at various trailheads or information boxes in Kennicott Valley.

The new WRST NPS App interface allows for the visitor with a mobile device to follow a predetermined “tour” that staff create. This could be something as simple as two or three wayside locations or places that don’t have any physical interpretation at all. This is entirely customizable. This could be available to any mobile device user. They may need to download the app and content before traveling away from cellular coverage.

National and Regional Outreach

Use the park and regional websites to interpret the Kennicott Glacier changes. These can use articles, videos, virtual reality, story maps, and other communications products.

Appendix: Interpretive Opportunities Summary

The following is a compilation of all the proposed interpretive sites, messages, and products presented in this plan.

Interpretive Opportunities Summary

Site	Messages	Products
1. West Footbridge Gateway	• Orient to first view of the Kennicott Glacier and river • Identify glacier features; moraines, lakes, debris-covered ice, etc. • Introduce concept of a “glacial landscape” • Introduce the “jokulhlaup” (glacier outburst flood); • Highlight opportunities in the valley to learn more	• Three interpretive wayside panels, each mounted either on footbridge side rail or in-ground on east side with a low-profile base.
2. East Footbridge	• “How ice impacts the landscape.” Glacier change has big impacts on rivers and landscapes. • “The challenge of getting to McCarthy.” The human history of the valley (especially access to town) has been shaped by such changes. • “Trailhead info” providing a map and information about the route to the East Glacier Lake Overlook.	• Two interpretive wayside panels, each mounted on the footbridge or in-ground with a low- profile base near the outhouses on the east side of the footbridge.
3. East Glacier Lake Overlook	• Trail orientation at trailhead to highlight views of surrounding mountains and Stairway Icefall up valley • “How surficial debris accumulates and affects melt” The dynamics of glacier retreat include exposure of new lands, some of which undergo plant succession while others are “over deepened” and fill up with meltwater. • Debris cover slows and complicates the glacier’s retreat. • Terminus “retreat” goes hand-in-hand with glacier thinning • Map showing historic shrinkage of the glacier, growth of the lake, and changes in river position. • Historic photographs, combined with a citizen science activity where visitors can set their phone on a designated point, take a picture, then later upload it for comparison with other photos. • Develop App content for the self-guided trail and glacier.	• One upright interpretive panel at the trailhead • Two interpretive panels in-ground with a low-profile base and inconspicuous from a distance • One citizen science post to capture photos • Other potential services: • Low rustic benches • Picnic table

Interpretive Opportunities Summary, *continued*

Site	Messages	Products
4. Visitor Center (VC)	<u>Kennecott Visitor Center (VC)</u> • This is the first exposure to Kennecott Mines NHL for most visitors • Views of the Kennicott valley and surrounding mountains • Maps, diverse displays, and interpretive staff available. • Area orientation <u>VC Deck and Vicinity</u> • Glacier then and now <u>Day Use Parking Area</u> • “Is that mine tailings?” No. Explain debris formation. • “How a glacier works”. Mass balance and flow. • “Is this glacier shrinking?” Yes. And so are most others. Show visually how the townsite, railroad, McCarthy, and footbridges (railroad grade) all were placed on the edge of the now-retreated glacier. • Terminus “retreat” goes hand-in-hand with glacier thinning, and the historic landscape provides a benchmark from which we can measure change.	<u>Kennecott Visitor Center (VC)</u> • Interactive exhibits inside VC: • Flat-screen videos about natural history and glaciers. • Perhaps in this location or in the Depot, Park Rangers could provide Virtual Reality goggles to show what the valley looked like in the mining era: look around and see the historic buildings at the peak of development, the glacier towering over the townsite, etc. • Booklet, poster board, or electronic display with multiple historic photos of Kennicott Glacier, showing changes. • Interpretive panel providing statistics for shrinkage of glaciers statewide, placing Kennicott’s changes (typical) in context of the rest of the state. • Others as developed for presentation directly by interpretive staff. <u>VC Deck and Vicinity</u> • A mobile exhibit, on wheels, that may “live” outside or inside at the Kennecott Visitor Center. It could be made of weatherproof material to stay outside on the deck or near the parking area. On occasion, it could be shared with other visitor contact stations (Chitina, HQ, Slana): • 3D scale topographic model of the Kennicott Valley with the modern glacier in it. • “Shells” of additional glacier ice that fit over the modern glacier and show the size and volume of the larger glacier during the mining era, during the peak of the Little Ice Age, and during the Last Glacial Maximum. These can be added and subtracted. <u>Day Use Parking Area</u> • Interpretive panel including or replacing existing glacier-focused panel on the railing • 1-2 panel interpretive wayside exhibits mounted here.

Interpretive Opportunities Summary, *continued*

Site	Messages	Products
5. Lower Road Overlook	• Unimpeded views of the Kennicott Glacier and valley; thinning of glacier clearly visible • Sharp boundary between cultural and natural landscapes • Much glacier retreat occurs through thinning, and it is particularly visible here.	• Interpretive panels at this site could be porcelain or built into clear plexiglass tops of 2-4 new picnic tables, avoiding any standing panels that obscure the view, but enhance the existing picnic area with more tables and information for picnickers. • "Fireweed Mountain used to be invisible from here." Photos, digital elevation models (DEMs), and anecdotes to convey the amazing fact that Fireweed Mountain was invisible from Kennecott during the mining era. • A citizen science activity where visitors can set their phone on a designated point, take a picture, then later upload it for comparison with other photos. • Potentially, "Trailhead Info" providing a map and information about the route down to the glacier margin towards McCarthy, if the trail is developed.
6. Root Glacier Trail Gateway	• The glacier "anatomy" is visible and understandable here. • The landscape around the glacier is an artifact of glacier activity and reflects that activity in landforms and ecological succession. • Medial moraines reflect the junctions of many tributaries up near the great icefalls. • Glaciers can be traversed safely--with proper precautions. • "Plant succession reveals the timing of glacier retreat." Identify common plants that are associated with different phases of plant succession, and the subtler response of animals, including spruce beetles. • "Lateral moraines reveal the geometry of glacier retreat." Point out lateral moraines and trimlines, including the one where the exhibit is located, and describe the material they're made of (glacial till). Give special attention to the big erratics further along the trail. • "The glacier is born in the accumulation zone and dies in the ablation zone." Point out the perennial snows of Mt. Blackburn and the bare ice of the terminus area and explain how they are related. • "Each medial moraine is the product of two glaciers coming together." Identify the main moraine that separates Root and Kennicott Glaciers and use it to explain the dynamics of medial moraines and how they relate to debris cover. Include a map showing all tributaries of the Kennicott. • "Safe travel in a glacier environment." Talk about loose moraines, slippery ice, & moulins	• These items will be determined in the future, but the main idea is to have a landscaped overlook with benches, clear views, good footing, and a pavilion with multiple interpretive panels with multiple messages.

Interpretive Opportunities Summary, *continued*

Site	Messages	Products
7. Glacier Access Trail	Glacier thinning is occurring rapidly here, fast enough to require annual trail adjustments.	- A single, dispersed exhibit marking the retreat of the glacier edge at this location: - Inconspicuous ground-mounted markers (perhaps small tastefully painted boulders, or small low wooden stakes) with dates on them, showing approximately when, in the 20th century, the clean white glacier ice was at certain locations where hikers of the day could have gotten onto the ice margin. - A single, low, small exhibit sign mounted inconspicuously alongside the trail at the start of the monuments, near the location of the sign for the food cache (where the trail levels out after emerging from the brush). This sign would explain the exhibits further along.
8. Chitina Ranger Station	- The basics of glacier formation and flow-- what is a glacier and how does it work? - Lake Atna was a glacier-dammed lake of superlative proportions and gave the Copper Basin its distinct topography. - Glacial rivers have unique characteristics, and can host major salmon runs	- Basic interpretive panels, subject to local space constraints, sharing content with other contact stations: "How a glacier works." Mass balance and flow. - Statistics for shrinkage of park glaciers statewide. "Lake Atna" Explanation of the geomorphology of an ice-dammed lake. "Glaciers and salmon" Describe characteristics of glacier rivers and how salmon depend on them. - Others as developed for presentation directly by interpretive staff.
9. Copper Center Visitor Center	- The basics of glacier formation and flow-- what is a glacier and how does it work? - Glaciers, volcanoes, and water are a common, but dangerous, mix. - Glaciers of WRST are globally exceptional, but in many ways typical of thousands of others throughout the state.	- Basic interpretive panels, subject to local space constraints, sharing content with other contact stations: "How a glacier works." Mass balance and flow. - Statistics for shrinkage of park glaciers statewide. "Lahars and outburst floods." Geohazards associated with glaciers. - Others as developed for presentation directly by interpretive staff.

Interpretive Opportunities Summary, *continued*

Site	Messages	Products
10. Slana Ranger Station	• The basics of glacier formation and flow-- what is a glacier and how does it work? • Glacial rivers have unique characteristics, and can host major salmon runs • Lake Atna was a glacier-dammed lake of superlative proportions and gave the Copper Basin its distinct topography.	• Basic interpretive panels, subject to local space constraints, sharing content with other contact stations: • "How a glacier works." Mass balance and flow. • "Glaciers and salmon" Describe characteristics of glacier rivers and how salmon depend on them. • Statistics for shrinkage of park glaciers statewide. • "Lake Atna" Explanation of the geomorphology of an ice-dammed lake. • Others as developed for presentation directly by interpretive staff.
Type	Outreach Media	Description
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Personal Interpretive Services	• Outreach and Training	• Provide hands-on training that includes presentations and fact sheets to inform all NPS staff, shuttle bus drivers, pilots, and local guides. •
Personal Interpretive Services	• Education and Outreach – Educational Curricula	• Provide curriculum-based programs and information to assist visiting school groups, help youth make a greater connection with the environment. •
Non-Personal Interpretive Services	• Self-Guided Walking Tours	• Multiple self-guided walking tours, including topics such as Glaciers 101, Glacier Changes, Geology, and Glacier Features. The new WRST NPS App interface allows for the visitor with a mobile device to follow a predetermined "tour" that staff create. •
Non-Personal Interpretive Services	• National and Regional Outreach – Websites	• Use the park and regional websites to interpret the Kennicott Glacier changes.



Close up view of Kennicott Glacier. NPS/Neal Herbert.