



Kluane  
National Park  
and Reserve



# *The Alsek River*

A CANADIAN HERITAGE RIVER

**Third Ten-year Monitoring Report: 2009 to 2018**

Prepared by:

Kluane National Park and Reserve, Parks Canada  
for The Canadian Heritage Rivers Board

JANUARY 2019

Canadian  
Heritage  
Rivers  
System



Le Réseau  
des rivières  
du patrimoine  
canadien



Parks  
Canada

Parcs  
Canada

Canada

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Parks Canada. 2019. The Alsek River: A Canadian Heritage River. Third Ten-year Monitoring Report: 2009 to 2018. Report to the Canadian Heritage Rivers Board.

La rivière Alsek : une rivière du patrimoine canadien. Troisième rapport de surveillance décennal : 2009 2018.

Aussi disponible en français

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**Cover Photo: Lowell Glacier with the Alsek River in the foreground.**

## Executive Summary

The Alsek River is one of Canada's most outstanding wilderness rivers. It begins in Kluane National Park and Reserve, Yukon, and flows 250 km through the glaciated valleys of the St. Elias Mountains until it reaches the Pacific Ocean in Glacier Bay National Park and Preserve, Alaska. The entire length of the Alsek River falls within the Kluane / Wrangell–St. Elias / Glacier Bay / Tashenshini–Alsek UNESCO World Heritage Site, which is one of the largest internationally protected land-based ecosystems in the world. The Alsek River was designated a Canadian Heritage River in 1986, for its outstanding examples of northern natural heritage. Since designation, the river has been recognized for its significant cultural heritage, and become world renowned for its incredible white water rafting opportunities. The section of the Alsek River with status as a Canadian Heritage River is 90 km long; it lies entirely within the traditional territory of the Champagne and Aishihik First Nations (CAFN) and the boundaries of Kluane National Park and Reserve (KNPR), which is cooperatively managed by Parks Canada and CAFN.

Canadian Heritage Rivers are subject to reporting requirements in the form of annual reviews, as well as ten-year monitoring reports. This report, which is the third ten-year monitoring report, describes significant events, actions, and research that are relevant to the Alsek River during the period from 2009 to 2018, and outlines any changes or threats to the natural, cultural, and recreational values of the river. The status of management objectives, key actions, and recommendations for the river are also reviewed.

Since 2009, there have been three significant changes that have the potential to affect the natural values of the Alsek River. These three changes did not occur on the Alsek itself, but instead on rivers upstream in the watershed, which eventually feed into the Alsek.

Firstly, in the spring of 2016, there was a dramatic drainage reorganization caused by the rerouting of meltwater from the Kaskawulsh Glacier, which switched from flowing northward in the Slim's River (Ä'äy Chù) to flowing southward in the Kaskawulsh River. This increased water levels on the downstream Alsek River by up to one metre during peak melt season. Although this drainage reorganization has resulted in significant environmental impacts for the Slim's River and Kaskawulsh River, the increased water level of the Alsek River has had very minimal effects since it is already such a large-volume river. Monitoring work by Parks Canada staff has found that natural values remain unaffected, that cultural values are of sufficient distance away from the river to not be susceptible to flooding, and that recreational values are unaffected, as the increased water levels have not substantially changed the technical difficulty of the river.

## ... the Alsek River continues to possess the heritage values and meets the integrity guidelines for which it was originally designated, ...

Secondly, power generation demands are increasing on the Aishihik hydroelectric plant located on the Aishihik River, which flows into the Dezadeash River (Titl'at Mǎn Tágà) roughly 60 kilometers upstream from where the Dezadeash and Kaskawulsh rivers combine to form the Alsek River. The main effects of the hydro plant on the Alsek River are increased winter flow rates and possibly increased diurnal variability, but these effects are more pronounced on the Dezadeash and Aishihik rivers and less pronounced further downstream on the Alsek, where effects are further abated by the Alsek's large volume. Although there are detectable changes to the flow regime of the Alsek, these changes are minor to the extent that all key elements and ecosystem components are unaffected.

Thirdly, the frequency of discharges of treated effluent from the Haines Junction wastewater treatment facility has been increasing, which has the potential to negatively affect water quality in the downstream Dezadeash River wetlands. During an emergency discharge in 2015, four parameters exceeded acceptable thresholds of the water license at the discharge pipe and the discharge was terminated. Improvements were made to the facility, and Parks Canada developed a formal monitoring program to better understand potential effects on the Dezadeash and Alsek River corridor. Discharges in 2017 and 2018 had water quality which remained within acceptable thresholds. Negative impacts to water quality have not been observed on the Dezadeash River and thus 22 km downstream on the Alsek River, the natural aquatic ecosystem is considered unaffected.

Although these three changes present as threats, all of these changes originate upstream of the Alsek River, and downstream effects on the Alsek itself are minor to the extent that they have not negatively impacted the natural, cultural, and recreational values of the river. This report concludes that the Alsek River continues to possess the heritage values and meets the integrity guidelines for which it was originally designated, and that the river is worthy of continued designation as a river of national significance within the Canadian Heritage Rivers System.

**Measuring water conditions  
in Dezadeash wetlands.**



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## Introduction

The Canadian Heritage Rivers System (CHRS) was established in 1984, to help recognize and conserve Canadian rivers with exceptional natural, cultural, and recreational values. The program is a cooperative initiative of the federal, provincial, and territorial governments and is managed by the Canadian Heritage Rivers Board (CHRB). The CHRS is required to submit annual assessments and decadal monitoring reports for designated rivers to the CHRB in order to ensure that Canadian Heritage Rivers continue to possess the heritage and integrity values for which they were originally designated.

In 1986, the Alsek River in Kluane National Park and Reserve (KNPR) was named a Canadian Heritage River because of its outstanding examples of northern natural heritage. The initial ten-year monitoring report for the Alsek was released in 1997, and the second ten-year monitoring report was released in 2008.

The objectives of the third ten-year monitoring report for the Alsek River are to address the following items with respect to the last ten years:

- Describe significant events, actions, and research relevant to the Alsek River.
- Outline changes or threats to the state or condition of the natural heritage and natural integrity values for which the Alsek River was originally designated.
- Document major changes or threats to significant cultural and recreational values for which the river is also well known.
- Review the status of the Alsek River management objectives and key actions outlined in the 2010 Kluane National Park and Reserve Management Plan; review the status of the recommendations made in the previous ten-year monitoring report; and outline current recommendations.
- Provide a summary of conservation, stewardship, economic, and cultural benefits resulting from the Alsek River's designation as a Canadian Heritage River.



**The Dezadeash River and wetlands flowing towards the Alsek River.**

...one of Canada's most outstanding  
wilderness rivers.



**Rafters on the Lava rapids  
of the Alsek River.**

## Background

The Alsek River is one of Canada's most outstanding wilderness rivers. One of the first rivers to be named a Canadian Heritage River, the Alsek River received designation in 1986 because of its significant natural resources: massive ice fields, high mountain peaks, unique geologic history, coastal and interior plant communities, significant grizzly bear population, and diverse bird species. Fed by glacial meltwater from the world's highest coastal mountain range, the St. Elias Mountains, the Alsek River begins at the confluence of the Dezadeash (Titl'at Män Tágà) and Kaskawulsh rivers in the southwest corner of the Yukon Territory in Canada's Kluane National Park and Reserve (KNPR)

[Figure 1]. Here, the river flows alongside the Ice Field Range of the St. Elias Mountains where one can find the highest mountains in Canada. The river flows out of KNPR and into British Columbia's Tatshenshini-Alsek Provincial Park and eventually crosses the international border into the United States' Glacier Bay National Park and Preserve, where it drains into the Pacific Ocean after traversing 250 km of pristine, internationally protected wilderness. In fact, these protected areas, along with Wrangell-St. Elias National Park, have been declared a UNESCO world heritage site and make up one of the largest internationally protected land-based ecosystems in the world (Figure 1).

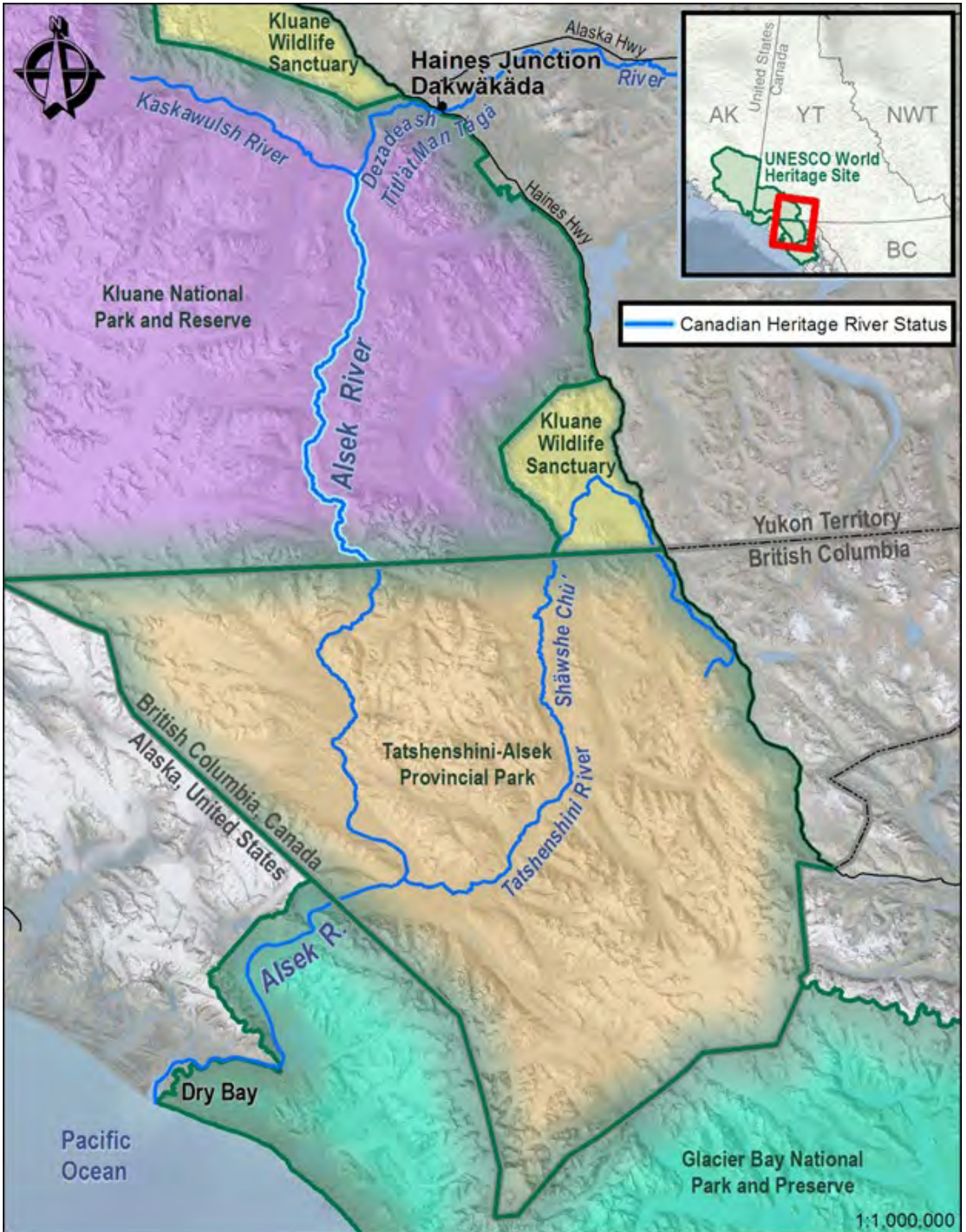
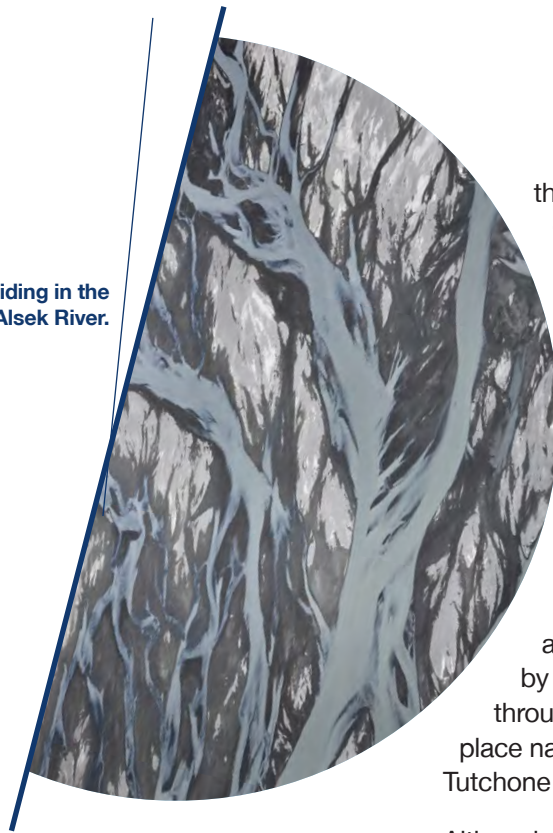


Figure 1. Geographic setting of the Asek River and protected areas that make up the UNESCO World Heritage Site.



Braiding in the Alsek River.



The Alsek River also possesses outstanding recreational values. It offers exceptional, high-quality rafting, kayaking or canoe-based wilderness recreation experiences characterized by flat to class IV+ waters, opportunities for solitude, natural quiet and self-reliance, pristine campsites, no support facilities and the chance to see moose, grizzly bear, Dall's sheep, mountain goats, glaciers, and icebergs. Visitors can enjoy these recreational experiences on their own, or through one of several rafting companies offering trips on the Alsek. The river is incredibly remote and all potential take-out locations on the river are only accessible by aircraft. Rafting trips can vary in length as 3-day trips down to Lowell Lake, or 14-day trips all the way to the ocean.

Providing a passageway between the interior and the coast, The Alsek and Tatshenshini rivers have a long history of use by the Dän (Southern Tutchone) of the interior and the Tlingit of the coast. It is along the Alsek–Tatshenshini watershed that the cultures of the Dän and Tlingit came together. Historic use of the watershed by the Dän and Tlingit dates as far back as the 1700s and was focused around the Tatshenshini River and the lower part of the Alsek River so that these two cultures could take advantage of the basin's rich salmon resource (Herbda et al., 2017). By foot over the frozen waters during the winter and with dugout canoes during the summer, The Dän and Tlingit cultures used the Alsek and Tatshenshini rivers as a travel corridor to move

throughout the land to hunt, fish, and trade. Copper, white marble, tanned skin garments, and furs were among some of the items that were transported along the watershed for trade. Along the Tatshenshini and Alsek rivers, the Dän and Tlingit cultures came together through marriage, trade, and the sharing of stories, songs, and dance. The cultural heritage values of the Alsek River are rooted in the strong cultural connection that these two cultures have to the Alsek–Tatshenshini watershed. Today, the Dän people of this area belong to the Champagne and Aishihik First Nations. The language used by the CAFN people is Southern Tutchone; throughout this document you will find that many place names and animal names will include a Southern Tutchone translation.

Although the Alsek River is 250 km long and crosses many different borders, the section of the Alsek River with status as a Canadian Heritage River is 90 km long and lies entirely within the traditional territory of the Champagne and Aishihik First Nations, and the boundaries of Kluane National Park and Reserve, which is cooperatively managed by Parks Canada and CAFN. The portion of the Alsek River with Canadian Heritage River status is thus managed by Parks Canada and CAFN, and KNPR's Management Plan provides the overall direction for the management of the Alsek River. This ten-year monitoring report was prepared by Parks Canada staff with input from CAFN. Although the Alsek River begins in KNPR, only one of the two main inputs for the river, the Kaskawulsh River, has headwaters within the park. The other main input, the Dezadeash River, begins outside of the park at Dezadeash Lake (Titl'at Män) and receives significant input from the Aishihik River before flowing into the park (Figure 2).

Given the Alsek's designation as a Canadian Heritage River, its location within Kluane National Park and Reserve and the even larger Kluane / Wrangel–St. Elias / Glacier Bay / Tatshenshin–Alsek World Heritage Site, the Alsek's natural, cultural, and recreational values are well protected, presented, and preserved for future generations. A plaque commemorating the designation of the river by the Canadian Heritage Rivers System is located at the Dezadeash River day-use area in Haines Junction.

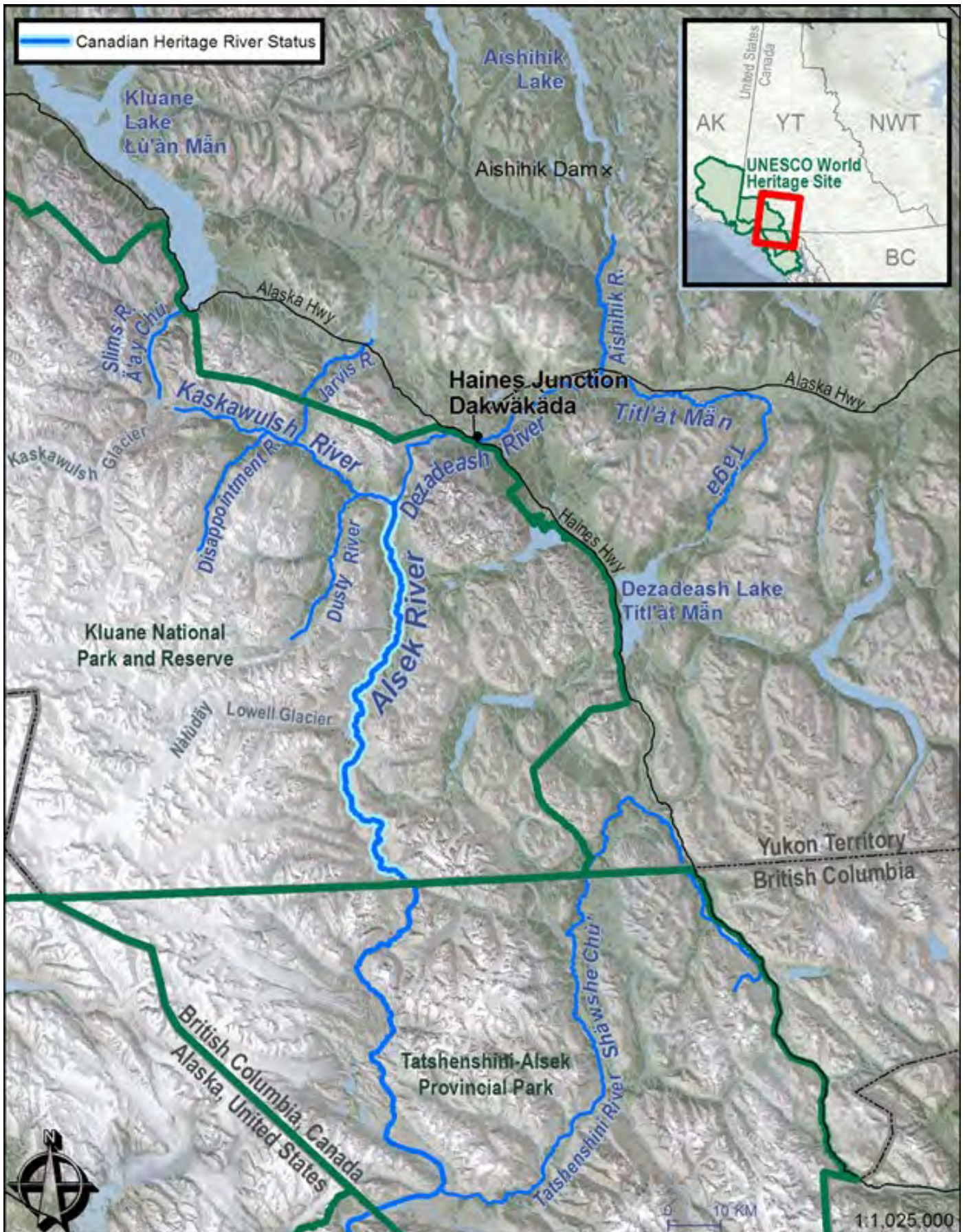


Figure 2. Geographic setting of the headwaters of the Alsek River.

# Chronology of Significant Events

The list below is a chronology of significant events, actions, and research since 2009 that are relevant to the Asek River watershed. Any significant events, actions, and research that involve a change or threat to the Asek River’s heritage values are discussed in more detail in the next section, “Changes and Threats to Heritage Values.”



Dall's sheep.

YEAR	EVENTS
2009-2018	<p><b>Dezadeash River (Tit'at Mān Tágà) Water Quality Monitoring:</b> With the headwaters of the Asek River being the confluence of the Dezadeash and Kaskawulsh rivers, the Dezadeash is one of the main sources of the Asek River. Since 1993, water samples have been collected at least monthly from the Dezadeash River by Parks staff as part of a long-term partnership with the Water Quality Monitoring Network of Environment and Climate Change Canada. Water quality is determined using the Canadian Council of Ministers of the Environment Water Quality Index for the protection of aquatic life (Saffran et al., 2001). Dezadeash River water quality has remained in a state of good ecological integrity with a stable trend (Wong, 2017).</p>
2009-2010	<p><b>Surge of the Lowell Glacier (Nätüdäy):</b> As reported in the Journal of Glaciology (Bevington and Copland, 2014), the Lowell Glacier has surged five times since the late 1940s, with its most recent surge occurring in 2009 and 2010. It was concluded that the size of surges of the Lowell Glacier is decreasing over time, suggesting that it is becoming less and less likely that Haines Junction will be subject to flooding as a result of damming of the Asek River by the Lowell Glacier.</p>
2009-2017	<p><b>Dall's Sheep (Mäy) Monitoring:</b> Aerial surveys of Dall's Sheep were carried out by KNPR and CAFN staff in the Asek watershed in 2009, 2014, and 2017, as part of the Auriol Sheep Population Survey for Kluane's ecological integrity monitoring program. The Auriol sheep population declined dramatically in the 1980s, and has since remained below historical thresholds with a stable trend. The most recent surveys confirm that the population is still relatively low but stable (Blakeburn and Wong, 2017; Wong, 2017). Parks Canada has contributed long-term data to a range-wide research study on Dall's Sheep and snow conditions (van de Kerk et al., 2018).</p>
2010-2018	<p><b>Mountain Goat (Ambäy) Monitoring:</b> Goatherd Mountain (Nätüdäy Dhǎi) and the east side of the Asek River have productive alpine habitats and provide ample forage and protection for one of the larger populations of mountain goats in the park. This population is in the flight path of fixed-wing flightseeing tours and helicopters used to portage rafters on the Asek River. The Goatherd Mountain population has been monitored since 1977, to assess possible impacts of climate change and aerial disturbance and, since 2009, was monitored in 2010, 2013, 2015, and 2018. The abundance of mountain goats in Kluane National Park and Reserve appears to be stable and in a good state of ecological integrity (Wong, 2017).</p>
2010	<p><b>KNPR Management Plan:</b> The most recent version of the Kluane National Park and Reserve Management Plan was released. The document provides an overview of the management plan for KNPR and includes a section on the management approach specific to the Asek and Dezadeash River Valley.</p>
2011-2018	<p><b>Moose (Kanäy) Monitoring:</b> Aerial population surveys of the Auriol moose subpopulation were conducted by Parks Canada and CAFN staff in 2011, 2012, 2014, 2015, and 2018. This subpopulation of moose, which includes moose in the Asek River watershed north of Raft Creek, is considered to be in good ecological condition with a stable trend (Blakeburn and Wong, 2015; Wong, 2017).</p>

YEAR	EVENTS
2011	<ul style="list-style-type: none"> <li>• <b>Aishihik Hydro Plant:</b> The Aishihik hydro plant is located on the Aishihik River, which flows into the Dezadeash River, and the Dezadeash is one of the two main inputs for the Alsek River. In 2011, Yukon Energy added a seven-megawatt hydro generator to their facility. Further downstream on the Alsek River, the effects of the hydro plant increase the winter flow rate and possibly cause stronger diurnal patterns. This topic is discussed in the “Changes and Threats to Heritage Values” section.</li> <li>• <b>Kaskawulsh Glacier:</b> A study by Foy et al. (2011) was published in the Journal of Glaciology, which reported on the extent to which the Kaskawulsh Glacier had decreased in size. The glacier decreased in area by 1.53% and decreased in volume by 3.27 to 5.94 cubic kilometres from 1977 to 2007. From 1956 to 2007, the terminus of the glacier retreated by 655 metres.</li> </ul>
2012	<ul style="list-style-type: none"> <li>• <b>Baikal Sedge Recovery Strategy:</b> The Alsek Valley offers critical habitat for Baikal Sedge (<i>Carex sabulosa</i>), a species at risk with COSEWIC and SARA status. The population on the Alsek Dunes represents 75% of the total population, and 45% of the total area occupied by Baikal Sedge in Canada, making the Alsek Valley home to the largest population of Baikal Sedge in Canada. In 2012, the Baikal Sedge Recovery Strategy was posted on the species-at-risk registry. Maintenance of natural ecosystem processes in the Alsek dunes is the key requirement for this species in Kluane.</li> <li>• <b>Packrafting:</b> Beginning roughly in 2012, packrafting started to gain popularity on the Alsek River, either by raft-supported trips to Dry Bay where visitors return by plane, or by self-supported trips to Lowell Lake where visitors then hike back via Mush Lake (Si Mǎn) or the Cottonwood Trail near Kathleen Lake (Mǎt’ǎtǎna Mǎn).</li> </ul>
2013	<p><b>Alsek River Exhibits:</b> In 2012, the KNPR Visitor Center moved to a new location shared with CAFN, and new exhibits were opened in 2013, which featured the history and natural wonders of the Alsek River in both film and interpretive panels.</p>
2014	<ul style="list-style-type: none"> <li>• <b>Monitoring by Raft - Forest Monitoring Plots:</b> Parks Canada staff used rafts on the Alsek River to assess river conditions and campsite integrity, and conduct environmental monitoring of the forest recovery after the spruce bark beetle outbreak in the late 1990s along the river corridor. Four new permanent monitoring plots were established.</li> <li>• <b>Bruce Spanworm:</b> Outbreak of Bruce spanworm was observed on defoliated scrub birch (<i>Betula glandulosa</i>) in the alpine along the Alsek River (Carmen Wong, pers. comm. 2018).</li> </ul>
2015-2018	<p><b>Water Quality Monitoring:</b> Parks staff developed a monitoring program for the discharge of treated wastewater effluent into the Dezadeash River wetlands from the Village of Haines Junction wastewater treatment facility. This topic is discussed in the “Changes and Threats to Heritage Values” section.</p>
2016	<ul style="list-style-type: none"> <li>• <b>River Piracy Event of the Slim’s River (ǎ’ǎy Chù) and Kaskawulsh Rivers:</b> In May of 2016, the discharge from the melting Kaskawulsh Glacier was rerouted from flowing north in the Slim’s River to flowing southeast in the Kaskawulsh River (Shugar et al, 2017), resulting in dramatic downstream ecosystem changes, such as increased water level on the Alsek River by up to one metre. Based on the results of their study, Shugar et al. concluded that this sudden change in flow, known as river piracy, was a result of post-industrial climate change. This topic is discussed in the “Changes and Threats to Heritage Values” section.</li> <li>• <b>Baikal Sedge COSEWIC Status:</b> Designated as “Threatened” in 2005, the COSEWIC status of Baikal Sedge was re-examined and down-listed to “Special Concern” in April 2016, because populations were found to be more stable than initially thought.</li> </ul>
2017-2018	<p><b>Water Quality Monitoring:</b> KNPR staff collaborated with local high schools to create an opportunity for students to assist with water sampling on the Dezadeash River as part of Parks Canada’s monitoring of the treated wastewater effluent from the Village of Haines Junction.</p>

YEAR	EVENTS
2017	<ul style="list-style-type: none"> <li>• <b>Flooding Impacts and Baikal Sedge:</b> Designated campsites used by rafting groups on the Alsek River were assessed for level of impact resulting from increased water levels from the river piracy event, and for level of impact resulting from human use. Using standardized methodology (Morris, 2007), it was found that the level of impact from human use was very low, which was consistent with 2007 findings. The level of impact resulting from high water affected campsites to varying degrees, either because of high-water effects on landing sites, and/or evidence of current or past flooding of camping areas. The overall level of impact was low. Additionally, the three main campsites used by river users were mostly unaffected by high water levels. The Baikal Sedge critical habitat assessment found that the increased water level had a very low level of impact, as there was only minor overlap between flooded areas and critical habitat (Letendre, 2017).</li> <li>• <b>Technical Compendium:</b> The Technical Compendium to the State of the Park Report was released, which summarized the analyses used to determine the current status and trend of ten monitoring measures reported in the 2017 State of the Park Report.</li> <li>• <b>Aishihik Hydro Plant:</b> A study by Baraer (2017) evaluated the extent to which Aishihik hydro plant operations influenced downstream hydrology. This topic is discussed in the “Changes and Threats to Heritage Values” section.</li> <li>• <b>Botanical Expedition:</b> Parks Canada staff, plant and insect experts, traveled to various areas along the Alsek and Kaskawulsh rivers looking for federally listed and rare species. The presence of Dune Tachnid Flies (listed under Species at Risk) was confirmed on the lower Alsek Dunes. New observations also expanded the known range of the coastal plant, chocolate lily.</li> </ul>
2018	<ul style="list-style-type: none"> <li>• <b>Monitoring by Raft – Campsite Assessments and Bear Risk:</b> From July 11 to 13, Parks staff conducted environmental monitoring work on the Alsek River. The main objectives were to take water samples as part of the sewage discharge monitoring project, set up a permanent photo point to compare the condition of the Lowell glacier to historical and future photos, determine the impacts of the increased water level on campsites and environmentally sensitive areas, inventory species at risk, and conduct bear risk assessments at designated campsites.</li> <li>• <b>Packrafting:</b> The first self-supported packraft descent of the entire Alsek River (with portage of Turnback Canyon) was completed in June, 2018 (Meiklejohn, 2018).</li> <li>• <b>Commemorative Plaque:</b> KNPR staff assessed the physical condition of the CHR commemorative plaque for the Alsek River and determined that it was in good condition. KNPR staff informed CAFN of the CHRS Reconciliation Plaque initiative, and invited feedback regarding whether the plaque should be revised to incorporate new content. CAFN may be interested in proposing new content for the plaque at some point in the future, but not this year. The plaque content currently includes English, French, and Southern Tutchone translations.</li> <li>• <b>Testing of Electric Fences:</b> Rafting groups on the Alsek River are required to use IGBC-approved bear-resistant containers or electric fences for the storage of food and other attractants. Starting in 2018, KNPR introduced the requirement for private rafting groups to not just bring this equipment, but also to demonstrate that they possess an approved fence, and that they are capable of correctly setting it up in a way that meets IGBC requirements.</li> </ul>

# Changes and Threats to Heritage Values

The section outlines any positive or negative changes or threats to the state or condition of the natural heritage and natural integrity values for which the Alsek River was originally designated. It also documents major changes or threats to significant cultural and recreational values for which the river is also well known. Changes and threats are briefly summarized in the table below and are addressed in more detail under the sections following the table.

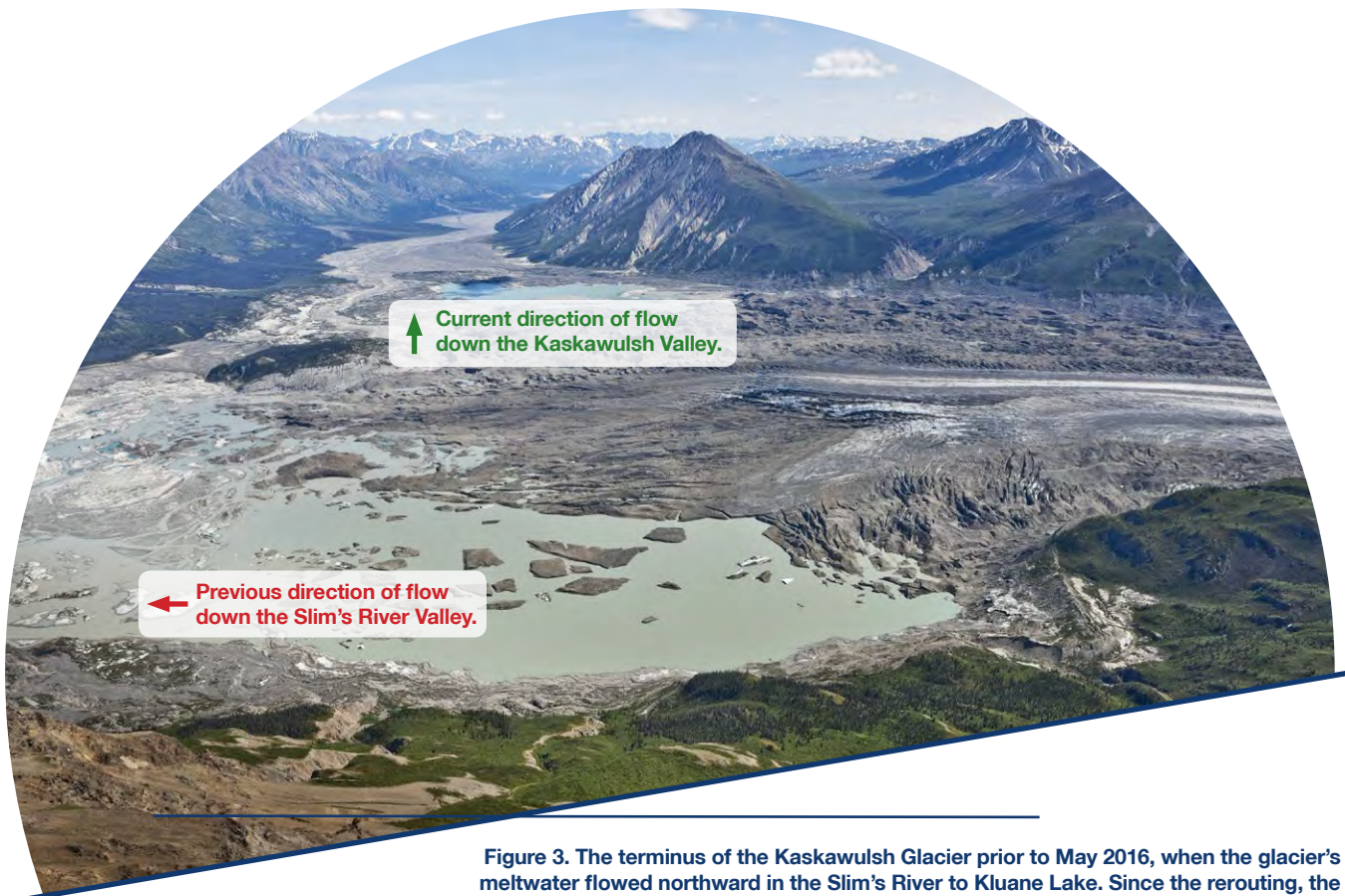


Rafters on Lowell Lake.

## Brief Overview of Changes and Threats

Threat or Change	Value(s) Affected	Description of Threat or Change	Reason for Threat or Change	Actions Taken in Response
River Piracy Event	River Size; Drainage Basin; Community of Rare Plant Species	Increase in water level on the Alsek River by up to 1 meter.  Threat to the sensitive community of SARA-listed Baikal Sedge.	In 2016, meltwater from the Kaskawulsh Glacier switched from flowing north in the Slim's River (Á'äy Chù) to flowing east in the Kaskawulsh River, which flows into the Alsek River.	Increased research, monitoring and public outreach to understand event and impacts.
Aishihik River Hydroelectric Dam	River Size; Seasonal Variation; Aquatic Ecosystem	Increase in water level fluctuations and overall increase in winter water level on the Dezadeash (Titl'at Män Tägà) and Alsek Rivers.	Increased power demands on the hydro plant on the Aishihik River, which flows into the Dezadeash and Alsek rivers.	Parks Canada engagement in environmental assessment process.
Haines Junction Waste Water Treatment Facility	Water Quality; Aquatic Ecosystem	Threat to water quality.	Increased discharge of treated sewage effluent from the Haines Junction waste water treatment facility into the Dezadeash River.	Formalized monitoring established by Parks Canada.
Spruce Bark Beetle Outbreak	Terrestrial Ecosystems	A spruce bark beetle outbreak from 1995 to the mid 2000's resulted in extremely high levels of mortality in white spruce.	The unprecedented scale of the outbreak is thought to have occurred due to a faster progression through life cycles among the beetles and because of unusually mild winters resulting in increased beetle survival.	KNPR staff have established a forest monitoring program to determine whether the structure and composition of spruce-dominated forests in KNPR will recover to similar conditions prior to the outbreak.

Threat or Change	Value(s) Affected	Description of Threat or Change	Reason for Threat or Change	Actions Taken in Response
Wood Bison Reintroduction Outside of KNPR	Terrestrial Ecosystems	In the 1980's, Wood Bison ( <i>Bison bison athabasca</i> ) were reintroduced to the Yukon outside of KNPR in the Aishihik Lake area. Bison have begun entering the park and possibly the Alsek River Valley.	The population of bison has grown significantly and has started to expand to other areas.	Discussion of management of bison in the Park is ongoing with CAFN and Kluane First Nation and the Yukon Bison Technical Committee.
Changes in Recreational Use	Terrestrial and aquatic ecosystems	The number of rafting trips on the Alsek River has decreased by roughly 30% compared to the previous reporting period. Packrafting, a relatively new sport, is starting to gain in popularity on the river.	The factors associated with the decrease in rafting trips are unknown at this point. Packrafting has increased on the Alsek River because it is a new sport that has recently gained popularity.	KNPR has adapted to this new form of recreation and travel by updating its visitor safety messaging and by monitoring for potential impacts in areas that were previously not usually visited.
Loss of First Nation Connection to the Land.	Terrestrial and aquatic ecosystems  Spiritual Associations	Subsistence harvest and gathering was banned in the Kluane area from 1943 to the early 2000's.	The Kluane Wildlife Game Sanctuary was created in 1943 for the protection of wildlife. In 1973, much of the game sanctuary became Kluane National Park and Reserve, but it wasn't until the early 2000s that the Canadian Government finally recognized that First Nations people have subsistence harvesting rights on their traditional territories in KNPR.	Since the 1990s, numerous management actions were implemented to reintegrate the Champagne and Aishihik and Kluane First Nations back into the park, such as the Healing Broken Connections Initiative.



↑ Current direction of flow down the Kaskawulsh Valley.

← Previous direction of flow down the Slim's River Valley.

Figure 3. The terminus of the Kaskawulsh Glacier prior to May 2016, when the glacier's meltwater flowed northward in the Slim's River to Kluane Lake. Since the rerouting, the glacier's meltwater flows eastward in the Kaskawulsh River, which flows into the Alsek River.

## River Piracy Event: Climate Change and the Retreat of the Kaskawulsh Glacier

The Kaskawulsh Glacier, nearly 80 km in length, is one of the largest glaciers in the St. Elias Icefield. In the eighteenth century, the Kaskawulsh reached its maximum extent. Since the nineteenth century, however, the glacier has been retreating (Foy et al., 2011). The terminus of the Kaskawulsh Glacier is now located at the beginning of two divergent river valleys, which forms a drainage divide for the Slim's River (Ä'äy Chù), in the Slim's River Valley, and the Kaskawulsh River, in the Kaskawulsh River Valley (Figure 3). Since the middle of the eighteenth century, while a portion of the meltwater from the Kaskawulsh Glacier flowed eastward in the Kaskawulsh River—which flows into the Alsek River and eventually the Pacific Ocean—most of the meltwater from the Kaskawulsh Glacier flowed northward in the Slim's River, which flows into Kluane Lake (Lù'àn Mǎn) and the Yukon River watershed, and eventually the Bering Sea (Shugar, 2017). This was the drainage pattern of the Kaskawulsh Glacier until a dramatic change suddenly occurred in May 2016.

The effects of melting caused a change in the structure of the glacier's terminus, which altered the drainage pattern of the glacier's meltwater, causing it to flow more eastward than northward. Since the Kaskawulsh has retreated to the extent that the glacier's terminus lies at the fork of the two divergent river valleys, the rerouting inevitably led the vast majority of the meltwater to start flowing east into the Kaskawulsh River instead of north into the Slim's River.

This rerouting of the headwaters from one drainage into a completely different drainage, referred to as a river piracy event, made international headlines. This was the first documented case of river piracy in modern history. Such a dramatic and rapid drainage reorganization has caused significant changes and a variety of impacts on local ecosystems. There are a number of potential implications for the Slim's River Valley and Kluane Lake areas, such as changes to sediment transport, an increase in dust storms, nutrient balances, fish populations and habitat, and particularly noteworthy, the decreased water level of Kluane Lake and the potential for it to decrease below its outlet, making it a closed basin.



The river piracy event and increased discharge of the Kaskawulsh River created changes in the Alsek River corridor as well. The water level of the Alsek increased substantially, exceeding historic maximum levels for the time of year by up to one metre in July 2016. With the significant increase in water level, KNPR staff began monitoring the potential effects on the heritage values of the Alsek River.

In 2017, KNPR staff carried out assessments of potential flooding impacts on designated campsites along the river, evaluated the potential threat on Baikal Sedge critical habitat, and evaluated whether there were any noticeable effects on the technical difficulty of the river for recreational users. It was found that the level of impact resulting from high water affected campsites to varying degrees, either because of high-water effects on landing sites, and/or evidence of current or past flooding of camping areas, but overall there was a low level of impact. Additionally, the three main campsites used by river users were mostly unaffected by high water levels. The Baikal Sedge critical habitat assessment found that the increased water level had a very low level of impact, as there was only minor overlap between flooded areas and critical habitat (Letendre, 2017). The potential increase in level of difficulty for river runners was evident at significant rapids, but not substantial enough to warrant a change in the difficulty rating of the river.

Water levels on the Alsek were similarly high in 2018. In July, KNPR staff conducted monitoring work by raft on the river, starting at Serpentine Creek and ending at Lowell Lake. Results regarding the potential impact on natural values resulting from increased water levels were similar to the previous year's results. The level of threat to natural values was very low, and the threat to cultural values along the river was even lower. Cultural values, such as historical cabins, have not been affected by higher water levels because they are located far enough away from the river.

The river piracy event ultimately occurred because of the Kaskawulsh Glacier's long pattern of retreat back to the head of the Slim's River Valley, where the seemingly minor alteration in the meltwater drainage pattern abruptly resulted in the complete rerouting of drainage from the Bering Sea to the Pacific Ocean. Although the Kaskawulsh Glacier has been retreating since the nineteenth century, retreat accelerated in the industrial age of the twentieth and early twenty-first centuries.

Over the relatively short period from 1956 to 2007, Foy et al (2011) showed that the Kaskawulsh retreated the remarkable distance of 655 metres back up the Slim's River Valley. Based on an analysis by Shugar et al. (2017), it was demonstrated that there was only a 0.5% chance that the extent of the Kaskawulsh Glacier's retreat could have occurred due to natural climate variability, leading to the conclusion that the retreat, and the resulting river piracy event, was the result of post-industrial climate change. Shugar et al. predict that this dramatic change is likely to be permanent, and that there is potential for the Kaskawulsh River to eventually capture the Kluane Lake drainage.

The impacts and changes resulting from the climate-induced retreat of the Kaskawulsh Glacier and the resulting river piracy event were immediate and immense, and point toward the need for a greater awareness and monitoring effort of the effects of climate change that occur more gradually and subtly, yet are equally significant. Aside from Parks Canada's assessment work on the river, the following research and public outreach events have occurred since the river piracy event:

- Summer 2016: Researchers conduct research to determine how the river piracy event occurred (Shugar et al. 2017)
- May 2017: Kluane Lake Research Summit
- 2017: Parks Canada establishes permanent photo points of the Kaskawulsh and Slim's River
- Dust research started in the Ä'äy Chù floodplains.
- 2018: Event profiled on national news show by Canadian Broadcasting Corporation.
- 2018: Parks Canada develops new interpretative messaging for local interpretative centre with a strong climate-change message.

Parks Canada staff and other researchers will continue to monitor the effects of the river piracy event. While this is a large landscape change resulting in widespread environmental impacts, effects on the Alsek River have been minimal. The Alsek River basin has received this amount of water before during Holocene configurations of the drainage basin (Shugar et al., 2017), and thus it is adapted to receiving increases in flow volume. Furthermore, since the Alsek is already such a large-volume river, it has much resilience to accommodate the increased input from the Kaskawulsh River.

## Aishihik River Hydroelectric Plant: Increasing Energy Demands

The Aishihik hydroelectric plant, which has been active since 1975, provides power to communities throughout the Yukon and is the only hydroelectric facility in the Yukon that is capable of storing power (Yukon Energy, 2018). The hydro plant is located on the Aishihik River, which then flows into the Dezadeash River (Titl'at Mān Tágà) roughly 60 kilometres upstream from where the Dezadeash and Kaskawulsh rivers combine to form the Alsek River (Figure 2). In 2017, a preliminary study used historical discharge records to determine the extent to which the operations of the Aishihik hydro plant influenced downstream hydrology (Baraer, 2017). The study characterized the hydrological regime of the Aishihik, Dezadeash, and Alsek rivers, and estimated the influence of the Aishihik hydro plant on the discharge rates and diurnal variability of the Dezadeash and Alsek rivers.

The flow regime of the Aishihik River is particularly affected during the winter months when power generation demands are greater, resulting in increased discharge rates for these months. This effect is also evident downstream in the flow regimes of the Dezadeash and Alsek rivers. The yearly average contribution of the Aishihik River to the total flow volume of the Dezadeash River is roughly 20%. From December to March, however, the Aishihik River makes up more than 50% of the discharge of the Dezadeash. Further downstream on the Alsek River, the yearly average contribution of the Aishihik River to the total flow volume of the Alsek is roughly 5%, yet between December and March, the Aishihik contributes around 30% of the discharge of the Alsek River. It is important to note, however, that given the absence of data prior to the installation of the dam, it is difficult to know what proportion of the Aishihik's contribution is due to the effects of the dam and what proportion of the contribution is due to natural factors. The Alsek River significantly decreases in size during the winter months because it is a glacier-fed system; it can therefore be expected that the percent contribution from the lake-fed Aishihik River would increase during the winter months. Although the percent contribution of the Aishihik to the Alsek substantially increases to 30% during the winter months, it is difficult to know what proportion of the increase is due to the effects of the dam

and what proportion is due to natural factors. However, based on the findings in Baraer's report, it is clear that a significant proportion of the increase is due to the effects of the dam.

Baraer's study also looked at flow rate changes within a 24-hour period, or the diurnal variability, of the Aishihik, Dezadeash, and Alsek rivers. There is significantly more diurnal variability upstream in the watershed for the Aishihik River, which has resulted in adverse environmental effects such as ice damming, flooding, and the formation of shell ice and large ice ledges on the shores of open water, which inhibit the travel of wildlife. The diurnal variability in the flow rate of the Aishihik River from power generation was also evident downstream on the Dezadeash River, but to a much lesser extent, due to the buffering effects brought about by the Dezadeash's larger volume and because diurnal variation decreases the further away from the source of the variation. Further downstream in the watershed, the extent of diurnal variability is less obvious for the much larger volume Alsek River. Additionally, due to a lack of hourly-data availability for the Alsek River, it was not possible to make conclusions regarding the extent of diurnal variability on the Alsek River. The Aishik hydro plant is due for relicensing by the Yukon Water Board in 2019. Parks Canada will be submitting a synopsis of the downstream impacts described above during the environmental assessment. Although there are significant changes to the flow regimes of rivers upstream in the watershed, the flow regime changes to the Alsek River are minor to the extent that all key elements and ecosystem components are unaffected.

## Village of Haines Junction Wastewater Treatment Facility

The sewage treatment facility in the Village of Haines Junction treats wastewater from the surrounding municipality of approximately 900 people. After undergoing treatment, the water is discharged periodically to free up volume in the facility. The treated discharge flows through a drainage channel for approximately 1.3 km before entering KNPR at the Dezadeash River (Titl'at Mān Tágà) wetlands (Figure 4). The discharge takes about two days to pass through the wetlands and enter the Dezadeash River. The Alsek River begins approximately 22 km downstream of this point.



Figure 4.  
The Dezadeash River wetlands.

Since the facility opened in 1986, there have been nine discharges from 1990 to 2018. Historically, discharges occurred every four to five years. Since 2011, the frequency of discharges has increased to every other year or annually due to increased water use (Figure 5). In 2015, an emergency discharge resulted in the estimated release of 144,789.1 m<sup>3</sup> to 151,048.0175 m<sup>3</sup> of water to provide adequate storage volumes and prevent the structural failure of the facility. Exceedances occurred four times during this discharge for the parameters pH, total suspended solids, and fecal coliforms (Gibson, 2015). In 2017, the scheduled discharge was delayed due to high pH exceeding the water licence in Cell 3, which required the addition of aluminum sulphate to lower the pH.

In partnership with the VOHJ, Environment Yukon, and Environment Canada, Parks Canada has been monitoring the treated wastewater effluent to better understand the effect it has on the surrounding wetland and the greater Dezadeash River. Monitoring that has been completed includes total metals, pharmaceuticals, and artificial sweeteners as wastewater tracers within the wetland complex. Preliminary results indicate that the levels of mercury, various metals, pharmaceuticals and personal

care products in the effluent are very low, and are not of concern at this point. Inputs of nitrogen and phosphorus appear to be mitigated by the Dezadeash River wetlands such that water quality further downstream in the Dezadeash River and the Alsek River have not been impacted by these discharges. Parks Canada will continue to monitor the treated wastewater effluent to better understand the potential effects that it may have on the aquatic ecosystem for the Dezadeash and Alsek rivers.

## Spruce Bark Beetle Outbreak

From 1995 to the mid-2000s, there was an outbreak of spruce bark beetle (*Dendroctonus rufipennis*) in southwest Yukon and Alaska, which affected 82% of spruce (*Picea glauca*) dominated forests in KNPR (Wong, 2017). The Alsek River corridor was the epicenter of the outbreak when it began, and by 2005, 80% to 90% of the trees in the Alsek River corridor had been killed (Garbutt, 2006). By the end of the outbreak, 44% of mature spruce trees were killed in affected forests in KNPR. The unprecedented scale of the outbreak was thought to have occurred due to a faster progression through life cycles among the beetles and because of unusually

mild winters resulting in increased beetle survival.

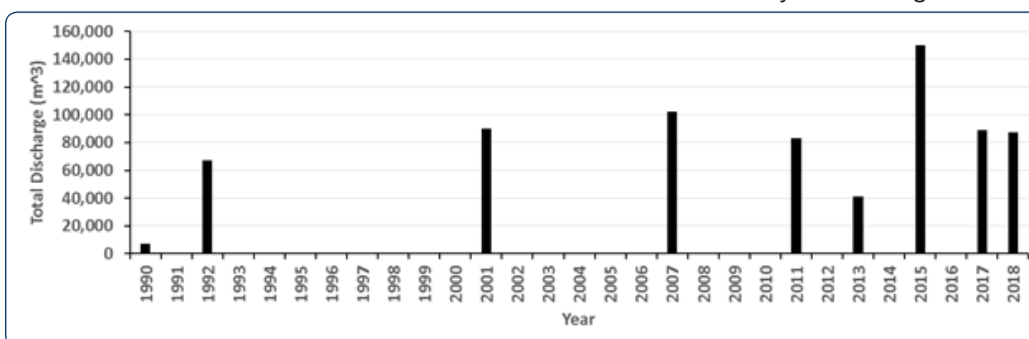


Figure 5. Total discharge in cubic meters of each discharge from the Village of Haines Junction Wastewater Treatment Facility since 1990.

Since the outbreak, KNPR staff have monitored whether the structure and composition of spruce-dominated forests in KNPR will recover to similar conditions prior to the outbreak (Wong, 2017). From 2009 to 2010, 50 permanent sample plots were established, and in 2014, 4 additional plots were established in the Alsek River corridor. Sample plots were monitored in 2009, 2010, and 2015. Forest structure was assessed in terms of basal area of live spruce, density of tree regeneration, resilience index, and volume of downed dead wood. Forest composition was assessed in terms of relative dominance of deciduous trees, ratio of willow clumps to tall spruce regeneration, and percent change in cover of berry-bearing shrubs. According to the Parks Canada rating system for ecological integrity, the forest structure was assessed to be in fair ecological condition and stable, and forest composition was assessed to be in good ecological condition but declining. KNPR will continue its monitoring framework to better understand the long-term ecological effects resulting from the spruce bark beetle outbreak.

## Wood Bison Reintroduction Outside of KNPR

In the 1980s, Wood Bison (*Bison bison athabasca*) were reintroduced to the Yukon outside of KNPR in the Aishihik Lake area to support the national effort of recovering wood bison. The Aishihik population of bison has grown significantly and has started to expand to other areas, surpassing predetermined goals. Individuals have begun entering the park and possibly the Alsek River

Valley, but no groups have yet to establish in the Park. Although wood bison historically occurred in the Kluane region at least 2,000 years ago, there is controversy about the expansion of the Aishihik herd (Markel and Clark 2012). There is a concern that there is no ability to control the population with hunting inside the Park, and that bison could threaten to displace other species and degrade grasslands. This concern was reflected in the Management Plan that bison should be removed where ethically feasible if found within a Bison Free Zone adjacent to the Park (Government of Yukon 2012). Discussion of bison management in the Park is ongoing with CAFN, Kluane First Nation, and the Yukon Bison Technical Committee.

## Changes in Recreational Use

Rafting trips on the Alsek River begin down the Alsek Valley road on the Dezadeash River (Titl'at Mān Tágà) in KNPR. The put-in location is the only part of the river accessible by road, making all three of the main take-out locations only accessible by aircraft. The first potential take-out is a two-to-three-day trip to Lowell Lake in KNPR. The second take-out is in Tatshenshini-Alsek Provincial Park at Turnback Canyon, which is a 7 km long canyon with class VI white water. This canyon is rarely attempted by expert kayakers and is not run by rafters. If continuing beyond the canyon, rafting groups use a helicopter to portage the canyon. Groups that continue beyond Turnback Canyon commit to the full 14-day trip to the end of the Alsek River, where it flows into the Pacific Ocean at Dry Bay in Glacier Bay National Preserve.

There has been a decreasing trend in the total number of rafting groups on the Alsek River over the last 25 years (Figure 6). For example, in the reporting period for the second ten-year monitoring report, from 1997 to 2008, there was an average of 22 rafting groups per season. During the reporting period for the third ten-year monitoring report, from 2009 to 2018, there was an average of 15 groups per season, a decrease of roughly 30%.

Although the ratio of commercial groups to private groups has always varied widely, the number of commercial groups has almost always been higher than the number of private groups from season to season. This trend was consistent from 2009 to 2018 (Figure 7), as the number of private groups

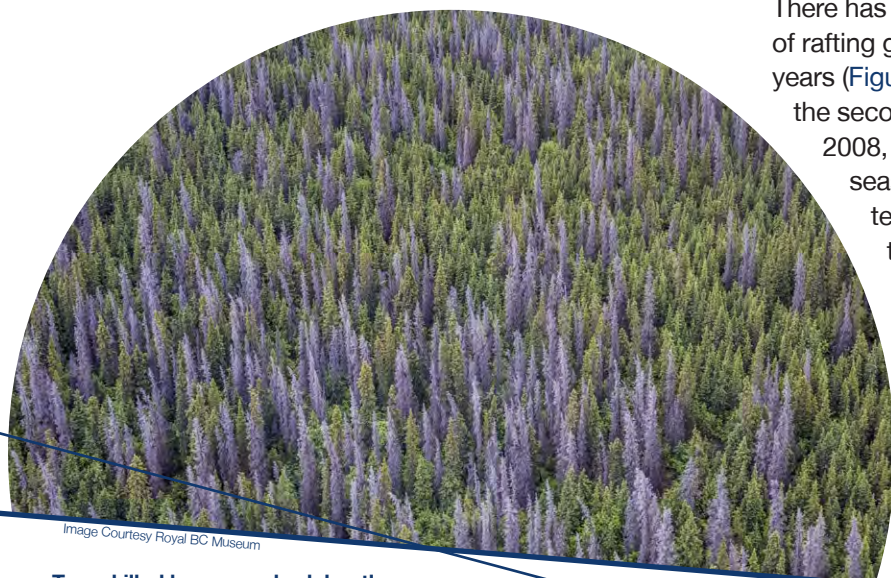


Image Courtesy Royal BC Museum

Trees killed by spruce bark beetles.

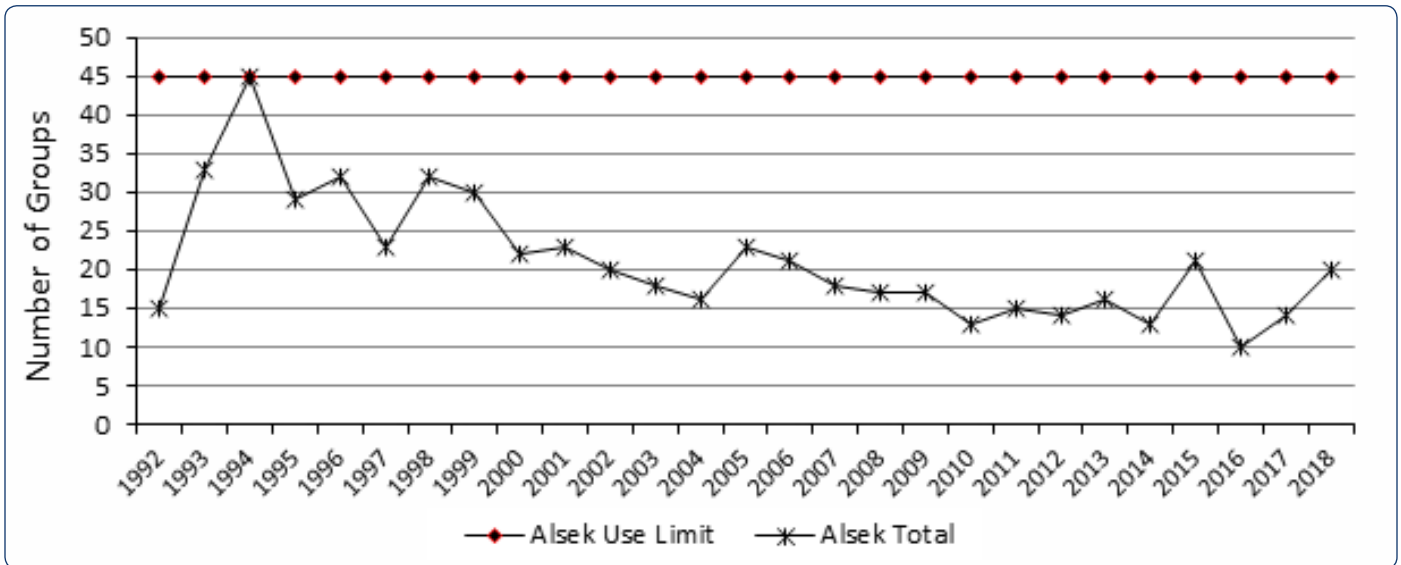


Figure 6. Total number of groups rafting the Alsek River each season compared to the maximum number of groups permitted on the river in one season (45 groups).

never exceeded the number of commercial groups. From 1997 to 2008, commercial groups averaged 53% of all rafting trips on the Alsek. This percentage rose to 66% from 2009 to 2018.

Recreational use of the Alsek River by rafters has been limited to one departure about every second day as a means of maximizing resource protection and maintaining the premier wilderness experience offered along the river. The maximum number of trips permitted on the Alsek River in one season is 45 trips. Monitoring of recreational use and level of environmental impact remains an important objective.

Another recreational activity that occurs in the Alsek River Valley is commercial flight tours for sightseeing using fixed-wing aircraft. Tours are flown throughout the icefields, and flight paths commonly include the Alsek River Valley to and from Lowell Lake. In 2016, in order to help minimize aerial disturbance to wildlife, KNPR staff developed an informative pamphlet intended for pilots and flight tour companies, which outlined the regulations and altitude recommendations for flying over wildlife.

Packrafting has become more popular in KNPR in recent years. On the Alsek River, packrafting trips on the full length of the river are most commonly supported by

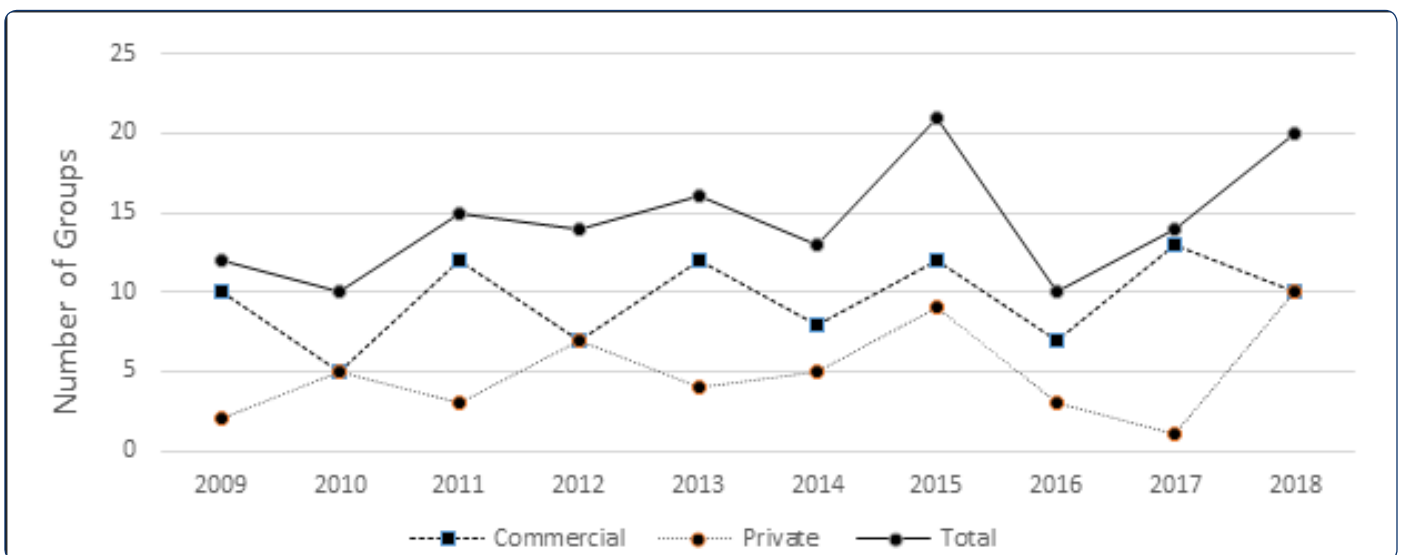


Figure 7. Total number of rafting groups on the Alsek River each season broken down by number of commercial groups and number of private groups.

full-size rafts. The other common packrafting trips are self-supported trips to Lowell Lake, where packrafters then hike back via Mush Lake or the Cottonwood Trail near Kathleen Lake. KNPR staff expect packrafting to continue to gain in popularity in the park and on the Alsek River.

Since the 1990s, Parks Canada's understanding of the Dän people's long-standing relationship with the land has led KNPR to adopt an approach of inclusion rather than exclusion.



Scraping a moose hide.

## Loss of First Nation Connection to the Land

In 1943, the Canadian government created the Kluane Wildlife Game Sanctuary for the protection of wildlife, which banned all people from residing, hunting, and trapping in the area. This also applied to the Champagne and Aishihik First Nations and Kluane First Nation people who lived throughout the greater area for thousands of years pursuing a subsistence-harvest and gathering lifestyle. In 1973, much of the game sanctuary became Kluane National Park and Reserve, but it wasn't until the early 2000s that the Canadian government finally recognized that First Nations people have subsistence harvesting rights on their traditional territories in KNPR. Since the Dän (Southern Tutchone) people have been part of the land since time immemorial, the presence of First Nations people in KNPR, as well as their practice of subsistence harvest, is considered an integral part of the ecological integrity of the park. The exclusion of First Nations people from the park had negative consequences for the park's natural values and ecological health, as well as for the cultural values associated with the Dän people's cultural connection to the land. The absence of First Nations people during this

period of time resulted in a loss of traditional ecological knowledge for the Alsek River and the rest of Kluane National Park and Reserve's natural resources.

Since the 1990s, Parks Canada's understanding of the Dän people's long-standing relationship with the land has led KNPR to adopt an approach of inclusion rather than exclusion. Numerous management actions have been implemented to reintegrate the Champagne and Aishihik and Kluane First Nations back into KNPR. The Healing Broken Connections initiative, which took place from 2004 to 2009, worked towards righting past wrongs by creating opportunities for First Nations people to become re acquainted with and reintegrated in the park. The initiative also recognized that, in order for KNPR to be healthy, First Nations people had to be recognized as an important part of the landscape. When it comes to people's use of the land in the Alsek River corridor and the rest of KNPR, it is not just recreational values that are important, but also the natural and cultural values associated with First Nations people continuing to practice their subsistence-harvest lifestyle and cultural connection to the land.



The Kaskawulsh Glacier.

## Integrity Guidelines

The Alsek River and its immediate environment continue to meet the natural integrity guidelines for which they were originally designated ([Appendix A](#)). The cultural and recreational integrity guidelines are also included as the river is also well known for its cultural and recreational values.

Since the last ten-year monitoring report, there have been three changes in the upstream drainages of the Alsek River, which could potentially threaten these guidelines, although monitoring to date has shown no significant impact:

1. The river piracy event that occurred in 2016 from the retreat of the Kaskawulsh Glacier resulted in significant increases to the volume of water in the Alsek River, but these changes have not impacted the integrity guidelines of the Alsek River.
2. The Aishihik River hydroelectric plant increases the Alsek River's winter flow rates above natural levels, but only to a minor extent. Key elements, ecosystem components, and cultural and recreational values are unaffected by the dam located outside the nominated section.
3. The increase in water use in the Municipality of Haines Junction has increased the frequency of discharges of treated wastewater into wetlands 22 km upstream of the Alsek River. In 2016 and 2017, monitoring of water quality upstream of the Alsek River remained within the water-quality thresholds of the discharge license. The Alsek River has not been affected by the Haines Junction wastewater treatment facility.

Furthermore there have been no human developments along the Alsek River, and Parks staff continue to manage the frequency and total number of recreational and commercial rafting trips.

# Current Status of Management Objectives, Key Actions, and Recommendations

Since the portion of the Alsek River with Canadian Heritage River status falls entirely within Kluane National Park and Reserve, Kluane's park management plan and Kluane's Alsek River Management Guidelines provide the overall management direction for the Alsek River as a Canadian Heritage River. Management objectives, recommendations, or key actions for the Alsek River can thus arise from Kluane management plans and from ten-year Canadian Heritage River monitoring reports. The most recent ten-year Canadian Heritage River monitoring report for the Alsek River was released in 2008, and the most recent management plan for Kluane was released in 2010. A revised management plan for Kluane is being drafted for release in late 2019.

The 2004 and 2010 Kluane Management Plans described management objectives for seven geographic areas in the park, and the Alsek–Dezadeash River corridor was considered to be one of the distinct geographic areas with its own unique management objectives. Two guiding principles were also outlined for the Alsek–Dezadeash River corridor. The first guiding principle was to continue managing the Alsek River as a premier wilderness rafting experience by allocating no more than 15 departures per month to private or commercial rafting groups. The second was to continue revising and implementing management strategies in order to protect the natural, cultural, and recreational values of the Alsek River.

The management objectives outlined in the management plans were divided into visitor experience objectives and ecological objectives, and are listed below. Kluane National Park and Reserve has continued to meet these ongoing management objectives.

## Ecological Objectives from the 2010 KNPR Management Plan

- To protect and maintain the Alsek/Kaskawulsh Special Preservation Grizzly Bear Protection Area and its associated denning areas, critical habitats, security areas, and movement corridors.
- To protect and maintain critical mountain goat habitats and resident goat populations on Goatherd Mountain (Nàtùdäy Dhǎǎ) and the Alsek Ranges.
- To protect and maintain the Dezadeash River (Titl'at Mǎn Tágà) wetland and shrub-dominated habitats as nesting and rearing areas for shorebirds and waterfowl, particularly ducks and trumpeter swans, and as feeding areas for moose and grizzly bears.
- To protect and maintain the wildlife and avian movement corridors between the Alsek River Valley and Shakwak Trench through Alsek Pass.



Water quality monitoring on the Dezadeash River.



### Visitor Experience Objectives from the 2010 KNPR Management Plan

- The Alsek River will be managed to maintain its existing high-quality wilderness experience, characterized by opportunities for solitude, natural quiet, self-reliance, pristine campsites, no support facilities, and opportunities to see moose, grizzly bears, sheep, mountain goats, glaciers, and icebergs. Maximizing recreational use is not a management objective for the Dezadeash–Alsek River corridor.
- To manage and provide for a variety of day and overnight recreational opportunities accessed by the Alsek Road.

- To manage the Alsek River watershed in conjunction with the Tatshenshini–Alsek Management Board, US Parks Service and the Yukon Government.
- To provide opportunities for a high-quality day use wilderness experience along the Dezadeash River between the Haines Junction bridge and Serpentine Creek, characterized by low encounter levels, pristine wetland habitats, and healthy shorebird, waterfowl, moose, and grizzly bear populations.

The 2008 Ten-Year Alsek River Monitoring Report outlined a number of key actions, which are listed below. All key actions are either completed or successfully ongoing.

### Key Actions from the 2008 Ten-Year Monitoring Report

- Use the Kluane National Park and Reserve Management plan and the Alsek River Management Guidelines as the management plan for the Alsek River as a Canadian Heritage River.
- Ensure that the water quality of the Alsek River exceeds federal water-quality guidelines.
- Increase awareness of the natural, cultural, and recreational values of the Alsek River.
- Continue to manage the Alsek River as a premier wilderness rafting experience by allocating no more than 15 departures per month (departures scheduled about every second day) to private or commercial river runners.
- Continue to establish and implement management strategies, including the Alsek River Management Guidelines, which protect the natural, cultural, and recreational values of the Alsek River.
- From direction in the *CAFN Final Agreement*, subject to submission of a business proposal, including an environmental assessment, a Champagne and Aishihik First Nations business will be permitted to offer a guided one-way motor supported float trip service on the Dezadeash River between Haines Junction and Serpentine Creek. Return trip will be by road.

- Kluane National Park and Reserve will cooperate with the Yukon Government and stakeholders to maintain the Alsek River Road for reliable seasonal four-wheel-drive vehicle access.

In addition to the above key actions, the 2008 Ten-Year CHR Monitoring Report included three recommendations, which are listed below. Recommendations 1 and 2 are successfully ongoing. Although progress has not been made on Recommendation 3 because of lack of capacity, the intent to pursue this in the future still remains.

### Recommendations from the 2008 Ten-Year Monitoring Report

1. Continue current research and monitoring programs related to the natural, cultural, and recreational values of the Alsek as a Canadian Heritage River, paying particular attention to the effects of climate change and identified internal and external environmental stressors.
2. Continue to integrate Canadian Heritage River reporting requirements with ongoing Park Management Planning, State of the Park Report, World Heritage Site, and Ecological Integrity Monitoring and Reporting programs, as a means to simplify and make reporting requirements more efficient and effective.
3. Continue to work with Champagne and Aishihik on re-nomination of the Alsek for its heritage values as time, resources, and ongoing research programs allow.

## Current Recommendations from the 2018 Ten-Year Monitoring Report

The current KNPR management plan is being drafted for release in late 2019. The management vision and goals for the Dezadeash/Alsek rivers are to remain the same as those in 2010, with additional focus on the following three recommendations:

1. Continue to monitor, research, and communicate the impacts of the increase in flow down the Alsek River from the river piracy event caused by the retreat of the Kaskawulsh Glacier.
2. Continue to monitor and minimize downstream effects from the Haines Junction Wastewater Treatment facility and the Aishihik River hydroelectric dam.
3. Continue to work with Champagne and Aishihik First Nations to improve cultural reconnection with the land in and around the Alsek River.



Slim's River (Ä'äy Chù) Valley.

# Summary of Benefits Since Designation

The CHRS Principles, Procedures, and Operational Guidelines document specifies that ten-year monitoring reports are to include a “list of river conservation, stewardship, economic, and cultural benefits resulting from designation.” Since the portion of the Alsek River with Canadian Heritage River status falls entirely within Kluane National Park and Reserve, the Alsek River Management Guidelines were developed in a way that reflects the values and management objectives of both Kluane National Park as well as the CHRS. Since this is the case, cultural and environmental benefits to the Alsek

River, such as improved water quality and the protection of culturally significant sites, will not be the focus of the list below, since they are less a result of the Alsek River’s designation as a CHR and more a result of the river being part of a national park managed by Parks Canada. Instead, the list below will focus on how the Alsek River’s designation as a CHR has helped to increase recreational and educational benefits, improve public knowledge, increase awareness of the values of the Alsek River, and increase access to funding.

TYPE OF BENEFIT	DESCRIPTION
Recreational Benefit	The Alsek River receives greater awareness, additional interest by rafting groups, and increased recreational use overall, because of its status as a CHR
Monetary Benefits	<ul style="list-style-type: none"> <li>Funding is available through the CHR program for the installation and maintenance of the Alsek River commemorative plaque.</li> <li>Funding is available through the CHR for background studies, nomination documents, designation documents, ten-year monitoring reports, and special studies or projects. In 2018, KNPR received \$5,000 of funding for flights back from Lowell Lake as part of the monitoring work that was carried out by raft in July of 2018 for the ten-year monitoring report.</li> </ul>
Educational Benefit	<ul style="list-style-type: none"> <li>The CHR commemorative plaque helps to increase public awareness and understanding of the Alsek River and the CHR program.</li> <li>The CHRS website showcases the Alsek River and helps to build awareness of river conservation and CHRS activities.</li> <li>The Alsek River’s status as a Canadian Heritage River has been emphasized in various publications. Of particular note, the National Geographic book “Journeys of a Lifetime” (2007) listed the Alsek and Tatshenshini rivers as number one in the world’s top ten raft trips.</li> <li>Because of its status as a CHR, the Alsek River receives greater recognition and attention during public outreach and educational programs, which fosters better public understanding of the Alsek’s natural, cultural, and recreational values.</li> </ul>
Improved Knowledge	The annual and ten-year reports required for CHR designation bring the Alsek River under the focus of Parks Canada staff more frequently. Knowledge of Alsek River regulations and its heritage values has improved through the preparation of these reports.

# Overall Assessment

There have been a number of significant events and actions that have occurred over the past ten years in the Alsek River corridor, and much of this has been environmental monitoring work as part of Parks Canada's ecological integrity monitoring program. However, some of the events that have occurred can be seen as threats to the natural integrity guidelines for which the Alsek River was originally designated, and three of these events warrant extra attention. These three events are the river piracy of the Slim's and Kaskawulsh rivers, the increasing power demands on the Aishihik hydro plant, and the increased frequency of discharges from the Haines Junction wastewater treatment facility.

The river piracy event, which rerouted meltwater from the Kaskawulsh Glacier from flowing into the Slim's River to flowing into the Kaskawulsh River, resulted in dramatic changes to these drainage basins, and this has increased water levels on the Alsek River. However, since the Alsek is a large-volume river, the increased input from the Kaskawulsh has not resulted in flooding significant enough to have environmental impacts. Additionally, during the early Holocene period, Kluane Lake flowed into the Alsek River, meaning that the Alsek River Valley has much resilience to accommodate increases in volume. Overall, the natural ecosystem has not been impacted by the increased water levels. Cultural values are of sufficient distance away from the river, and recreational values are unaffected, as the increased water levels have not substantially changed the technical difficulty of the river.

The Aishihik hydro plant has been active since 1975, but power generation demands are increasing. The main effects of the hydro plant on the Alsek River are increased winter flow rates and possible increased diurnal variability, but these effects are more pronounced on the Dezadeash and Aishihik rivers, and less pronounced further downstream on the Alsek, where effects are further abated by the Alsek's large volume. Although

there are detectable changes to the flow regime of the Alsek, these changes are minor to the extent that all key elements and ecosystem components are unaffected.

Due to increased residential water use in the community of Haines Junction, the frequency of discharges from the Haines Junction wastewater treatment facility into the Dezadeash River wetlands has increased since 2009. During an emergency discharge in 2015, four parameters exceeded acceptable water-license thresholds, and the discharge was terminated. Improvements to the facility occurred, and Parks Canada developed a formal monitoring program to better understand potential effects on the Dezadeash and Alsek River corridor. Discharges in 2017 and 2018 had water quality that remained within acceptable thresholds. Negative impacts to water quality have not been observed on the Dezadeash River, and thus 22 km downstream on the Alsek River, the natural aquatic ecosystem is considered unaffected.

Although these three changes present as threats, all of these changes originate upstream of the Alsek River, and downstream effects on the Alsek itself are minor to the extent that they have not negatively impacted the natural, cultural, and recreational values of the river. The current status of previously proposed management objectives, key actions, and recommendations for the Alsek River are successfully ongoing, and one of the recommendations put forward in this report is to continue to monitor and communicate the status of the three events that make up the main changes and threats to the Alsek River's heritage values.

Overall, the natural, cultural, and recreation values of the Alsek River have been determined to be intact and for the most part unchanged since CHRS designation in 1986. It has been found that the Alsek River continues to meet the integrity guidelines for which it was originally designated. The Alsek River is worthy of continued designation as a river of national significance within the Canadian Heritage Rivers System.

# Appendix A: CHRS Integrity Guidelines

The below is a list of the CHRS integrity guidelines listed in the Principles, Procedures, and Operational Guidelines document. A river and its immediate environment must meet the Integrity Guidelines in order to be nominated to the Canadian Heritage Rivers System.

## Natural Integrity Guidelines

For a river to be judged to have outstanding Canadian natural heritage value, it must meet all of the following natural integrity guidelines:

- The nominated section is of sufficient size to include significant representations of all of the natural processes, features, or other phenomena that give the river its outstanding natural value;
- The nominated section includes those ecosystem components that contribute significantly to the provision of habitat for species in need of protection;
- There are no human-made impoundments within the nominated section;
- All key elements and ecosystem components are unaffected by impoundments located outside the nominated section; and
- The water in the nominated section is uncontaminated to the extent that its natural aquatic ecosystem is intact.

## Cultural Integrity Guidelines

For a river to be judged to have outstanding Canadian cultural value, it must meet all of the following cultural integrity guidelines:

- The natural aesthetic character of the nominated section is free of, or not adversely affected by, human developments;

- The nominated section is of sufficient size to include significant representations of all of the features, activities, or other phenomena that give the river its outstanding cultural value;
- The visual character of the nominated section enables uninterrupted appreciation of at least one of the periods of the river's historical importance;
- The key artifacts and sites comprising the cultural values for which the river is nominated are unimpaired by impoundments and human land uses; and
- The water quality of the nominated section does not detract from the visual character or the cultural experience provided by its cultural values.

## Recreational Integrity Guidelines

For a river to be judged to have outstanding Canadian recreational value, it must meet all of the following recreational integrity guidelines:

- The river possesses water of a quality suitable for contact recreational activities, including those recreational opportunities for which it is nominated;
- The river's visual appearance is capable of providing river travelers with a continuous natural experience, or a combined natural and cultural experience, without significant interruption by modern human intrusions; and
- The river is capable of supporting recreational uses without significant loss of, or impact on, its natural and cultural values or its visual character.

# References

- Baraer, M. Evaluation of the Aishihic hydro plant operation influences on downstream hydrological regimes – Preliminary Report (Draft Version). 2017. École de Technologie Supérieure.
- Blakeburn, D. and Wong, C. 2015. Auriol Moose Survey 2015. Kluane National Park and Reserve, Parks Canada. 2015.
- Blakeburn, D. and Wong, C. 2017. Auriol Sheep and Goat Survey 2017. Kluane National Park and Reserve, Parks Canada. 2017.
- Bevington, A., Copland, L. 2014. Characteristics of the last five surges of Lowell Glacier, Yukon, Canada, since 1948. *Journal of Glaciology*. 60, 113-123.
- Garbutt, R., B. Hawkes, and E. Allen. 2006. Spruce beetle and the forests of the southwest Yukon. Pacific Forestry Centre, Canadian Forest Service.
- Gibson, J. Env. Consulting. 2015. Village of Haines Junction – Wastewater Discharge 2015 April 28 to August 3, 2015 August 25 to September 8, 2015. Village of Haines Junction. <https://apps.gov.yk.ca/waterline/> (MN-030-2 Reports) Accessed October 23, 2018.
- Government of Yukon. 2012. Management Plan for the Aishihik Wood Bison (*Bison bison athabasca*) Herd in southwestern Yukon. Environment Yukon, Whitehorse, Yukon. 28pp.
- Hebda, R., Greer, S., Mackie, A. Kwäday Dän Ts'incihi – Teachings from long ago person found. Champagne and Aishihik First Nations. Royal British Columbia Museum, 2017.
- Letendre, A. Baikal Sedge Critical Habitat: Assessment of risks associated with flooding at the Alsek Dune at the confluence of the Kaskawulsh and Dezeddash rivers. Kluane National Park and Reserve. 2017.
- Markel, C. and Clark, D. Developing policy alternatives for the management of wood bison (*Bison bison athabasca*) in Kluane National Park and Reserve Canada. *The Northern Review*. 36: 53-75.
- Meiklejohn, B. (2018, August 2). Packrafting the Alsek. Retrieved from <https://www.anchoragepress.com/>.
- Morris, R. P. 2008. Kluane National Park and Reserve Backcountry Campsite Impact Assessment 2005–2007. Submitted to: Parks Canada, Yukon Field Unit.
- Saffran, K., Cash, K., Hallard, K., Neary, B., and Wright, R. 2001. Canadian Water Quality
- Shugar, D. H., et al. (2017). River piracy and drainage basin reorganization led by climate-driven glacier retreat. *Nature Geoscience* 10: 370
- Van de Kerk, M., Verbyla, D., Nolin, A., Sivy, K., and Prugh, L. 2018. Range-wide variation in the effect of spring snow phenology on Dall sheep population dynamics. *Environmental Research Letters*. 13.
- Wong, C. M. Status of Ecological Integrity in Kluane National Park and Reserve 2017. Technical Compendium to the State of the Park Report. Report by Parks Canada, Kluane National Park and Reserve, Yukon, 2017.
- Yukon Energy. (n.d.). Aishihik Hydro Plant. Retrieved November, 2018 from <https://yukonenergy.ca/energy-in-yukon/projects-facilities/aishihik-hydro-plant>.



**The entire length of the Alsek River falls within the Kluane/Wrangell-St. Elias/ Glacier Bay/ Tashenshini-Alsek UNESCO World Heritage Site, which is one of the largest internationally protected land-based ecosystems in the world.**

