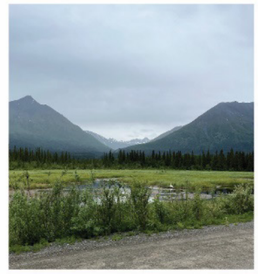
McCarthy Road PEL Study



McCarthy Road Planning and Environmental Linkages (PEL) Study

AK FLAP DOT 198(4)

Needs and Opportunities Assessment Report

March 2024

Prepared for:

Federal Highway Administration Western Federal Lands Division

In partnership with:

National Park Service

Alaska Department of Transportation and Public Facilities

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Acronyms and Abbreviations

Acronym	Definition
°F	degree(s) Fahrenheit
AADT	annual average daily traffic
ADCCED	Alaska Department of Commerce, Community and Economic Development
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADOLWD	Alaska Department of Labor and Workforce Development
AHRS	Alaska Heritage Resources Survey
AKEPIC	Alaska Exotic Plants Information Clearinghouse
ANILCA	Alaska National Interest Lands Conservation Act
ARDOR	Alaska Regional Development Organization
ATV	All-terrain vehicles
AVSP	Alaska Visitor Statistics Program
AWC	Anadromous Waters Catalog
BEA	U.S. Bureau of Economic Analysis
BIL	Bipartisan Infrastructure Law
CEDS	Comprehensive Economic Development Strategy
CFR	*Code of Federal Regulations*
CR&NW	Copper River and Northwestern Railway
CRWP	Copper River Watershed Project
CSP	Corrugated steel pipe
CUA	commercial use authorization
CVDA	Copper Valley Development Association
CVTC	Copper Valley Telephone Cooperative
DNR	Alaska Department of Natural Resources
DOT&PF	Department of Transportation and Public Facilities
EFH	Essential Fish Habitat
EO	Executive Order
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FLAP	Federal Lands Access Program
GAM	Geotechnical Asset Management
GIS	Geographic Information System
GMU	game management unit
IPaC	Information for Planning and Consultation

Acronym	Definition
KOMP	*Kennecott Operations and Management Plan*
LiDAR	Light Detection and Ranging
LP3	Log-Pearson Type III
LRTP	long-range transportation plan
M&O	Maintenance and Operations
MAC	McCarthy Area Council
MADT	monthly average daily traffic
MP	milepost
mph	mile(s) per hour
NAIC	North American Industry Classification System
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRHP	National Register of Historic Places
PAC	project advisory committee
PEL	Planning and Environmental Linkages
ROW	right-of-way
RS	Revised Statute
RV	recreational vehicle
SADT	seasonal average daily traffic
SHPO	State Historic Preservation Office
U.S.C.	*U.S. Code*
USACE	U.S. Army Corp of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WFL	Western Federal Lands
WRST	Wrangell-St. Elias National Park and Preserve

Executive Summary

The Federal Highway Administration (FHWA) Western Federal Lands (WFL) Highway Division, Alaska Department of Transportation and Public Facilities (DOT&PF), and National Park Service (NPS) are working together to prepare a Planning and Environmental Linkages (PEL) study for the McCarthy Road corridor. The PEL study will result in a documented framework that guides future access and transportation-related improvement projects along the McCarthy Road.

The McCarthy Road corridor is an important roadway in Alaska, providing community connection and access to private and public lands including the nation's largest national park, Wrangell-St. Elias National Park and Preserve.

A PEL study is a tool that project sponsors can use when they have a large study area and it is unlikely that there is available funding to address all the issues in the entire area, as is the case with this road corridor.

This report reflects the results of the first phase of the PEL study, which was to identify the existing and projected corridor conditions, needs, and opportunities of the McCarthy Road as it relates to users and corridor residents. The PEL study team conducted several activities between mid-2023 into early 2024 to identify needs and opportunities along the road corridor, as summarized in this report. These activities included collecting and reviewing existing baseline data and prior plans, and obtaining input from the public, agencies, and stakeholders. This report summarizes road corridor history; relevant prior and present plans/studies and projects for the corridor and region; basic transportation system conditions and road characteristics; maintenance and operations; drainage; geological and geotechnical conditions; economic considerations; and the environmental setting. Appendix A contains a comprehensive list of identified needs, opportunities, and issues identified in the study corridor through these activities. In the next phase of the PEL study, the study team will continue to collect and refine data.

The following represents an overview of the main themes of the identified issues, needs and opportunities.

- Improve the safety of the road corridor
  - Address issues such as narrow road and bridge widths, limited sight distance/road curvature, steep grades and roadbed slopes, and speeding.
- Improve the road/infrastructure conditions and maintenance
  - Address issues such as dust, overgrown brush, poor road surface, drainage, erosion, poor soils, glaciation over roadway during winter, limited winter road maintenance, and culverts.
- Improve road reliability and protection from natural hazards (resiliency)
  - Address geohazard locations (e.g., landslides, avalanches)
- Reliably maintain and enhance access and support land uses, including visitor experience
  - Examples: improve signage, improve road junctions, provide adequate pullouts (for both safety and visitor experience), provide adequate trash removal, and expand recreational opportunities (e.g., trails, access to lakes)
- Consider non-motorized roadway users, such as pedestrians, bicyclists, and horseback riders
- Not only avoid or minimize environmental impacts but improve environmental conditions when road improvements occur (e.g., improving salmon habitat and passage)
- Consider the improvements and community interests included in previous plans

This report is intended to provide a comprehensive understanding of the corridor's existing conditions to help define the issues and needs to be addressed. This report also summarizes environmental resources within the study corridor that may be affected and could inform the development and evaluation of improvement options, which is the next phase of the PEL study. Those options will be evaluated and screened for consideration as recommendations to be moved forward for future implementation (pending future funding availability).

1. Introduction

1.1 Planning and Environmental Linkages Study Overview

The McCarthy Road Planning and Environmental Linkages (PEL) study was initiated in 2023 with the intent to provide an opportunity to collaborate and engage area residents and stakeholders in a transportation planning process to plan for future roadway corridor and access improvements. This transportation planning process will result in a documented framework that guides future access and transportation-related improvement projects along the McCarthy Road.

To bring partnering agencies, stakeholders, and the public together to collaboratively plan for future road corridor improvements, the Alaska Department of Transportation and Public Facilities (DOT&PF) Northern Region and the National Park Service (NPS) joined together and obtained Federal Lands Access Program (FLAP) funding from the Federal Highway Administration (FHWA) Western Federal Lands (WFL) Highway Division to fund the PEL study. Together, these three partnering agencies are preparing this PEL study to provide an implementation plan for future road corridor improvement projects.

This PEL study is a planning-level process that looks at transportation issues, solutions, and environmental considerations. The final PEL study results will be used by project partners and others to help implement future road corridor improvement projects. PEL studies often are conducted to streamline the project development process by helping to move projects forward from the planning phase into the environmental review process, thereby better linking planning and environmental project phases. Analysis and decisions made in this study are intended to be used to inform future National Environmental Policy Act (NEPA) processes and may be incorporated by reference. PEL studies are typically prepared early in the transportation decision-making process and provide an opportunity to consider environmental and community issues early before a formal environmental review process begins.

This report includes identifying current and future conditions, needs, and opportunities along the McCarthy Road as it relates to roadway users and area communities. A significant feature in the corridor is the nation’s largest national park: Wrangell-St. Elias National Park and Preserve (WRST). The McCarthy Road is one of only two roadways that traverse into WRST. Over the years, local residents and visitors to the park have provided feedback to the DOT&PF and NPS that emphasizes the need to evaluate the reliability of access and public safety.

This report summarizes the results from the first phase of the McCarthy Road PEL study process: assessing needs and opportunities along the road corridor. This report summarizes existing and projected future conditions and the needs and opportunities identified during outreach with key stakeholders and the public.

1.2 PEL Study Purpose

The primary purpose of the PEL study is a documented framework and process that will do the following:

- Assess existing and project conditions and needs along the McCarthy Road corridor, analyze potential improvement options, and identify a list of prioritized projects for future implementation.
- Bring together local communities, stakeholders, and users of the McCarthy Road to seek input and build collaboration to identify corridor improvements.

The project sponsors identified the following supporting and corresponding priorities and outcomes for the PEL study:

- Community outreach is critical.
- A collaborative process will aim to build consensus with the recommended projects.
- The PEL study will yield a list of recommended projects that can be fed into NPS's and DOT&PF's lists of future projects.
- Recommended projects should be implementable (i.e., ability for the projects to be reasonably funded and approved).
- The PEL study will collect and evaluate data, including (but not limited to) the following specific topics:
    - Geohazards, particularly near the Kotsina Bluffs area and milepost[1] (MP) 58
    - Locations of the road right-of-way (ROW) discrepancies
    - Material source locations
    - Culverts impacting fish passage
    - Multimodal use (e.g., walking, bicycling, shuttles), especially in between McCarthy and the end of the study corridor toward the Kennecott Mines National Historic Landmark (NHL)
    - Ownership and responsibility of vaulted toilets/restrooms in the study corridor

1.3 Study Corridor Location and Setting

1.3.1 Study Corridor Location

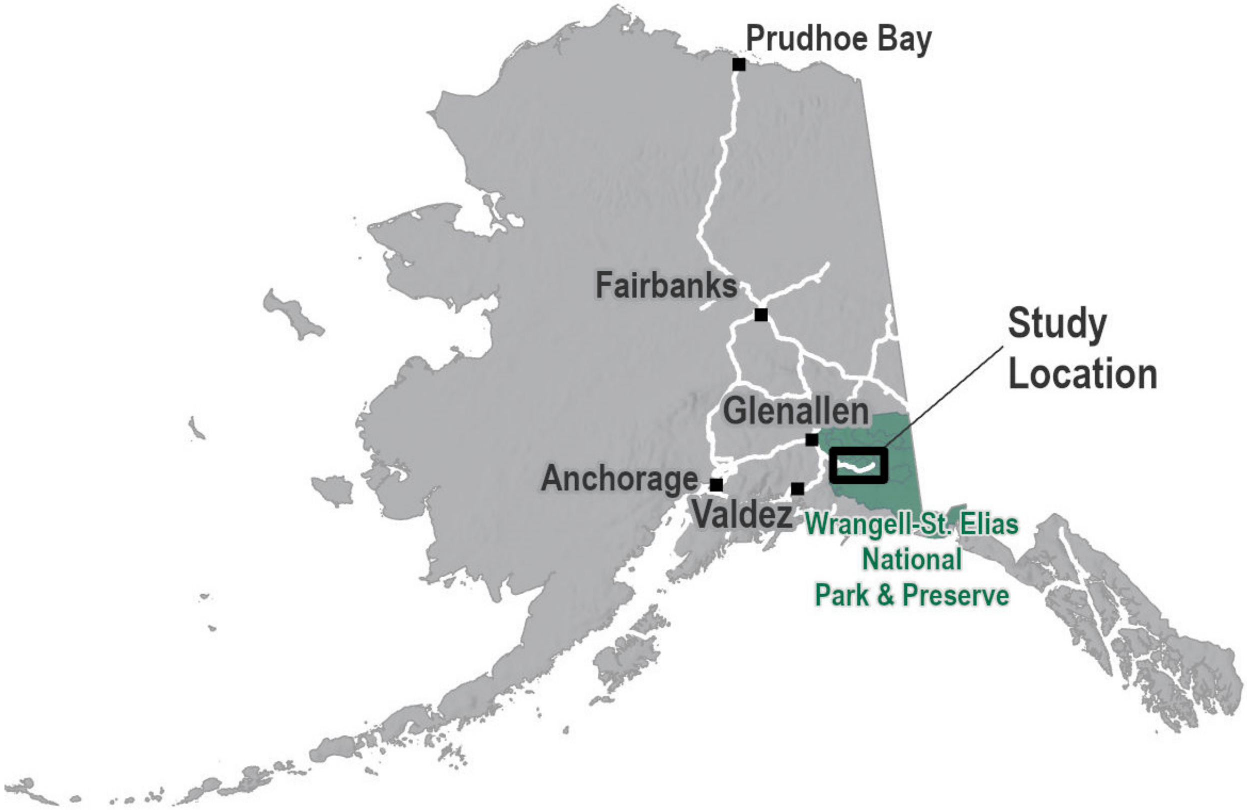
The McCarthy Road is accessed at the east end of the 33-mile Edgerton Highway. The Edgerton Highway begins at MP 83 of the Richardson Highway. The intersection of the Richardson and Edgerton highways is approximately 32 miles south of the regional hub of Glenallen (refer to Figure 1-1 and Figure 1-2).

The McCarthy Road begins at mile 33 of the Edgerton Highway in Chitina and extends east nearly 60 miles into the heart of WRST. The McCarthy Road stops at the Kennicott River, which the public can cross using an existing bridge referred to as the "DOT footbridge." Even though the bridge is referred to as a footbridge, all-terrain vehicles (ATVs) also use it. There is also a private vehicular bridge that is usable "under lock and key" that crosses over the river farther downstream from the footbridge. Once the river is crossed over the footbridge, the road extends another approximate 5 miles, where it terminates at the southern boundary of NPS's Kennecott Mines NHL. The area near the NHL is also referred to as Kennicott.[2]

[1] Physical mileposts do not actually exist in the corridor; however, miles are referred to as mileposts in study documentation.

[2] Depending on the area feature being described, different spellings of Kennicott and Kennecott are used.

Figure 1-1. Study Location Vicinity

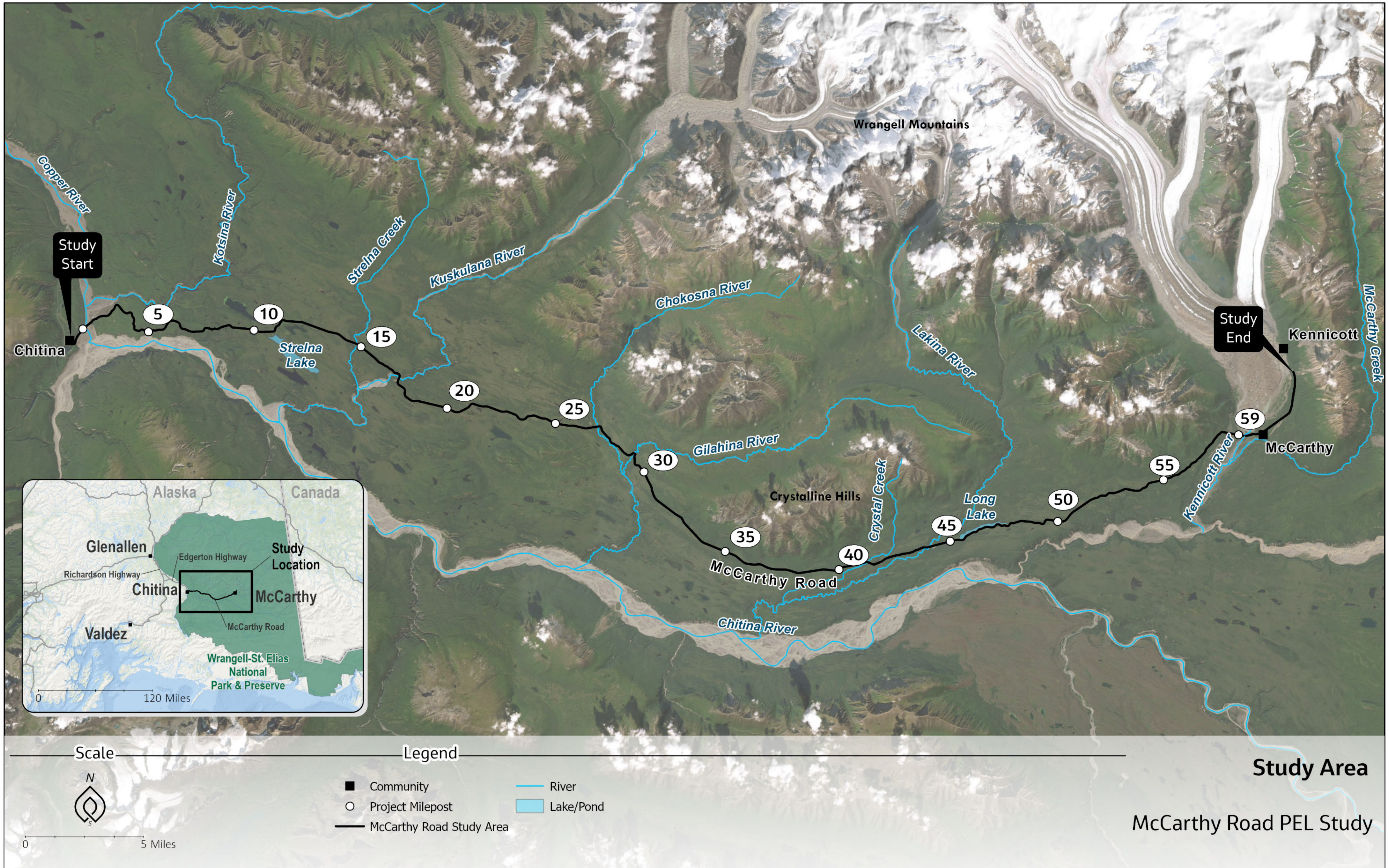


The PEL study corridor begins at the eastern edge of Chitina, then it travels briefly through a single-lane bedrock cut and extends nearly 64 miles to where it ends at the southern end of the Kennicott subdivision[3] (refer to Figure 1-2). The end of the study corridor coincides with the end of the DOT&PF road ROW. Although the PEL study will focus on improvements along the McCarthy Road corridor, activities beyond the main road corridor are of consideration since they influence the needs of the McCarthy Road and its users.

The McCarthy Road corridor traverses west-east largely parallel to and south of the Wrangell Mountains, which are a subrange of the much larger Alaska Range. The Chitina River mostly parallels the road corridor to the south, which flows into the Copper River near the west end of the study corridor. From Chitina, the road heads east through rolling terrain, starting at an approximate elevation of 500 feet and ending near McCarthy at approximately 1,500 feet. The Chitina Glacier carved and influenced the valley where the road traverses.

[3] As of late 2023, the NPS is concurrently updating its Kennecott Operations Plan, which covers the area where the Kennicott subdivision is located.

Figure 1-2. PEL Study Corridor



1.3.2 Study Corridor Context Overview

1.3.2.1 Communities

The communities of Chitina and McCarthy (2022 population 114 and 97, respectively) are toward the beginning and end of the study corridor, respectively. McCarthy is approximately 0.5 mile east of the Kennicott River crossing. Since 2010, McCarthy has seen a steady population increase. Chitina is near the study corridor start on the west end. The population of Chitina has slightly decreased since 2010. There is a sprinkling of small year-round population settlements along the study corridor. Summer experiences a sizable, regional seasonal population bump. Refer to Section 9.2.1 for more details on population trends.

1.3.2.2 Road History: Rail to Road

The establishment of Chitina and McCarthy and eventual construction of the McCarthy Road stem from the area's copper mining boom in the early 1900s and subsequent construction of the Copper River and Northwestern Railway (CR&NW). The railroad was constructed between 1908 to 1911; it extended nearly 200 miles from Cordova, followed the Copper River upstream, and then entered into the Chitina River valley to provide access to the Kennecott Mines. The town of McCarthy was established just south of the Kennecott Mines in the early 1900s, and Chitina was established as a railroad construction camp. After nearly 30 years in operation, the railroad was closed and abandoned in 1938. A few years later, the Kennecott Corporation donated the railroad ROW to the United States government for use as a public highway.

In the 1960s, the (then) Alaska Department of Highways (precursor to the DOT&PF) began converting the railbed into a roadbed. Railroad ties and rails were attempted to be removed and the railbed was graded for use as a pioneer road. At the time, it was a 12-foot-wide primitive road. Vehicular bridges were constructed along the corridor in the early 1970s. Subsequent improvements and repairs have occurred over the decades since. The corridor's railroad history remains evident today, with remnant rail trestles still present, the rock cut east of Chitina having been the former railroad tunnel (as shown on Figure 1-3), and the Kuskulana rail bridge is still in use, having been converted to a single-lane vehicular bridge. Refer to 3.2 for more details on historic road construction.

Figure 1-3. Beginning of the PEL Study Corridor, East of Chitina

1.3.2.3 Roadway Users and Adjacent Landowners

About two-thirds of the land adjacent to the McCarthy Road is under federal or state ownership, with the NPS having the greatest proportion. Other adjacent landowners are the University of Alaska, Native regional corporations, and private landowners.

The McCarthy Road is used by a variety of travelers including local residents, seasonal and other property owners, tourists (residents and non-residents), park visitors and other recreation users, subsistence users, and others harvesting off the land (including resource development). The Kennecott Mines NHL receives the vast majority of WRST's reported visitors.

The McCarthy Road is considered one of two primary gateways into WRST (the other is Nabesna Road). As such, many of the intrinsic values associated with WRST are particularly appreciated by road users, which serves as the primary access point to these lands. The following are representative qualities that contribute to WRST's significant landscape (NPS 2016; Drazkowski et al. 2011):

- WRST provides superlative scenic beauty (e.g., expansive vistas, ecological resources, scenic wildlands).
- WRST encompasses the nation's largest protected active glacial complex.
- WRST encompasses portions of three major mountain ranges, which includes 9 of the 16 highest peaks in North America.
- Vast undeveloped expanse containing diverse aquatic and terrestrial ecosystems, ranging from alpine to marine, and providing natural habitat for populations of Alaskan flora and fauna.
- Nearly 10 million areas within WRST are designated and managed as wilderness, making this the largest wilderness area within the NPS.
- Preserved within WRST is abundant evidence of more than 3,000 years of cultural and technological development.
- WRST is an inhabited area where local communities and traditional human activities remain integrated with the wilderness setting.

1.3.2.4 Roadway Characteristics Overview

The McCarthy Road is composed mostly of gravel, with the exception between MP 3 and MP 17 where the road consists of emulsified asphalt overlaid by crushed aggregate (also referred to as "high-float" emulsion asphalt surface treatment). The laydown of this harder surface material occurred in 2014, as part of a multi-week project led by DOT&PF to smooth out some of the roadway and to make it easier to maintain.

In general, the existing gravel road is comprised of two lanes, each varying in width between 10 and 12 feet. There are many road sections that are narrower than this. The road has little to no shoulders and variable side slopes and ditch depths. In addition to the one lane width through the rock cut east of Chitina, the road eventually narrows to one lane east of the Kennicott River crossing, with pullouts for vehicles to pass as it approaches Kennecott Mine on the east end of the study corridor.

The road grades are typically good except at some river crossings (e.g., Gilahina River); steeper grades exist near where the old railroad trestle was abandoned and the road was routed around them.

The typical posted speed on the McCarthy Road is 30 miles per hour (mph).

The McCarthy Road crosses over a handful of mountain streams originating from the Wrangell Mountains to the north. Notable crossings include the Copper River, Strelna Creek, Kuskulana River, Chokosna River, Gilahina River, Lakina River, and Kennicott River (both west and east channels). Refer to Section 6.2 for more details on bridges and major stream crossings. The bridge construction over the Copper River in 1971 resulted in motorists being able to travel from Chitina to the end of the road at the Kennicott River.

The DOT&PF regularly maintains the road throughout the summer months until about October 1 every year. DOT&PF plows the road in the winter periodically, only enough to provide access to clear the state-owned McCarthy Airport runway that is near McCarthy.

The McCarthy Road surface has notoriously been very rough over the years, with washboards and potholes resulting in frequent flat tires. In recent years, corridor residents have applauded DOT&PF Maintenance and Operations (M&O) staff on how much better maintained the roadway has become.

The DOT&PF M&O staff face substantial challenges through the road corridor, which includes drainage issues, culvert issues, road/embankment sloughing, dust control, road damage, rockslides, soft shoulders, and mudslides. The most noteworthy M&O issues are landslide concerns located at the Kotsina Bluffs (beginning at MP 3) and near MP 58. In these locations, the road can experience substantial movement during the fall and spring that require daily work by DOT&PF M&O staff.

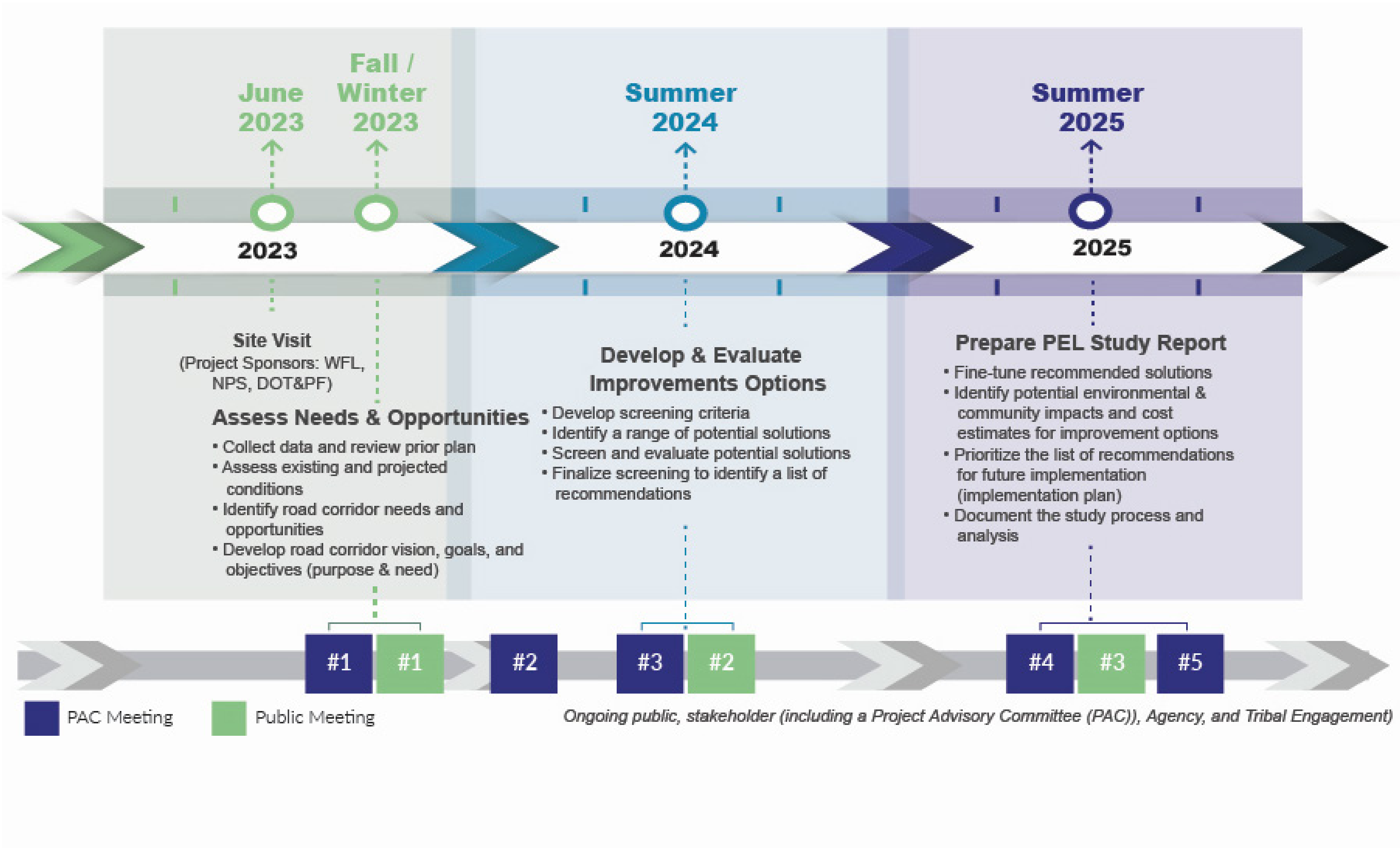
Roadside vegetation limits visibility and creates sight distance problems, particularly approaching roadway curves. Members of the PEL's project advisory committee (PAC) at its first meeting as well as public comment received during the first public meeting emphasized the need to clear vegetation because it is a safety hazard. Visitors frequenting the corridor in larger recreational vehicles (RVs) and stopping in blind corners further exacerbates the safety concern and has resulted in near misses.

1.4 Study Process

Figure 1-4 depicts the PEL study process. The PEL study process will assess conditions and needs, analyze potential improvements, conduct conceptual design, and identify a list of prioritized projects for future implementation. The PEL study process will bring together local communities, stakeholders, and users of the McCarthy Road to seek input and build collaboration for identifying corridor improvements.

The PEL study will follow the provisions set forth in 23 *United States Code* (U.S.C.) §168 – Integration of planning and environmental review and in accordance with the provisions linking planning and NEPA presented in 23 *Code of Federal Regulations* (CFR) 450.318 and Appendix A of 23 CFR 450. Decisions and analysis done during the PEL study can be adopted or incorporated by reference in future NEPA documents if it has been prepared in compliance with the 10 statutory conditions listed in 23 U.S.C. §168.

Figure 1-4. PEL Study Process and Key Phases



1.5 References

Drazkowski, B., K. J. Stark, M. R. Komp, G. Bernatz, D. Brown, C. Richtman, C. Lee, A. Robertson, and K. Slifka. 2011. *Wrangell-St. Elias National Park and Preserve, Natural Resource Condition Assessment*. Natural Resource Report NPS/NRSS/WRD/NRR—2011/406. http://npshistory.com/publications/wrst/nrr-2011-406.pdf.

National Park Service (NPS). 2016. *State of the Park Report for Wrangell-St. Elias National Park and Preserve*. State of the Park Series No. 37. National Park Service, Washington, D.C. http://npshistory.com/publications/state-of-the-park/wrst-2016.pdf.

2. Identified Road Corridor Needs and Opportunities

2.1 Methods for Identifying Needs and Opportunities

The study team conducted the following activities from mid-2023 to early 2024 to identify and assess the needs and opportunities within the study corridor:

- Reviewed existing data to identify existing and projected future corridor conditions
- Conducted a site visit
- Held meet-and-greet sessions with the public on the west and east end of the study corridor
- Conducted outreach with agencies
- Conducted outreach with Alaska Native Tribes and Corporations
- Conducted outreach with stakeholders, including holding a PAC meeting
- Held a public online open house to solicit public input

Based on these activities, the study team compiled a comprehensive list of identified needs issues, needs and opportunities in the study corridor (see Appendix A). This list contains both general corridor-wide comments as well as comments regarding specific locations along the corridor.

2.2 Identified Needs and Opportunities Overview

The following represents the main themes of the identified needs and opportunities, as further detailed in the subsequent sections of this report and appendices.

- Improve the safety of the road corridor
  - Address issues such as narrow road and bridge widths, limited sight distance/road curvature, steep grades and roadbed slopes, and speeding.
- Improve the road/infrastructure conditions and maintenance
  - Address issues such as dust, overgrown brush, poor road surface, drainage, erosion, poor soils, glaciation over roadway during winter, limited winter road maintenance, and culverts.
- Improve road reliability and protection from natural hazards (resiliency)
  - Address geohazard locations (e.g., landslides, avalanches)
- Reliably maintain and enhance access and support land uses, including visitor experience
  - Examples: improve signage, improve road junctions, provide adequate pullouts (for both safety and visitor experience), provide adequate trash removal, and expand recreational opportunities (e.g., trails, access to lakes)
- Consider non-motorized roadway users, such as pedestrians, bicyclists, and horseback riders
- Not only avoid or minimize environmental impacts but improve environmental conditions when road improvements occur (e.g., improving salmon habitat and passage)
- Consider the improvements and community interests included in previous plans

3. Road Corridor History: Relevant Prior and Present Plans/ Studies and Projects for the Corridor and Region

3.1 Overview

The McCarthy Road serves a variety of roadway users' needs and interests. Previously prepared plans and studies provide context for the importance of this road corridor and insight on various stakeholders' previously identified visions, goals, needs, and opportunities for the corridor. Reviewing these prior efforts results in having a greater understanding of baseline conditions and opinions related to the transportation corridor and its users.

Additionally, during the PEL study team meet-and-greet sessions with the public in McCarthy and Chitina in June 2023, members of the public asked that past and present planning efforts be considered and not overlooked. As a project partner, the NPS also reiterated the consideration of recommendations included specifically in the McCarthy Road/Chitina Valley Roundtable Project and the *McCarthy Road Scenic Corridor Plan* (NPS, DNR, and DOT&PF 1997). To the extent possible, the PEL study will incorporate and build upon relevant work that has been done previously.

This section presents a brief history of the McCarthy Road and past improvements. This section also provides a brief summary of the following plans/studies and projects.

- McCarthy Road/Chitina Valley Roundtable Project Phase I-III reports (LDN 2000a, 2000b, 2002)
- *McCarthy Road Scenic Corridor Plan* (NPS, DNR, and DOT&PF 1997)
- *McCarthy Road Reconnaissance Study* (DOT&PF 1989)
- Other efforts currently in progress:
  - NPS Kennecott Operations and Management Plan (KOMP)
  - Alaska Department of Natural Resources (DNR) Copper River Basin Area Plan Revision Update
  - NPS WRST Emergency Evacuation Planning
  - Copper Valley Development Association (CVDA) Comprehensive Economic Development Strategy (CEDS)
  - Copper Valley Telephone Cooperative (CVTC) Fiber Optic Cable Project
  - McCarthy Area Council (MAC) McCarthy Area Survey
  - DOT&PF Interior Alaska Transportation Plan Update

The following are some of the common themes in these plans and studies:

- Provide and maintain access
- Improve road safety for all roadway users. (Past plans often identify safety as the highest level of importance as a road improvement objective. Past plans site areas with landslides, erosion, and poor soils and drainage conditions as some of the most important safety hazards to be addressed first.)
- Development and infrastructure should not detract from natural setting
- Establish and leverage partnerships
- Balance the need for infrastructure improvements, desired economic development opportunities, and enhanced visitor facilities with preserving the natural setting and uniqueness of the corridor

3.2 Road Corridor History and Past Projects

Over many decades, there have been studies that have considered upgrading the McCarthy Road and improving access, including providing vehicular public access (or not) to the community of McCarthy across the Kennicott River. This history shows that achieving a public consensus on the amount of access and McCarthy Road improvements that should occur will be difficult. Balancing improvements with the intrinsic values the road corridor provides to its users is important as evidenced in past documentation. The history of the McCarthy Road corridor and area access, including constructed improvements, has been well documented (NPS 2002) and summarized as follows:

- Early 1900s: The town of McCarthy was established due to the mining boom at the Kennecott Mine.
- 1908 to 1911: The CR&NW constructed a railroad to provide access to Kennecott Mine. The town of Chitina was established as a construction camp for the railroad.
- 1938: After nearly 30 years of operation, the railroad was closed and abandoned.
- 1960s: The (then) Alaska Department of Highways (the precursor of DOT&PF) began converting the railbed into a roadbed. Railroad ties and rails were attempted to be removed and the railbed was graded for use as a pioneer road. Culverts were installed. The primitive road was 12 feet wide.
- 1971: A bridge constructed over the Copper River made it possible to drive to the west bank of the Kennicott River.
- 1973/1974: Two vehicular bridges were constructed over the two river channels of Kennicott River, making it the first-time vehicles could drive to McCarthy over a bridge.
- 1975: Spring thaw resulted in water damaging both bridges over the Kennicott River. In August, both bridges were closed to vehicle traffic. For several years, the two bridges over Kennicott River were used by pedestrians, though without maintenance these bridges deteriorated beyond repair.
- 1970s: DOT&PF and FHWA in cooperation with the NPS prepared an environmental impact statement for a proposed McCarthy Road upgrade project.
    - Initial proposed improvements would have included clearing, grading, widening, adding drainage, reducing the curvature of the sharper curves, revegetating, signing, and providing other related safety features. Proposed opportunities would have included providing scenic turnouts, public waysides and campgrounds, and other traveler amenities.
    - Public, stakeholder, and agency input was sought. As a result of public outreach, proposed improvements were scaled down to merely improving the existing road and focusing on the bridges over the Lakina and Kennicott Rivers. Due to a shift in funding, a scaled-down bridge was erected over the Lakina River, which was a used one-lane bridge (which was replaced in 2016). During this time, both the NPS and the public largely opposed constructing a vehicular bridge over the Kennicott River.
- 1983: Hand-pulled cable trams were installed across both channels of the Kennicott River.
- 1987: DOT&PF temporarily closed the Kuskulana River bridge, except for emergency traffic, due to an RV's rear wheels breaking through the bridge decking. As a result of serious bridge deterioration, the DOT&PF installed gates at both bridge ends and posted warning signs. DOT&PF also established weight restrictions and added plywood to help distribute the weight of vehicles.
- 1988: DOT&PF repaired and reopened the Kuskulana Bridge. Several entities including the DOT&PF and NPS signed a Memorandum of Understanding, which provided a framework for

future decision-making that the management of adjacent lands and the design and operation of the road itself consider "the scenic, recreational and habitat values of the area." This concept adhered to the "Park Road Standards" developed by the NPS in 1983, which suggested that roads through areas administered by federal agencies be "carefully designed to protect important natural and cultural resources."

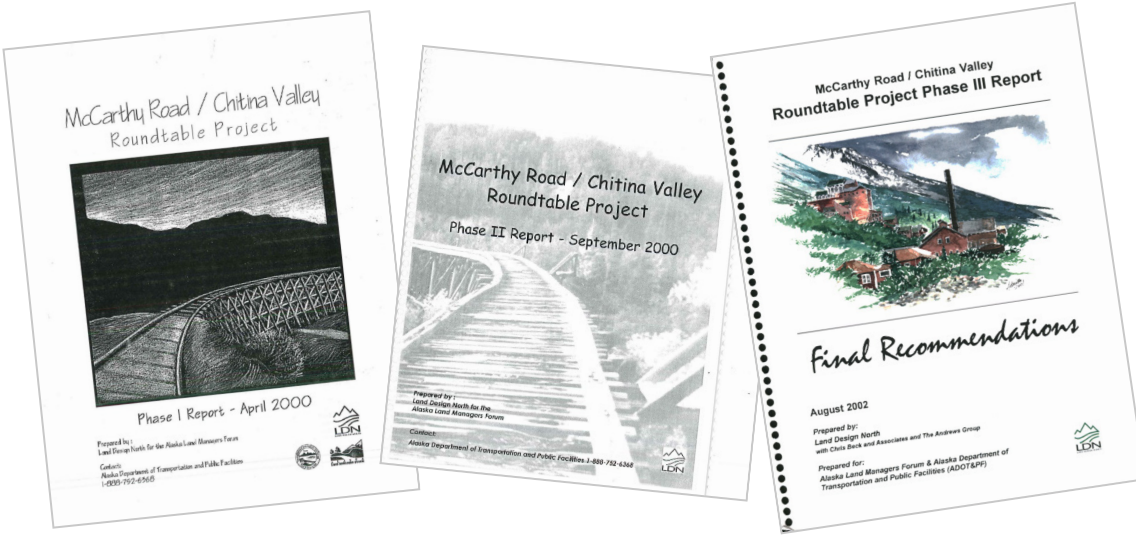
- The Memorandum of Understanding between NPS and DOT&PF was established to improve transportation in and approaching the NPS facilities through the following activities:
  - Develop and implement innovative transportation plans
  - Establish personnel exchanges and information sharing systems
  - Establish interagency project agreements for developing and implementing transportation improvement initiatives
  - Develop innovative transportation planning tools
  - Develop innovative policy, guidance, and coordination procedures for the implementation of safe and efficient transportation systems that are compatible with the protection and preservation of the NPS's cultural and natural resources.

- 1989: DOT&PF conducted a reconnaissance study evaluating three alternatives for the McCarthy Road (DOT&PF 1989). The three options included the following: leave it unchanged, upgrade the existing corridor, or realign it. At the time, the NPS supported the state's plans but still opposed providing vehicular access beyond the Kennicott River. "The NPS feels that road access via the McCarthy Road to the west side of the Kennicott River is very important for visitor access to that portion of the park. We continue to agree with the consensus developed by the community of McCarthy that the community should retain pedestrian access. We could support the installation of a footbridge across the Kennicott River for non-motorized access if that is the wish of the community. We do not feel, at this time, that motorized access across the Kennicott River is appropriate."
- 1990: NPS joined with DOT&PF to participate in the reconnaissance study started the previous year. NPS and DOT&PF agreed to emphasize improving the road for safety rather than for speed.
- 1991 to 1992: DOT&PF and NPS partnered to develop a transportation corridor and visitor opportunities plan for Wrangell-St. Elias/Kennicott Area to help develop the WRST and Kennicott area's potential as a world-class tourism destination. A year later, NPS and DOT&PF decided to cooperatively evaluate making improvements to the McCarthy Road and adjacent lands.
- 1993: FHWA issued a notice to prepare an environmental impact statement on a proposed road reconstruction project. Some proposed road realignments would shift the road onto NPS park lands, which would require authorization under Title XI of Alaska National Interest Lands Conservation Act (ANILCA).
- 1994: The McCarthy Area Landowners Association informed the NPS that the community supported roadway improvement projects, providing that their planning was sensitive to local conditions. McCarthy area residents reiterated construction of a bridge over the Kennicott River should accommodate only foot and bicycle traffic. Local residents expressed concern for needs associated with parking, camping, sanitation, and trash removal. Local residents also recommended that the NPS establish a visitor contact station at the end of the road to help set visitor expectations.
- 1995: DOT&PF and NPS established an Interagency Planning Team to study the road corridor. Preliminary trail planning was added to the corridor study, through the Trails and Recreational Access for Alaska initiative.

- 1995 to 1996: The Interagency Planning Team conducted field investigations, talking to local residents and to identify the corridor's existing natural, scenic, historic, cultural, and recreational resources. The resultant *McCarthy Road Scenic Corridor Plan* (NPS, DNR, and DOT&PF 1997) included several recommendations; including land-use policies, road and corridor design standards, maintenance guidelines, and a series of waysides. The plan also identified the best location for a parallel, multipurpose trail.
- 1997: DOT&PF installed two 6-foot-wide foot bridges over the twin channels of the Kennicott River. Steel and concrete bollards were placed at either end to prevent motorized vehicle access. Some local residents did not like the restriction and a pattern of DOT&PF installing and local residents removing them ensued.
- 1998 to 2002: The Alaska Managers Forum began its interest in DOT&PF's effort to improve the McCarthy Road as a part of its Copper River/Wrangell Tourism Work Group. The result was a multi-year, three-phased series of McCarthy Roundtable Project reports, which included a lot of outreach.
- 2001: The NPS began drafting a transportation plan for the McCarthy-Kennicott area, which examined transportation issues both to the NHL and within it. DOT&PF and the public were engaged.
- Early 2000s: A private vehicular bridge (on a "fee-for-use" basis) was constructed by a McCarthy area resident over the Kennicott River, located downstream of the DOT&PF footbridge.
- 2013: McCarthy Road Upgrades *(DOT&PF Project No. 0850(25)/77129).* The project included maintenance-level work (e.g., resurfacing, minor widening, drainage improvements and some widening/slope work at "hug a boulder" near MP 17, before the Kuskulana River bridge).
- 2013: McCarthy Road & Edgerton Highway Flood Permanent Repairs (Oct '06) *(DOT&PF Project No. ER-0081[7] 77083).* Related improvements included:
  - McCarthy Road MP 14.8 Strelna Creek fish pass pipe replacement
  - McCarthy Road MP 16.5 slide repairs and ditch drainage re-establishment
  - MP 27 Chokosna Bridge riprap replacement
  - McCarthy Road MP 44.7 Lakina River bridge resurfacing course placement
  - McCarthy Road MP 57.6 roadway spot repair
- 2020: McCarthy Road MP 27 Chokosna River Bridge #1193 Replacement Project.
- 2021: McCarthy Road MP 41 Crystal Creek Culvert Replacement (funded through FLAP).
- 2023: In progress: facility improvements at the public Copper River boat launch, near MP 1.5. (funded through FLAP).

3.3 Review of Representative Prior Plans and Studies

3.3.1 McCarthy Road/Chitina Valley Roundtable Project (1999 to 2002)



"The mere presence of an established National Park – especially the nation's largest – is a tremendously important part of the area's attraction to not only visitors but also for those who have the opportunity to own a piece of land whose backyard is untouched wilderness." (LDN 2000a)

Between 1999 and 2002, the Alaska Managers Forum in coordination with DOT&PF and others conducted a three-phased study that explored the effects of the McCarthy Road improvements on the local communities, particularly McCarthy. The project analyzed tourism development, access improvements, and community development. Tasks included the following: identified stakeholder interests, issues, and concerns; analyzed land ownership, use, and management policies, natural and cultural attractions, tourism infrastructure, and levels of visitation; completed traffic analysis; developed growth scenarios; and crafted a range of preliminary management strategies.

According to the Phase I Report (LDN 2000a), key issues initially identified through stakeholder outreach that served to develop guiding principles included the following:

- **Provide access and control**: Landowners and managers must have access to their lands and at the same time, trespassing needs to be controlled.
- **Maintain Private Property Rights**: The lack of restrictions on land-use development and other government controls is part of the appeal of the area; however, it also makes it challenging to maintain the qualities that are viewed as so desirable.
- **Improve Road Safety**: Safety improvements to the McCarthy Road are important for all stakeholders.
- **Maintain Quality of Life/Quality of Experience**: Development should happen incrementally to allow the stakeholders to proactively plan for the needs of visitors and residents. Appropriate infrastructure must be in place before growth happens. Development should not detract from the natural setting or community character. There is a high value placed on the natural setting.
- **Preserve the Uniqueness of Experience**: This region is different from Denali National Park; its rugged setting and the types of experiences that it offers indicate that low levels of visitation may be more appropriate for much of the park. The park does not offer the easily accessible "drive by" wildlife and scenic viewing possibilities nor is it located near major population centers, both which make Denali so popular.

- **Establish Partnerships**: Ahtna, NPS, DOT&PF, State of Alaska, Chitina Native Corporation, communities, visitors, and private landowners will need to work together.

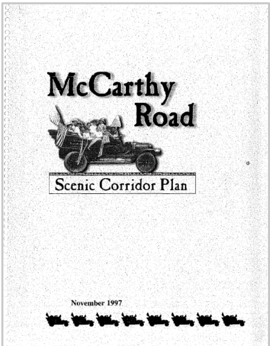
The project found there were differing opinions on the future of the area regarding the following topics:

- **Economic Development Opportunities**: Diverse opinions regarding the appropriate level of economic development in the region, and how it could impact the quality of life and experience, both negatively and positively.
- **Level of Road Improvement**: While most agree that improvements are needed in the name of public safety, there is considerable debate about the timing of the major improvements and whether or not an improved road should be paved.
- **Carrying Capacity**: Most people agree low levels of visitation are compatible with this area. The type and level of tourism and associated infrastructure that can be sustained by the area needs to be defined.
- **Costs**: Who should pay to meet the expanded infrastructure and service needs associated with tourism growth to the area?
- **Regional and local interests**: There are differing opinions on how to balance interests of a national park and the implication of public ownership with the interest of private landowners and how they can be impacted by changes to the park lands surrounding them.

The Final Report from Phase III identified the following four corridor-wide goals along with a number of supporting recommendations, some of which are listed as follows (LDN et al 2002):

- Better governance (without government)
  - Provide adequate public services, more capacity for community projects
  - Establish link between growth in service demand and growth in revenues
  - Respect private property rights, such as freedom from taxes, intrusion by government
- Provide needed public services
  - Meet needs of today’s residents
  - Meet/cope with service demands tied to both residential and visitor growth
  - Develop better link between growth in service demand and growth in revenues
- A healthy economy that benefits locals
  - Create stronger, more diverse local economy
- Protect qualities that make a place unique
  - Guide the overall amount, pace and type of growth
  - Protect sensitive, environmental, and cultural areas
  - Encourage locations and types of growth consistent with community goals
  - Encourage quality and character of development consistent with community goals

3.3.2 McCarthy Road Scenic Corridor Plan (1997)



The NPS, DOT&PF, and DNR prepared the *McCarthy Road Scenic Corridor Plan* in 1997, which identified facilities and road improvements for the McCarthy Road based on standards established for NPS roads. The plan was initiated in part because traffic volumes had been steadily increasing since WRST was established in 1980, and the DOT&PF was proposing to upgrade the McCarthy Road to improve public safety.

Recommendations included road improvement standards and a series of public waysides and campgrounds, as well as cooperative agreements between agencies for maintenance of the road and wayside facilities.

Objectives of the study were to plan a safe park-like road that offers visitor services and commercial opportunities that are compatible with the cultural, scenic, and natural qualities of the area.

The plan described general conditions and recommendations related to the gateway communities, roadway design standards and typical sections, bridges, waysides, trails, and corridor design guidelines. The plan also assessed corridor management and maintenance.

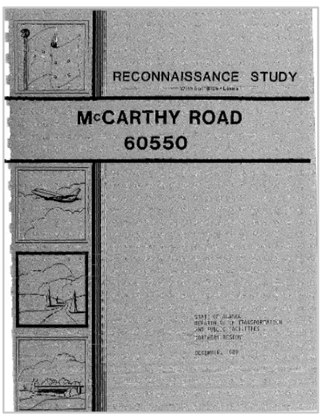
For the PEL study, representative take-aways and observations about the conclusions, identified issues of importance, and desired future conditions included in the plan are summarized in the following list.

- **Roadway deficiencies and design balanced with desire for the protection of the intrinsic characteristics of the corridor**: The road cut immediately east of Chitina is narrow and averages only 16 feet from wall to wall, accommodating only one-way travel at a time. The plan recommended retaining the narrow roadway as a reminder of the road's railroad origins. Improvements such as roadway alignment, widening, and vegetative management recommendations should be made with an eye to maintaining visual qualities and the natural character of the road.
- **Economic development**: Private campgrounds and related visitor services have been identified to encourage private sector commercial development. Public campgrounds can also meet the growing needs of visitors.
- A safe, park-like road, planned through the following objectives and actions:
  - Enhance the driving experience for visitors and residents alike by planning a safe and natural appearing road that protects and conserves cultural, scenic, and natural qualities and resources in the area.
  - Consider both DOT&PF and NPS road design standards.
  - Establish road design standards that reflect NPS standards, low design speeds, and visitor enhancements that add to the visitors driving experience.
  - Promote visitor safety within the roadway corridor.
  - Consider and plan for a public trail that parallels the road and links waysides between Chitina and McCarthy.
- Visitor accommodations:
  - Provide interpretive exhibits reflecting historic, cultural, scenic, and natural resources accessible and visible from the road corridor.
  - Minimize vehicular/human impacts on existing wildlife, habitat, cultural, and natural resources.

  - Create opportunities for non-motorized access to public lands adjacent to the roadway corridor.
  - Encourage non-motorized activities such as walking for pleasure, jogging, hiking, biking, horseback riding, skiing, mushing, camping, and fishing.
- Commercial opportunities:
  - Promote and encourage private development that complements cultural, scenic, and natural resources in the area and provides visitor facilities and services.
  - Accommodate future private/public use(s) that are in balance with the resources along the corridor.

This plan indicated that one of the primary goals during a reconstruction of the McCarthy Road should be to provide the visitor [roadway user] with a sense of the natural environment.

3.3.3 McCarthy Road Reconnaissance Study (1989)



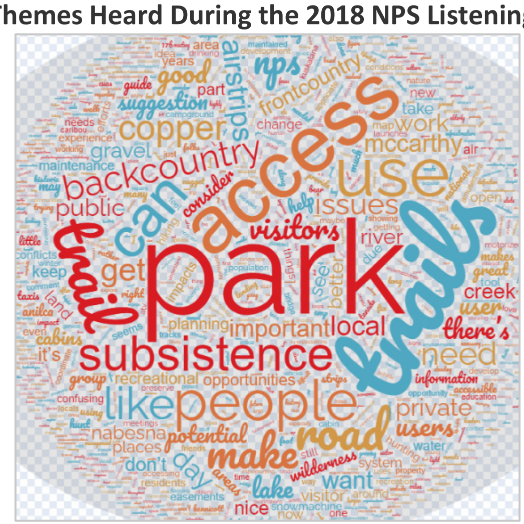
The DOT&PF completed a reconnaissance study in 1989 that evaluated three alternatives for upgrading the McCarthy Road to “provide adequate safety and convenience for the traveling public.” The three options included the following: a no build option, upgrade the existing facility with minor realignments, or a major realignment. The upgrade existing facility option involved upgrading the existing facility generally within the same alignment or with minor realignments and with one major exception: the first 2 miles along the Kotsina Bluffs was proposed for realignment to avoid the existing slides and steep sidehill cut. The upgrade existing facility option and major realignment option would have brought the road to a 40- or 50-mph design standard, respectively. The study describes the areas of the proposed realignment segments.

The study listed roadway requirements, including traffic data and design criteria. The same maintenance issues listed in this study are those that DOT&PF M&O crew still experience today: drainage problems, roadside brush control, lack of adequate surface course material, and high costs of maintenance due to the remote location. Listed winter maintenance problems included drifting snow and hillside icing.

3.3.4 NPS WRST Public Listening Posts (2018)

In 2018, NPS staff hosted a series of community listening sessions in Chitina, McCarthy, and Kennicott (in addition to several other regional communities) to gather information from the public regarding land management planning at WRST. This effort built on previous planning efforts for backcountry and wilderness stewardship but expanded conversations to also include the frontcountry areas, where the McCarthy Road is located. NPS sought public input to gain a broad understanding of the values, issues, and concerns related to WRST and how it is managed. More than 200 comments were submitted (NPS 2023); the frequency at which topics were commented on is demonstrated in the adjacent word cloud. Common topics mentioned by the public included trails, access, users, backcountry, people, visitors, recreation, opportunities, public, issues, river, land, cabins, creek, lake, and wilderness.

Figure 3-1. A Word Cloud Graphic with Popular Themes Heard During the 2018 NPS Listening Posts



3.4 Other Representative Planning Efforts or Projects in Progress

3.4.1 NPS Kennecott Operations and Management Plan Update

As of late 2023, the NPS is in the process of preparing an update to its Kennecott Operations Plan, which was last prepared in 2013. The current update to the plan, which is now called the *Kennecott Operations and Management Plan* (KOMP), is a guiding document for the NPS's management of park land in and around the Kennecott Mines NHL and is geographically focused on the Kennicott subdivision. The KOMP will evaluate current and future desired conditions. The NPS began seeking public comment in 2023 and provided a draft plan to the public in fall 2023. The NPS plans to finalize the KOMP in 2024. The NPS aims to review its operations plan every approximately 5 years, though the most recent update was delayed due to the COVID-19 pandemic, as well as the amount of action items (64 action items). Many of the actions identified in the 2013 Kennecott Operations Plan have already been completed, are currently being completed, or are being re-evaluated.

The purpose of the KOMP is two-fold:

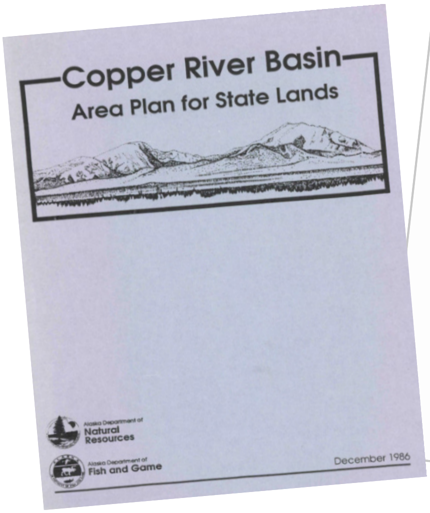
- Provides long-term guidance and protocols for an NPS/community partnership
- Provides long-term goals, guidance, and management strategy for NPS-owned portions of the Kennecott Mines NHL. This includes historic structure preservation and stabilization, interpretation, NPS utilities and infrastructure, access/transportation, and vegetation management.

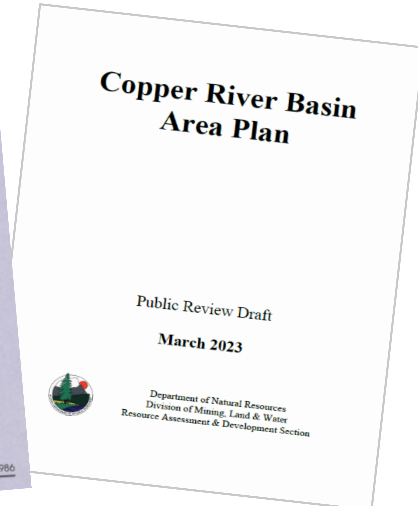
One of the action items (numbered as Action Item 27) is for the NPS to construct a 3.5-mile pedestrian trail from the footbridge over the east (dry) fork of Kennicott River to the Kennecott Mines NHL. The proposed location would generally follow the east side of the Kennicott Glacier and west of the road between McCarthy and Kennicott. The trail would be constructed and maintained exclusively for non-motorized use. This has relevancy to the PEL study, as the NPS is interested in doing a *focused study of non-motorized and motorized uses in the Kennicott area*.

3.4.2 NPS WRST Emergency Evacuation Planning

Beginning in 2023, the NPS began partnering with Pennsylvania State University to begin a multi-year effort to review emergency evacuation needs and planning for WRST. The effort will particularly look at emergency evacuation needs at the end of the McCarthy Road in the event an emergency situation arises from issues such as wildfires.

3.4.3 DNR Copper River Basin Area Plan Revision





As of late 2023, the DNR is in the process of finalizing its revision to the Copper River Basin Area Plan (adopted 1986), which describes the intended uses of state lands and waters within the Copper River Basin Area Plan boundary for the next two decades. DNR breaks its planning area into several smaller regions. The McCarthy Road (and PEL study corridor) mostly falls within the boundary of the plan's Wrangell/McCarthy Region. A small portion of the beginning of the PEL study corridor falls within the plan's Glenn/Richardson Region, which mostly overlays the main highway corridors in the planning area. The March 2023 public review draft of the plan discusses these two regions in chapter 3, respectively, on pages 61 to 101 and 103 to 119 (DNR 2023).

For the Glenn/Richardson Region of the area plan, DNR's overall management intent emphasizes providing more opportunities for development, recreation, and habitat values.

For the Wrangell/McCarthy Region of the area plan, DNR describes management of this area as maintaining the balance of land that should be available for settlement and the preservation of habitat, recreation, and other values on other lands. DNR indicates its management policies are based on DOT&PF continuing to conduct only seasonal maintenance of the McCarthy Road. DNR describes recreation uses in this area that includes hunting, sportfishing, backpacking, sightseeing, pack trips, mountaineering, and river running.

3.4.4 CVDA Copper River Region CEDS Update

The CVDA is one of nine Alaska Regional Development Organizations (ARDORs) that serve regions in Alaska; the CVDA is the ARDOR that serves the region for which the PEL study corridor falls within (Copper River). ARDORs reside within the Alaska Department of Commerce, Community, and Economic Development Division of Community and Regional Affairs and are required to develop and implement regional economic development strategies or similar economic development plans. As of late 2023, the CVDA is developing its CEDS for the Copper River region; the previous one was completed in 2012 (CVDA 2012).

Having a CEDS helps make organizations in the region eligible for funds under the U.S. Economic Development Administration, such as the Administration's public works, economic adjustment, and planning programs. The CEDS strategic planning process consisted of several outreach efforts in 2023 to area communities. Representative feedback from the public relevant to the PEL study includes the following suggested improvements for the Copper Valley and its communities:

- More year-round services for the community to support community needs
- Increase the year-round population
- Keep the community thriving by attracting younger families to sustain and build the community
- Increase tourism at a small scale
- Have a balance between growth and infrastructure that will maintain peace and quiet in the community
- Have a better developed arena for communication in order to cooperatively help work through issues and determine solutions to solve community issues
- Transportation Goal (specific to McCarthy): Find optimum place for parking areas for winter and summer without impacting view shed or town feel

These comments reflect reoccurring themes of seeking a balance between growth and infrastructure and community values, economic development, and building better partnerships.

3.4.5 Copper Valley Telephone Cooperative Fiber Optic Cable Installation Project

The CVTC received grant funding from the U.S. Department of Agriculture Rural Utility Service to plan for and install fiber optic transport cable and Fiber To The Premise (i.e., fiber extends to the end-user premise) between the communities of Chitina and McCarthy. The project will provide high-speed broadband access to remote residents and businesses along the McCarthy Road corridor. As of early 2024, CVTC is in the process of obtaining environmental approvals for the project. CVTC is coordinating with the NPS, as there is potential for areas that would be cleared of vegetation to install the cable to be converted for trail use in the future. Construction of the project is tentatively scheduled for the summers of 2025 and 2026.

3.4.6 McCarthy Area Council McCarthy Area Survey

In the absence of a local government, the MAC is an active, nonprofit organization that focuses on improving the lives of locals and visitors in the McCarthy-Kennicott area. The MAC meets typically from March through September and disseminates meeting minutes and other information to keep people informed of relevant area issues and events. In the fall of 2023, the MAC made available a McCarthy Area Survey that aimed to collect demographic and lifestyle information from residents of the McCarthy area. “This survey will help local organizations better understand the community’s composition, needs, and preferences, thereby enabling them to make informed decision[s] and develop targeted programs for the betterment of the community.” The results of this survey are not available as of late 2023; however, they are relevant as some of the questions pertain to corridor values and issues related to transportation, such as road maintenance.

3.4.7 DOT&PF Interior Alaska Transportation Plan Update

In 2023, the DOT&PF began a multi-year update of its regional Interior Alaska Transportation Plan, for which the PEL study corridor falls within. The previous regional plan was completed in 2010. This plan will guide future public investments in transportation infrastructure covering the interior Alaska region over a 20-year horizon; it will include both long- and short-term range strategies and actions as well as carry forward policies, principles, and investment strategies from DOT&PF’s statewide long-range transportation plan (LRTP). Alaska Moves 2050 is DOT&PF’s most recent statewide LRTP, which was updated in draft form in 2022; it outlines goals, policies, and measurable actions for an adaptable and resilient Alaska transportation system. Relevant for consideration with regard to PEL study goals are the following goals and actions listed in Alaska Moves 2050 (DOT&PF 2022) (and by reference within the Interior Alaska Transportation Plan update):

- Safety: provide for and continuously improve the transportation system's safety for all users.
- Mobility and access: move people and goods efficiently and equitably by strategically supporting all modes, improving accessibility, safety, personal mobility, and interconnectedness.
- Economic vitality: plan for and invest in transportation infrastructure that supports economic growth and lowers goods and service costs.
- State of good repair: plan for full life cycle costs across the transportation system, including planning, construction, operation, and maintenance, to improve funding allocation consistently and effectively.
- Resiliency: assess risk and investment in solutions to develop a transportation agency and system that will adapt to and recover from the effects of climate change, natural disasters, and other disruptions.
- Sustainability: promote a sustainable, clean, equitable transportation system to reduce costs to consumers and businesses and provide wider social and environmental benefits.

3.5 References

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4. Transportation System Conditions and Road Characteristics

4.1 Functional Classification and Roadway Users

4.1.1 Functional Classification

Road classification is relevant to the applicability and eligibility of funding sources for future projects. The roadway through the study corridor is functionally classified as either a rural major collector or minor collector. The McCarthy Road is functionally classified as *rural major collector* from Chitina to its end at the Kennicott River bridge (DOT&PF 2023a); this meets the definition of a federal-aid-highway, which means this highway section is eligible for 23 U.S.C. 317 funding. From the Kennicott River bridge crossing east to the Kennicott subdivision, the road is classified as a *minor collector*; this section does not meet the definition of a federal-aid-highway.

4.1.2 Roadway Users

The McCarthy Road is a key transportation corridor for local residents and visitors, serving a variety of roadway users' needs and interests. The study corridor provides access for residents, recreational users (including, but not limited to, skiers, hikers, horseback riders, snowmachine users, ATV users, and hunters), subsistence users, property owners, tourists, and NPS park visitors. The McCarthy Road serves as the main road surface gateway into WRST for visitors; the Nabesna Road is on the northern side of WRST and does not see as much use compared with the McCarthy Road.

The McCarthy Road corridor has a mix of landowners that include NPS, DOT&PF, University of Alaska, and private and native corporations. This mix of landowners means a diverse group of roadway users are needing to access their lands.

Tourist, recreation, and residential traffic is highest in the summer months with many residents being seasonal and regular maintenance of the roadway ceasing in the winter. Tourist and recreation traffic is typically accessing WRST or trails, waterways, and other recreation access points along the study corridor. Residential traffic is largely traveling to McCarthy, but small communities along the study corridor are also accessed (like Strelna and Long Lake).

Freight and commercial users are limited to hauling construction equipment/supplies and servicing the small businesses located in McCarthy. Truck traffic at the Copper River bridge near Chitina is 10% of the total traffic, but a large portion of that traffic is two-axle single-unit trucks. RVs fall under this classification and likely attribute to a large percentage of the traffic recorded.

Most car rental companies in the state restrict renters from driving the McCarthy Road, thereby reducing some visitor traffic that may have come to the road corridor and WRST.

4.2 Traffic and Safety

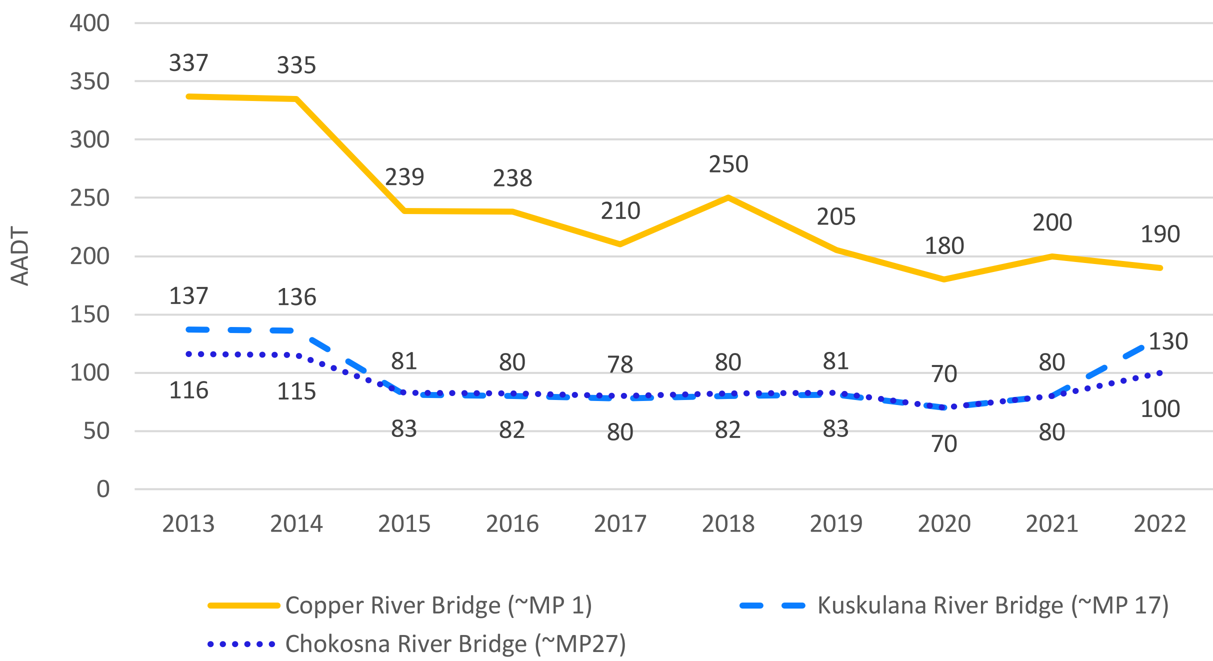
4.2.1 Traffic

4.2.1.1 Annual Average Daily Traffic

The DOT&PF collects traffic data in three locations along the study corridor. This occurs near the Copper River bridge (DOT&PF Station ID 37010035), Kuskulana River bridge (Station ID 30010051), and Chokosna River bridge (Station ID 30010061). All three locations are temporary short-term stations that typically collect data for a maximum of 7-day intervals.

The DOT&PF defines annual average daily traffic (AADT) as the average volume of traffic for the average 1-day (24-hour) period during a year at a specific roadway location (DOT&PF 2023b). Historic traffic volumes at the three locations along the study corridor between 2013 and 2022 are shown in Figure 4-1. Historic counts consist of actuals, estimates, and/or user supplied. In this timeframe, traffic volumes decreased from 337 to 190 near the Copper River bridge, whereas traffic counts remained relatively the same at the other two locations.

Figure 4-1. Annual Average Daily Traffic in the Study Corridor, 2013 to 2022



Source: DOT&PF 2023b.

For another data point for reference, DOT&PF's 1989 *McCarthy Road Reconnaissance Study* indicated current average daily traffic for the McCarthy Road was 125 vehicles at the Copper River bridge and 25 vehicles at the Chokosna River bridge (DOT&PF 1989). Over the three-decade period, this represents an approximate 50% increase in traffic at the Copper River bridge and a 300% increase at the Chokosna River bridge, indicating a larger percent increase in drivers traveling east on the McCarthy Road.

4.2.1.2 Monthly Average Daily Traffic

The DOT&PF infrequently collects monthly average daily traffic (MADT) in the study corridor. Figure 4-2 depicts images retrieved from DOT&PF's traffic website depicting MADT counts taken periodically between 2013 and 2022 at the three locations. Comparing traffic counts taken during a July one year with those taken in an August another year is somewhat like comparing apples and oranges, because of annual and seasonal traffic variations. However, these counts have been included here to show a general trend. MADT has decreased on the western end of the study corridor near the Copper River crossing, whereas MADT has increased in the other two locations farther to the east. It is possible this is indicative that more people are driving east during the summer than a decade ago.

Figure 4-2. Monthly Average Daily Traffic in the Study Corridor, 2013, 2015, 2019, and 2022

Copper River Bridge (~MP 1)

MADT by Year

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	-	-	-	-	-	-	-	446	-	-	-	-
2015	-	-	-	-	-	-	-	425	-	-	-	-
2017	-	-	-	-	-	-	-	-	-	-	-	-
2018	-	-	-	-	-	-	-	-	-	-	-	-
2019	-	-	-	-	-	-	420	-	-	-	-	-
2022	-	-	-	-	-	-	-	-	-	-	-	-

Kuskulana River Bridge (~MP 17)

MADT by Year

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	-	-	-	-	-	-	-	180	-	-	-	-
2015	-	-	-	-	-	-	-	-	-	-	-	-
2022	-	-	-	-	-	-	235	-	-	-	-	-

Chokosna River Bridge (~MP 27)

MADT by Year

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	-	-	-	-	-	-	-	149	-	-	-	-
2015	-	-	-	-	-	-	-	-	-	-	-	-
2022	-	-	-	-	-	-	180	-	-	-	-	-

Source: DOT&PF 2023b.

4.2.1.3 Projected Traffic Volumes

Table 4-1 shows current and projected future traffic volumes (AADT) for the corridor in the three locations where traffic counts are collected. The DOT&PF anticipates traffic volumes are projected to increase.

Table 4-1. Current and 20-year Projected Traffic Volumes in the Study Corridor

Traffic Count Locations	2022 AADT	Future AADT (2040)
Copper River Bridge	190	240
Kuskulana River Bridge	130	160
Chokosna River Bridge	100	130

Source: Vockeroth, pers. comm. 2023.

Projected seasonal average daily traffic (SADT) at both ends of the study corridor are shown in Table 4-2. DOT&PF calculated these volumes when it applied for the funding for this PEL study.

Table 4-2. Current and 20-Year Projected Seasonal Average Daily Traffic in the Study Corridor

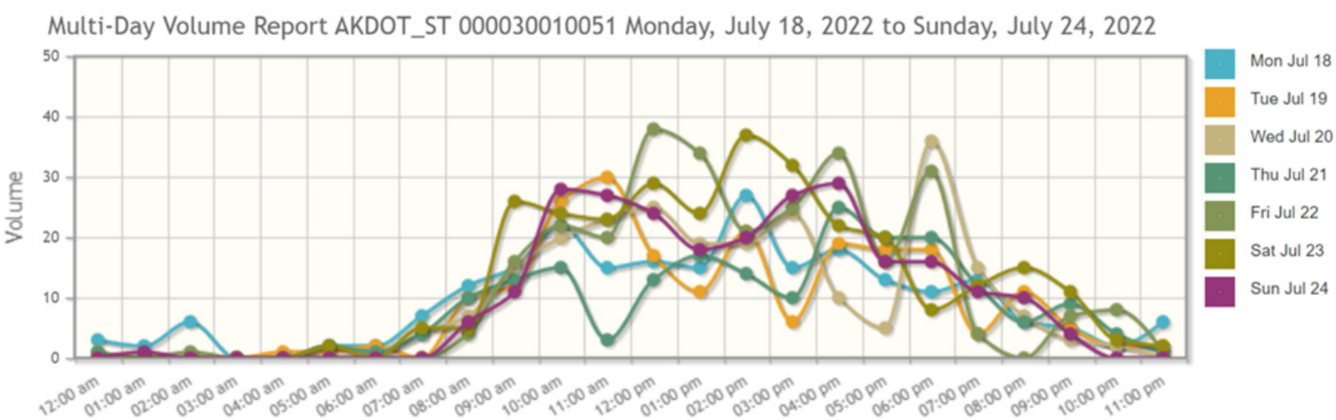
SADT (peak season)	Current Actual Traffic Counts at Start of Study Corridor	20-year Projected Traffic Counts at Start of Study Corridor	Current Actual Traffic Counts at End of Study Corridor	20-year Projected Traffic Counts at End of Study Corridor
McCarthy Road	400	475	150	185

Source: DOT&PF and NPS 2021.

4.2.1.4 Representative Daily Traffic Volumes

Figure 4-3 shows representative daily traffic volumes at the Kuskulana River bridge traffic counter during a week in July 2022. The highest traffic volumes appeared to occur Friday around noon, followed by Saturday around 2:00 p.m., and Wednesday around 6:00 p.m. Four of the top five peaks of traffic that week occurred on either Friday or Saturday, indicating the weekend traffic counts are generally higher compared to weekday traffic.

Figure 4-3. Representative Daily Traffic Volumes at Kuskulana River Bridge, Week of July 18, 2022

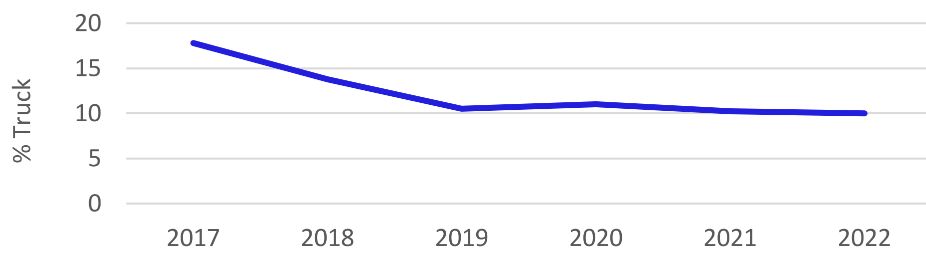


Source: DOT&PF 2023b (Graphic taken from DOT&PF's Traffic Data website).

4.2.1.5 Percent Truck Traffic

Truck traffic is only collected at the Copper River bridge count location and not beyond it to the east. Truck counts are only available from 2017 through 2022, as shown on Figure 4-4. The percentage of traffic that are trucks (which includes RV classification) has decreased over the past 5 years, plateauing around 10% for the past couple of years.

Figure 4-4. Percentage of Vehicles that are Trucks at the Copper River Bridge Count Location, 2017 to 2022



Source: DOT&PF 2023b.

4.2.2 Safety and Crash Data

The most recent 5-year DOT&PF crash data for the study corridor is from 2017 to 2021. The data show that very few crashes (three) have been reported during this timeframe, as summarized in Table 4-3. No crash patterns were identified. Public input provided during the first public meeting indicated crashes go unreported and are likely quite a bit more than the data indicates.

Table 4-3. Reported Crashes in the Study Corridor, 2017 to 2021

McCarthy Road Location (MP)	Date	Time	Number of Vehicles (and Type)	Harmful Event	Road Surface	Other Condition	Crash Severity	Property Damage
59	August 2020	12 a.m.	2 (Dodge)	Sideswipe	Standing Water	N/A	No Injury	Minor
36.9	October 2020	6 p.m.	1 (Dodge Sedan)	Overturn/ Rollover	Dry	Animal in Roadway	No Injury	Unknown
8.6	November 2021	12 p.m.	1 (Jeep 2-door)	Overturn/ Rollover	Snow	N/A	Minor Injury	Disabling

Source: Vockeroth, pers. comm. 2023.
N/A = not applicable.

4.3 Roadway Characteristics

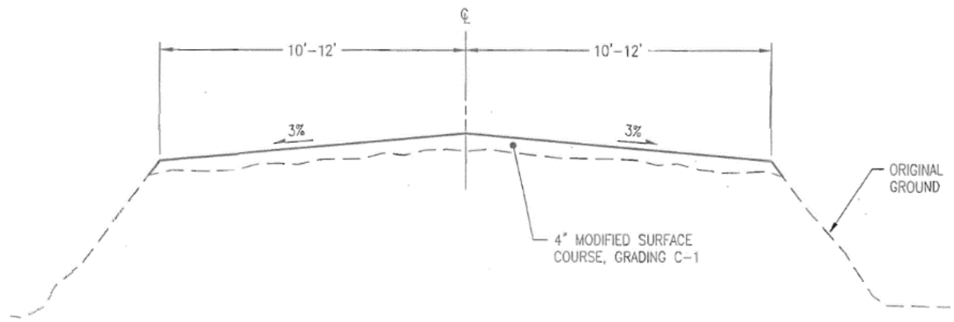
4.3.1 Typical Cross-section

Figure 4-5 shows the existing typical section for the McCarthy Road between Chitina and where it ends at the Kennicott River. East of the Kennicott River crossing, the road narrows with pullouts for vehicles to pass as it approaches the Kennecott Mines NHL. Figure 4-6 is a typical section copied from the McCarthy Road Scenic Corridor Plan, which DOT&PF and NPS has been identified as the preferred road cross section. The preferred cross section has 10- to 12-foot-wide lanes.

In general, existing lane widths vary from 10 to 12 feet with no shoulders and variable side slopes and ditch depths. Many locations along the McCarthy Road are narrower than this typical section and need to be widened. Refer to Section 5 (Table 5-1)for specific locations that need widening based on a DOT&PF M&O site visit in May 2023; this table also identifies locations with road and slope issues that are substandard or are creating maintenance issues. During the first public meeting for the PEL study, the public commented on the need to resolve narrow roadway segments.

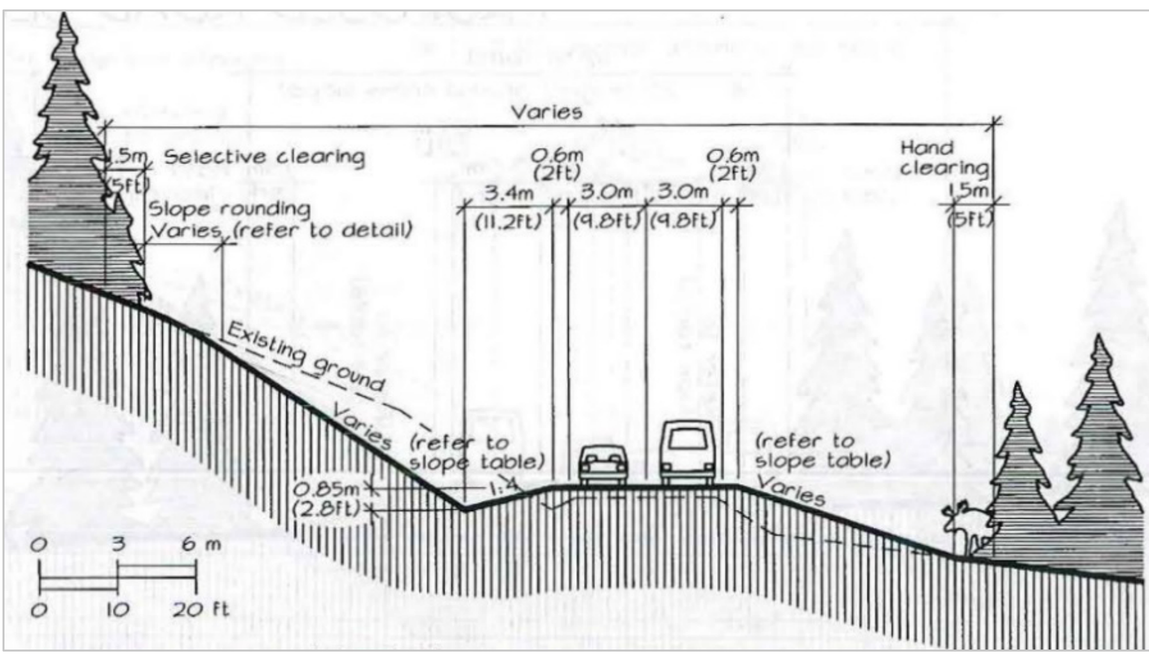
The full study corridor was flown for LiDAR (Light Detection and Ranging) in the fall of 2023; the study team will analyze the LiDAR in early 2024 to determine the locations of the road where the road width is deficient.

Figure 4-5. Existing Typical Cross Section of the McCarthy Road



Source: DOT&PF 2011.

Figure 4-6. Preferred Typical Cross Section for the McCarthy Road



Source: NPS, DNR, and DOT&PF 1997.

Roadside vegetation limits visibility and creates sight distance problems, particularly approaching roadway curves. Improvements to roadway width, embankment and cut slopes, and selective clearing would be beneficial in improving sight distance. The need for brush clearing was a common comment submitted by members of the public during the PEL study's first public meeting.

With the low speed and low traffic volumes, there are very few traffic barriers in the study corridor, mostly confined to bridge approaches. As projects are designed, barrier analysis should be completed to confirm if there is a need for protection from some of the steep and tall embankment slopes.

There are eight bridges in the study corridor, with two of these being one-lane bridges (Kuskulana and Gilahina) and two of the bridges being pedestrian, non-vehicular bridges (aside from ATVs) (the Kennicott River east and west footbridges). In general, the bridges meet the approach roadway width with the exception of the Kuskulana and Gilahina bridges. Refer to Section 6.2 for additional bridge rating information, including photos, of the study corridor bridges.

4.3.2 Pedestrian Accommodations

Pedestrian facilities and access along McCarthy Road are limited. Pedestrians do not have a dedicated space and currently utilize the edge of the roadway for travel. None of the roadway bridges along the study corridor have a dedicated space for pedestrians. Several of the bridges do not meet pedestrian barrier safety requirements, including the one-laned Kuskulana River bridge, which is 238 feet above the river.

The Kennicott River (west) footbridge bridge has a mix of ATV and pedestrian users, which causes conflicts and safety concerns. The *McCarthy Road Scenic Corridor Plan* (NPS, DNR, and DOT&PF 1997) recommended a multi-use trail that paralleled the roadway between Chitina and McCarthy. There is interest in conducting an alternative analysis to evaluate pedestrian access improvements along the entire study corridor to improve the experience and safety for road users. As mentioned in Section 3.4.5, the planned installation of fiber optic cable in the McCarthy Road corridor vicinity might provide additional opportunity for converting the fiber optic cable corridor into a future trail.

East of the main Kennicott River crossing there is another pedestrian bridge (Kennicott River East) over a currently dry river channel prior to entering the community of McCarthy. Once in McCarthy, where vehicle traffic is limited and slow moving, pedestrians freely walk along the roads without issue. Pedestrians have a multi-use trail known as “The Wagon Road” that parallels the road from McCarthy to the Kennecott Mines NHL; while it is intended to be a trail, some people use ATVs and full-size passenger vehicles on it, though it is narrow and brushy.

4.3.3 Geometry

Design standards establish a uniform set of values to use as the basis for roadway design, including geometric standards. The study corridor begins at Chitina where the McCarthy Road heads east through rolling terrain. The road has a typical posted speed of 30 mph with advisory speeds for areas with constrained horizontal or vertical geometry. In general, horizontal and vertical geometry are not major areas of concern that need improvement within the study corridor. Most geometric changes anticipated to be evaluated will be to improve drainage or geological conditions affecting the roadway. The LiDAR analysis will identify the locations where geometry is substandard (refer also to Section 4.3.1).

4.3.4 Road Right-of-Way

The width of the McCarthy Road ROW is generally 100 feet (e.g., extending 50 feet on both sides of the road centerline); there are areas where the ROW varies from this distance. For instance, the road ROW narrows at the southern boundary of NPS’s Kennecott Mines NHL, where the PEL study corridor ends.

There are a few discrepancies where the McCarthy Road centerline does not follow the road ROW and extends beyond the ROW. This occurs near the Gilahina Trestle (near MP 29) and just east of the Kennicott River footbridge near the community swimming hole; these are shown on Figure 4-7 and

Figure 4-8, respectively. On these figures, the red dashed line follows the road centerline. The blue line depicts the actual ROW boundary that does not match the road centerline.

Figure 4-7. Road ROW Discrepancy near Gilahina Trestle, MP 29

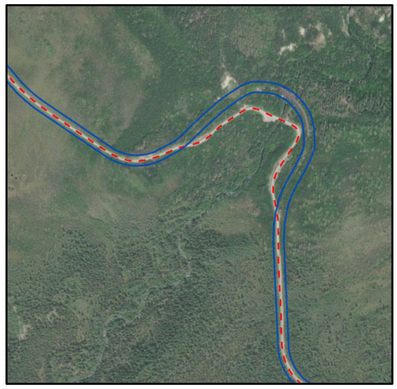
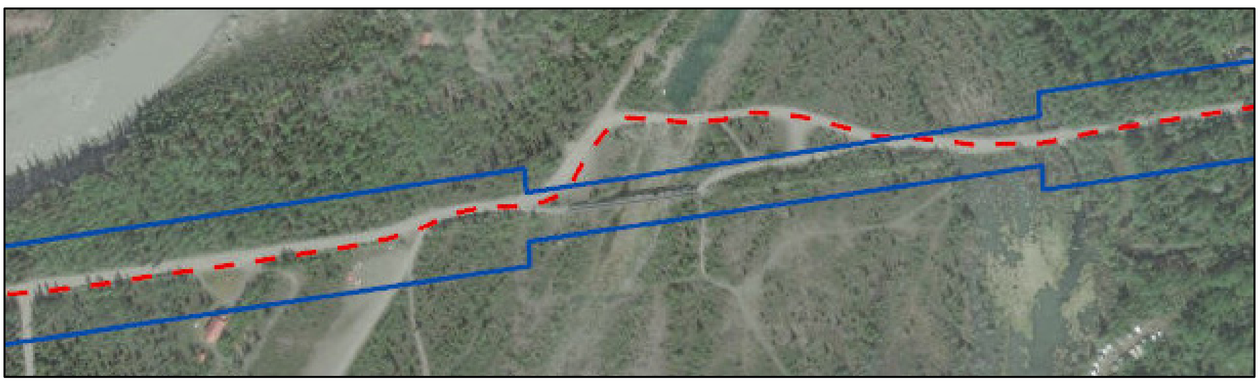


Figure 4-8. Road ROW Discrepancy East of Kennicott River Crossing near Community Swimming Hole



4.3.5 Roadway Condition

The DOT&PF provides pavement condition reports for many of their roads throughout the state. Rutting, cracking, and roughness are all metrics used to rate roadway conditions. For the PEL study corridor, the DOT&PF only has data for MP 3 to 17; this is the roadway stretch where a high-float structural section (emulsified asphalt overlaid by crushed aggregate) was constructed by DOT&PF.

Based on discussions with DOT&PF M&O staff, the high-float section of roadway between MP 3 and MP 17 has been a success. It has reduced maintenance issues, such as making it easier for DOT&PF to re-grade the road. Other benefits for DOT&PF is that it requires less maintenance, results in less dust, and works well to control erosion.

Public comment during the first public meeting for the PEL study indicated mixed opinions on the use of high-float, ranging from liking it and wanting it applied to other portions of the corridor to wanting it removed and reverted to gravel. Negative public comments related to the high-float section included that it eventually resulted in the persistent presence of potholes and frost heaves, sometimes making it difficult to travel. Others indicated it improved reliability, safety, and reduced dust. Public comments show it is a mixed opinion as to whether or not the high-float provides road users with a better traveling experience. Gravel can be graded flat relatively quickly but it is dusty. The need to mitigate dust was a common issue mentioned by the public.

High-float versus gravel should be evaluated for use on additional sections of the McCarthy Road.

Figure 4-9 depicts roadway rutting between MP 3 and MP 17. Rutting is a depression or groove worn into a road by the travel of wheels. The DOT&PF's trigger for a rutting rehabilitation design is a rut depth of 0.5 inch (DOT&PF 2012). DOT&PF data indicate the roadway rutting is generally less than either 0.25 or 0.5 inch (shown in green or yellow, respectively, on the figure).

Figure 4-9. Roadway Rutting in the Study Corridor, MP 3 to MP 17

Source: DOT&PF 2023c (Image taken from DOT&PF website).

Figure 4-10 depicts roadway cracking between MP 3 and MP 17. Cracking is the separation of the pavement surface caused by failure of the asphalt to bind properly, fatigue, temperature changes, vehicle turning movements, and other factors. DOT&PF data indicate the percentage of roadway cracking is mostly either less than 5% or between 5 and 10% (shown in green or light green, respectively, on the figure). Additionally, there are several locations throughout the 14 miles where cracking is between 10 and 20%.

Figure 4-10. Roadway Cracking in the Study Corridor, MP 3 to MP 17

Source: DOT&PF 2023c (Image taken from DOT&PF website).

Figure 4-11 depicts roadway roughness between MP 3 and MP 17. DOT&PF data indicate nearly all of the 14 miles have an international roughness index value greater than 170; this is considered "poor."

Figure 4-11. Roadway Roughness in the Study Corridor, MP 3 to MP 17

Source: DOT&PF 2023c (Image taken from DOT&PF website).

For the rest of the study corridor that is not included in these data, information gathered from field inspection and discussions with maintenance was utilized. Overall, the roadway is in fair condition with areas that are in poor condition based on drainage or geological issues. Figure 4-12 shows a portion of the McCarthy Road that is experiencing these issues even during a dry portion of the summer.

Figure 4-12. McCarthy Road Conditions near MP 58

Image taken during June 2023 site visit.

The existing roadway will benefit from drainage and geotechnical improvements to reduce potholes, standing water, sloughing, and overall road damage. Other reported roadway issues are railroad spikes (from overlaid railroad ties), washboard sections, soft shoulders, and road base failure.

4.3.6 Speed Limits

The posted speed on McCarthy Road is 30 mph but is reduced with advisory speeds in certain areas with constrained geometry. There have been several requests by local residents to reduce speeds near communities along the road, including the properties adjacent to Long Lake. Speed concerns will be evaluated in these areas, and mitigation measures will be recommended where applicable. East of the Kennicott River crossing, speeds are naturally reduced with increased pedestrian and ATV traffic and decreased vehicle usage. The NPS has requested a 25-mph speed limit as the road heads north from McCarthy to Kennecott Mines NHL to accommodate vehicle pullouts on the existing one-lane road.

4.4 References

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Vockeroth, Scott, Traffic Data Collection Manager, DOT&PF Northern Region. 2023. Personal communication (email) with Paul Eckman, DOT&PF Northern Region Design Engineer. September 25.

5. Maintenance and Operations

The DOT&PF regularly maintains the McCarthy Road seasonally from May 15 to October 1 every year. The DOT&PF does not regularly maintain the road in the winter. However, the DOT&PF is required to maintain and clear the state-owned McCarthy Airport runway that is near McCarthy. This means the DOT&PF plows the McCarthy Road in the winter periodically, only enough to provide access to clear the McCarthy Airport runway, which is a 3,500-foot-long by 60-foot-wide general aviation gravel runway.

The DOT&PF M&O staff face substantial challenges throughout the study corridor, including drainage issues, culvert issues, road/embankment sloughing, dust control, road damage, rockslides, soft shoulders, and mudslides. Due to the length of the McCarthy Road and the limited amenities on the McCarthy side, maintaining the road is time consuming and expensive. The most noteworthy maintenance issues are at the Kotsina Bluffs and MP 58 Landslide where global stability is a concern. In both areas, the roadway can experience significant movement during the fall and spring that require work by staff daily. Resolving these two areas will be costly and require capital project funding, beyond annual maintenance funding.

Table 5-1 contains a list of issues and needs identified by the DOT&PF M&O staff during a road inspection that occurred on May 24, 2023. The table denotes issues that can be fixed through typical summer M&O work; most other issues are more work and costlier and DOT&PF M&O staff requested they be included in the PEL study to be addressed.

Figure 5-1 graphically shows the frequency for which these issues were observed during the site visit. Many of these issues are discussed in other sections of this report in greater detail. These M&O issues represent a snapshot in time. Nearly 25% of the observations were related to water drainage issues, lack of ditching, or a plugged ditch. The second most commonly observed issue was related to high cutbanks. The third most commonly observed issue was related to culverts. At that time, the DOT&PF identified at least 10 culverts that need modification or replacement, as well as the need for at least 14 new culverts.

Figure 5-1. Representative M&O Issues Observed During DOT&PF Site Visit, May 2023

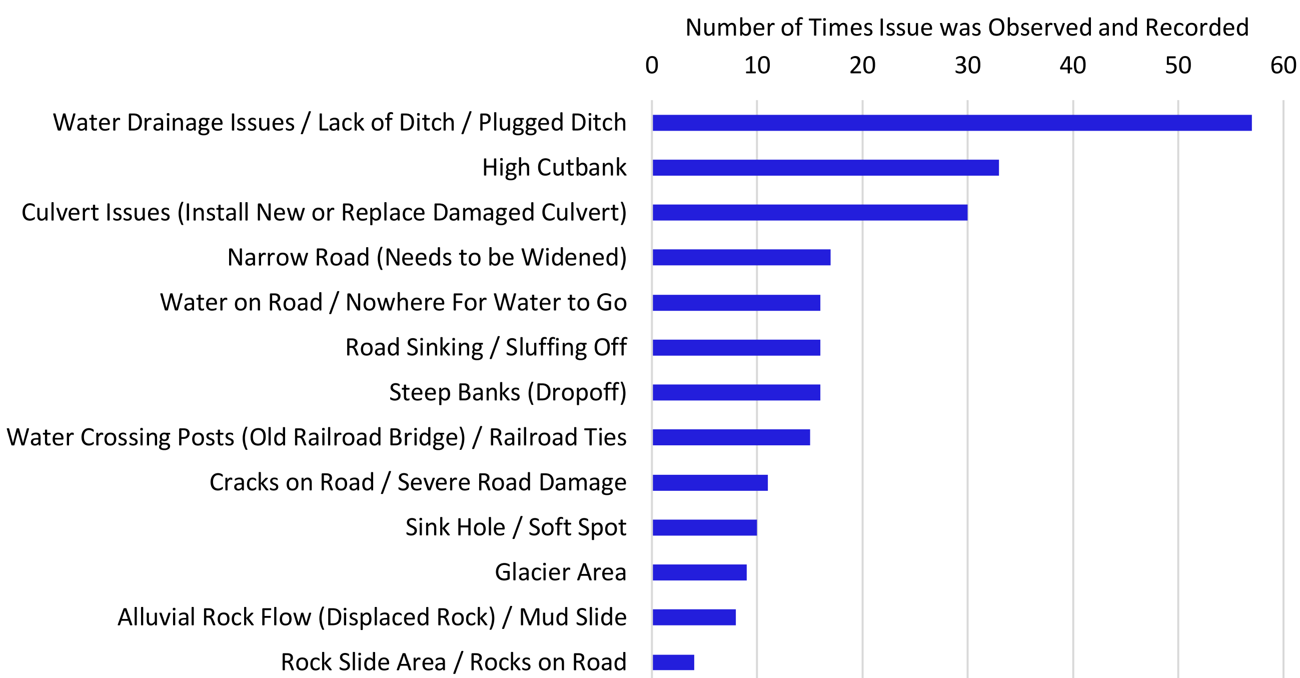

Table 5-1. Alaska DOT&PF M&O Staff-identified Needs along the McCarthy Road

Mileposts (MP)	Notes	Water Drainage Issues/Lack of Ditch/Plugged Ditch	Culvert Issues (Install New or Replace Damaged Culvert)	Road Sinking/ Sluffing Off	Narrow Road (Needs to be Widened)	High Cutbank	Steep Banks (Dropoff)	Cracks on Road/ Severe Road Damage	Water on Road/ Nowhere For Water to Go	Glacier Area	Water Crossing Posts (Old Railroad Bridge)/Railroad Ties	Rockslide Area/Rocks on Road	Alluvial Rock Flow (Displaced Rock)/Mud Slide	Sink Hole/ Soft Spot
0	Rock cut at start of the McCarthy Road needs to be widened; Historical cut			Yes	Yes	Yes								
0.4	Old dump site; Add fill; Previously “burrito wrapped”													
0.7		Yes			Yes	Yes	Yes							
1.0 to 1.1	Rockslide area; People fish and park in this location; Edge of road is being eroded away toward the Copper River					Yes	Yes							
1.5 to 2.7	Bypass Kotsina River Bluff by using Kotsina River ROW	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	
3.4	Sluffing toward Chitina River (200-foot long, one-half driving lane)			Yes	Yes		Yes							
3.7 to 3.8	Northeast side away from Chitina River; All year water flow	Yes	Yes			Yes								
5.1				Yes				Yes				Yes		
5.7 - 6.0		Yes		Yes										
6.2 - 7.0		Yes	Yes	Yes										
7.1				Yes										
7.7	Dirt cutbank				Yes	Yes								
7.8 to 7.9				Yes										Yes
8.1	[a]													
8.2				Yes										Yes
8.8		Yes												
9.2		Yes		Yes										
9.4 to 9.6	No room for snow removal	Yes				Yes								
10 to 10.2		Yes							Yes					
10.5 to 10.6	Hole in culvert; No drainage in dip	Yes	Yes						Yes					
10.6 to 10.7	No drainage; Nowhere to put water	Yes							Yes					
11	Next to pond	Yes									Yes			
11.2 to 11.3	Dirt cutbank; No room for snow removal	Yes			Yes	Yes								

Mileposts (MP)	Notes	Water Drainage Issues/Lack of Ditch/Plugged Ditch	Culvert Issues (Install New or Replace Damaged Culvert)	Road Sinking/ Sluffing Off	Narrow Road (Needs to be Widened)	High Cutbank	Steep Banks (Dropoff)	Cracks on Road/ Severe Road Damage	Water on Road/ Nowhere For Water to Go	Glacier Area	Water Crossing Posts (Old Railroad Bridge)/Railroad Ties	Rockslide Area/Rocks on Road	Alluvial Rock Flow (Displaced Rock)/Mud Slide	Sink Hole/ Soft Spot
11.3 to 12	Bad dips	Yes									Yes			
12.1 to 12.5		Yes			Yes						Yes			
12.6	Saturated roadbed	Yes						Yes						
12.9 to 14		Yes						Yes						
13.4						Yes								
13.6	Hole in culvert; Extend Culvert		Yes											
14.8	Just past Strelna Creek	Yes				Yes		Yes						
15		Yes							Yes					
15.1 to 16.0		Yes		Yes		Yes			Yes		Yes			
16.2		Yes				Yes								
16.5				Yes					Yes					
16.7		Yes				Yes								
16.8 to 17.1	Cutbank is sliding toward road	Yes						Yes				Yes	Yes	
17.4		Yes							Yes					
18		Yes				Yes								
18.6	New culvert needed [a]		Yes											
18.7 to 20.5	Wood showing from railroad ties; Culverts damaged	Yes	Yes					Yes			Yes			
20.5	Extend culvert [a]		Yes											
20.5		Yes			Yes									
20.6 to 20.9		Yes				Yes					Yes			
21 to 21.2		Yes				Yes		Yes						
21.1	Culvert plugged with material [a]		Yes											
21.7 to 22.6		Yes		Yes				Yes	Yes					
22.7	New culvert needed	Yes	Yes											
23.1		Yes												
23.2 to 23.5		Yes												
23.55 to 23.7	New culvert needed	Yes	Yes				Yes		Yes					
24.1	Replace plastic culvert [a]		Yes											

Mileposts (MP)	Notes	Water Drainage Issues/Lack of Ditch/Plugged Ditch	Culvert Issues (Install New or Replace Damaged Culvert)	Road Sinking/ Sluffing Off	Narrow Road (Needs to be Widened)	High Cutbank	Steep Banks (Dropoff)	Cracks on Road/ Severe Road Damage	Water on Road/ Nowhere For Water to Go	Glacier Area	Water Crossing Posts (Old Railroad Bridge)/Railroad Ties	Rockslide Area/Rocks on Road	Alluvial Rock Flow (Displaced Rock)/Mud Slide	Sink Hole/ Soft Spot
24.1 to 24.5		Yes		Yes						Yes				
24.55	Water pumping out in road at double turnouts								Yes					Yes
24.6 to 24.7	Dirt banks; Ties showing	Yes				Yes					Yes			
24.9	Damaged culvert needs to be replaced and ditched	Yes	Yes											
25 to 25.8	New culvert needed	Yes	Yes											
26.1 to 26.3		Yes												
27	Soft shoulder						Yes							
27.2 to 27.4						Yes	Yes				Yes		Yes	
27.7	Ice dam area	Yes												
28 to 28.6		Yes									Yes			Yes
28.6		Yes				Yes								
28.9	Gilahina River needs new bridge													
29.1 to 29.3		Yes							Yes					
29.5 to 33		Yes	Yes	Yes						Yes	Yes			
30.1	Plastic culvert needs to be replaced [a]		Yes											
30.2	[a]													Yes
30.4	New culvert needed [a]		Yes											
33.3 to 33.6		Yes								Yes				
33.6 to 39.3		Yes									Yes			
34.3 to 34.8										Yes				
35	[a]													Yes
35.7									Yes					
36.1 to 36.2										Yes				
36.4 to 36.6										Yes				
36.7	[a]													Yes
37.2	New culvert needed		Yes								Yes			

Mileposts (MP)	Notes	Water Drainage Issues/Lack of Ditch/Plugged Ditch	Culvert Issues (Install New or Replace Damaged Culvert)	Road Sinking/ Sluffing Off	Narrow Road (Needs to be Widened)	High Cutbank	Steep Banks (Dropoff)	Cracks on Road/ Severe Road Damage	Water on Road/ Nowhere For Water to Go	Glacier Area	Water Crossing Posts (Old Railroad Bridge)/Railroad Ties	Rockslide Area/Rocks on Road	Alluvial Rock Flow (Displaced Rock)/Mud Slide	Sink Hole/ Soft Spot
38.1	Gravel buildup [a]												Yes	
38.5 to 38.6										Yes				
39.2	New culvert needed [a]		Yes											
39.9	New culvert needed [a]		Yes											
40.1	Stream changes channel; Larger culvert [a]		Yes										Yes	
40.2	[a]													Yes
40.3 to 40.7		Yes												
40.8 to 41.1	Uphill embankment				Yes	Yes	Yes							
41.4	Dirt bank south side				Yes	Yes								
41.5 to 43	Dirt bank south side	Yes			Yes	Yes								Yes
41.6	New culvert needed [a]		Yes											
42.1	New culvert needed [a]		Yes											
43 to 44		Yes				Yes	Yes					Yes	Yes	
43.3									Yes					
43.4	[a]							Yes					Yes	
45.2 to 47.8		Yes	Yes		Yes	Yes	Yes							
47.4	New culvert needed [a]		Yes											
47.9	Broken culvert on inlet side; 5-foot culvert [a]		Yes											
48 to 50.2		Yes				Yes					Yes			
50.5 to 50.7	Both sides of road					Yes			Yes		Yes			
51 to 52.5		Yes				Yes								
52.7 to 52.8		Yes				Yes								
52.8	[a]													Yes
53 to 54.1		Yes			Yes	Yes	Yes							
54.2 to 58.5		Yes				Yes	Yes		Yes		Yes			
54.3	New culvert needed [a]		Yes											
54.5 to 54.8										Yes				
55.3	New culvert needed [a]		Yes											

Mileposts (MP)	Notes	Water Drainage Issues/Lack of Ditch/Plugged Ditch	Culvert Issues (Install New or Replace Damaged Culvert)	Road Sinking/ Sluffing Off	Narrow Road (Needs to be Widened)	High Cutbank	Steep Banks (Dropoff)	Cracks on Road/ Severe Road Damage	Water on Road/ Nowhere For Water to Go	Glacier Area	Water Crossing Posts (Old Railroad Bridge)/Railroad Ties	Rockslide Area/Rocks on Road	Alluvial Rock Flow (Displaced Rock)/Mud Slide	Sink Hole/ Soft Spot
55.5							Yes							
56.1	New culvert needed [a]		Yes											
56.2	Swift Creek; Repair culvert		Yes				Yes							
57.4					Yes	Yes	Yes							
57.5 to 57.8					Yes	Yes	Yes			Yes			Yes	
58				Yes	Yes									
58.2					Yes			Yes						
58.4	Dirt banks both sides of road	Yes				Yes								

Source: DOT&PF, NPS.
Note: Observations in this table represent a snapshot in time and cover the road corridor from the beginning of the PEL study corridor to the Kennicott River crossing. An additional site visit by study team members to verify issues in the field for the entire PEL study corridor (extending east to the southern boundary of the Kennecott Mines NHL) is scheduled for early summer 2024.
[a] Issue that can be resolved through planned DOT&PF M&O summer work.
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6. Baseline Area Drainage Analysis

6.1 Introduction

This section provides an overview of the area drainage in the study corridor. The purpose of this section is to quantify and present a baseline area drainage analysis that summarizes existing condition data collected from field visits, as-builts, local information, and other available sources. This baseline area drainage analysis includes the following:

- Drainage basin delineation within the study corridor, which includes the Copper River, Strelna Creek, Kuskulana River, Gilahina River, Lakina River, and Kennicott River and sub-basins for contributing tributaries that have been identified within the study corridor.

Flood frequency peak flow determination for the primary (Copper River, Kuskulana River, Gilahina River, Lakina River, and Kennicott River) and tributary waterways.

- Geomorphic stability evaluation of primary and tributary waterways in context of the McCarthy Road, with specific emphasis on existing bridge and culvert structures and highway embankments where adjacent to river/stream channels.
- Identification of fish passage issues that are present in the study corridor using readily available information.

6.1.1 General Baseline Area Drainage Conditions

Significant offsite cross drainage evaluated throughout the study corridor generally appear in good conveyance condition. Although no hydraulic analysis was completed, bridges and culverts appear to be adequately sized for general rainfall runoff events.

Although an in-depth geomorphological analysis was not completed for these cross drainages, general stream stability appears to be in good condition with a couple exceptions:

- The Chokosna River crossing near MP 26.8 shows erosion of the western side riverbank just upstream from the bridge.
- The Lakina River near MP 44 shows signs of migration outside the existing banks on both sides of the river.

DOT&PF M&O staff has identified multiple locations where they have concluded drainage to be an issue related to poor roadway conditions. Ponding observed adjacent to the roadway corridor, in general, appears to contribute to deteriorating roadway embankments and roadway structural sections.

General baseline conditions were observed to be moderate. Many locations where roadside ditches were inundated or poorly defined created ponding conditions immediately adjacent to the roadway embankment. Roadway runoff conditions were good with few exceptions.

6.2 Existing Conditions and Facilities

As-built plan sets obtained from the DOT&PF cover small portions of the study corridor. These as-builts were used to identify six of the existing major crossings along the study corridor. Routine bridge inspections were completed in August 2021 throughout the study corridor. The bridge inspection reports were used to identify existing facilities along the study corridor. Existing culvert data obtained from the Copper River Watershed Project (CRWP) shows all existing cross culverts throughout the study corridor. These data were included as a GIS [Geographic Information System] shapefile. A combination of the as-built plan sets, the bridge inspection reports, the existing culvert GIS file, and field verification were used to determine location and to assess existing conditions of all major crossings along the study corridor.

Table 6-1 lists the existing bridges in the study corridor and presents bridge characteristics and current sufficiency ratings. Bridge sufficiency ratings are based on bridge inspection observations, structural analysis, average daily traffic, and other considerations. The sufficiency rating formula provides a numeric value presented as a percentage in which 100 represents a fully sufficient bridge and 0 (zero) representing an insufficient bridge. The sufficiency rating is used as one consideration in predicting a bridge's capability to remain in service.

Table 6-1. Existing Bridges in the Study Corridor

NBI[a] Structure Number	Bridge Name	Approximate Milepost	Sufficiency Rating	Overall Length (feet)	Year Built
0205	Copper River (Chitina)	1.2	74	1,378	1971
0397	Kuskulana River	17	77.1	775	1910; reconstructed in 1988
1193	Chokosna River	26.8	94.2	146	2021
1194	Gilahina River	29	52	41	1991
1195	Lakina River	44	94.2	336	2016
6004	Kennicott West	N/A	-2.0	450	1997
6005	Kennicott East	N/A	-2.0	271	1997

Source: 2021 DOT&PF Bridge Routine Inspection Reports.
[a] National Bridge Inventory.
N/A = not applicable (foot bridges over the Kennicott River occur immediately east of the end of the McCarthy Road).

In the western portion of the study corridor, the Copper River crosses the McCarthy Road under an eight-span bridge. Directly east of this bridge, the McCarthy Road is between and parallel to the Chitina River and the Kotsina River. The Kotsina River is north of the McCarthy Road and flows east to west to combine with the Copper River just north (upstream) of the Copper River bridge in the study corridor. The Chitina River is parallel to (and south of) the McCarthy Road throughout the entire corridor and flows east to west combing with the Copper River just south (downstream) of the Copper River bridge in the study corridor.

Near MP 14.7, the Strelna Creek crosses the roadway corridor and joins with the Kuskulana River approximately 2 miles south of the corridor. Near MP 17.1, the Kuskulana River crosses the project corridor from the east flowing west. The Kuskulana River continues west and combines with the Strelna Creek, where it begins flowing south as the Kuskulana River, then combines with the Chitina River.

The Chokosna River crosses the McCarthy Road at MP 26.8 from the north. Between MP 27 and MP 31, the Chokosna River and the Gilahina River flows south on the western side of the study corridor, where smaller tributaries to these rivers cross the roadway from the east. Ruth Creek and Crystal Creek cross the corridor from the north to combine with the Lakina River between MP 37 and MP 44. The Lakina River flows parallel with the corridor until it crosses the McCarthy Road, from the north, immediately east of MP 44.

Between MP 45 and MP 48, the McCarthy Road is just south of Long Lake. The Long Lake Creek on the downstream end of the lake crosses the study corridor at MP 45.3 from the north and flows southwest to combine with the Lakina River. Near MP 47.9, the Long Lake Creek on the upstream side of the lake crosses the study corridor from the southeast and continues northwest, feeding Long Lake.

The Nizina River flows parallel to the study corridor to the south between MP 49 to 55. The Nizina River combines with the Chitina River south of MP 49. Tractor Creek crosses the McCarthy Road from the north near MP 53.5 and flows south combing with the Nizina River. Near MP 55, the study corridor begins traveling parallel to the Kennicott River. Swift Creek and Farm Creek cross the McCarthy Road at MP 56.1 and 57.3, respectively, and feed into the Kennicott River.

Near MP 59.3, the Kennicott River crosses the study corridor under a pedestrian bridge from the north. The Kennicott River continues to flow south, combining with the Nizina River at a confluence point approximately 5 miles downstream of the existing pedestrian bridge.

There are 18 crossings along the study corridor that meet the DOT&PF policy requiring a hydraulically designed crossing. This includes all crossings that are 48 inches in diameter or larger. There are 16 crossings that have been identified by the CRWP as having increased fish passage potential. For the purposes of the following hydrologic analysis, significant crossings were consolidated to meet the following criteria:

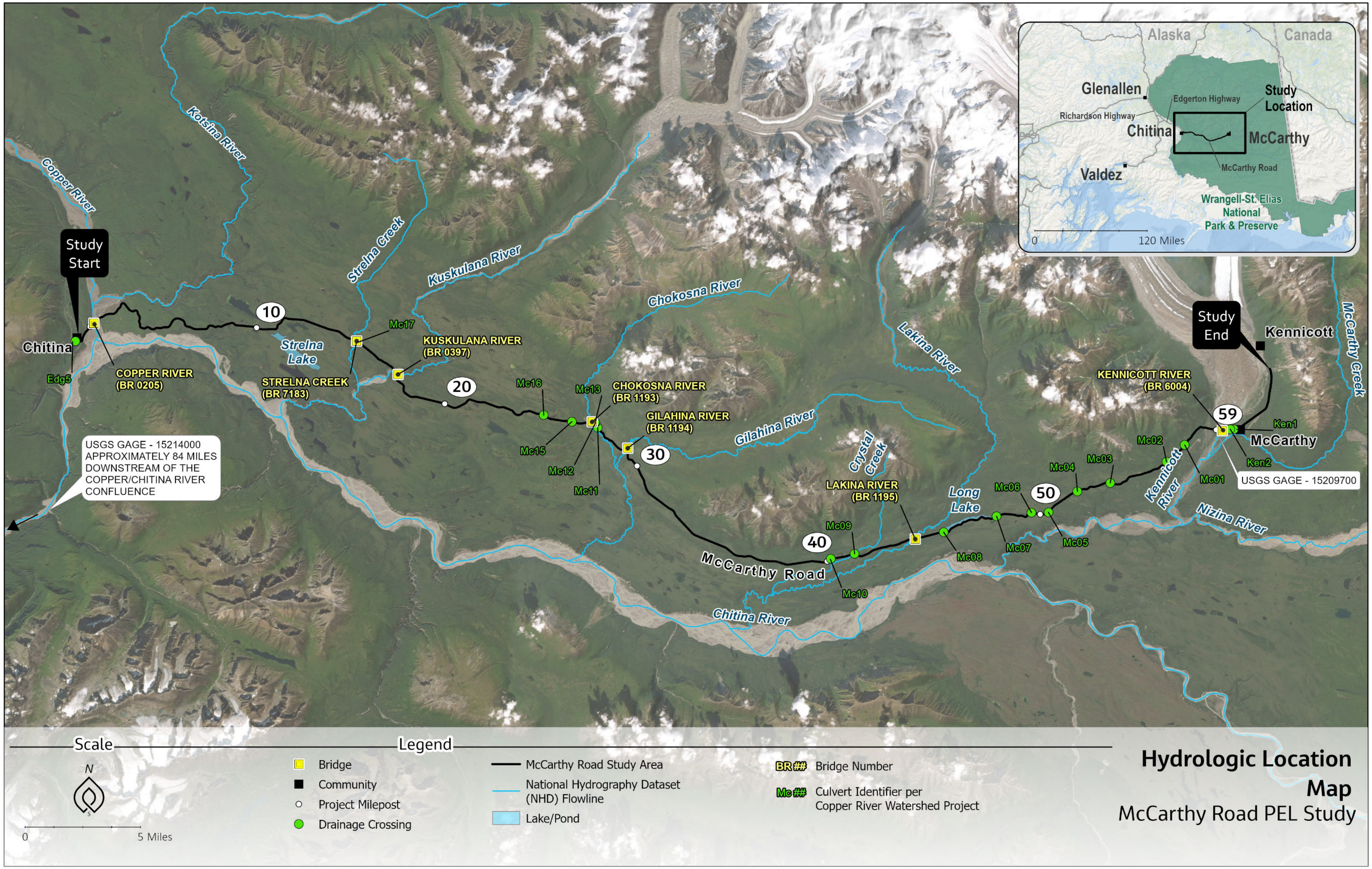
Where the Alaska Department of Fish and Game (ADF&G) had identified the stream as anadromous.

- At all bridge crossings.
- Crossing structure sizes of 48-inch-diameter culvert or larger

6.2.1 Existing Significant Crossing Assessments

Figure 6-1 shows the location of all known drainage crossings and hydrologic features in the study corridor.

Figure 6-1. Known Drainage Crossings in the Study Corridor



Drainage crossings were identified based on the significance of each drainage crossing of the roadway corridor. Significant drainage crossings were identified based on a crossing structure size of a 48-inch-diameter culvert or larger, including all bridge crossings. This threshold meets criteria outlined in the *Alaska Highway Preconstruction Manual* sections 450.9.7 and 1120.5.1 (DOT&PF 2019). Significant streams were also identified where U.S. Geological Survey (USGS) topographic perennial streams were located as well as any streams that the ADF&G had identified as anadromous streams.

A field visit focusing on existing roadway and drainage features and their respective physical condition is anticipated for the spring of 2024. This visit will help determine potential failures related to culvert end conditions, erosion around culvert end treatments, inherent geomorphic conditions around bridge crossings and locations where the highway embankment is adjacent to river/stream channels. Identification of existing offsite and onsite drainage issues is discussed later in this section.

The following is a brief description of the significant crossings that are included in this study. These descriptions will be described from west to east starting at the first significant crossing near MP 1 and continuing east through MP 60. This study also includes the approximate 4 miles from the termini of the McCarthy Road/Kennicott River crossing to the southern end of the Kennicott subdivision. The images and geometric data on the following pages come from a variety of sources, including the bridge routine inspection reports completed by DOT&PF maintenance crews as well as the CRWP database.

6.2.1.1 Copper River (BR 0205) Crossing

Figure 6-2 shows the Copper River crossing, located on the west end of the study corridor. Near MP 1.2, Copper River flows north to south under the McCarthy Road corridor existing 1,378-foot-long, eight-span bridge structure (Figure 6-2) built in 1971. The Copper River combines with the Kotsina River upstream from the bridge and combines with the Chitina River downstream of the bridge. This bridge does not include any skew or flaring with the Copper River. Full-sized trees have been observed within the riverbed as potential driftwood clogging. Existing riprap armoring has been observed to be in fair condition with minor repairs needed. The DOT&PF staff has identified the possible need for future bridge abutment work.

Figure 6-2. Copper River (Chitina) Bridge (BR 0205), Upstream Looking Downstream

6.2.1.2 Strelna Creek (BR 7183) Crossing

Figure 6-3 and Figure 6-4 show the Strelna Creek crossing, looking at the downstream and upstream ends, respectively. Near MP 14.7, the Strelna Creek crosses the McCarthy Road from the north flowing south under a 16.9-foot by 10.5-foot corrugated steel pipe (CSP) arch culvert. The Strelna Creek combines with the Kuskulana River approximately 2 miles south of the Strelna Creek crossing. This culvert is skewed approximately 13 degrees to the creek and has been observed to be in very good condition.

Figure 6-3. Strelna Creek Culvert (BR 7183), Downstream Looking Upstream

Figure 6-4. Strelna Creek Culvert (BR 7183), Looking at Upstream End of Culvert

This culvert was replaced in 2013 because the previous culvert was undersized. The CRWP data have identified this current culvert to include high velocities through the pipe. A major bank collapse and erosion has been identified approximately 300 feet upstream of this crossing (CRWP 2024).

6.2.1.3 Kuskulana River (BR 0397) Crossing

Figure 6-5 and Figure 6-6 shows the Kuskulana River crossing. Near MP 17, the Kuskulana River crosses the McCarthy Road from the east, under the existing 775-foot long, triple-span bridge structure (BR 7183) built in 1910. The Kuskulana River flows and continues west to combine with the Strelna Creek, then flows into the Chitina River. Vertical clearance over the river has been observed to be more than adequate with minimal scour risk due to the foundations being built on bedrock outside of the river floodplain.

Figure 6-5. Kuskulana Bridge (BR 0397), Downstream Looking Upstream

Figure 6-6. Kuskulana Bridge (BR 0397), Aerial View, Left and Right Piers

6.2.1.4 Chokosna River Tributary (MC 15)

Figure 6-7 and Figure 6-8 show the Chokosna River Tributary crossing. Near MP 26, this Chokosna River Tributary crosses the McCarthy Road from the north within a 131-inch by 76-inch CSP elliptical culvert structure. This structure, named MC 15 by the CRWP database, was observed to be in good condition. The tributary flows southeast, approximately 1.5 miles, to the confluence with Chokosna River.

Figure 6-7. Chokosna River Tributary (MC 15) Cross Culvert, Upstream Side Looking South

As this Chokosna River Tributary approaches the McCarthy Road corridor, it ponds up on the northern side due to flat wetlands and beavers damming the water. The tributary downstream of the crossing is also ponded up because of flat wetlands.

Figure 6-8. Chokosna River Tributary (MC 15) Cross Culvert, Upstream Looking Downstream

This is a relatively new culvert with beaver complexes that frequently appear upstream of this crossing. Interconnecting deeply incised channels with increasing gravels have been identified further upstream. Adult and juvenile coho salmon have been identified here. (CRWP 2024)

6.2.1.5 Chokosna River (BR 1193) Crossing

Figure 6-9 and Figure 6-10 show the Chokosna River crossing. Near MP 26.8, the Chokosna River crosses the McCarthy Road from the north within a 146-foot long, single-span bridge structure (BR 1193) built in 2021. This bridge has an approximate skew of 30 degrees to the river.

Figure 6-9. Chokosna River Bridge (BR 1193), Upstream Looking Downstream

The riverbed is composed of gravel and cobbles. The bridge abutments are armored with moderately sized riprap, and the river show signs of potential migration outside its existing banks. The western bank upstream from the bridge has been armored with moderately sized riprap but shows signs of erosion.

Figure 6-10. Chokosna River Bridge (BR 1193), Looking Upstream, Right and Left Abutment

6.2.1.6 Chokosna River Tributary (MC 13)

Figure 6-11 and Figure 6-12 show the Chokosna River Tributary crossing. Near MP 26.9, the Chokosna River Tributary (MC 13) crosses the McCarthy Road from the eastern side to the western side. This structure, named MC 13 by the CRWP database, was observed to be in good condition.

The tributary combines with the Chokosna River about 0.25 mile southwest from the major crossing. At the major crossing, the tributary crosses the corridor within a 78-inch by 60-inch CSP arch culvert.

Figure 6-11. Chokosna River Tributary (MC 13), Upstream End Ponded

The upstream end of this crossing is a flat wetland with very low flow causing ponding in the area. The upstream roadway side slope is armored with moderately sized riprap protecting the area around the culvert from erosion. The area downstream has a moderate slope and conveys the water west of the corridor to the Chokosna River.

Figure 6-12. Chokosna River Tributary (MC 13), Looking Downstream End

6.2.1.7 Chokosna River Tributary (MC 12)

Figure 6-13 and Figure 6-14 show the Chokosna River Tributary crossing. Near MP 27, the Chokosna River Tributary (MC 12) crosses the McCarthy Road from the eastern side to the western side. This structure, named MC 12 by the CRWP database, was observed to be in good condition.

The tributary combines with the Chokosna River about 0.25 mile southwest from the major crossing. At the major crossing, the tributary crosses the corridor within a 48-inch CSP culvert.

Figure 6-13. Chokosna River Tributary (MC 12), Upstream End Ponded

The upstream end of this crossing is a flat wetland with very low flow causing ponding in the area. The upstream roadway side slope is armored with smaller sized riprap protecting the area around the culvert from erosion. The area downstream has a moderate slope and conveys the water west of the corridor to the Chokosna River.

Figure 6-14. Chokosna River Tributary (MC 12), Looking Downstream

6.2.1.8 Chokosna River Tributary (MC 11)

Figure 6-15 and Figure 6-16 show the Chokosna River Tributary crossing. Near MP 27.3, the Chokosna River Tributary (MC 11) crosses the McCarthy Road from the northeastern side to the southwestern side. This structure, named MC 11 by the CRWP database, was observed to be in good condition.

The tributary combines with the Chokosna River about 0.25 mile southwest from the major crossing. At the major crossing, the tributary crosses the corridor within a triple-barrel 36-inch CSP culvert.

Figure 6-15. Chokosna River Tributary (MC 11), Downstream Looking Upstream

Upstream from the crossing, the tributary is fed by overflow from three unnamed ponds. The area immediately upstream from the crossing is gradually sloped grasslands area. The area downstream has a moderate slope and conveys the water west of the corridor to the Chokosna River. The roadway side slopes on either side are not armored with riprap, and there are signs of erosion around the culvert.

Figure 6-16. Chokosna River Tributary (MC 11), Downstream Looking Upstream

There is a significant change in streambed elevation from the inlet end to the outlet end of the culvert affecting stream bed stability. Head cutting and channel over-widening is occurring upstream and downstream of this crossing. Channel stability increases approximately 130 feet downstream of this crossing and offers good habitat for spawning and rearing. (CRWP 2024)

6.2.1.9 Gilahina River Bridge (BR 1194) Crossing

Figure 6-17 and Figure 6-18 show the Gilahina River bridge crossing. Near MP 28.9, Gilahina River crosses the McCarthy Road from the north within a 41-foot-long, single-span bridge structure (BR 1194) built in 1991.

Figure 6-17. Gilahina River Bridge (BR 1194), Downstream Looking Upstream

The bridge abutments are armored with large-sized riprap. The river does not show signs of potential migration outside its existing banks. The river is moderately sloped, and the bed is made up of large cobbles and rock that do not appear to be aggregating. Small branches were observed around the abutments at the waterline that represents potential for driftwood impacts. The DOT&PF M&O staff has identified that this bridge needs to be replaced. It was observed that scour occurs at abutments, debris gets into girders, and a higher bridge clearance is needed. Throughout all of the vehicular bridges in this study corridor, the Gilahina River bridge (BR 1194) has the highest load restriction.

Figure 6-18. Gilahina River Bridge (BR 1194), Looking Upstream, at Left and Right Abutment

6.2.1.10 Ruth Creek Crossing (MC 10)

Figure 6-19 and Figure 6-20 show the Ruth Creek crossing. Near MP 40.3, Ruth Creek crosses the McCarthy Road from the north within a 60-inch CSP culvert structure. This structure, named MC 10 by the CRWP database, was observed to be in good condition.

Figure 6-19. Ruth Creek Cross Culvert (MC 10), Upstream Looking Downstream

This creek appears to be a dry creek the majority of the year, only getting flow from spring snow melt. The creek does not show signs of potential migration outside its existing banks. The upstream creek bed is moderately sloped and is made up of medium-sized cobbles. Downstream of the cross culvert, there is an open area with about a 3-foot-tall berm to channel the creek south where it combines with Crystal Creek.

This crossing has been recommended for an upsized pipe culvert by the DOT&PF maintenance staff. It has also been observed to include horizontal channel migration in the past and includes the potential for future horizontal migration.

Figure 6-20. Ruth Creek Cross Culvert (MC 10), Downstream Looking Upstream

6.2.1.11 Crystal Creek Crossing (MC 9)

Figure 6-21 and Figure 6-22 show the Crystal Creek crossing, depicting the before and after conditions of DOT&PF's recent culvert improvement project, which was constructed in 2022. Near MP 41.2, Crystal Creek crosses the McCarthy Road from the northeast within a newly constructed 13.3-foot by 9.3-foot structural plate arch pipe culvert.

Figure 6-21. Crystal Creek (MC 9), Downstream Looking Upstream (pre-improvement project)

The upstream end of this crossing is a flat wetland with very low flow, causing ponding in the area. The roadway side slopes are armored with rock armor that was installed as part of the recently completed project. The area downstream has a moderate slope and conveys the water west of the corridor to the southwest to the Lakina River.

Figure 6-22. Crystal Creek (MC 9), Looking Upstream (post-improvement project)

The DOT&PF project (NFHWY00538/0850(029)) was completed in the summer of 2022, in partnership with the FHWA. The project reconstructed approximately 750 feet of the McCarthy Road at the Crystal Creek crossing. The project replaced three undersized and deteriorating culverts with a new 13.3-foot by 9.3-foot structural plate arch pipe culvert. The new culvert structure will improve the ability for fish, specifically coho salmon and trout, to pass through safely. The before and after photos show the resolution of the previously perched culvert, which was impeding fish passage. The roadway grade was also slightly raised and shifted to improve driver safety and comfort.

6.2.1.12 Lakina River Bridge (BR 1195) Crossing

Figure 6-23 and Figure 6-24 show the Lakina River bridge crossing. Near MP 44, Lakina River crosses the McCarthy Road within a 336-foot, triple-span bridge structure (BR 1145) built in 2016. The bridge is skewed approximately 30 degrees to the river.

Figure 6-23. Lakina River Bridge (BR 1195), Upstream Looking Downstream

The Lakina River is a braided river upstream and downstream from the Lakina River bridge. The bridge abutments and piers are armored with moderately sized riprap. The river shows signs of migration outside its existing bank. The channel bed consists of cobles and rock. It has been observed that tree-sized debris appear to frequently get caught along the banks and dried portions of the riverbed and floodplain approximately 3 feet above normal water level.

Figure 6-24. Lakina River Bridge (BR 1195), Looking Upstream, Piers and Right Abutment

6.2.1.13 Long Lake Outlet Crossing (MC 8)

Figure 6-25 and Figure 6-26 show the Long Lake crossing. Near MP 45.3, the outlet to Long Lake crosses the McCarthy Road from the northeast within a dual 72-inch CSP culvert structure. This structure, named MC 8 by the CRWP database, was observed to be in good condition.

Figure 6-25. Long Lake Creek Cross Culvert (MC 8), Looking Upstream

Upstream from the corridor major crossing, Long Lake flows northeast to southwest to feed the Long Lake Creek. The creek does not show signs of potential migration outside its existing banks because these banks are heavily vegetated.

Figure 6-26. Long Lake Creek Cross Culvert (MC 8), Downstream Looking Upstream

6.2.1.14 Long Lake Creek Crossing (ADF&G Stream No. 212-20-10080-2300-3421-4062) (MC 7)

Figure 6-27 and Figure 6-28 show the Long Lake Creek crossing. Near MP 47.9, Long Lake Creek crosses the McCarthy Road from the southeast within a 60-inch CSP culvert structure. This structure, named MC 7 by the CRWP database, was observed to be in good condition.

Figure 6-27. Long Lake Creek Crossing (MC 7), Looking Upstream

The upstream area is a somewhat flat vegetated wetland. Downstream of the corridor crossing, the creek does not show signs of potential migration outside its existing banks because the banks are relatively steep and somewhat vegetated.

Figure 6-28. Long Lake Creek Crossing (MC 7), Downstream Looking Upstream

6.2.1.15 Tractor Creek Crossing (MC 3)

Figure 6-29 and Figure 6-30 show the Tractor Creek crossing. Near MP 53.5, Tractor Creek crosses the McCarthy Road from the north within a 48-inch CSP culvert structure. This structure, named MC 3 by the CRWP database, was observed to be in good condition.

Figure 6-29. Tractor Creek Cross Culvert (MC 3), Downstream Looking Upstream

The condition of the existing cross culvert appears to be deteriorating. The upstream area is a somewhat flat, heavily vegetated area. The upstream and downstream roadway side slopes are armored with moderately sized riprap protecting the area around the culvert from erosion.

Figure 6-30. Tractor Creek Cross Culvert (MC 3), Upstream Looking Downstream

6.2.1.16 Swift Creek Crossing (MC 2)

Figure 6-31 and Figure 6-32 show the Swift Creek crossing. Near MP 56.1, Swift Creek crosses the McCarthy Road from the north within a 72-inch CSP culvert structure. This structure, named MC 2 by the CRWP database, was observed to be in good condition.

Figure 6-31. Swift Creek Crossing (MC 2), Downstream Looking Upstream

The cross culvert appears to be in great condition. Riprap armoring is not present on the roadway side slopes around the culvert inlet or outlet. Roadway side slopes are in danger of erosion around the culvert inlet and outlet. The DOT&PF M&O staff has recommended that this culvert be repaired.

Figure 6-32. Swift Creek Crossing (MC 2), Looking Upstream

6.2.1.17 Farm Creek Crossing (MC 1)

Figure 6-33 and Figure 6-34 show the Farm Creek crossing. Near MP 57.3, Farm Creek crosses the McCarthy Road from the west within a 48-inch CSP culvert structure. This structure, named MC 1 by the CRWP database, was observed to be in good condition.

Figure 6-33. Farm Creek Cross Culvert (MC 1), Upstream Looking Downstream

The creek does not show signs of potential migration outside its existing banks because these banks are heavily vegetated. Farm Creek flows southeast to combine with the Kennicott River.

Figure 6-34. Farm Creek Cross Culvert (MC 1), Downstream Looking Upstream

6.2.1.18 Kennicott River Bridge (BR 6004) West Crossing

Figure 6-35 shows the Kennicott River bridge (west) crossing. Near MP 59.3, the Kennicott River crosses the pedestrian bridge immediately east after the McCarthy Road dead ends at a parking lot. While the bridge is referred to by many as the DOT&PF "footbridge," ATVs do traverse the bridge; passenger vehicles are not allowed. The Kennicott River crosses within a 450-foot-long, five-span bridge (BR 6004) built in 1997.

Figure 6-35. Kennicott River Bridge (BR 6004), Downstream Looking Upstream

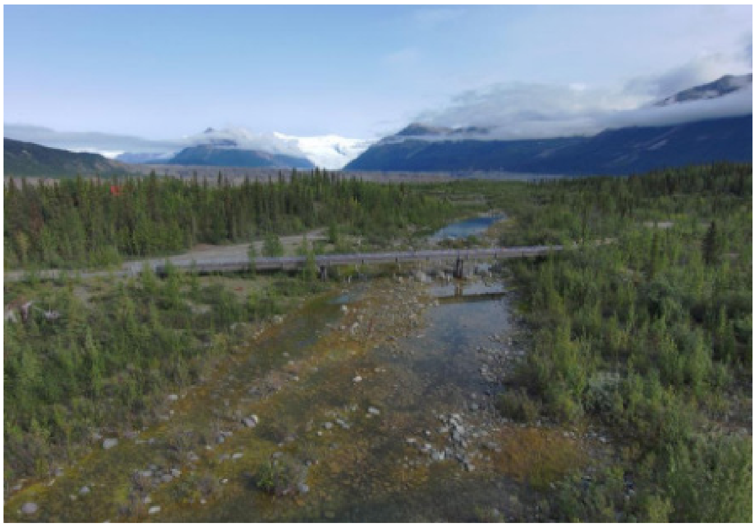
The bridge abutments are armored with large-sized riprap. The river does not show signs of potential migration outside its existing banks because these banks are fairly steep. Erosion is observed to exist on the west bank where there now exists large riprap to protect the bank. The riverbed is composed of primarily silt, cobble, and boulder material.

Local observations have noted frequent glacial outbursts that result in flooded water surface elevations approximately 2 to 3 feet below the bridge girders. These outbursts have also coincided with heavy streambed erosion (approximately 9 feet as observed by the locals). M&O crews have recommended the need for more erosion protection on the northwest riverbank.

6.2.1.19 Kennicott River Bridge (BR 6005) East Crossing

Figure 6-36 and Figure 6-37 show the Kennicott River bridge (east) crossing. Near MP 59.8, a pedestrian bridge crosses the east channel of the Kennicott River. This channel is locally referred to as the “dry channel.” This bridge is a 270-foot-long, three-span pedestrian bridge built in 1997. This bridge is downstream of roadway culverts that convey Clear Creek flows under a rerouted portion of the main road. A community swimming hole is immediately adjacent to and north of the rerouted portion of the main road in this location.

Figure 6-36. Kennicott River Bridge (BR 6005), Downstream Looking Upstream



Clear Creek is frequently dry with a creek bed consisting of primarily silt, cobbles, and boulders with minimal risk of erosion.

Figure 6-37. Kennicott River Bridge (BR 6005), Looking Upstream and Looking Downstream

6.2.2 Additional Existing Drainage Patterns and Historical Maintenance Concerns

In addition to the existing significant crossing assessments presented previously, there are numerous locations where concentrated surface water runoff comes in contact with the roadway corridor. These locations may or may not currently have a cross culvert installed to convey these concentrated flows across the roadway corridor. The DOT&PF M&O staff identified a number of maintenance issues during a road inspection on May 24, 2023, summarized as follows (and detailed in Section 5 Maintenance and Operations).

6.2.2.1 Chitina Area

A double-barrel cross culvert with unknown size exists near MP 0.2 to convey surface water runoff from the slopes on the northern and western sections of the town of Chitina toward Chitina (Town) Lake.

DOT&PF M&O staff has noted maintenance issues near MP 0.7, stating that there appears to be a lack of a drainage ditch based on a narrow road cross section.

6.2.2.2 MP 1.5 through MP 9.2

Surface water runoff from the area south of the roadway approximately between MP 1.5 and MP 2.7 is directed toward the Kotsina River. This runoff most likely concentrates along the roadway before ultimately flowing north in the Kotsina River, crossing the roadway where allowed. DOT&PF M&O staff has noted a significant amount of drainage issues related to the lack of ditches based on a narrow roadway cross section. They have also noted sumps directly on and adjacent to the roadway where surface water runoff is unable to be drained.

Surface water runoff from the areas north of the roadway approximately between MP 2.7 and MP 7.0 as well as MP 7.0 and MP 9.2 are directed toward the Chitina River. No known cross culverts exist between these mile posts, and concentrated runoff most likely flows over the roadway at various low points along this distance. DOT&PF M&O staff has noted maintenance issues between MP 3.7 and MP 3.8, stating that there is a need for improved drainage facilities. They have stated that there is surface water flow in this area all year round. There may or may not be a culvert here, and efforts should be made to identify opportunities for surface water conveyance improvement. Similar issues were identified between MP 5.7 and MP 6.0 as well as between MP 6.2 and MP 7.0. Drainage issues were also identified by DOT&PF M&O staff near MP 8.8 and MP 9.2.

6.2.2.3 MP 9.4 through Strelna Creek (MP 14.7)

The roadway section between MP 9.4 through MP 14.0 includes a lot of drainage issues noted by the DOT&PF M&O staff. This stretch of roadway is somewhat flat with localized high and low points within the roadway profile that creates multiple areas of standing water with no active drainage routes. The adjacent terrain throughout this stretch of roadway includes similar topography that includes ponds and wetlands and general poor surface water drainage routes. Surface water runoff of the adjacent terrain could drain toward the Chitina or Kotsina Rivers depending on the location through this section.

Near MP 11 and between MP 11.3 and MP 12.5, old drainage crossing posts were identified by DOT&PF M&O staff. There is an existing culvert near MP 13.6 that may be deficient because this culvert is either damaged or undersized. There may or may not be culverts through the remaining portions of this section, and efforts should be made to identify opportunities for surface water conveyance improvement.

6.2.2.4 MP 14.8 through MP 18.0

DOT&PF M&O staff has identified multiple drainage issues related to extremely high cutbanks and poor roadway drainage mostly as a result of surface water runoff from the north side of the roadway. The adjacent terrain either drains toward the Strelna Creek, which crosses the roadway near MP 14.7, or toward Kuskulana River, which crosses the roadway near MP 17.1.

Throughout this segment of roadway, there appears to be a lack of a drainage ditch (primarily on the north side) that could direct adjacent surface water runoff toward either the Strelna Creek or the Kuskulana River.

6.2.2.5 MP 18.0 through MP 20.5

Surface water runoff from the adjacent area on the north side of the roadway primarily drains toward the southwest and accumulates against the roadway corridor.

Between MP 18.7 and MP 20.5, old drainage crossing posts were identified by DOT&PF M&O staff. There may or may not be culverts through the remaining portions of this section, and efforts should be made to identify opportunities for surface water conveyance improvement. There is an existing culvert near MP 18.6 and MP 20.5 that may be deficient because this culvert is either damaged or undersized.

6.2.2.6 MP 20.5 through Chokosna River (MP 26.8)

Throughout this stretch of roadway, surface water runoff from the adjacent terrain drains from the north toward the McCarthy Road in the southwest. This includes the Chokosna Lake outlet (approximately MP 26.7). Drainage issues are numerous through this stretch as ponded water and inundated surface runoff from adjacent terrain appears to have poor drainage.

The roadway profile through the section defined between MP 20.5 and MP 26.8 includes a series of high and low points that may or may not include cross culverts in locations that impede adjacent surface water runoff. The DOT&PF M&O staff has identified locations that include old drainage crossing posts (MP 20.6 to MP 20.9 and MP 24.6 to MP 24.7) and damaged culverts or locations that would benefit from a new culvert (MP 21.1, MP 22.7, MP 23.55 to MP 23.7, MP 24.1, MP 24.9 and MP 25 to MP 25.8).

6.2.2.7 MP 27.7 through MP 28.6

The adjacent terrain in this area drains from north to southwest and primarily is collected and conveyed within the Chokosna River and its tributaries. Closer to MP 28.9, the adjacent terrain drains north to south and is collected and conveyed within the Gilahina River.

The DOT&PF M&O staff has identified the stretch between MP 28 and MP 28.6 to have poor drainage with old drainage crossing posts and minimal roadside ditch capacity. An ice dam and potential for additional ice dams were observed near MP 27.7. This has the potential to continue to damage the existing roadway.

6.2.2.8 MP 29.1 through MP 30.4

The adjacent terrain in this area primarily drains toward the Gilahina River.

Poor drainage has been observed by the DOT&PF M&O staff between MP 29.1 and MP 29.3 as well as between MP 29.5 and MP 33. A damaged culvert that appears to need repair or replacement has been identified near MP 30.1. The DOT&PF also noted a potentially damaged culvert or a need for a new culvert crossing near MP 30.4.

6.2.2.9 MP 31 through MP 39.9

Offsite surface water runoff drains toward the roadway corridor primarily from the north. This adjacent terrain is tributary to the Gilahina River and the Crystal Creek. These tributary areas produce surface water runoff that becomes inundated by the McCarthy roadway corridor. There may or may not be cross culverts that drain ponded water throughout this stretch of roadway.

In 2022, a landslide occurred near MP 34.5; debris to the north from the Crystalline Hills came down and blocked the road as a private driveway. At the time, DOT&PF constructed a large berm on the north side of the road, which effectively blocked another landslide that occurred the following year. The berm blocked most of the landslide, except for at each end of the berm. Both land and water came down across the road and remained an issue. Public comment during the first PEL study public meeting indicated a longer berm is needed. Bigger ditches, a larger culvert, and/or a settling pond are additional options suggested for exploring.

The DOT&PF M&O staff has identified poor drainage between MP 33.3 and MP 39.3. Potential glaciation has also been identified through this stretch of roadway. Old water crossing posts were noted between MP 33.6 and MP 39.3 as well as at MP 37.2. The DOT&PF also noted a potentially damaged culvert or a need for new culvert crossings near MP 30.4, MP 39.2 and MP 39.9.

6.2.2.10 MP 40.3 through MP 44

The adjacent terrain within this large stretch of roadway primarily drains toward Ruth Creek and Crystal Creek. Surface water runoff that is impeded by the roadway corridor would pond up and cross over the roadway or be conveyed in roadside ditches toward the Ruth or Crystal Creek crossings.

The DOT&PF has noted the lack of roadside ditch capacity between MP 40.3 and MP 40.7 as well as between MP 41.5 and MP 44. This is primarily due to a narrow roadway cross section with high cutbanks. The DOT&PF also noted a potentially damaged culvert or a need for a new culvert crossing near MP 41.6 and MP 42.1.

There may or may not be culverts through the remaining portions of this section, and efforts should be made to identify opportunities for surface water conveyance improvement.

6.2.2.11 MP 45.2 through MP 50.2

The adjacent terrain toward the north of the existing roadway corridor primarily drains south to southwest within the Lakina River or Long Lake Creek or one of its tributaries. The roadway corridor is parallel to Long Lake Creek for a large portion of this stretch.

The DOT&PF M&O staff identified a potential damaged culvert or a need for a new culvert crossing near MP 47.4. Poor drainage conditions reflecting roadside ditches with inadequate capacity were identified between MP 45.2 and MP 47.8 as well as MP 48 and MP 52.2. This is primarily due to a narrow roadway cross section and/or high cutbanks.

6.2.2.12 MP 51 through MP 58.5

The offsite drainage areas in this vicinity primarily drain north to south toward Tractor Creek, Swift Creek, Farm Creek, or ultimately the Kennicott River. Tributaries of these creeks and rivers become inundated by the McCarthy roadway corridor and either pond up and cross over the roadway or are conveyed in roadside ditches toward the nearest available existing cross culvert.

The DOT&PF M&O staff has identified poor drainage conditions within inadequate roadside ditches between MP 51 to MP 52.8 and at MP 58.4. Undersized roadside ditches in these locations are primarily a result of high cutbanks and minimal room. Potential damaged culverts or a need for new culverts were noted near MP 54.3, MP 55.3, and MP 56.1.

Near MP 58, the roadway corridor has been sinking and sloughing off to the side. This is a location where there is currently poor drainage with recurring ponded water.

6.2.2.13 MP 59.8 to Study Corridor End

The offsite drainage pattern within this stretch of McCarthy roadway is primarily from east to west from the Bonanza Ridge toward the Kennicott River.

This portion of the McCarthy roadway corridor includes poor roadway and drainage conditions. Ponded water on top of the roadway is a frequent occurrence and has contributed to the degrading nature of the roadway surface. Poor roadside ditch drainage and undersized/damaged culverts along this entire portion were noted.

6.2.3 Storm Water Management and Geomorphic Evaluation

6.2.3.1 Stormwater Management

Existing onsite storm water management is limited to roadway sheet flow runoff directly down slopes into toe ditches within a roadway fill typical section. Roadside ditches in cut slope typical sections convey roadway runoff and cut slope surface runoff where applicable. These toe and roadside ditches also collect offsite surface runoff to ultimately discharge into the larger adjacent rivers via gradually sloping terrain. These ditches were not designed to comply with stormwater treatment criteria but provide minimal treatment to stormwater runoff with regards to trash capture.

6.2.3.2 Geomorphic Evaluation

Local streams ice over in the winter, and during prolonged freezing conditions, ice formations may block a stream's main channel, diverting flow onto the overbanks or over the ice cover. Backwater increases and aufeis may result at site-specific locations; however, flow is generally under the ice cover because flows typically decrease during the freezing months. Where the roadway corridor exists adjacent to concentrated surface water runoff conveyances, aufeis is a considerable issue and is recommended to be incorporated in roadway design modifications.

Formal bank migration studies have not been conducted for this study. Existing onsite drainage patterns consist of roadway sheet flow directly down fill slopes. Runoff is subsequently concentrated and directed into existing topography and to the adjacent rivers. In cut slope situations, onsite and offsite runoff is combined and collected in roadside ditches and conveyed via the roadway profile to nearby toe of slope ditches and ultimately directed under the roadway and into the existing topography toward the adjacent rivers.

Each significant crossing was evaluated with relation to bank stability adjacent to the existing crossing structure. Section 7.2.1 (significant crossings assessments) summarizes any potential future stream migration near each existing significant crossing. Other observations are denoted as follows.

McCarthy Area

The McCarthy area includes the previously identified pedestrian bridge at MP 59.3 (BR 6004) as well as a privately constructed roadway immediately east of the pedestrian bridge starting at approximately MP 59.5 and ending at approximately MP 59.7. The pedestrian bridge crosses the primary channel of the Kennicott River (west channel). The roadway crosses a historical channel of the Kennicott River (east channel) near MP 59.6. McCarthy Road also crosses another historical channel near MP 59.8, noted as Clear Creek. The McCarthy Creek is a tributary of the Kennicott River and has the potential to impact the tail water conditions for Clear Creek and the east channel of the Kennicott River.

The NPS issued a memo that identifies flooding potential within the McCarthy area that relates to both the Kennicott River and the McCarthy Creek. This memo identifies current aggradation happening in the McCarthy Creek near the town of McCarthy that potentially increases the probability of flooding within the town. This aggradation is beginning to impound the Clear Creek outlet location, which has backed up Clear Creek flows, inundating the McCarthy Road near MP 59.8 on multiple occasions. This is also true where the road crosses the east channel of the Kennicott River near MP 59.6. (NPS 2019)

The NPS memo also identified historical flooding that has occurred at MP 59.8 in the fall of 2018. Flooding at this location temporarily restricted both vehicle and pedestrian access to the town of

McCarthy. The roadbed was then raised by a local contractor utilizing DOT&PF funding, but the water level of the impounded Clear Creek has been observed to be higher again. The roadway near MP 59.6 is approximately 10 feet lower than the previously flooded MP 59.8 crossing and includes a partially crushed culvert that could prompt rapid roadbed flooding if not replaced. Even with a culvert replacement, that area is at high risk for further flooding if McCarthy Creek aggradation continues. (NPS 2019)

Kennicott River

The lower Kennicott Glacier (which feeds the Kennicott River) has thinned and retreated since approximately 1860. The Kennicott River originates on the south side of the Wrangell Mountains and terminates at the confluence with the Nizina River. The drainage basin upstream from the confluence with McCarthy Creek is approximately 352 square miles, of which approximately 46% is covered by glaciers and perennial snow. Glaciers in the Wrangell Mountains commonly block ice-free tributary valleys, forming unstable lakes. Many glacier-dammed lakes drain rapidly on an annual basis. Failures of the glacier-ice dams cause periodic flooding downstream. (USGS 1997)

Six glacier-dammed lakes and numerous small ponds that drain periodically are known in the Kennicott basin. Outburst floods (jökulhalaups) are common in the Kennicott River and cause considerable loss of property, disruption of transportation links into WRST and threaten human life. Jökulhalaups on the Kennicott River cause the river stage to rise over a period of several hours. Kennicott glacier retreat contributes a significant portion of the Kennicott Rivers channel instability, migration, and rerouting. Flooding as a result of continual glacial retreat enhances channel geomorphology even further.

The largest channel changes occur during jökulhalaups from Hidden Creek Lake (approximately 10 miles upstream of the current Kennicott River bridge crossing), which is the largest glacier-dammed lake in the Kennicott River basin. (USGS 1997) Jökulhalaups from Hidden Creek Lake have the potential to become larger due to continual glacial retreat.

Data throughout this segment are sparse and may be refined during future field visits.

6.2.4 Waterbodies

Waterbodies in the corridor vicinity include lakes and rivers. Lakes include Strelna Lake, near MP 10, and Long Lake near MP 46, along with many smaller unnamed lakes. Larger lakes are identified on Figure 6-1, and most smaller lakes are found adjacent to the study corridor.

The only major river in the study corridor that is categorized as a navigable waterway is the Copper River, which is both a U.S. Coast Guard (USCG) Navigable Waterway and a U.S. Army Corp of Engineers (USACE) Navigable Waterway. (HIF 2023, USACE 2012)

A search of the Federal Emergency Management Agency (FEMA) database found that there are no delineated 100-year floodplains or regulatory floodways within the study area.

6.2.5 Fish Passage

The U.S. Fish and Wildlife Service (USFWS) created the National Fish Passage Program to work with transportation agencies to improve road stream crossings to a level that promotes safe and adequate fish passage. Anadromous and resident fish populations depend on reliable passage through drainage structures when migrating to spawning, rearing, and over-wintering grounds. Barriers to fish passage can be a significant factor in fish population decline. (DOT&PF 2001)

To identify fish passage issues that are present in the study area, several readily available datasets were reviewed. These include the following:

- The ADF&G maintains an Anadromous Waters Catalog (AWC) that is important for spawning, rearing, or migration of anadromous fishes and an accompanying Atlas to the Catalog. The AWC is a numerically ordered list of the water bodies with documented use by anadromous fish for these purposes. The Atlas to the Catalog shows, cartographically, the location, name and number of these specified water bodies, the anadromous fish species using these water bodies, and the fish life history phases for which the water bodies are used (to the extent known) (ADF&G 2023a). The AWC can be accessed online through the ADF&G's Interactive Mapper application.
- Essential Fish Habitat (EFH) in Alaska is identified in Fishery Management Plans developed by the North Pacific Fishery Management Council (NOAA 2023). EFH maps are available online via the Alaska EFH Mapper ArcGIS Web Application.
- The ADF&G created a "Culvert Priorities" (September 2023) document that they distributed to DOT&PF staff, which focused on priority culverts statewide needing to be replaced for fish passage.
- In its agency scoping letter to WFL dated December 15, 2023, ADF&G identified many culverts as fish passage barriers that should be upgraded as part of any future road improvement project (ADF&G 2023b).
- The CRWP maintains an online fish passage culvert mapper that identifies and ranks culverts by priority for potential fish passage improvements (CRWP 2024).

The ADF&G's AWC mapper identified several anadromous streams in the project area. These streams include various species such as coho salmon, chum salmon, Chinook salmon, pink salmon and sockeye salmon in multiple life stages throughout each stream. (Besides anadromous fish streams, there are also likely to be some streams that have just resident fish species, which may warrant or require a fish passage culvert design).

A search of the National Oceanic and Atmospheric Administration (NOAA) EFH mapper database did not identify any EFH locations in the study corridor.

The culvert priorities document created by ADF&G focuses on one fish passage priority in this study corridor. The ADF&G has noted that the 5-foot-diameter culvert for Long Lake Creek, at MP 47.9, (#20101830) was damaged during high flows in summer 2023 and can no longer pass fish. Long Lake Creek is documented in the AWC for coho and sockeye salmon on both sides of the McCarthy Road in this location. Replacing this culvert will restore connectivity and improve access to habitat for anadromous and resident fish species. The culvert should be replaced with a 5-foot or larger culvert. (ADF&G 2023a, 2023b)

The CRWP fish passage culvert mapper supplements the available fish passage data with additional potential fish passage crossings.

Table 6-2 shows existing or potential fish passage crossing locations along the study corridor, based on these data sources. These locations include where anadromous fish streams cross the study corridor (and in some cases non-anadromous fish streams) and locations that are identified as either having fish passage or are blocking fish passage.

Figure 6-38 shows fish passage locations and their relative rating within the study corridor.

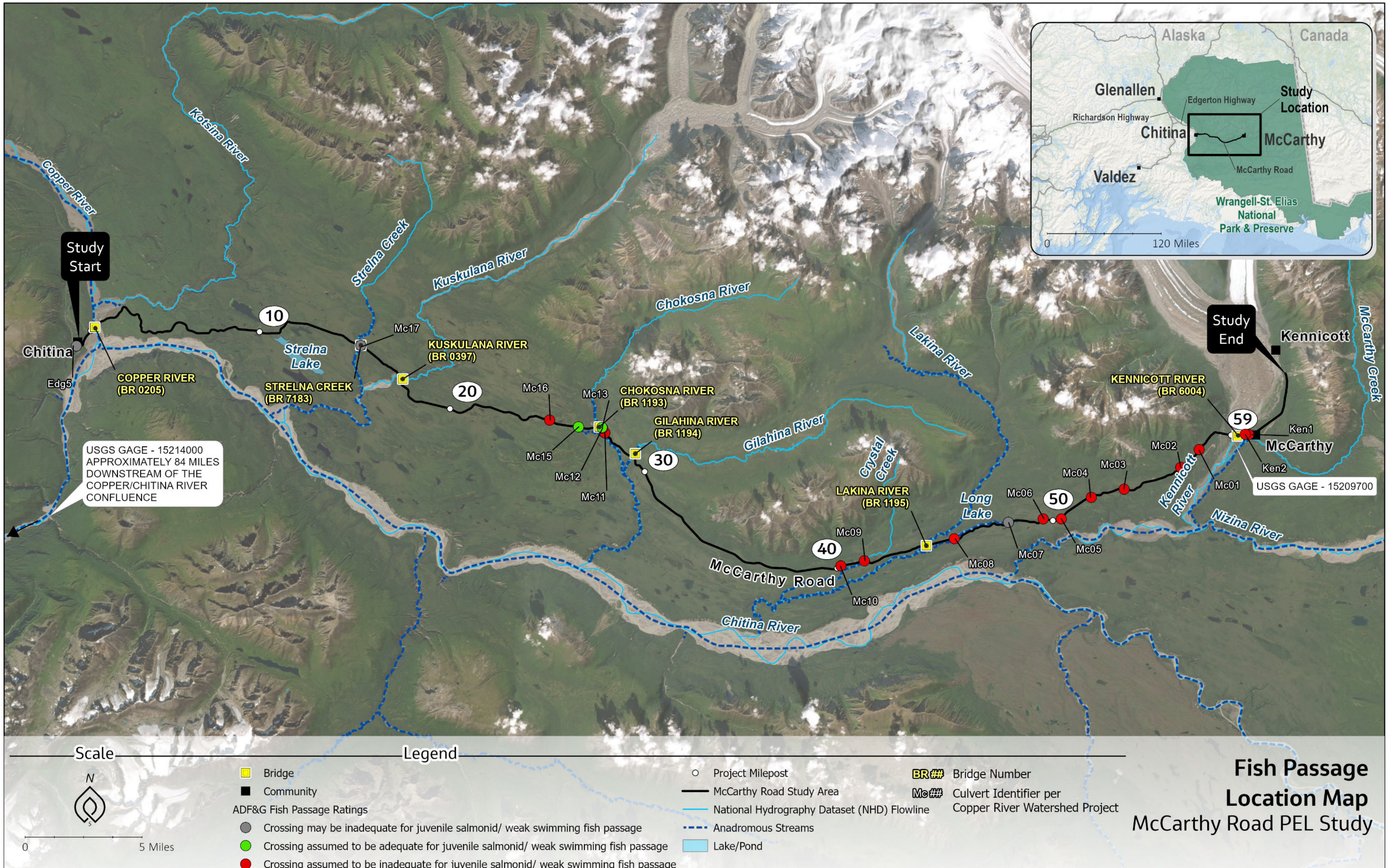
Appendix B includes the presentation of data acquired from the AWC mapper, which identifies anadromous streams and fish passage assessed culverts along the study corridor, respectively.

Table 6-2. Existing or Potential Fish Passage Crossing Locations in the Study Corridor

Milepost (MP)	Crossing Name	Structure	Diameter (if applicable)	AWC Stream Number	Culvert Identifier Number (and Rating or Priority Designation) [a,b]	Additional Notes
Before 0	Town Lake	Culvert	Dual 36 inches	None	ADF&G: 20100564 (green); CRWP: Edg5 (Priority IV)	None
1.2	Copper River	Bridge	N/A	212-20-10080	N/A	Eight-span bridge
14.8	Strelna Creek	Culvert	16.5 feet by 10.5 feet	212-20-10080-2300-3041-4021	ADF&G: 20101840 (gray); CRWP: Mc17 (Priority II)	Pipe condition new (CRWP 2024).
24.6	Chokosna Lake outlet	Culvert	24 inches	None	ADF&G: 20101839 (red); CRWP: Mc16 (No priority)	Pipe condition good (CRWP 2024).
25.8	Chokosna River Tributary	Culvert	10 feet by 5 feet	212-20-10080-2300-3371-4041-5105	ADF&G: 20101838 (green); CRWP: Mc15 (Priority: II)	Pipe condition new (CRWP 2024).
26.8	Chokosna River	Bridge	N/A	212-20-10080-2300-3371-4041	N/A	Single-span bridge
27.2	Chokosna River Tributary	Culvert	7.25 feet by 4.5 feet	None	ADF&G: 20101836 (green); CRWP: Mc13 (Priority IV)	Pipe condition new (CRWP 2024).
27.2	Chokosna River Tributary	Culvert	48 inches	None	ADF&G: 20101835 (red); CRWP: Mc12 (Priority IV)	Pipe condition new (CRWP 2024).
27.4	Chokosna River Tributary	Culvert	36 inches	None	ADF&G: 20101834 (red); CRWP: Mc11 (Priority III)	Pipe condition poor (CRWP 2024).
28.9	Gilahina River	Bridge	N/A	212-20-10080-2300-3371	N/A	Single-span bridge
40.2	Ruth Lake Creek	Culvert	60 inches	None	ADF&G: 20101833 (red); CRWP: Mc10 (Priority III)	Referred to as Ruth Creek or Ruth Lake Creek (CRWP and ADF&G, respectively). Shallow embedment (ADF&G 2023b). Pipe condition poor (CRWP 2024).
41.2	Crystal Creek	Culvert	13.3 feet by 9.3 feet	212-20-10080-2300-3421-4021	ADF&G: 20101832 (red); CRWP: Mc09 (Priority II)	Broken pipe (ADF&G 2023b). Pipe condition new (CRWP 2024).
45.3	Long Lake Creek/Outlet	Culvert	Dual 72 inches	212-20-10080-2300-3421-4062	ADF&G: 20101831 (red); CRWP: Mc08 (Priority II)	Pipe condition good (CRWP 2024).
47.9	Long Lake Creek/Tributary	Culvert	60 inches	212-20-10080-2300-3421-4062	ADF&G: 20101830 (gray); CRWP: Mc07 (Priority II)	High priority for replacement, perched pipe (ADF&G 2023b). Pipe condition poor (CRWP 2024).
49.6	Long Lake Creek/Tributary	Culvert	36 inches	None	ADF&G: 20101829 (red); CRWP: Mc06 (Priority IV)	Pipe condition fair (CRWP 2024). Perched pipe (ADF&G 2023b).
50.4	Unnamed	Culvert	36 inches	None	ADF&G: 20101828 (red); CRWP: Mc05 (Priority IV)	Pipe perched/broken (ADF&G 2023b).
51.9	Unnamed	Culvert	36 inches	None	ADF&G: 20101827 (red); CRWP: Mc04 (Priority III)	Pipe perched (ADF&G 2023b). CRWP refers to this as Tractor Creek Tributary.
53.5	Tractor Creek	Culvert	48 inches	None	ADF&G: 20101826 (red);CRWP: Mc03 (Priority IV)	Shallow embedment (ADF&G 2023b).
56.2	Swift Creek	Culvert	72 inches	None	ADF&G: 20101825 (red); CRWP: Mc02 (Priority III)	Pipe perched (ADF&G 2023b).
57.2	Unnamed	Culvert	48 inches	None	ADF&G: 20101824 (red); CRWP: Mc01 (Priority III)	Broken pipe; referred to as a tributary to Swift Creek (ADF&G 2023b). CRWP refers to this as a Kennicott River tributary.
59.3	Kennicott River	Bridge	N/A	212-20-10080-2300-3511-4035-5018	N/A	None
59.5	Swimming Hole	Culvert	24 inches	212-20-10080-2300-3511-4035-5018	ADF&G: 20103766 (red); CRWP: Ken02 (Priority IV)	Crushed culvert (ADF&G 2023b). Pipe condition critical (CRWP 2024).
59.8	Clear Creek	Culvert	4 feet by 3.3 feet	12-20-10080-2300-3511-4035-5019	ADF&G: 20103765 (red); CRWP: Ken01 (Priority II)	Beaver blockage (ADF&G 2023b).

Source: ADF&G 2023a, 2023b; CRWP 2024.
[a] ADF&G assigns the culvert a fish passage site number and rating as either green, gray, red, or black. Ratings are based on several features, including culvert measurements (e.g., type, slope, outfall height, constriction, and other physical parameters) and stream channel and juvenile salmonid passage.
A *green* rating means the culvert is assumed to be adequate for juvenile fish passage.
A *gray* rating means the culvert may be inadequate for juvenile fish passage.
A *red* rating means the culvert is assumed to be inadequate for juvenile fish passage.
A *black* rating means the culvert is unable to be rated because of lack of information or safety concerns, or culvert has been replaced and not reassessed.
[b] CRWP assigns priorities to culverts based on culvert conditions (e.g., construction, perch, and velocity) and ecological conditions (e.g., quantity and quality of fish habitat, and fish presence).
A *I* priority indicates a higher ecological condition and worse culvert condition.
A *II* priority indicates a higher ecological condition and better culvert condition.
A *III* priority indicates a lower ecological condition and worse culvert condition.
A *IV* priority indicates a lower ecological condition and better culvert condition.
N/A = not applicable.

Figure 6-38. Fish Passage Locations within the Study Corridor



6.3 Hydrologic Analysis

A hydrologic analysis was performed on each significant drainage crossing along the study corridor. This analysis determines peak flow values used in the hydraulic design of cross culverts and ditches. Detailed hydrology maps, including a delineation of drainage basins and key sub-basins for contributing tributaries, can be found in Appendix C.

6.3.1 Hydrologic Methodology and Criteria

Appendix A in the *Alaska Highway Drainage Manual* (DOT&PF 2006) and Table 1120-1 of the *Alaska Highway Preconstruction Manual* (DOT&PF 2019) outlines the required design frequency for drainage crossings of highway corridors. Table 6-3 is a summary of the criteria outlined in these two manuals.

Table 6-3. Design Flood Event Criteria

Type of Structure	Design Frequency	Exceedance Probability
Culverts on Primary Highways	50 years	2%
Bridges on All Highways	50 years	2%
Culverts on Primary Highways	50 years	2%

Source: DOT&PF 2019, 2006.

The *Alaska Highway Drainage Manual* (DOT&PF 2006) allows the use of various hydrologic methods depending on basin size and available data. For analyses that require a peak runoff value to be used in culvert and bridge crossing designs, USGS stream gage data was used. The USGS Scientific Investigations Report 2016-5024 (USGS 2016) presents statistical analysis, including a Log-Pearson Type III (LP3) analysis, performed on all USGS gages within the State of Alaska. The report also presents regional regression equations for developing peak runoff values for delineated watersheds.

DOT&PF has recommended the incorporation of nonstationary conditions within the hydrologic and hydraulic analysis related to FHWA guidelines within the *Highways in the River Environment – Floodplains, Extreme Events, Risk and Resilience* (HEC-17) (FHWA 2016).

6.3.1.1 Crossings with USGS Stream Gages

Where USGS stream gages exist, a weighted average of the stream gage peak flow estimate obtained by the LP3 analysis, and a peak flow estimate obtained from the regional regression equations, was conducted in accordance with the methodologies outlined in the USGS Scientific Investigations Report 2016-5024 (USGS 2016).

There are two USGS stream gages on rivers that the study corridor crosses (either upstream or downstream of the physical crossing):

1. Copper River at Million Dollar Bridge NR Cordova AK: 15214000
2. WF Kennicott River at McCarthy AK: 15209700

The Copper River stream gage is approximately 84 miles downstream from the study corridor crossing. The Kennicott River stream gage is at the McCarthy Road pedestrian bridge crossing of the Kennicott River west channel.

6.3.1.2 Crossings without USGS Stream Gages

If a delineated watershed was near a USGS stream gage but did not have a gage, an improved peak flow estimate was obtained from the regression equation for the ungaged site, weighted with the weighted peak flow estimate from the gaged site and a drainage area-based multiplier. This multiplier and the methodology required to perform this weighted analysis at any ungaged site is presented in the USGS Scientific Investigations Report 2016-5024. This methodology is also only valid for sites that are near a USGS stream gage. A site is considered near if it is within 50% to 150% of the drainage area of the gaged site.

If the ungaged site is not considered near a gaged site, the weighting procedure gives full weight to the regional regression analysis outlined in the USGS Scientific Investigations Report 2016-5024.

6.3.2 Drainage Area

From MP 1 to about MP 8 the topography is somewhat flat with a slight uphill and downhill grades throughout. The study corridor is adjacent to rivers for the majority of this stretch. From MP 8 to the eastern limit of the corridor consists of rolling to moderately rugged hills separated by areas of relatively flat, typically poorly draining bogs.

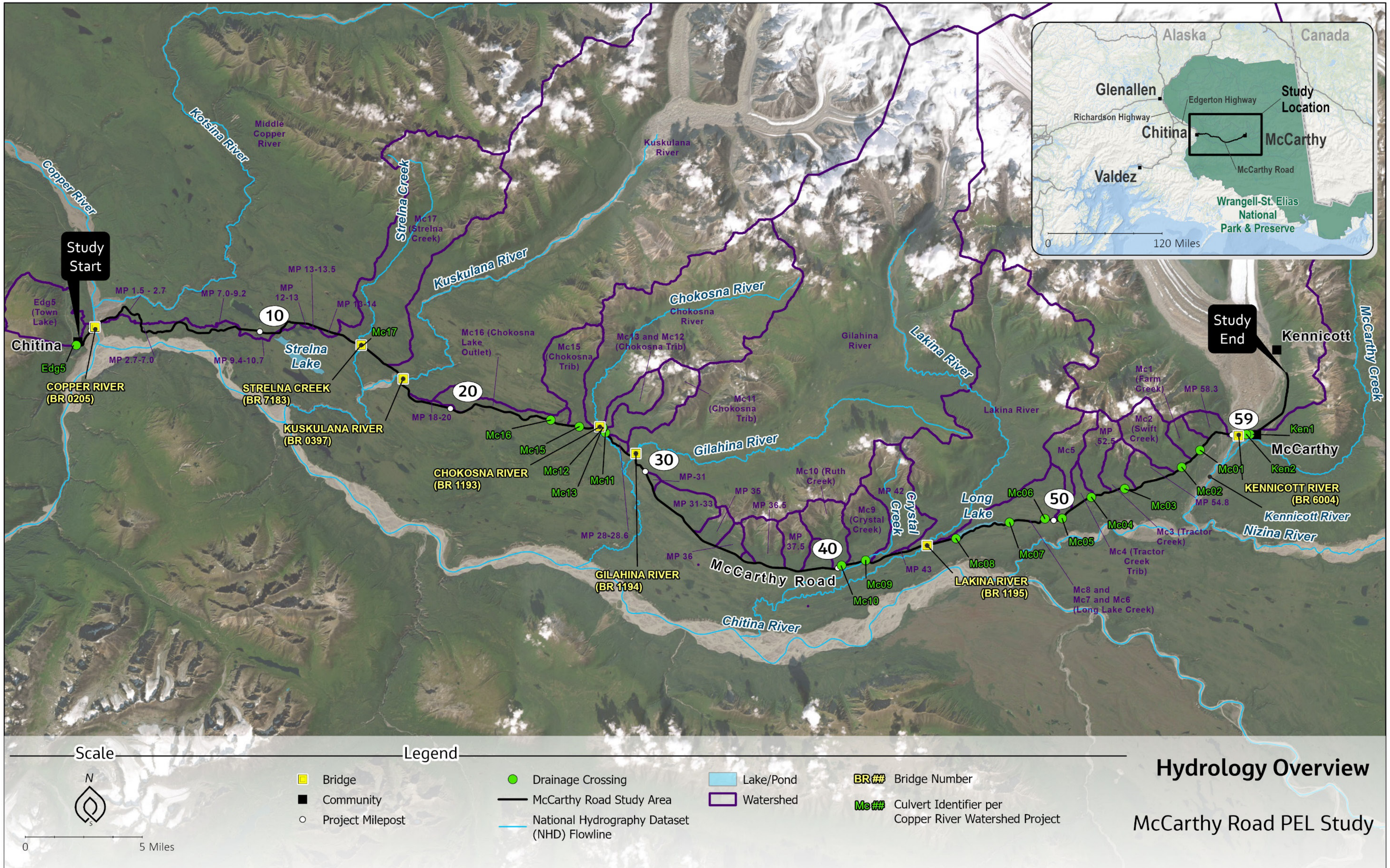
Elevations range from 500 feet (Copper River crossing) to 16,525 feet (Mt Blackburn) within the drainage basins that produce surface water to the Copper River. Surface water runoff generally flows from the higher elevations toward the lower drainage paths via streams and rivers. Concentrated surface water runoff will typically cross under the project roadway corridor via culverts or bridges.

The USGS quadrangle maps (Valdez C-1, Valdez C-2, and McCarthy) were consulted to delineate drainage runoff areas for offsite drainage crossings (USGS 2023a, 2023b, 2023c). USGS elevation data derived from these quad maps were obtained from the USGS National Map and processed in ArcGIS Version 10.8, a GIS software program created by the Environmental Systems Research Institute, commonly referred to as ESRI. Processing scripts (ArcHydro) created for ArcGIS were used to ensure the raw elevation data was conditioned to create a drainage grid. This process is called digital elevation model reconditioning and uses algorithms to match grid elevation data to streamline data obtained from the National Hydrography Dataset in the USGS National Map (USGS 2020).

Contours created from these digital elevation models aided in the delineation of drainage basin boundaries used for offsite hydrology. Contours from the actual quad map imaging were also consulted and aided in verifying drainage boundaries.

Figure 6-39 illustrates delineated drainage basins as they relate to the McCarthy Road alignment.

Figure 6-39. Hydrology Overview



6.3.3 Rainfall Characteristics

All drainage systems for the roadway corridor are sized to meet the design criteria for this project using appropriate rainfall data for the area.

Mean annual precipitation from the PRISM precipitation dataset, developed by the PRISM Climate Group and published for Alaska by Gibson (2009), was selected as a variable in flood frequency regression equations for the study in the USGS Scientific Investigations Report 2016-5024. LP3 analysis completed in the USGS study utilize the PRISM data as the precipitation variable. All regression equations developed within the USGS Report also use this precipitation data to minimize variations in parameter usage.

Table 1 in the USGS Scientific Investigations Report 2016-5024 has presented the basin average mean annual precipitation data for every USGS gage site in the State of Alaska.

6.3.4 Log-Pearson III

Flood frequency estimates for stream gages are computed by fitting the base-10 logarithms of the series of annual peak flows to a known statistical distribution. The flood magnitude and frequency estimates for this study were computed using the LP3 distribution as recommended in Bulletin 17B (Interagency Advisory Committee on Water Data 1982). The fitting of this distribution requires calculating the three statistics—the mean, standard deviation, and skew of the logs of annual peak flows, which describe the midpoint, slope, and curvature of the peak flow frequency curve, respectively. (USGS 2016)

USGS stream gage statistics and an LP3 fitting for each gage is presented in the USGS Scientific Investigations Report 2016-5024 Table 4, *Flood-frequency statistics for stream gages in Alaska and conterminous basins in Canada with at least 10 years of record through water year 2012*. These data were obtained for use in this PEL study.

6.3.5 Regional Regression

The USGS Scientific Investigations Report 2016-5024 outlines a methodology using exploratory regression analysis by beginning to illustrate ordinary least-squares regression as a simple form of multiple-linear regression that assumes that the peak flow values at stream gages are independent and that each stream gage record has similar variance, which is influenced by the length of records.

Streamflow data are naturally correlated spatially and temporally, making the assumptions of ordinary least-squares regression incompletely satisfied. A more sophisticated technique, generalized least-squares analysis, improves the equations by accounting for time-sampling error, which is a function of record length, and cross-correlation of annual peak flows between stream gages. If two stream gages are near each other and flooding is caused by regional rainstorms or other basin climate conditions, the annual series of peak flow will be largely correlated at both stream gages and cannot be considered independent information for the purposes of the regression. (USGS 2016)

The final regional regression equations were derived and presented in the USGS Scientific Investigations Report 2016-5024 Table 7, *Regional regression equations for estimating annual exceedance-probability discharges for unregulated streams in Alaska and conterminous basins in Canada.* These equations were used in this PEL study documentation.

6.3.6 Weighted Averaging

Weighted averaging that uses USGS stream gage data, regional regression analysis, and nearby ungaged sites was conducted to present a more conservative and accurate depiction of annual exceedance probability peak flows for each delineated drainage basin.

6.3.6.1 Weighted Averaging with USGS Gage Data

Flood frequency estimates at stream gages can be improved by computing a weighted average of the stream gage estimate obtained by LP3 analysis of peak flows, here referred to as the station estimate, and the estimate from the regression equation. Optimal weighted flow estimates can be obtained if the variance for each of the two estimates is known or can be estimated accurately. (USGS 2016)

The USGS Scientific Investigations Report 2016-5024 includes within its Table 4 values from each USGS stream gage derived through the LP3 methodology, regional regression methodology, and a weighted average between the two.

6.3.6.2 Weighted Averaging without USGS Gage Data

For ungaged sites near a gaged site on the same stream, an improved estimate can be obtained from the regression estimate for the ungaged site, weighted with an estimate based on the weighted estimate for the gaged site and a drainage area-based multiplier. The sites are considered near if the drainage area of the ungaged site is within 50% to 150% of the drainage area of a gaged site. (USGS 2016)

Methodology for completing a weighted average for a site without a USGS stream gage can be found in the USGS Scientific Investigations Report 2016-5024. This corridor study uses a computational spreadsheet to evaluate drainage basins that meet criteria to include weighted averaging with a nearby gaged site or evaluate a peak flow estimate utilizing regional regressions only.

6.4 Hydraulic Analysis

Hydraulic analysis on all identified stream crossings was not conducted as a part of this corridor study. As outlined in the *Alaska Highway Preconstruction Manual* (DOT&PF 2019), hydrologic and hydraulic analysis must be conducted on all bridge crossing designs as well as any culvert crossings 48 inches in diameter or larger. The analysis should evaluate the failure caused by hydrostatic and hydrodynamic forces, erosion, saturated soils, or plugging by debris.

The minimum diameter for round cross-drainage culverts is 24 inches, as stated in the *Alaska Highway Preconstruction Manual* (DOT&PF 2019). Throughout the study corridor, where icing becomes a potential issue, the DOT&PF recommends a minimum size of 36 inches in diameter.

DOT&PF recommends a culvert and storm drain system with a service life of 30 to 75 years.

6.5 Summary

Peak flow analysis was completed utilizing the hydrologic methodologies outlined previously. Recommended future analysis has been included in this section for consideration in future design efforts.

6.5.1 Peak Flow Analysis

A hydrologic and hydraulic analysis is required for culvert structures 48 inches and larger or bridge structures, as defined in the *Alaska Highway Preconstruction Manual* (DOT&PF 2019). These significant crossings were determined by using as-built plan sets obtained from the DOT&PF covering the entire corridor. In the future, the existing significant crossings will need a hydraulic analysis to evaluate the failure caused by hydrostatic and hydrodynamic forces, erosion, saturated soils, or plugging by debris.

For USGS gaged streams, the maximum value obtained from the USGS Scientific Investigations Report 2016-5024 was extracted from either the LP3, Regression, or weighted analysis and presented here. This applies to the Kennicott River only.

For ungaged crossings that are near a gaged site, an improved peak flow was obtained from the regression equation. The ungaged crossing is weighted with the weighted peak flow estimate from the gaged site and a drainage area-based multiplier. This applies to the Copper River only.

For any ungaged crossing that is considered not near a gaged site, the regression equation was used.

Results from the hydrologic analysis on the identified significant crossings in the corridor can be found in Table 6-4. This table presents resulting peak flow values for the 50-year storm event for each identified crossing. Additional analysis is included in Appendix C.

Table 6-4. Significant Crossing Locations in the Study Corridor

Milepost (MP)	Crossing Name	Estimate Method	Structure	Size/Diameter (inches, unless otherwise denoted)	Drainage Area (square miles)	50-Year Peak Flow Rate (cfs[a])
1.2	Copper River	Weighted Regression	Bridge	8-span	9549.42	159,008
14.7	Strelna Creek	Regression	Culvert	198 x 126	22.77	1,120
17.1	Kuskulana River	Regression	Bridge	Double-span	174.54	6,578
25.9	MC15	Regression	Culvert	131 x 76	4.99	303
26.8	Chokosna River	Regression	Bridge	Single-span	28.26	1,526
26.9	MC13	Regression	Culvert	84 x 60	1.95	174
26.9	MC12	Regression	Culvert	48	1.95	174
27.3	MC 11	Regression	Culvert	3 x 36	3.96	327
28.9	Gilahina River	Regression	Bridge	Single-span	115.8	4,610
40.3	Ruth Creek	Regression	Culvert	60	2.8	248
41.2	Crystal Creek	Regression	Culvert	13.3 foot by 9.3 foot	3.65	657[b]
44.0	Lakina River	Regression	Bridge	3-span	39.16	1,785
45.3	Long Lake Creek	Regression	Culvert	2 x 72	4.02	251
47.9	Long Lake Creek	Regression	Culvert	60	4.02	251
43.5	Tractor Creek	Regression	Culvert	48	1.65	156
56.1	Swift Creek	Regression	Culvert	72	3.62	323
57.3	Farm Creek	Regression	Culvert	48	1.27	137
59.3	Kennicott River	LP3	Bridge	5-span	176.15	6,220

[a] cfs = cubic feet per second.
[b] For the Crystal Creek crossing, this was obtained from DOT&PF Design Plans (0850029/NFHWY00538).

6.5.2 Future Analysis

Identification of additional crossings that need hydrologic and hydraulic analysis should be considered for future solutions related to M&O concerns. Non-stationary conditions throughout the study corridor including potentially increasing jökulhalaups should be considered in analysis and hydraulic design of future crossing modifications. It is recommended that a minimum crossing culvert size of 36 inches be considered to reduce icing concerns per DOT&PF policy.

Implementation of the methodology outlined in HEC-17 (FHWA 2016) regarding a framework that applies to the statistical hydrologic methodology completed as a part of this analysis should be considered. This framework ensures the inclusion of a nonstationary condition analysis related to climate change. It is recommended that a minimum Level 2 procedure outlined in HEC-17 be conducted. This Level 2 procedure considers uncertainty within the use of historical data to identify an appropriate range of conditions to aid in a more resilient design of drainage facilities.

At Level 2, the design team estimates the design discharge based on historical data and qualitatively considers future changes in land use and climate as in Level 1. In addition, the design team quantitatively estimates a range of discharges (confidence limits) based on historical data to evaluate plan/project performance. (FHWA 2016)

Fish passage criteria will need to be identified to provide a tiered approach outlined in the memorandum of agreement between the DOT&PF and the ADF&G to designing and installing fish passage roadway culverts throughout the study corridor. Current culvert crossings would also need to be evaluated and assessed to identify poor fish passage parameters, and that information would be included in the AWC in the future.

Erosion could be a future problem for the roadway at most locations where the river is near or in contact with a slope that supports the road. At the locations where the road is on the outside edge of the cutbank, erosion from the river could cause slope failure in the future.

Drainage issues are a fairly common problem faced by maintenance crews along the McCarthy Road. These problems with inadequate drainage will result in continual damage to the foundation of the roadway, shoulders, and the road surface. Future analysis to identify locations where a combination of larger culverts, additional culvert crossings, and enhanced roadside ditch grading to alleviate current drainage issues is recommended.

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7. Baseline Geological and Geotechnical Assessment

7.1 Introduction

This section provides an overview of the general geological context of the study corridor, encompassing regional geology, tectonics, seismic activity, and other site-specific factors that could inform the planning process. This section summarizes existing readily available geologic and geotechnical information obtained from data collection and field observations (including a June 2023 project team site visit) and describes the following:

- Physical conditions in the area, including climate, seasonal frost, permafrost, and vegetation
- Regional geology and seismicity
- Geologic hazards previously documented and/or observed in the field, including descriptions of historical areas of concern previously documented by the DOT&PF M&O and NPS, and the DOT&PF Geotechnical Asset Management (GAM) database
- Geotechnical challenges and conceptual mitigation possibilities.

7.2 Geologic Setting and Climate

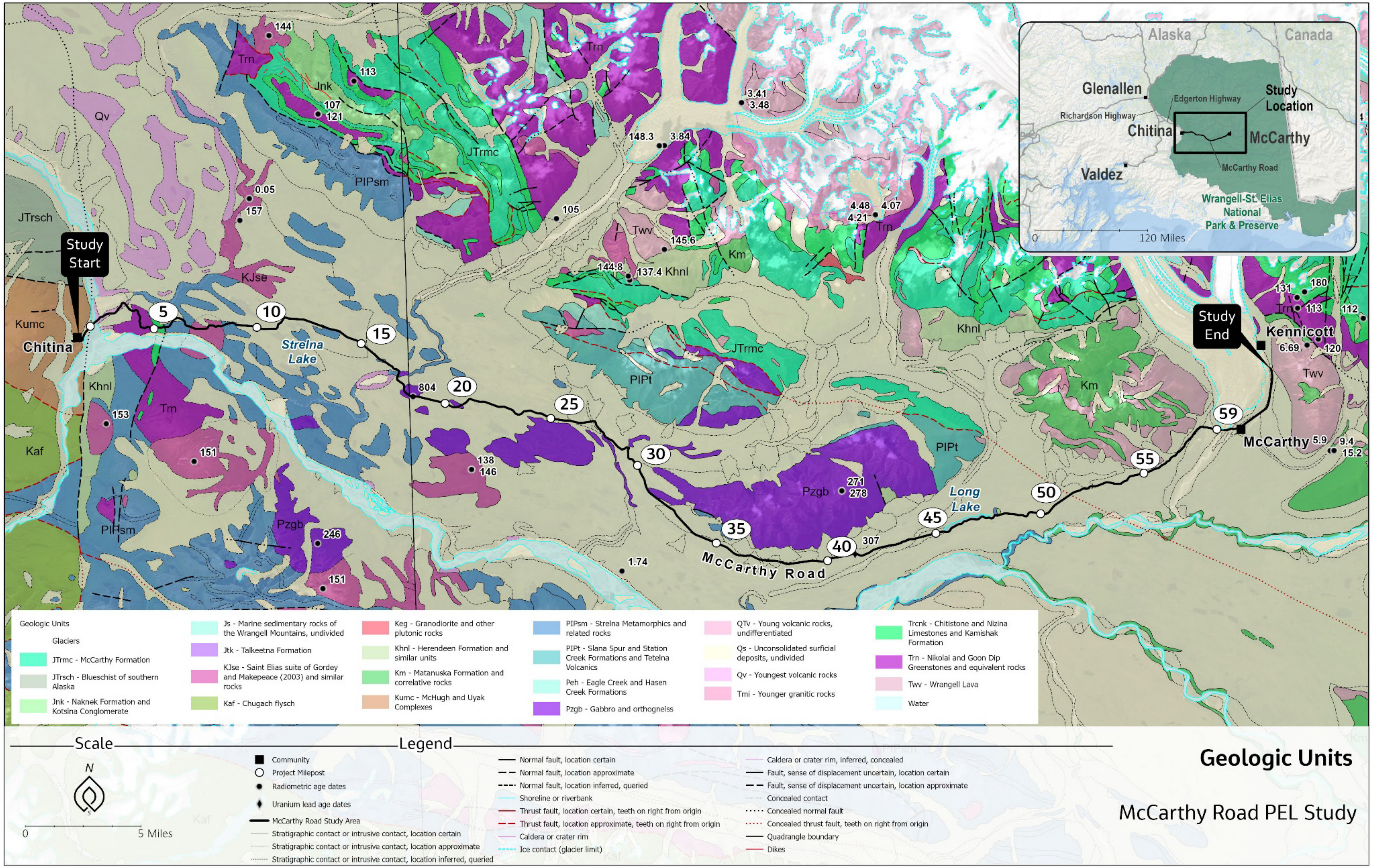
The McCarthy Road and study corridor extends through Eastern Alaska, running between the Wrangell-St. Elias and Chugach Mountain Ranges. The geologic features within this corridor were shaped significantly by geologic processes on a large scale, including tectonics, volcanism, multiple periods of glaciation, and fluvial processes. The region's topography is primarily defined by a central valley, bordered to the north and south by mountains sculpted by glaciers. The geological composition of this area primarily reflects earlier phases of regional tectonic activity, accompanied by volcanic events, followed by later erosional processes driven by glaciers and glaciofluvial activity.

7.2.1 Regional and Roadside Geology

The McCarthy Road corridor lies entirely within a sliver of the Copper River Lowlands physiographic region between the Chugach and Wrangell Mountain Regions (Wahrhaftig 1965). The landforms typically found here are lateral moraines and scoured bedrock ridges overlooking outwash plains. Several periods of glaciation over the last 20,000 years have helped to carve the valley into the current topography. The bedrock is now covered in layers of glacial till and alluvium as well as geomorphological features and deposits associated with glacial activity in the region. Along the road there are very few changes to the surficial geology while the bedrock goes through various formations. Figure 7-1 displays geologic units in the region along the study corridor (Wilson et al 2015).

At the beginning of the study corridor at MP 1 of the McCarthy Road, the roadway is a single lane through a bedrock cut comprised of the McHugh Formation, a tectonic mélange of weakly metamorphosed siltstone, graywacke, arkose, and conglomerate sandstone (Winkler et al. 1981). The road widens to two lanes and then continues along the eastern side of the bedrock ridge before crossing the Copper River near MP 1.4. From here, the road rises approximately 100 feet along what is referred to as the Kotsina Bluffs. These bluffs are 200 feet tall and composed of lahar deposits from the Chetaslina Volcanic Debris Flow from Mount Wrangell deposited approximately 200,000 years ago (Yehle and Nichols 1980). This debris flow is a matrix of silts and sands with large volcanic rock inclusions that are unconsolidated, unstratified, and ungraded. The non-uniform nature of this material has led to unstable slope conditions along the bluff.

Figure 7-1. Regional Geologic Map



Near MP 2.5, the road crosses from the bluffs into quaternary glacial and glaciofluvial deposits lying atop bedrock of various origins. At MP 5, there are several pullouts where the Nikolai Greenstone formation outcropping is visible. This greenstone is a metamorphosed basaltic lava flow that is commonly found around the mountains to the north (MacKevett 1978). The organic material overlying this formation here is sloughing off. At the bottom of the outcrop is the Chitina River in a classic braided-stream pattern that is typical of glacially fed sediment-laden rivers.

Continuing east toward McCarthy, the road is on glacial till overlaying the Strelna Metamorphics rock group (Winkler et al. 1981). The rocks outcrop in a few places but are most easily seen at the bottom of the Kuskulana River Gorge at MP 17. The glacial depositional features become more apparent from here as numerous elongated lateral moraines and lakes run parallel to the valley. These features continue until MP 55.

The road from MP 55 to MP 58.5 cuts along the side of the mountain ridge near its base. Here the road traverses a large lateral moraine. The material is highly unconsolidated and prone to failure based on observations from and work performed by DOT&PF M&O personnel on slides in this area. Numerous small-scale failures have occurred above and below the road, and there is a possibility of a much larger failure occurring based on the 2021 investigation by the NPS and DOT&PF, as described later in this section.

From MP 58.5, the road dips down into McCarthy Valley. The glacial flood plain here is composed of mostly gravels and boulders. The Kennicott River cuts off the road at MP 59.4. Here the river meanders through the valley floor, and it is slowly eroding away at the west bank under the bridge abutment. On the other side of the river, the road continues until it reaches another pedestrian bridge crossing over the former Kennicott River channel (the east channel, which is dry) and then just north of the community of McCarthy as it continues up another lateral moraine, where it reaches the end on the south side of the Kennicott subdivision about 4 miles from the Kennicott River crossing. To the east of the eastern end of the study corridor, a substantial landslide occurred in 2002. The landslide deposited debris on the road and was not completely repaired. There is evidence of recurrent historic slides east of the road between the McCarthy Airport and the end of the study corridor. Historically, water has caused slope failures and landslides in this stretch.

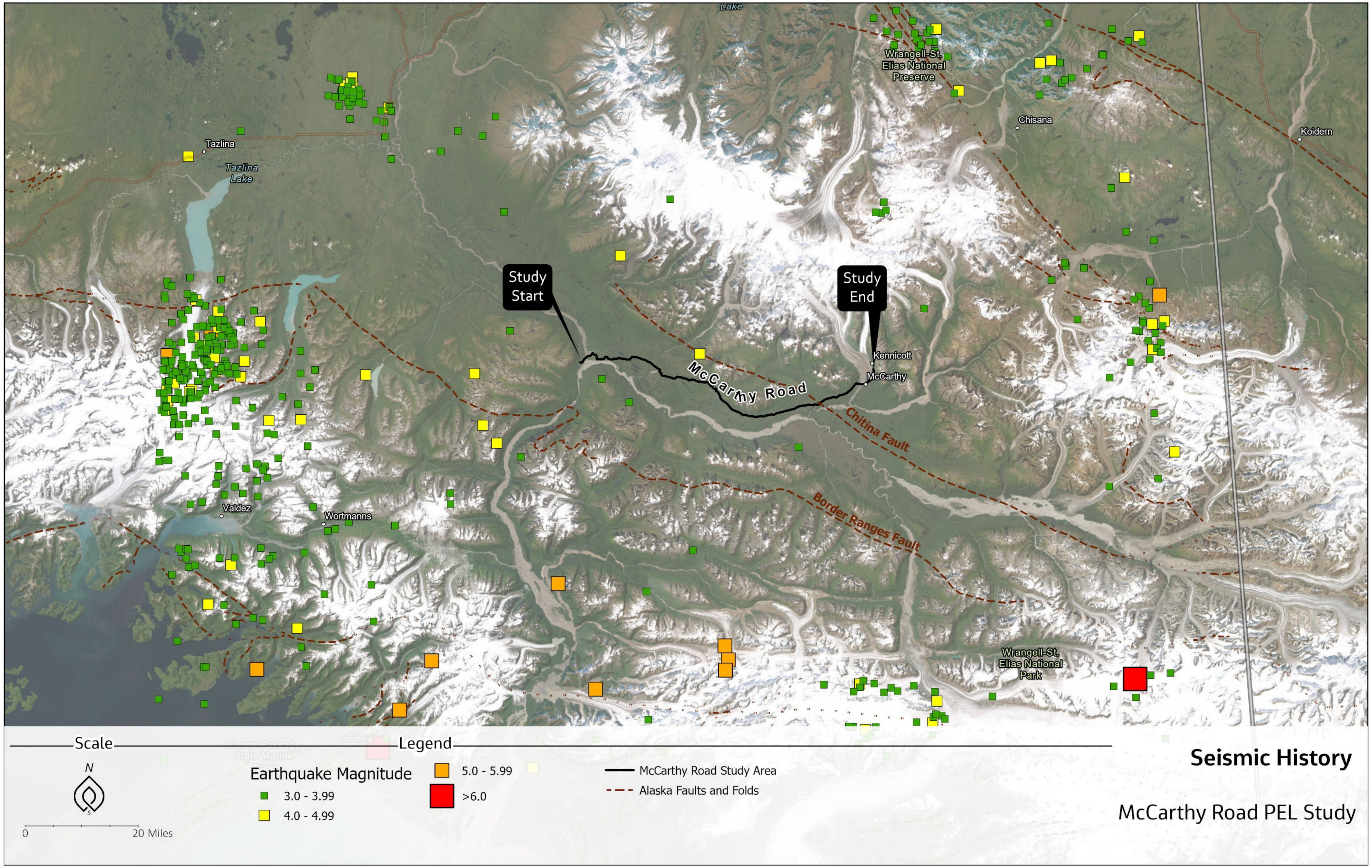
7.2.2 Tectonics and Seismicity

The tectonic setting of the McCarthy Road is characterized by its location in the Wrangell Mountains. These mountains are a subrange of the much larger Alaska Range. The region is situated on the highly active boundary between the Pacific and North American Plate. Under this corridor, the Pacific Plate is subducting beneath the North American Plate, leading to ongoing tectonic forces and seismic activity.

Overall, the tectonic setting along the McCarthy Road reflects a complex interplay of plate tectonics that have created several fault systems between the mountain ranges and valley floor that the road runs along. To the north of the road is the Chitina Fault System and to the south is the Border Ranges Fault.

This corridor is rated to have a moderate to high seismic hazard level according to the USGS 2007 Alaska Seismic Hazard Map (USGS 2023a). According to the USGS Unified Hazard Tool, there is a 5% probability that the peak ground acceleration exceeds 30g in the next 50 years based on a 975-year mean return period (USGS 2023b). The region has experienced more than 400 earthquakes rated at 3.0 or higher from 1928 to 2023. The largest earthquake was a 7.1 in 1979, centered roughly 70 miles southeast of McCarthy (USGS 2023c). Figure 7-2 shows the faults and historic earthquakes in the region.

Figure 7-2. Historical Seismicity and Faulting



7.2.3 Climatology

The climate in the study corridor is characterized by its subarctic or boreal climate. The winters are long and cold with short mild to warm summers. Winter temperatures are often below freezing and heavy snowfall is common while summer temperatures are moderate. The coldest month on average is January with an average of -2.6 degrees Fahrenheit (°F). The warmest month is July with an average of 65.3°F.

According to the Community Climate Charts for McCarthy from the Scenarios Network for Alaska and Arctic Planning website produced by the University of Alaska Fairbanks, there is a noticeable upward trend in average winter and summer temperature trends (UAF 2023). The mean annual temperature increase would equate to a 4- to 6°F raise over the next 30 years. Table 7-1 shows the average monthly climate summary for Chitina, Alaska, from 1981 to 2010; this is the most recent available data within the region.

Table 7-1. Climate Data for the Study Corridor (Chitina, Alaska), 1981 to 2010

Measurement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max Temperature (°F)	0.1	17.1	33.0	42.7	57.0	64.9	65.3	61.0	54.4	37.3	18.6	2.7	37.9
Average Min Temperature (°F)	-2.6	-1.9	12.5	23.5	34.8	42.7	46.5	43.5	35.6	20.6	5.1	0.8	21.8
Average Total Precipitation (inches)	0.00	0.10	0.14	0.39	0.36	2.52	1.86	1.81	0.87	0.94	0.55	0.01	9.55

Source: Western Region Climate Center 2023.

7.3 Field Reconnaissance

A site visit was conducted by personnel from WFL, DOT&PF, NPS, and Jacobs in June 2023. The goal of this trip was to provide a chance to view firsthand some of the issues that are occurring along the McCarthy Road that impacts local residents and visitors. During the visit, the team briefly looked at notable previous and ongoing concerns and got the opportunity to document new unreported geotechnical issues occurring along the roadway. The field visit focused a substantial amount of time on some of the larger known issues that are occurring at the Kotsina Bluffs and MP 58 landslide area. Additionally, the team made observations of other points along the road for some smaller geotechnical issues. The following sections describe some of the existing geotechnical conditions and issues observed during the site visit.

7.4 Existing Geotechnical Hazards

The McCarthy Road, along this 64-mile project corridor, passes through varying terrain that creates numerous challenges for the use and maintenance of the road. The road crosses rivers, permafrost, peat bogs, and traverses along mountain sides. These diverse terrains create hazards for the road including erosion, unstable soils, landslides, and rockfalls. Additionally, changing permafrost conditions and seismic activity can contribute to the hazards and make maintenance and repairs more challenging.

The DOT&PF's GAM program identifies numerous historic geological hazard events (geo events) as having occurred within the study corridor, as shown on Figure 7-3. Examples of geo events are avalanches, rockfalls, debris flows, ice falls, and tree falls. Within the study corridor, the only types of geo event reported for the study corridor are the following: landslide/embankment failure, rockfall, and flood damage/encroachment. As shown on the figure, most of these are concentrated near the Kotsina Bluffs and MP 58. DOT&PF's geo event data do not extend from the Kennicott River east to the study corridor end. However, the area east of the roadway has recurrent historic landslides and poses substantial avalanche danger. Table 7-2 lists the number of these occurrences based on where they occurred along the study corridor between December 2003 and December 2022. Nearly 75% of the reported geo events (68 of 93 events) are landslide/embankment failures. These historic incidents are described in Section 7.5.

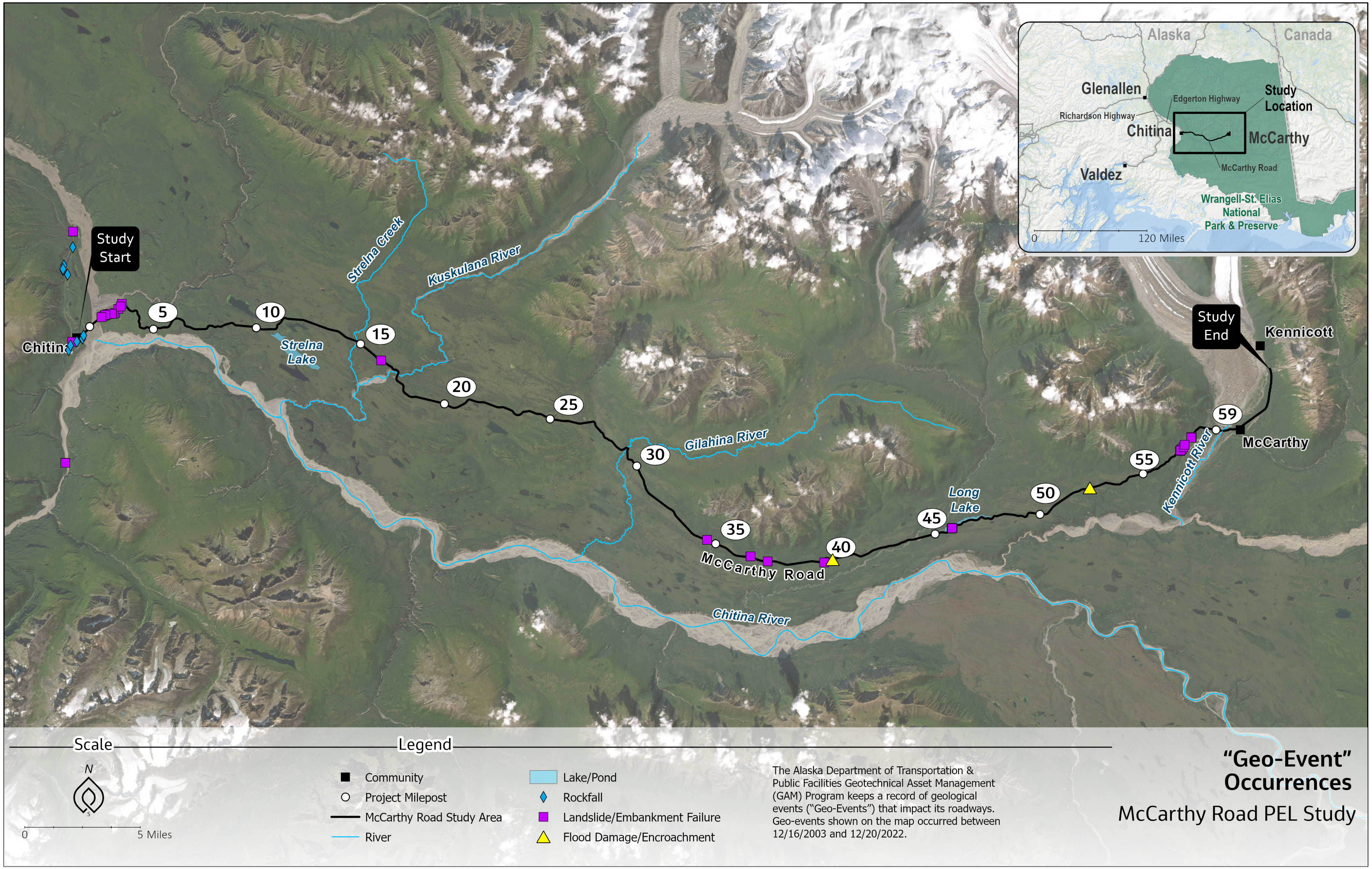
Table 7-2. DOT&PF Geo Event Occurrences in the Study Corridor, 2003 to 2022

Road Segment	Landslide/ Embankment Failure	Rockfall	Flood Damage/ Encroachment
MP 0 to 10	33	23	0
MP 10 to 20	3	0	0
MP 20 to 30	0	0	0
MP 30 to 40	5	0	0
MP 40 to 50	3	0	1
MP 50 to 59	24	0	1
East of Kennicott River to Study End [a]	N/A	N/A	N/A

Source: DOT&PF 2023a.

[a] DOT&PF does not have geo event data for this segment, though there have been known geo events occurring in the segment. For example, a previous substantial landslide is observable to the east and upslope of where the study corridor ends, just south of the Kennicott subdivision.
N/A = not available.

Figure 7-3. DOT&PF Geo Event Occurrences, 2003 to 2022



7.4.1 Erosion

Erosion is a major concern along the McCarthy Road. The road crosses several rivers and streams, and during periods of high flow, erosion of riverbanks can undermine the roadbed, leading to structural instability. The most significant concern is at Kotsina Bluffs from MP 1.5 to 2.75. Along the base of the bluffs, the Kotsina River creates a deltaic tributary as it joins the Copper River. Due to the nature of deltas, the primary stream channel can meander continuously over time. Recently, the channel was along the north side of the delta far away from the bluff, and a berm was constructed by the Ahtna Native Corporation to control the location the Kotsina River. During a flood event, the berm was breached, and the Kotsina River has now meandered directly to the base of the bluffs. This is causing increased erosion of the already unstable bluffs and will eventually create new problems for the road above.

Proximity of the road to the terminus of Kennicott Glacier, which is known to have outburst floods that have the potential to grow in volume/discharge, could present challenges for the current pedestrian bridge that crosses the Kennicott River. The bridge is already being scoured away on the west abutment. Approximately 0.25 mile farther down the road toward McCarthy, a second pedestrian bridge was constructed within the official ROW for the McCarthy Road. Previous flooding events changed the course of the river and abandoned the river channel this bridge crosses (referred to as the east [dry] channel). Future flooding events could potentially cause this channel to become active again, although it is unlikely. This would eliminate the bridge bypass road that is constructed outside of the ROW and adjacent to the community swimming hole.

7.4.2 Landslides

The steep terrain within the road corridor and frequent precipitation in the region results in landslides. This is one of the more common hazards along the road because there is a vast amount of unconsolidated material deposited on the bedrock. Triggers for landslides in the area can be rainfall, snowmelt, and earthquakes. Commonly seen are shallow translational landslides from sluffing of material off a bedrock plane. These are a typical result of heavy precipitation or thawing permafrost that loosen the already unconsolidated material and cause it to slide down the slope.

In addition to the numerous small-scale landslides, recent examples including Kotsina Bluffs, Mile 34.5, and to the east of the road just north of the McCarthy airport, a larger landslide is potentially developing near MP 58. A previous surface investigation, in 2021, discovered a surface crack 200 feet above and parallel to the road. The exposed section of crack was small but coincides with a depression at the top of the hill. The crack could be a failure plane of a much larger rotational block landslide that would destabilize the entire hillside and road.

7.4.3 Rockslides and Rockfalls

The presence of steep cliffs and rocky terrain result in rockfalls or rockslides. Freeze-thaw cycles, seismic events, or weathering weaken rock formations and lead to falling debris on the road. Numerous rockslides and rockfall events have been seen in the first mile of road at this area, particularly in the major one-lane through-cut area that is an iconic marker of the start of the McCarthy Road. Rocks are frequently seen coming down either side of this through-cut and blocking the road or littering the ditches. Evidence of larger rockslides exist on the east side of the through-cut toward the Copper River.

7.4.4 Subsidence and Settling

Multiple sections of the road pass along and through freshwater forested/shrub wetlands, according to the USFWS Wetlands Mapper (USFWS 2023). These areas are typically infilled basins between the glacially deposited lateral moraines that are prevalent and oriented parallel to the valley. These basins have filled with organic rich soil and peat. This material is not as well suited for a road subgrade because it can compress over time and settle the road prism. Numerous zones of subsidence and settling were observed during the 2023 site visit between MP 18 and MP 55. Due to the nature of the road constructed on top of an early 1900s-built railroad bed, there has not been any work to mitigate these issues except for infrequent maintenance with a road grader.

7.4.5 Seismic Activity

Earthquakes may induce issues like subsidence, landslides, and rockfalls. Since this road is in a moderate seismically active area, there is a considerable risk. The road also crosses the Chitina Fault near MP 51.5. This concealed thrust fault has not been studied enough to determine if it is still an active fault. Therefore, caution should still be used when planning construction along the fault crossing. Another hazard with seismic activity is the potential for liquefaction of soil beneath the road. Liquefaction reduces the shear stress of soil and can create settlement or lead to slope instability.

7.4.6 Permafrost and Season Frost

The McCarthy region is underlain by discontinuous permafrost. When permafrost thaws due to temperature fluctuations or road construction activities, it can lead to subsidence and settlement issues. The water produced can induce landslides to occur like those seen at the Kotsina Bluffs if drainage is not adequate. During the 2007 DOT&PF Geotechnical Investigation of the Kotsina Bluffs, DOT&PF encountered frozen soils throughout the centerline drilling.

For areas where permafrost is under the road, there is a potential for the loss in subgrade support due to the ice volume loss, depth of thawing, compressibility of the soils thawed, and loading. There are several places along the road where settlement has occurred and pooling is forming on the base of the embankment; these failure locations could very well be caused by permafrost degradation.

Due to the lack of roadbed and a thin embankment, the McCarthy Road can be heavily affected by seasonal frost. Hazards include frost heaves and loss of support during spring thawing. While no frost heaves were visible because of the timing of the June 2023 site visit, the amount of heavily saturated road suggests they are a frequent issue and require grading. Refer also to Section 6.2.3 for a discussion on aufeis.

7.5 Historical Areas of Concern

Table 7-3 summarizes major historic geotechnical issues along the study corridor, according to the geo events reported in DOT&PF's GAM program database.

Table 7-3. Historic Areas of Concern in the Study Corridor

Approximate Milepost (MP)	Hazard Type	General Description
MP 0.25	Rockfall	Rocks falling off narrow road cut through bedrock.
MP 0.75	Landslide and rockfall	High rock wall on west side of road has had issues with rocks falling on road. Additionally, during times of high precipitation, the organic soils and debris on top of bedrock become loose and slide off.
MP 1 to 2	Landslide, unstable embankment, and drainage issues	This area is referred to as the Kotsina Bluffs. The loosely deposited material becomes heavily saturated and fails through small-scale landslides above and below road.
MP 5	Landslides and unstable embankment	Material is sluffing off below road. No maintenance-related issues reported, but there is potential to become a larger issue if embankment fails.
MP 16	Landslide	Small landslide in 2014 requiring heavy equipment.
MP34 to 35	Landslide	Small landslide requiring heavy equipment.
MP 36 to 38	Landslides	Small landslide in 2017. Small landslide in 2020 caused 4-hour road closure.
MP 39 to 40	Landslide	Small landslide in 2017 requiring heavy equipment.
MP 40.2	Flooding	Flooding over road for 2 days.
MP 45.75	Landslides	Three small landslides over the course of 3 days in 2018.
MP 52.5	Flooding	Flooding caused a slowdown of the road for 5 days.
MP 56.75 to 58	Landslides and unstable embankment	Commonly referred to as the MP 58 landslide; this area consists of numerous small-scale slides above and below the road. Larger potential failure plane has been identified, leading to a massive landslide in the future.
East of Kennicott River to Study End	Landslides, drainage issues	Substantial landslide occurred in 2002 east of the road, north of McCarthy. Evidence of recurrent historic landslides. Most seasons, there is surface water on the roadway; the road base is failing due to excess water.

Source: DOT&PF 2023a; NPS.

In addition to the events and hazards listed in this table, refer to Table 5-1, which summarizes observations made by DOT&PF M&O personnel during a May 2023 site visit along the McCarthy Road. Those observations included issues based on location along the road corridor related to drainage, culverts, narrowing, cracking, flooding, rockslides, and sink holes.

The two dominant areas of concern that have been investigated previously are the Kotsina Bluffs and the MP 58 Landslide. The Kotsina Bluffs was investigated in 2007 (Currey 2008) as part of an FHWA Emergency Relief Fund to look at permanent repairs due to flooding damage along the McCarthy Road. The investigation involved reconnaissance drilling along the centerline of the bluff and then along the base of the bluff. The alternatives that were considered were buttressing the toe of the bluff, realignment to the valley bottom, using a tie-back wall, and widening the hill side. The conclusions reached by the investigation were that all alternatives were found to be geotechnically viable with some stipulations.

The MP 58 Landslide has not been as thoroughly investigated as at the Kotsina Bluffs (though more investigation is needed at Kotsina Bluffs as well). The investigation at MP 58 was a preliminary site walk, conducted in August 2021 by DOT&PF and NPS personnel (Loso 2021) to look at the depression and cracking on the top of the slope and a series of smaller slides that occur above and below the road. Field observations concluded that a large-scale failure is possible but unknown how rapidly the slope could be shifting and that more investigation should occur. The road at this location cuts across the middle of the slope and would likely be unrepairable if this failure occurs because the entire road and railroad bed underneath would be moved downslope.

7.6 Geotechnical Challenges and Mitigation Possibilities

The study corridor contains numerous hazards that could be impractical or cost prohibitive to repair. The following sections will discuss options that may be available to mitigate some of the hazards along McCarthy Road. These conceptual mitigation strategies are provided in broad terms as to further support the need to perform an in-depth site-specific geotechnical investigation to determine the correct mitigation strategy for each construction project planned along the project corridor.

7.6.1 Erosion Mitigation

Most of the erosion issues on the McCarthy Road are due to rivers. There are several options to mitigate this including riverbank protection, vegetation, artificial erosion control products, active monitoring, and streambank restoration. Riverbank protection can be as simple as adding riprap that is appropriately sized for the needed protection. The chosen strategy can be challenging because of the varying terrain along the road and will require a comprehensive approach considering both human and natural elements.

7.6.2 Landslide Mitigation

Mitigating landslide hazards on roads involves several key strategies. Firstly, comprehensive slope stabilization measures are essential, such as installing retaining walls, rock bolts, or mesh to reinforce unstable slopes and prevent soil or rock mass movements. Secondly, effective drainage systems including culverts and ditches help manage surface water and prevent soil saturation, which can trigger landslides. Regular monitoring and early warning systems, such as inclinometers and ground sensors, allow for timely detection of slope instability, enabling road closures or evacuations when necessary. Lastly, careful road planning and design in consideration of geological and topographical factors can help avoid high-risk areas altogether. Combining these approaches is vital to minimize the risk of landslides and ensure road safety in landslide-prone regions.

7.6.3 Rockslides and Rockfall Mitigation

Rockfall and rockslide hazards along roads require various protective measures for mitigation. One crucial approach is the installation of rockfall barriers or catchment fences positioned strategically to intercept falling rocks and redirect or absorb their energy. Additionally, rock scaling and slope stabilization techniques, such as rock bolting, meshing, and rockfall netting, can be used to secure loose or unstable rocks on steep slopes. Regular inspection and maintenance are essential to identify and remove potential rockfall hazards before they become a threat. Furthermore, warning signs and barriers can be placed to keep vehicles and pedestrians away from high-risk areas. By implementing a combination of these measures and conducting thorough geological assessments, the risk of rockfalls impacting road safety can be significantly reduced.

7.6.4 Seismic Mitigation

Most seismic hazards have no practical geotechnical mitigation technique. When it comes to liquefaction, typically for new construction projects it is best to avoid the susceptible soils. Along the McCarthy Road however, avoiding these soils is less of an option due to the narrow ROW. Mitigation methods like compaction, soil grouting, draining, and dewatering are best suited to handle the preexisting conditions. While these are the best mitigation techniques, they are also costly and may not be an effective solution depending on the project. It would be best to address the liquification after an event occurs during the reconstruction of the road.

7.6.5 Permafrost Mitigation

Careful planning and engineering are required for mitigating permafrost hazards on a road. Three key techniques for addressing these challenges are insulation, drainage, and embankment design. First, insulation involves insulating the roadbed to reduce heat transfer from the road surface to the permafrost below, preserving its frozen state. Second, effective drainage systems are crucial to divert water away from the road, preventing it from seeping into the ground and causing permafrost thaw. Lastly, proper embankment design considers the use of thermosyphons or other heat-exchange systems to regulate ground temperatures and maintain permafrost stability beneath the road. Employing a combination of these techniques is essential for ensuring the longevity and safety of roads in permafrost regions.

7.7 Existing Material Sites

Table 7-4 summarizes DOT&PF-identified material sites in and near the study corridor. The reports associated with these sites were updated between 2009 and 2015; therefore, available material quantities should be verified. There are 8 material sites along the McCarthy Road and 12 additional material sites outside of the study corridor located along the Edgerton Highway.

The extent and availability of existing gravel material sites within the study corridor likely would be sufficient for anticipated construction projects; however, this assumption does not consider other material needs DOT&PF may need to consider. Riprap may not be available within the study corridor. Additionally, actual projects the PEL will recommend is not known at this phase of the PEL study.

Table 7-4. Existing Material Sites in and near the Study Corridor

Material Site	Name	Road	Milepost	Permitted Acres	Estimated Quantity[a]	Site Type	Material Source	Maximum Size (inch)	Riprap
MS 850-003-5	Chitina Bridge Pit	McCarthy Road	1	3.9	20,000	River Bar	Fluvial	N/A	Not Possible.
MS 850-004-5	Kotsina River Pit	McCarthy Road	2	18.3	180,000	River Bar	Fluvial	8	Not Possible.
MS 850-005-5	N/A	McCarthy Road	2.5	35.4	460,000	River Bar	Fluvial	60	Not Possible.
MS 850-007-5	N/A	McCarthy Road	3	8.8	200,000	Quarry	Bedrock	N/A	Possible. Further investigation needed.
MS 850-001-5	Kuskulana No. 2	McCarthy Road	17	57.8	40,000	Borrow Pit	Fluvial	60	Not Possible.
MS 850-008-5	Kuskulana No. 1	McCarthy Road	17	49.9	450,000	Borrow Pit	Fluvial	72	Not Possible.
MS 850-085-5	Wood Site	McCarthy Road	26.5	42.1	360,000	Borrow Pit	Fluvial	12	Not Possible.
MS 850-077-5	N/A	McCarthy Road	52	65.5	390,000	Borrow Pit	Fluvial	18	Not Possible.
MS 850-011-5	N/A	Edgerton Highway	1	7.1	20,000	Borrow Pit	Fluvial	10	Not Possible.
MS 850-022-5	Mile 1 Pit, MS 16-3M, OMS 16-3M	Edgerton Highway	1	59.8	360,000	Borrow Pit	Fluvial	12	Not Possible.
MS 850-036-5	Kenny Lake School Pit	Edgerton Highway	5	89	740,000	Borrow Pit	Fluvial	12	Not Possible.
MS 850-029-5	Old Tonsina Maintenance Camp	Edgerton Highway	19	1.4	2,000	Borrow Pit	Fluvial	N/A	Not Possible.
MS 850-070-5	Lower Tonsina Pit	Edgerton Highway	19	31.4	100,000	Borrow Pit	Fluvial	12	Not Possible.
MS 850-070A-5	Weaver Pit	Edgerton Highway	19	8.6	5,000	Borrow Pit	Fluvial		Not Possible.
MS 850-033-5	North Liberty Falls Pit	Edgerton Highway	23	12.1	50,000	Borrow Pit	Fluvial	60	Possible. Further investigation needed.
MS 850-032-5	South Liberty Falls Pit	Edgerton Highway	24	15.7	220,000	Borrow Pit	Fluvial	15	Not Possible.
MS 850-031-5	N/A	Edgerton Highway	26	8.3	30,000	Borrow Pit	Fluvial	60	Possible. Further investigation needed.
MS 850-074-5	Chitina Airport Pit	Edgerton Highway	28.5	5.17	5,000	Borrow Pit	Fluvial	15	Not Possible.

Material Site	Name	Road	Milepost	Permitted Acres	Estimated Quantity[a]	Site Type	Material Source	Maximum Size (inch)	Riprap
MS 850-027-5	N/A	Edgerton Highway	30	2.1	110,000	Quarry	Bedrock	N/A	Possible. Further investigation needed.
MS 850-073-5	Mile 31 Pit	Edgerton Highway	31	10.6	30,000	Borrow Pit	Fluvial	8	Not Possible.

Source: DOT&PF 2023b.

[a] Estimate material is from as recent as 2015. Available material is subject to substantial change.

N/A = not available.

7.8 Closure and Limitations

The McCarthy Road PEL study corridor is a 64-mile stretch of unstudied and uninvestigated road that needs a closer examination for all projects planned after this report is written. This report should not serve as a comprehensive list of all known or expected geotechnical hazards along the road, and there may be additional undocumented areas of concern missing from this report or that develop after this report is written that may become an issue for future projects. Issues like avalanches were intentionally left out due to the seasonal summertime designation of the roadway. Should the summer-only use change, avalanche dangers will also need mitigation. It is therefore recommended that for all future construction planning along this corridor, an extensive geotechnical and/or geophysical investigation take place to determine the geotechnical conditions and appropriate mitigation techniques required.

7.9 References

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8. Economic Conditions Assessment

8.1 Introduction

With the intent of fostering collaborative and integrated approaches early in the transportation decision-making process, a focus on economy is one of several goals that are encouraged to be considered as part of the PEL process.

This section includes a planning-level economic impact assessment that will be used to guide in the prioritization of proposed improvements and regional cooperation for leveraging public lands resources. This section describes the following:

- Existing demographics and economic data (e.g., population, employment, income) including economic activity generators (e.g., tourism, WRST visitors, fisheries, subsistence)
- Future economic generators, based on other planning efforts
- Estimates of the total economic contribution or impact of WRST

This economic assessment used background information that was previously gathered for another WFL-led PEL study: the Cantwell to Healy PEL study conducted for the Parks Highway near Denali National Park and Preserve (Jacobs 2022). That background information was used to help determine the effects of travel and visitation to quantify the value of the corridor. A characterization of the corridor study area's existing demographics and economic activities and identification of future economic development opportunities largely came from reviewing Copper River Census Area data.

8.2 Existing Demographics and Economics

Numerous federal and state data sets were reviewed to characterize the study area's economics. This includes, but is not limited to, the following key sources:

- Data from the U.S. Census Bureau and the Alaska Department of Labor and Workforce Development (ADOLWD) were used to describe historical and current trends in population, median household incomes and poverty rates within the Copper River Census Area, the State of Alaska, and the U.S.
- Data from the U.S. Bureau of Labor Statistics and the ADOLWD were used to describe the historical and current trends in labor force characteristics of the Copper River Census Area, the State of Alaska, and the U.S.
- Data from the U.S. Bureau of Economic Analysis (BEA) were used to characterize the historical and current trends in per capita income, employment by industry, and earnings by industry in the analysis area.
- Data from the NPS website on visitation to WRST in addition to visitation data from the Alaska Department of Commerce, Community and Economic Development (ADCCED).

Finally, to facilitate the evaluation of trends on income that are typically reported in the current year, all the income were converted to real dollars, in 2022 dollars, using the gross domestic product implicit price deflator (BEA 2023a).

8.2.1 Population

The PEL study corridor is within the Copper River Census Area. The Copper River Census Area was created in 2019 when it was split from the Valdez-Cordova Census Area and Chugach Census Area. Because it is part of the Unorganized Borough, it has no borough seat. Of the 11 census areas that fall within the unorganized borough designation in Alaska, it is one of the least densely populated census areas. The annual year-round population of Copper River Census Area has fluctuated very little over the past 12 years; it declined slightly by an average annual rate of 1.2% between 2010, when the ADOLWD reported a population of 2,955, and 2020 and increased slightly by an average annual growth rate of 0.04% between 2020 and 2022. Table 8-1 shows both the State of Alaska and the U.S. had higher growth rates during these periods.

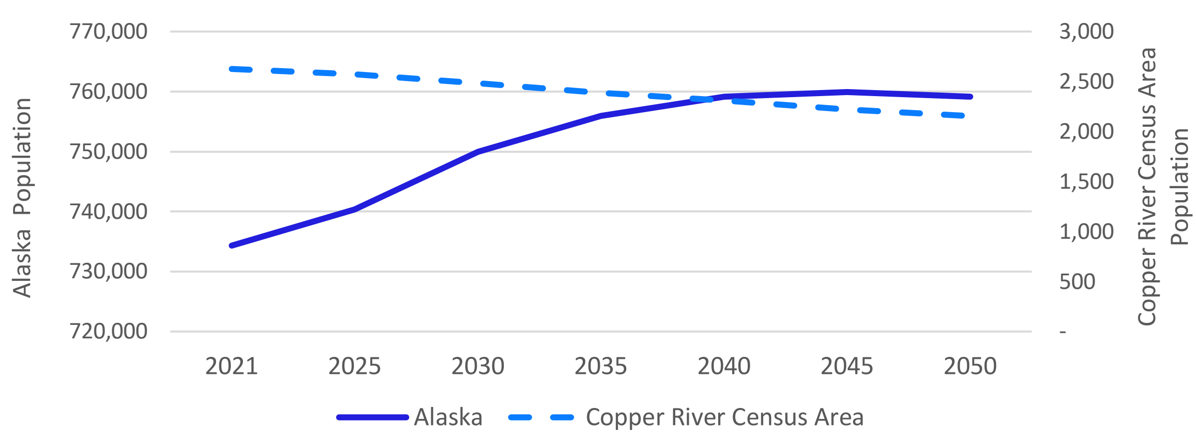
Table 8-1. Historical Population of Copper River Census Area, State of Alaska and U.S., 2000, 2010, 2020, and 2022

Area	2000	2010	2020	2022	Average Annual Growth Rate (%) 2000 to 2010	Average Annual Growth Rate (%) 2010 to 2020	Average Annual Growth Rate (%) 2020 to 2022
Copper River Census Area	N/A	2,955	2,617	2,619	N/A	-1.21%	0.04%
Alaska	626,932	710,231	733,391	736,556	1.26%	0.32%	0.22%
U.S.	281,421,906	308,745,538	331,449,281	333,287,562	0.93%	0.71%	0.28%

Source: ADOLWD 2023a, USCB 2000a.
Note: N/A = not applicable or available.

ADOLWD provides population projections at 5-year intervals for regions, boroughs, and census areas within the state. Based on the 2021 population estimate of 2,626, ADOLWD projects that Copper River Census Area's population will continue to decline through 2050 (Figure 8-1). The population in the state is projected to grow at an average growth of 0.2% while that of the census area is projected to decline by 0.4%, respectively, between 2030 and 2050. (ADOLWD 2023b).

Figure 8-1. Projected Population in Copper River Census Area and the State of Alaska, 2021 to 2050



Source: ADOLWD 2023b.

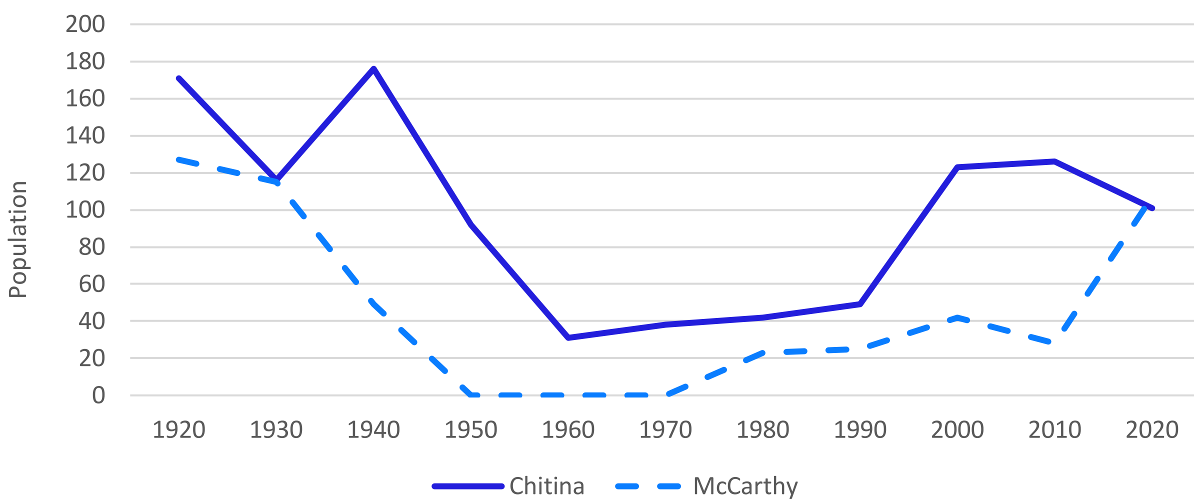
There are a few communities and small population settlements along the study corridor, with summer greatly contributing to a seasonal bump.

Chitina, which includes the Native Village of Chitina, is near the beginning of the study corridor. In 2022, the population of Chitina was 97 (ADCCED 2023a). The resident population in Chitina experienced a spike in 2020 due to COVID-19 but has since returned to normal (Nelson, pers. comm. 2023). Chitina receives a lot of visitors in the summer because it is an access point for Copper River salmon fishing.

The community of McCarthy is toward the eastern end of the study corridor. In 2022, the population of McCarthy was 114 (ADCCED 2023a). McCarthy experiences a seasonal bump in population during the summer, as it is the gateway community into WRST and particularly the Kennecott Mines NHL. There are fewer cabins in Chitina than in McCarthy.

Figure 8-2 displays the historic decadal population counts for Chitina and McCarthy from 1920 to 2020. From 2020 to 2022, the population declined slightly in Chitina, going from 101 to 97. Between 2020 to 2022, McCarthy experienced a slight population increase, going from 107 to 114. Looking further back in time, the population in McCarthy has experienced a tremendous growth; between 2010 and 2020, the population grew from 28 to 107.

Figure 8-2. Historic Population Counts, Chitina and McCarthy, 1920 to 2020



Source: ADCCED 2023a

The following summarizes the population of smaller communities along the study corridor based on anecdotal accounts. This is not a complete list, because there are private landowners sprinkled throughout or just outside of the study corridor and they are a mix of seasonal and year-round residents, which makes it difficult to accurately count the population. Area residents express a growth in population.

- McCarthy Road (approximate MP 9 to 15), Strelna: This area has about a half-dozen families year round.
- MP 11, Silver Lake (is still considered Strelna): There are some seasonal houses used for winter and summer recreation.
- MP 27, Chokosna: The vicinity has approximately five families.
- MP 45 Lakina River/Long Lake: This is largely a seasonal community with possibly two families who reside here year round. An area in this vicinity was recently subdivided by a group of several dozen people, who work at McCarthy in the summers.

In Kennicott, north of the end of the study corridor, there are a handful of residents who live year-round.

8.2.2 Employment

Two estimates of employment are typically used to describe employment in an area: total civilian labor force and employment by industry. These are described as follows:

- Civilian labor force data reflect the employment status of individuals by place of residence and include self-employed, employees on unpaid leave of absence, unpaid family workers, and household workers.
- Employment by industry data reflect jobs by place of work and exclude the self-employed, unpaid family workers, employees on leave of absence, and household workers. Individuals with more than one job are counted only once in civilian labor force data, and they are counted in each job in the employment by industry data.

Table 8-2 shows the civilian labor force characteristics for the census area, the state, and the country.

No civilian labor force (composed of civilian employment and civilian unemployment) estimates were recorded for the census area in 2000 or 2010. The first U.S. Bureau of Labor Statistics-recorded estimates for the census area was in 2020, when the area's total civilian labor force was estimated at 1,293. By 2022, the census area's civilian labor force rose to 1,405, an increase of 112 (or an annual growth rate of 4.2% over the period). The civilian labor force increased between 2000 and 2010 in both the state and country; however, the rate of growth in Alaska during this decade was about 1.5 times that of the country. While the civilian labor force continued to increase over the next decade (2010 to 2020) and the 2020 to 2022 period, the rate of growth in Alaska was slower than that in the country.

Annual unemployment rate was higher in the census area compared to the state and country during the periods shown in Table 8-2, notably in 2020 and 2022, when estimates were available. However, as shown on Figure 8-3, the unemployment rate in the census area was lower than that at the state and national levels in 2021.

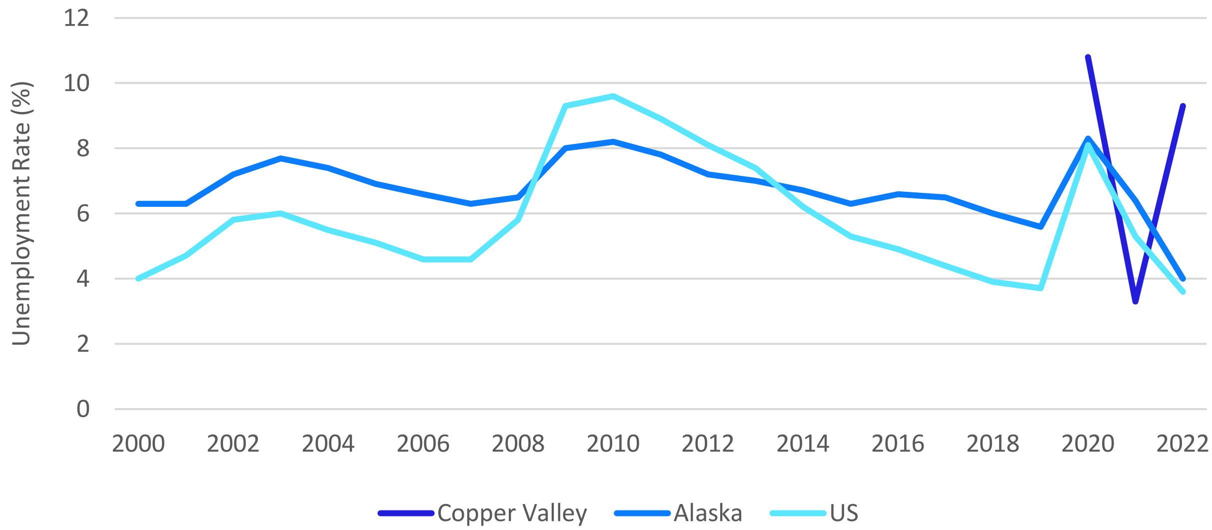
Table 8-2. Historical Labor Force Characteristics in the Copper River Census Area, State of Alaska, and U.S., 2000, 2010, 2020, and 2022

Area	2000 Civilian Labor Force	2010 Civilian Labor Force	2020 Civilian Labor Force	2022 Civilian Labor Force	2000 Unemployment Rate (%)	2010 Unemployment Rate (%)	2020 Unemployment Rate (%)	2022 Unemployment Rate (%)
Copper River Census Area	N/A	N/A	1,293	1,405	N/A	N/A	10.8%	9.3%
Alaska	319,511	361,913	347,779	546,834	6.4%	7.9%	6.1%	4%
U.S.	142,583,000	153,889,000	163,539,000	263,973,000	4%	9.6%	3.7%	3.6%

Source: BLS 2023a, 2023b.

Note: N/A = not applicable or available.

Figure 8-3. Historical Annual Unemployment Rates (%) in the Copper River Census Area, State of Alaska, and U.S., 2000 to 2022

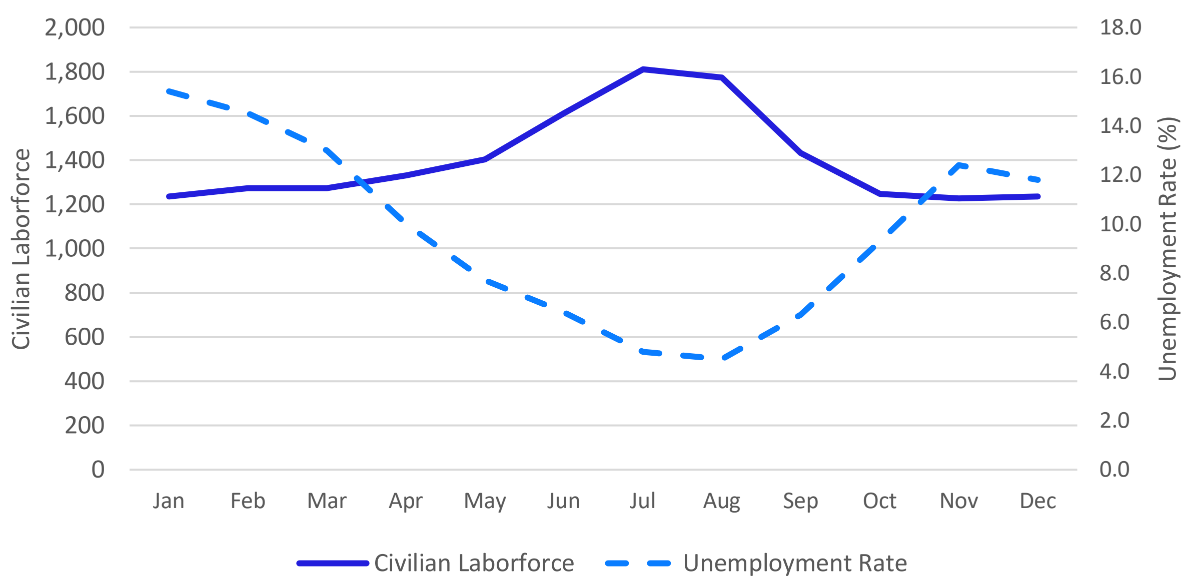


Source: BLS 2023a, 2023b.

While the annual unemployment rate shown on Figure 8-3 can give a picture of where the economy is with respect to the civilian labor force when averaged over the entire year, it does not capture the cyclical nature of labor force needs within specific industries or areas. In the case of Copper River Census Area, employment follows seasonal patterns, with higher labor force and lower unemployment rates during the summer months and the reverse during the winter months.

Figure 8-4 demonstrates the cyclical nature of employment and unemployment in the census area during 2022. In 2022, census area unemployment dipped below 5% in the summer months compared to 12% to almost 16% during winter months.

Figure 8-4. Monthly Labor Force and Unemployment Rates (%) in Copper River Census Area, 2022



Source: BLS 2023b.

Top Industry Jobs: At-a-Glance
Copper River Census Area Employment

In 2021, the following two subsectors comprised 71% of total census area's industry jobs:

- Accommodation/Food Services
- Arts/Entertainment/Recreation

Compare this to the state, in which these two subsectors comprise 9% of total industry jobs.

The BEA reports annual full and part-time employment by industry data at the state and county (borough/census area in the case of Alaska) level. Some industries did not report data for some of the years to avoid disclosure of confidential information or because the data was not available. However, this section does include employment estimates for those industries in higher-level totals. The same limitations exist with the income by industry data regarding incomes.

Table 8-3 displays the full- and part-time employment numbers by industry in the Copper River Census Area in 2020 and 2021. Because of compatibility issues between the pre-2001 data, which used the Standard Industrial Classification Code to classify industry sectors, and the post-2001 data, which uses the North American Industry Classification System (NAICS) Code, the employment industry data used for this economic assessment starts in 2001. However, because no employment by industry estimates were recorded for the census area in 2000 or 2010, Table 8-3 only shows estimates for 2020 and 2021.

The average annual employment by industry for the Copper River Census Area is concentrated in the services and government sectors. These two sectors account for 42% and about 45%, respectively, of all jobs in the census area in 2020 and 2021. Within the services sector, the accommodation and food services subsector has the highest employment accounting 56% and 65%, respectively, of all services jobs in the census area in 2020 and 2021 (BEA 2023b). In 2020, an estimated 155 jobs out of 1,439 (or about 11% of total industry employment) were in the accommodation and food services subsector. That number increased to 179 out of 1,517 in 2021, which is about 12% of the total industry employment. The next highest contributor, other services subsector, contributed 5% and 4%, respectively, of the total service sector employment, in 2020 and 20201. The arts, entertainment and recreation subsector contributed 4% of the total service sector employment in both 2020 and 2021. The accommodation and food services and the arts, entertainment and recreation subsectors are the two subsectors in the services sector most identified with recreation and tourism. Combined, these two subsectors accounted for about 76% and 71% in 2020 and 2021, respectively, of the total service sector jobs. With respect to total industry jobs, these two subsectors accounted for about 15% and about 16% of total industry employment, respectively. Based on the available data, it looks like the contribution from these two subsectors to the total industry employment has remained constant over the 2-year period for which data are available. This implies that the census area's reliance on these service sector jobs is increasing. However, without the 2000 or 2010 data for both subsectors, this cannot be determined conclusively.

The contribution of government sector employment to the census area's total employment has remained constant: it was 329 in 2020 and 330 in 2021. In 2020, employment in the federal and state governments accounted for one out of five jobs.

Table 8-3. Full- and Part-time Employment Numbers by Industry, Copper River Census Area, Alaska, 2020 and 2021

Industry Sector	2020	2021	Average Annual Growth Rates (%)
Agriculture[a]	50	51	2.0%
Mining, Quarrying, and Oil and Gas Extraction	23	22	-4.3%
Construction	(D)	77	N/A
Manufacturing	28	(D)	N/A
Wholesale Trade	(D)	(D)	N/A
Retail Trade	147	152	3.4%
Transportation, Warehousing, and Utilities[b]	58	62	6.9%
Information	27	26	-3.7%
FIRE[c]	(D)	(D)	N/A
Services[d]	**275 ^**	**346 ^**	25.8%
Accommodation and Food Services	**155 ^**	**179 ^**	15.5%
Arts, Entertainment, and Recreation	55	66	20.0%
Health Care and Social Assistance	(D)	(D)	N/A
Other Services	65	67	3.1%
Government	**329 ^**	**330 ^**	0.3%
Federal Government	83	88	6.0%
Federal Civilian	65	70	7.7%
Military	18	18	0.0%
State Government	75	70	-6.7%
Local Government	171	172	0.6%
Total Industry Employment[e]	**1,439**	**1,517**	**5.4%**

Source: BEA 2023b.

Notes:

[a] Composed of employment in forestry, fishing, and related activities only; no farming.

[b] The estimates associated with utilities are characterized by (D) in both years shown. These estimates are not included in the totals shown for this sector.

[c] FIRE is a combination of two sectors: finance and insurance; and real estate, rental, and leasing. Both are characterized by (D).

[d] Totals shown for this sector exclude estimates for several of the subsectors whose estimates were characterized by (D) in each of 2 years shown in the table.

[e] Totals for each year may not add up to the total shown. This is because some of the employments estimates within some of the sectors are marked (D).

Data are marked with (D) to avoid disclosure of confidential information. However, the estimates are included in the totals.

N/A = Not applicable because all or some underlying data are characterized as (D).

^ = denotes higher employments number compared with other industry sectors.

Table 8-4 presents the annual full- and part-time employment by industry in Alaska for 2001, 2010, and 2021. The transportation, warehousing and utilities; services; government; and construction sectors accounted for about 65%, 71%, and 73% of the total industry employment in Alaska, respectively, in each of the years shown in the table (BEA 2023b).

Compared to the Copper River Census Area, the accommodation and food services subsector accounts for about 7% of total industry jobs instead of 11 to 12%.

About six in ten government jobs within the state are in the federal and state government while the remaining four in ten jobs are in local government. Employment in the federal government grew (at an average annual rate of 1.7%) between 2001 and 2010 and declined (at an average annual rate of 0.5%) during the 2010-2021 period. Military employment accounted for most of the job growth between 2001 and 2010, while federal civilian employment accounted for most of the decline in federal government employment between 2010 and 2021. Both state and local government employment followed the same trend by growing between 2001 and 2010 and declining in the 2010 to 2021 period, with the state government experiencing a higher rate of decline.

Table 8-4. Full- and Part-time Employment Numbers by Industry, Alaska, 2001, 2010, and 2021

Industry Sector	2001	2010	2021	Average Annual Growth Rates (%) - 2001 to 2010	Average Annual Growth Rates (%) - 2010 to 2021
Agriculture[a]	775	13,135	11,802	N/A	-1.0%
Mining, Quarrying, and Oil and Gas Extraction	(D)	17,782	12,785	N/A	-3.0%
Construction	22,339	24,026	23,015	0.8%	-0.4%
Manufacturing	14,326	14,940	6,862	0.5%	-6.8%
Wholesale Trade	7,184	7,211	7,168	0.0%	-0.1%
Retail Trade	42,401	43,647	42,219	0.3%	-0.3%
Transportation, Warehousing, and Utilities	24,234	24,706	29,496	0.2%	1.6%
Information	8,144	7,418	6,107	-1.0%	-1.8%
FIRE[b]	21,470	26,673	30,825	2.4%	1.3%
Services[c]	113,262	156,182	163,210	3.6%	0.4%
Accommodation and Food Services	28,158	31,365	31,785	1.2%	0.1%
Arts, Entertainment, and Recreation	8,632	10,067	9,344	1.7%	-0.7%
Health Care and Social Assistance	33,873	46,365	53,382	3.5%	1.3%
Other Services	42,599	68,385	20,110	5.4%	-10.5%
Government	97,328	108,184	101,757	1.2%	-0.6%
Federal Government	38,386	44,590	42,316	1.7%	-0.5%
Federal Civilian	16,375	17,588	15,083	0.8%	-1.4%
Military	22,011	27,002	27,233	2.3%	0.1%
State Government	23,082	25,352	22,785	1.0%	-1.0%
Local Government	35,860	38,242	36,656	0.7%	-0.4%
Total Industry Employment[d]	**394,565**	**443,904**	**443,047**	**1.3%**	**0.0%**

Source: BEA 2023c.

Notes:

[a] Includes employment in forestry, fishing, and related activities. The estimates associated with forestry, fishing and related activities are characterized by (D) in 2001, thus the number shown excludes these numbers.

[b] FIRE is a combination of two sectors: finance and insurance; and real estate, rental, and leasing.

[c] This is the total missing estimates for the others services subsector. This subsector is marked (D) in 2001 and accounts for about 7% of totals shown for the service sector in 2010 and 2021.

[d] Totals for each year may not add up to the total shown. This is because some of the employment estimates within some of the sectors are marked (D).

Data are marked with (D) to avoid disclosure of confidential information. However, the estimates are included in the totals.

N/A = Not applicable because all or some underlying data are characterized as (D).

8.2.3 Income

Three measures of income are presented in this analysis. These three measures, which are discussed separately in the following subsections, are median household income, per capita income, and income by industry. Additionally, poverty rates are also included in this discussion.

8.2.3.1 Median Household Income

Table 8-5 shows the real median household incomes (in 2022 dollars) for the Copper River Census Area, the state, and the country. Between 2000 and 2010, real median household incomes increased in Alaska (at about 0.2%) while declining nationally. No median household income estimates were available for the census area in 2000 or 2010. Between 2010 and 2020, real median household incomes grew in both Alaska and nationally, at about 0.2% and 1%, respectively, annually over the decade. The Great Recession could partially be responsible for the lower median household income in the U.S. in 2010 (Federal Reserve Bank 2013).

For the census area and Alaska, real median household incomes declined in 2021, from their estimates in 2020, by about 0.4% and about 1.3%, respectively. Nationally, real median household incomes grew by about 1.5% between 2020 and 2021. The decline in real household incomes in the census area and the state points to the COVID-19 pandemic having a greater impact in Alaska, perhaps due to the losses in the tourism sector.

Table 8-5. Real Median Household Incomes in the Copper River Census Area Compared to State of Alaska and the U.S., 2000, 2010, 2020, and 2021 (in 2022 dollars)

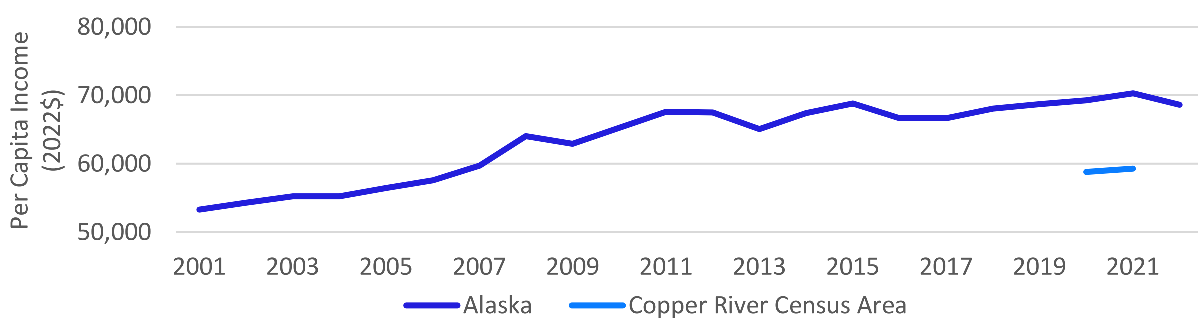
Area	2000	2010	2020	2021	Average Annual Growth Rate (%) 2000 to 2010	Average Annual Growth Rate (%) 2010 to 2020	Average Annual Growth Rate (%) 2020 to 2021
Copper River Census Area	N/A	N/A	$72,481	$72,187	N/A	N/A	-0.41%
Alaska	$83,661	$84,994	$87,085	$85,940	0.16%	0.24%	--1.32%
U.S.	$68,125	$65,870	$72,760	$73,881	-0.34%	1.00%	1.54%

Source: USCB 2000b, 2023a, 2023b, 2023c; BEA 2023a.
N/A = Not available.

8.2.3.2 Per Capita Income

Figure 8-5 shows the real per capita income (in 2022 dollars) for the Copper River Census Area and Alaska. The census area's real per capita income was only available for 2020 and 2021 ($58,798 and $59,277, respectively); during these 2 years, it was lower than the state's per capita income, which was $69,294 and $70,285, respectively.

Figure 8-5. Real Per Capita Income in the Copper River Census Area and State of Alaska, 2001 to 2022 (in 2022 dollars)



Source: BEA 2023a, 2023d, 2023e.

8.2.3.3 Poverty Rates

Table 8-6 summarizes poverty rates in 2000, 2010, 2020, and 2021 for the census area, state, and nation. Copper River Census Area had the highest poverty rates for the 2 years (2020 and 2021) for which data were available as shown in Table 8-6. The census area's poverty rate increased by an average annual rate of 12.6% between 2020 and 2021. This rate was slightly higher than the state average of 12.5% for the same period. The nation's poverty rate grew during the 2000-2010 period, declined between 2010 and 2020 before increasing by a little less than 1% in 2021.

Table 8-6. Poverty Rates, Copper River Census Area Compared to State of Alaska and the U.S., 2000, 2010, 2020, and 2021

Area	2000	2010	2020	2021	Average Annual Growth Rate (%) 2000 to 2010	Average Annual Growth Rate (%) 2010 to 2021	Average Annual Growth Rate (%) 2020 to 2021
Copper River Census Area	N/A	N/A	12.7%	14.3%	N/A	N/A	12.6%
Alaska	8.5%	11%	9.6%	10.8%	2.6%	-1.%	12.5%
U.S.	11.3%	15.3%	11.9%	12.8%	3.1%	-2.%	7.6%

Source: USCB 2023d.

N/A = Not available.

8.2.3.4 Earnings by Industry

Table 8-7 shows the real annual earnings (in 2022 dollars) by industry for the Copper River Census Area in 2020 and 2021. No annual earnings by industry were available for the census area prior to 2020. Table 8-8 presents real annual earnings by industry for Alaska in 2001, 2010, and 2021.

Real earnings by industry in the Copper River Census Area grew at 3.3% between 2020 and 2021. Earnings in the services and government sectors accounted for about half of the total real industry earnings in the census area. These two sectors are also the sectors that contribute the largest number of jobs in the census area (Table 8-3). Earnings in the government sector accounted for slightly less than a third (32% and 31%, respectively, in 2020 and 2021) of the census area's total industry earnings in each in both 2020 and 2021; within the government sector, about 30% of the earnings were from the federal government. The federal civilian sector accounts for most (about 90%) of the federal government sector earnings. Earnings in the federal civilian subsector grew at 5.3% annually between 2020 and 2021, whereas they declined by about 0.2% in the military subsector during this period.

Within the services sector in the census area, the highest contribution to real industry earnings is from the accommodation and food services subsector. Based on the available data, earnings in this subsector accounted for 52% in 2020 and 29% in 2021 of all service sector earnings (BEA 2023c). The next highest contributor is the other services subsector, based on the available data (for 2020 and 2021); this subsector contributed about 27% and 16%, respectively, of the total service sector earnings. The arts, entertainment and recreation subsector accounted for 21% and 14%, respectively, of the total service sector earnings in 2020 and 2021. The accommodation and food services subsector, and the arts, entertainment, and recreation subsector together account for 73% and 53%, of the total service sector earnings in 2020 and 2021, respectively. These two subsectors are most identified with recreation and tourism, and the observed decline in these two sectors could be because of the COVID-19 pandemic effects. Based on the available data, the contribution from these two subsectors appears to be declining.

However, without the 2000 or 2010 data for these two subsectors, this cannot be determined conclusively.

Table 8-7. Real Earnings by Industry, Copper River Census Area, Alaska (thousands in 2022 dollars)

Industry Sector	2020	2021	Average Annual Growth Rates (%)
Agriculture[a]	761	760	-0.2%
Mining, Quarrying, and Oil and Gas Extraction	81	120	48.7%
Construction	(D)	3,514	N/A
Manufacturing	3,207	(D)	N/A
Wholesale Trade	(D)	(D)	N/A
Retail Trade	8,050	8,404	4.4%
Transportation, Warehousing, and Utilities[b]	2,706	2,870	6.1%
Information	-1,894	-2,385	25.9%
FIRE[c]	(D)	(D)	N/A
Services[d]	9,172	16,053	75.0%
Accommodation and Food Services	4,740	6,330	33.6%
Arts, Entertainment, and Recreation	1,930	2,255	16.9%
Health Care and Social Assistance	(D)	(D)	N/A
Other Services	2,502	2,574	2.9%
Government	31,678	31,253	-1.3%
Federal Government	9,084	9,526	4.9%
Federal Civilian	8,360	8,804	5.3%
Military	723	721	-0.2%
State Government	9,319	8,706	-6.6%
Local Government	13,276	13,022	-1.9%
Total Industry Earnings[e]	**97,985**	**101,181**	**3.3%**

Source: BEA 2023a, 2023d.

Notes:

[a] This number includes earnings in forestry, fishing, and related activities.

[b] The estimates associated with utilities are characterized by (D) in 2020 and 2022. These estimates are not included in the totals shown for this sector.

[c] FIRE is a combination of two sectors: finance and insurance; and real estate, rental, and leasing.

[d] Totals shown for this sector exclude estimates for one or more subsector whose estimates were characterized by (D) in each of the 2 years shown in the table. In 2020, estimates for the following subsectors were not available, thus the low total for the service sector estimates shown in the table: professional, scientific, and technical services; management of companies and enterprises; administrative and support and waste management and remediation services; educational services; and health care and social services. In 2021, the low estimate for the services sector is due to the estimates for the following subsectors: professional, scientific, and technical services; management of companies and enterprises; educational services; and health care and social services being characterized by (D).

[e] Totals for each year may not add up to the total shown. This is because some of the earnings estimates within some of the sectors are marked (D).

Data are marked with (D) to avoid disclosure of confidential information. However, the estimates are included in the totals.

N/A = Not applicable because all or some underlying data are characterized as (D).

Alaska's real earnings by industry is primarily driven by the services and government sectors (refer to Table 8-8). Earnings in these two sectors accounted for about 40% of total real earnings within the state in each of the years shown in Table 9-8). These two sectors are also among the sectors contributing the largest number of jobs in the state (Table 8-4).

Earnings in the government sector accounted for about 20% of total industry earnings within the state and, within the government sector, federal government earnings accounted for about 40% in each of the 3 years shown in Table 8-8. The proportion of earnings from the civilian federal subsector declined slightly from 54% in 2001 to about 46% in 2021, while that from the military increased from about 46% in 2001 to about 54% in 2021. Average annual growth rate in military subsector earnings (6.9%) was about three times that in the federal civilian subsector (2.4%) during the 2001 to 2010 period. Both the military and federal civilian subsectors experienced negative earnings growth during the 2010 to 2021 period.

The state's real earnings from the accommodation and food services subsector was about 17% in 2001, 12% in 2010, and about 13% in 2021, respectively, of the total service sector earnings (BEA 2023c). Based on the available data, the state's combined contribution from the accommodation and food services and the arts, entertainment and recreation subsectors was 20% in 2001, 14% in 2010, and 15% in 2021, respectively, of the overall service sector earnings. In contrast, the accommodation and food services subsector, and the arts, entertainment, and recreation subsector together accounted for 53% of the total service sector earnings in the census area in 2021. Thus, based on the data for 2021 alone, the contribution of recreation and tourism (as represented by the two subsectors) to the service sector earnings is lower in the state compared to the census area.

Table 8-8. Real Earnings by Industry, Alaska (thousands in 2022 dollars)

Industry Sector	2001	2010	2021	Average Annual Growth Rates (%) 2001 to 2010	Average Annual Growth Rates (%) 2010 to 2021
Agriculture[a]	31,740	558,678	457,418	37.5%	-1.8%
Mining, Quarrying, and Oil and Gas Extraction	(D)	2,857,022	2,066,565	N/A	-2.9%
Construction	2,192,756	2,995,397	2,361,962	3.5%	-2.1%
Manufacturing	844,124	954,486	1,111,679	1.4%	1.4%
Wholesale Trade	534,110	570,502	576,733	0.7%	0.1%
Retail Trade	2,186,429	2,034,629	2,060,117	-0.8%	0.1%
Transportation, Warehousing, and Utilities	2,031,177	2,490,295	2,727,944	2.3%	0.8%
Information	649,188	508,157	569,358	-2.7%	1.0%
FIRE[b]	1,191,562	1,699,797	1,963,370	4.0%	1.3%
Services[c]	5,997,983	9,669,515	10,721,782	5.4%	0.9%
Accommodation and Food Services	1,026,427	1,189,765	1,347,915	1.7%	1.1%
Arts, Entertainment, and Recreation	143,602	203,410	247,409	3.9%	1.8%
Health Care and Social Assistance	2,208,649	3,540,096	4,692,392	5.4%	2.6%
Other Services	(D)	1,051,350	1,097,859	N/A	0.4%
Government	8,345,290	11,116,932	10,691,906	3.2%	-0.4%
Federal Government	3,254,938	4,907,324	4,640,279	4.7%	-0.5%
Federal Civilian	1,767,566	2,192,360	2,043,943	2.4%	-0.6%
Military	1,487,372	2,714,964	2,596,336	6.9%	-0.4%
State Government	2,154,787	2,700,308	2,545,918	2.5%	-0.5%
Local Government	2,935,565	3,509,301	3,505,709	2.0%	0.0%
Total Industry Earnings[d]	**38,983,266**	**57,464,286**	**58,026,592**	**4.4%**	**0.1%**

Source: BEA 2023a, 2023e.

[a] This number includes earnings in forestry, fishing, and related activities. The estimates associated with forestry, fishing, and related activities are characterized by (D) in 2001.

[b] FIRE is a combination of two sectors: finance, insurance; and real estate, rental, and leasing.

[c] Total shown for this sector in 2001 excludes estimates for one subsector whose estimates were characterized by (D). These estimates for this subsector are included in the totals shown for other services in 2010 and 2018 but are missing from the 2001 total.

[d] Totals shown for this sector in 2001 exclude estimates for the other services subsector whose estimates were characterized by (D). These estimates for this subsector are included in the totals shown for all other services in 2010 and 2021 but are missing from the 2001 total.

Data are marked with (D) to avoid disclosure of confidential information. However, the estimates are included in the totals.
N/A = Not applicable because all or some underlying data are characterized as (D).

8.2.4 Economic Activity Generators

The *Comprehensive Economic Development Strategy Copper River Region* (CVDA 2012) identified the census area's economic development opportunities as those related to the following:

1. Alternative energy production
2. Value added manufacturing from local natural resources
3. Tourism/eco-tourism
4. Entrepreneurship
5. Oil and gas exploration

While opportunities 1, 2, and 5 in the preceding list may be important in providing year-round, well-paid jobs, especially if coupled with entrepreneurship, the remoteness of the area may not be conducive to the development of these. In addition to remoteness, the strategy document also includes other factors such as the high cost of energy or energy supply, unskilled workforce or the workforce availability, and transportation as other barriers to economic growth, However, due to the presence of WRST in the area, development associated with tourism/eco-tourism may be more feasible. Later in this section, data on the mining, quarrying, and oil and gas extraction; manufacturing; and transportation, warehousing, and utilities sectors show that these three sectors are minor contributors to the census area's economy.

The following discussion focuses on the contribution of tourism to the census area's economy based on sources other than the BEA sources. The discussion also includes information on the Copper River Chitina Personal Use Salmon Dipnet fishery and subsistence hunting in the area.

8.2.4.1 Tourism

Tourism in the census area is centered around exploring WRST and surrounding scenic and recreational areas. While the data and discussion presented in Section 9.2.2, Employment, and Section 9.2.3.4, Earnings by Industry, demonstrate the aggregate contribution of the tourism industry to both the census area's and Alaska's economies, understanding the underlying data and how these data have changed over the past decade or two helps to inform the predictions on the future contribution of this sector to the census area's economy.

General Visitation Trends

The Alaska tourism industry is multi-faceted and includes a substantial number of visitors traveling to Alaska's NPS units, which includes WRST. The Alaska Visitor Statistics Program (AVSP) is a statewide visitor study periodically commissioned by the ADCCED. The study provides "essential information on one of Alaska's major economic engines: out-of-state visitors" (ADCCED 2017). The most recent study (AVSP 7) was completed in 2016 and provides information on visitor volume and results from a visitor survey. The visitor survey, which was administered to a sample of out-of-state visitors at major exit points, provides information on "trip purpose, transportation modes used, length of stay, destination, lodging, activities, expenditures, satisfaction, trip planning, and demographics" (ADCCED 2017).

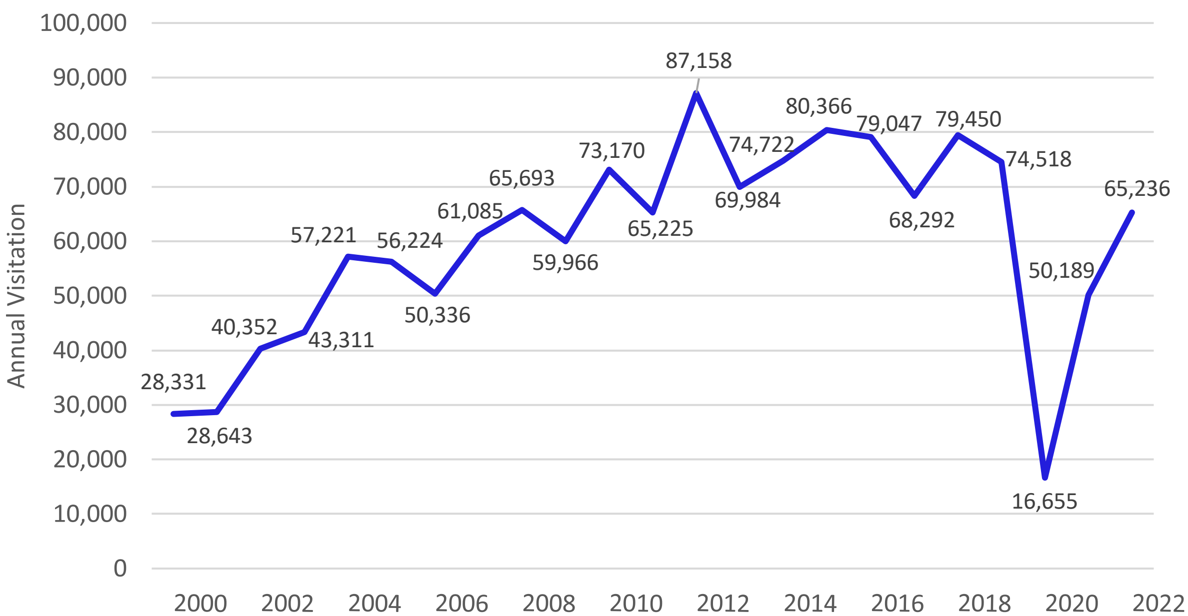
The AVSP indicated that approximately 1.85 million nonresident visitors came to Alaska during summer 2016, of which 55% arrived as part of the cruise ship industry. Based on the visitor survey, the AVSP estimates that about 1% of all day/overnight visitors to Alaska in 2016 identified WRST as their destinations during their trip, and 79% of the visitors indicated that the purpose of their trip to WRST was vacation, while 15% indicated they were visiting friends/family. The visitor survey indicated that while 77% of day or overnight visitors to WRST traveled to Alaska by air, about 22% came on cruise ships and 16% used a combination of highway and ferry in 2016. The average length of stay in Alaska for vacation or pleasure by visitors to WRST was estimated at 17.2 nights. (ADCCED 2017)

Wrangell-St. Elias National Park and Preserve Visitation

The WRST is the largest national park in the U.S. With a total acreage of 13.2 million acres, it is larger than Yellowstone National Park, Yosemite National Park, and Switzerland combined (NPS 2023a). McCarthy Road is one of two roads that enter the park; Nabesna Road is the other. WRST can be accessed by road, trail, water route, and air. Since access is varied with no mandatory registration, estimates for visitor use historically have been a challenge (NPS 2016).

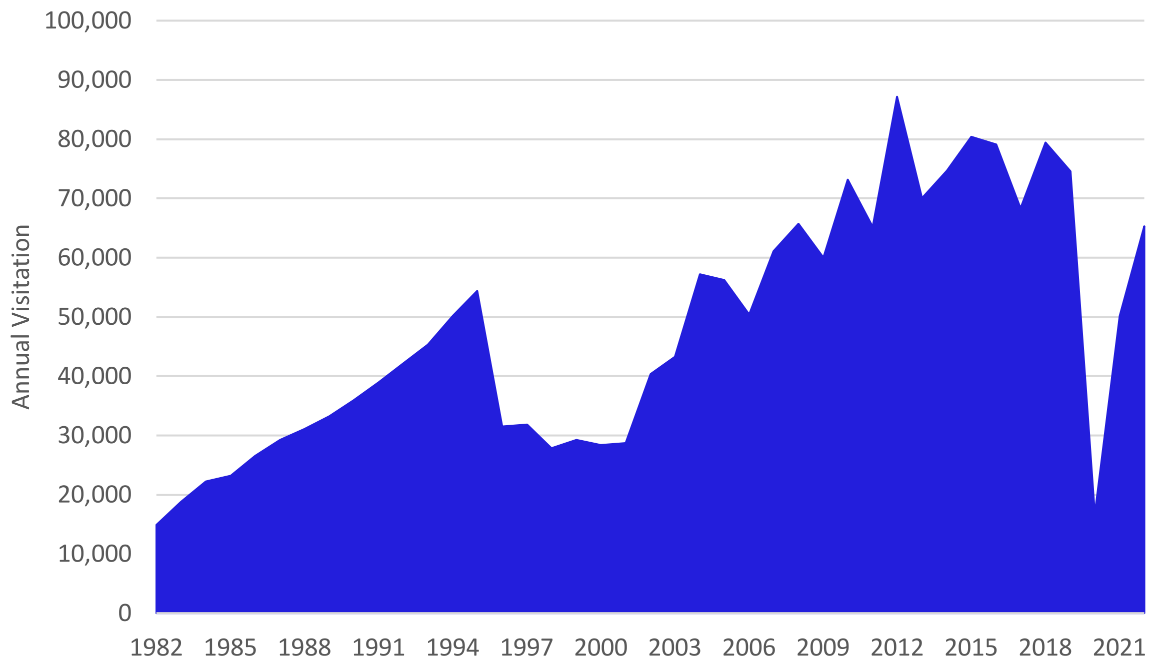
Figure 8-6 shows the trend in the annual recreation visitors to WRST over the past 22 years. Although visitation numbers declined during some of the years from what they were in the immediately preceding year, the overall trend has been upward, characterized by an average annual growth rate of 3.9% over the 22-year period. The lowest number of visitors (16,655) was in 2020, while the highest (87,158) was in 2012. The lowest number of visitors before 2020 (pre-pandemic) was 28,331 in 2000. The decline in visitation in 2009 is most likely related to the effects of the Great Recession on nonresident visitors (either from other parts of the U.S. or the world) to the park (ADCCED 2017, ADOLWD 2010). The decline in 2020 is related to the effects of the COVID-19 pandemic. Historic visitation to WRST extending back even earlier to 1982 is depicted on Figure 8-7.

Figure 8-6. Wrangell-St. Elias National Park and Preserve Annual Recreation Visitors, 2000 to 2022



Source: NPS 2023b.

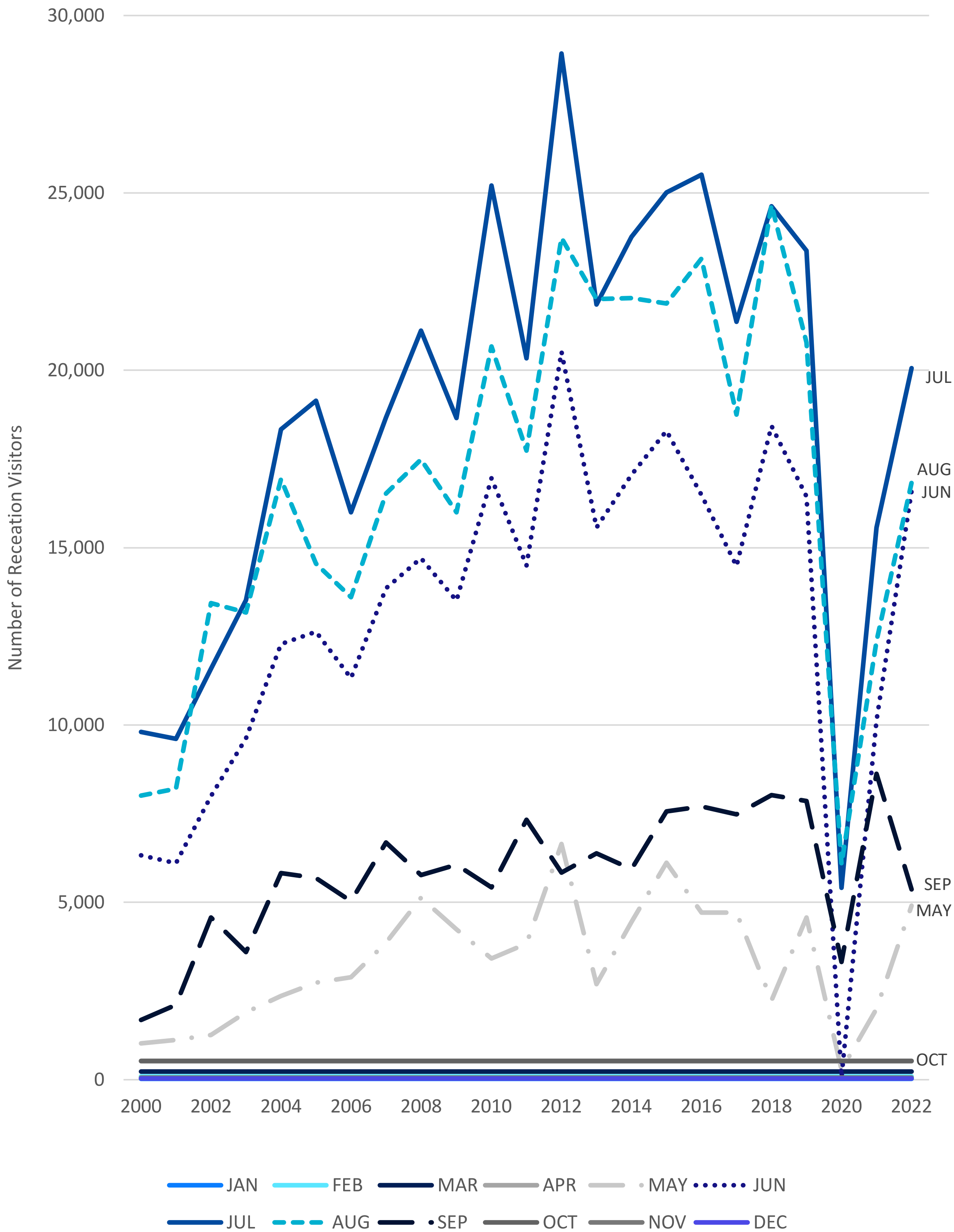
Figure 8-7. Wrangell-St. Elias National Park and Preserve Historic Annual Visitation, 1982 to 2022



Source: NPS 2023b.

Figure 8-8 shows the trend in monthly recreation visitors to the WRST over the past 22 years. In general, visitation has been trending upwards for most months for each of the past 22 years. The highest visitation is during the summer months of June, July, and August. The next busiest months are September followed by October then May. Visitation is typically lower during the late fall through early spring.

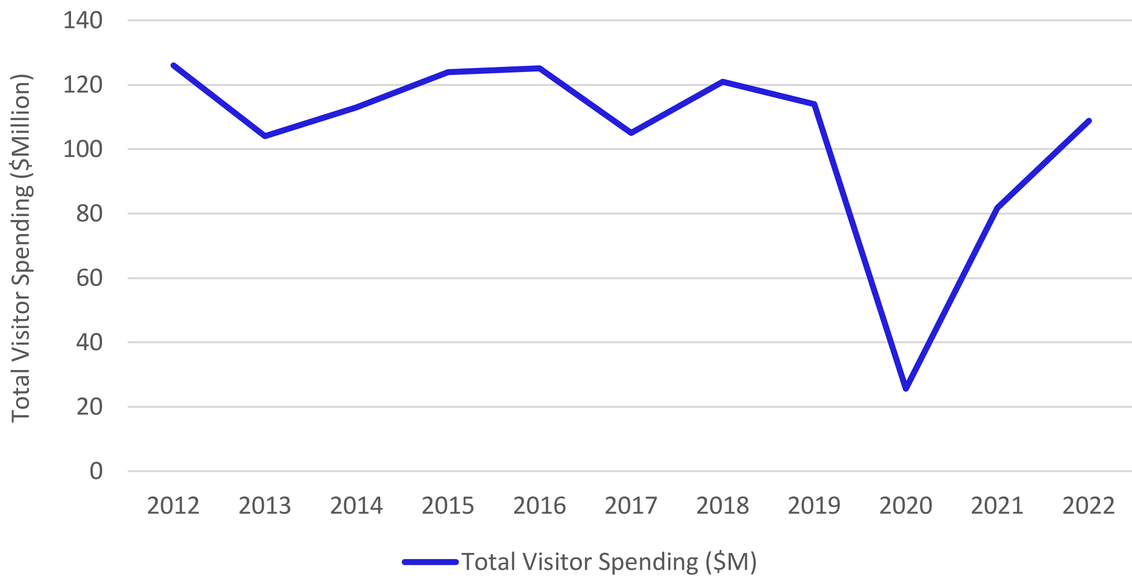
Figure 8-8. Monthly Recreation Visitors to Wrangell-St. Elias National Park and Preserve, 2000 to 2022



Source: NPS 2023c.

Figure 8-9 shows total visitor spending in WRST between 2012 and 2022. For the years shown, visitor spending corresponds to the number of visitors to the park. Between 2013 and 2016, total annual visitor spending grew by 6%. It declined by more about $20 million between 2016 and 2017 before bouncing back in 2018 to $121 million. It dipped again in 2018 and declined by about 77% between 2019 and 2020. Visitor spending has been increasing since 2021; however, it has not yet returned to the highs from 2015 and 2016.

Figure 8-9. Total Annual Visitor Spending by Year Wrangell-St. Elias National Park and Preserve, 2012 to 2022



Source: NPS 2023d.

Some of the activities in the park allow for a 2-year Commercial Use Authorization (CUA) permit while others allow for a 1-year CUA permit. The current (2023) cost of a 1-year CUA permit is $350, of which $100 goes directly to WRST while the remaining $250 goes to the Alaska Region Office to manage the CUA program. If an operator does not operate in the park, WRST refunds the $100. The total fees taken in by WRST from CUA permits depends on the year, how many of these CUAs are 1-year or 2-year permits, and whether the operator uses the permit. In 2022, the NPS issued 26 CUA permits and took in $3,230 in CUA permit fees (Crow, pers. comm., 2023). The 2023 estimate is expected to be more than $6,100 in CUA permit fees, the estimate as November 2023 (Crow, pers. comm. 2023).

WRST had one concession contract specific to McCarthy that served 6,493 and 6,785 clients in 2022 and 2023, respectively. Total franchise fees paid to the park in 2022 was about $4,636 (Crow, pers. comm. 2023). WRST also has concession contracts for sport hunting guides, and the closest one operating to the McCarthy/Kennicott area is at Lakina. Total concession contract fees in 2022 was $63,693, and the 2023 estimate is expected to be more than $44,810, the estimate as of November 2023 (Crow, pers. comm. 2023).

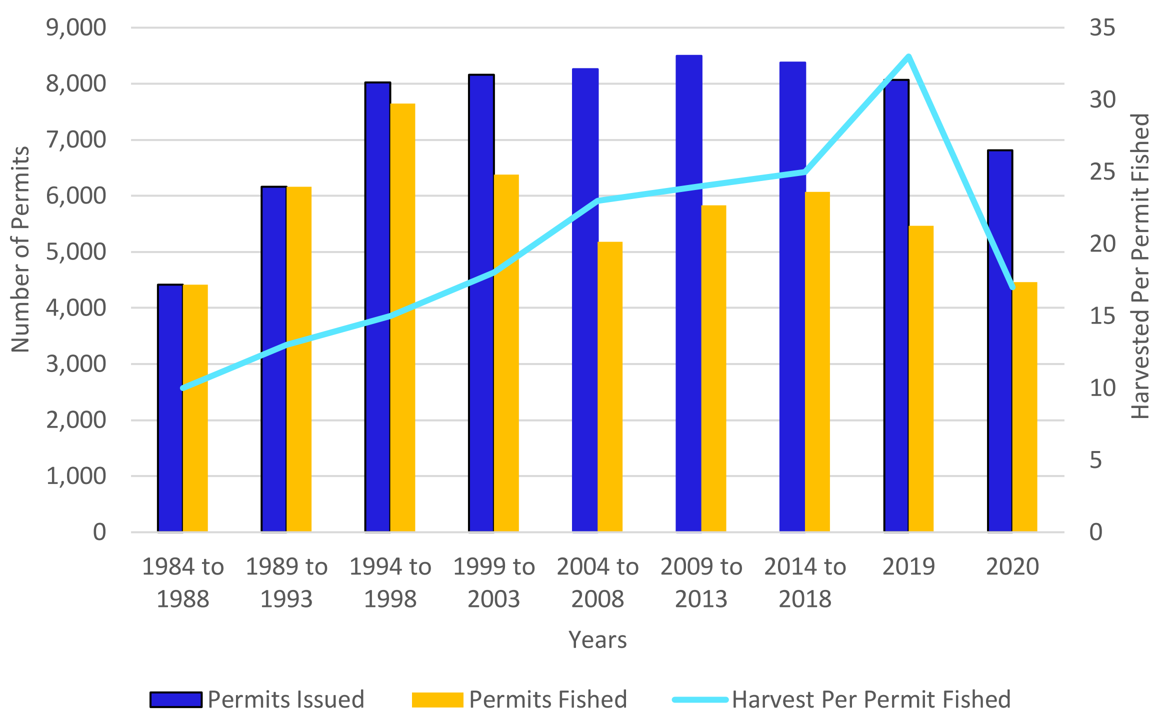
8.2.4.2 Other Economic Activity Generators in the Copper River Census Area

Fisheries, Subsistence, Hunting and Trapping

Other economic activity generators in the Copper River Census Area include fishing (sport, recreation, or subsistence) and hunting. The Copper River is world renowned for its sockeye and king salmon. Within the PEL study corridor, the Chitina dipnet personal use fishery is a popular fishery exclusive for Alaska state residents. The Chitina Subdistrict Personal Use Salmon Fishery is within the western end of the PEL study corridor; as of 2023, the fishery is restricted solely to the waters of the mainstem of the Copper River beginning from the downstream edge of the Copper River bridge (around MP 1.5 of the McCarthy Road) and continues downstream to ADF&G regulatory markers in Wood Canyon (ADF&G 2023a). Personal use fishery is restricted to state residents and the state requires personal dipnetters to have current sport fishing license and a Chitina Subdistrict Personal Use Fishing Permit. Per the Copper River Personal Use Dip Net Salmon Fishery Management Act (*Alaska Administrative Code* Title 5 Section 77.591), salmon fishing is allowed from June 7 through September 30. The schedule is typically adjusted during the season pending information on the returning salmon and salmon escapement goal for the season (ADF&G 2023a).

Over several decades, the ADF&G has issued between 4,982 and 12,365 permits annually for the Chitina Subdistrict Personal Use Salmon Fishery (ADF&G 2023b). The ADF&G reports that about 65% of the permits are actually used each year. These numbers represent a sizable infusion of summer visitors into the small community of Chitina and the region. Figure 8-10 summarizes the number of permits issued, the number of permits fished, and the harvest per permit fished for the years 1984 to 2020. The data underlying the figure is available in clusters of 4 years except for the last 2 years (i.e., 2019 and 2020).

Figure 8-10. Chitina Subdistrict Personal Use Fishery Permits Issued, Permits Fished and Harvest per Permit Fished, 1984 to 2020



Source: ADFG 2023b.

In recent years, ADF&G shifted from no fee to instituting a $15 fee for the Chitina Subdistrict Personal Use Fishing Permit. The fee is used to support road and trail maintenance and help provide sanitation services.

In addition to fishing on the Copper River, there is sport hunting, trapping and fishing at WRST. In the case of sport hunting, guides are required for nonresident hunters of brown/grizzly bear, sheep, or goat. Guides are also required for non-U.S. resident hunters of brown/grizzly bear, black bear, bison, caribou, deer, elk, goat, moose, muskox, sheep, wolf, or wolverine. Hunting guides in WRST are managed through concessions contract that provide sport hunting services in each of the 15 guide areas in the preserve (NPS 2023).

Under state regulations, trapping is allowed only on the preserve, and trappers are required to have a state trapping license. Sport fishing is also allowed on WRST under state regulations in both the park and the preserve. WRST waters include three different sport fish regions: the Southcentral Region, the Interior Region, and the Southeastern Region. A sport fishing license is required for all resident anglers 18 years and older and all nonresident anglers 16 years or older (NPS 2023).

Subsistence fishing and hunting is also allowed in the park and preserve to local rural residents, per federal subsistence regulations (NPS 2023).

Finally, unlike the tourists, hunters, and anglers who visit the census area during certain months of the year, Alaska residents travel to the Copper River Census Area for recreation purposes year round, thus contributing to the economy of the census area.

8.2.5 Local Tax Revenues

Because the Copper River Census Area does not have a governing body, there is no taxing authority. (Whereas other boroughs in the state such as the Denali Borough generate revenue through accommodation taxes such as a bed tax.) As such, the census area does not assess sales tax on goods and services purchased within the census area.

8.3 Future Economic Generators

Future economic generators disclosed in this section are those identified through either explicitly stated economic development goals from planning documents or those identified through other documents or studies.

8.3.1 Future Economic Generators from Economic Development Goals

This section documents the economic activity generators in the Copper River Census Area that have been identified through a review of existing planning documents and policies at both the local and state levels.

8.3.1.1 Copper River Census Area

The ARDORs Program encourages all regional development organizations to prepare and implement regional development strategies with customized work plans that contain goals, objectives, and strategies (ADCCED 2023b). The CVDA is the ARDOR that serves the Copper River Valley and thus the Copper River Census Area. The CVDA functions as a public and private partnership to address natural resource and economic development opportunities. As of late 2023, the CVDA is currently working on developing its CEDS that will be a locally based and regionally driven planning process to guide the economic prosperity and resiliency of the Copper Valley (CVDA 2023).

The following are the goals identified in the CEDS:

- Promote sustainable economic development
- Create job opportunities
- Foster effective transportation systems
- Enhance and protect the environment
- Balance resource use through sound management of development

The CVDA is currently seeking funding to do a new CEDS, which will include the following additional goals and objectives (ADCCED 2023c):

- Stabilization from COVID-19's devastating effects on businesses and local economy through the Coronavirus Aid, Relief, and Economic Security (CARES) Act and other federal and state programs.
- Work with the Chamber of Commerce, state agencies, and federal agencies to rebuild and reinvent existing businesses as well as develop new businesses.
- Support projects and initiatives for workforce development and job creation, including Fire Fuel Mitigation, Alaska Vocational Technical Center hub, and Alaska Small Business Development Center.
- Support the Road Belt Inter-Tie infrastructure project, which will assist in regional economic and natural resource development through the advent of cheaper and more abundant electricity.
- Support regional transportation infrastructure, including Federal Aviation Administration upgrades to Gulkana Airport and the development of the Alaska to Alberta railroad project.

Although the goals for the area are still being fleshed out and it may be another year or more before they are adopted and implemented, the region is looking to diversify its economic base by recommending improved transportation for its residents and as well as visitors to WRST.

8.3.1.2 Wrangell-St. Elias National Park and Preserve

The *Wrangell-St. Elias National Park and Preserve Resource Stewardship and Science Report* (NPS 2021) lays out the NPS's plan to support research on Copper River sockeye salmon and identifies the following three ongoing research projects focusing on different aspects of the Copper River sockeye salmon recovery efforts.

- applying genetic analysis to Copper River salmon stock to inform in-season decisions
- examining health metrics of Copper River stocks to inform management decisions
- describing and modeling factors affecting migratory success of the Copper River sockeye salmon

The report also discusses the NPS and its plan for the implementation of cleanup activities at the Nabesna Mine Site and the Kennecott Mines and Mill Town site. WRST staff and collaborators from NPS Alaska Region, NPS Inventory and Monitoring Program, NPS Climate Change Response Program, and USGS are involved in the development of a Resource Stewardship Strategy for WRST (NPS 2021). Whether economics will be addressed in the resource stewardship strategy is unknown at this time.

The *2022 National Park Visitor Spending Effects* (NPS 2023g) study estimates that the 65,236 visitors to the park in 2022 spent a total of $107.7 million and supported a total of 1,510 jobs. The total jobs include both those directly employed in the tourism sector and the secondary jobs created in the area because of the multiplier effect. The study does not state if the total jobs include both part-time and full-time workers.

At-a-Glance: WRST Economic Value

For 2022, estimates indicate more than 65,000 visitors to WRST spent more than $107 million and supported nearly 1,500 jobs.

8.3.1.3 State of Alaska

The State of Alaska's 2022 to 2027 CEDS calls for the improvement of transportation, energy, and technological foundations of the state (ADCCED 2023d). The specific objectives of this strategy that are relevant to the corridor are improving broadband access, improving rural resilience by increasing economic opportunity and self-sufficiency in rural Alaska while preserving balance with subsistence lifestyle, and improving transportation infrastructure. Improving broadband access will improve internet connectivity for both residents and visitors to the Copper River Census Area, while improving transportation infrastructure including intermodal hubs will lead to improved transportation for residents and visitors as well as provide access to markets for any potential new industry or businesses located in the census area.

8.3.2 Other Future Economic Generators

The CVDA is looking to partner with Greater Copper Valley Chamber of Commerce and state and federal agencies to develop new businesses that would generate jobs. Some of these new businesses could be businesses that cater to the tourists that visit the area and could include guides as well as those working in the hospitality area. Additional jobs could come from investment in the development of clean energy.

8.3.2.1 Visitor Spending

The AVSP study estimated that travelers spent—on average per person—a total of $2,177 (in 2016 dollars) in Alaska during their visit to WRST (ADCCED 2017). This estimate does not include the transportation costs to and from Alaska. Of the $2,177 (or $2,614 in 2022 dollars) spent in Alaska, about $280 (or $336 in 2022 dollars) were spent in the local area. Assuming the following, the total visitor spending in the Copper River Census Area would be between $38.1 million and $380.7 million in 2022 dollars:

- Visitation levels range from a low of 28,331 (the 2000 levels) and a high of 87,158 (the 2012 levels)
- Each of these visitors spend a minimum of 4 and a maximum of 13 nights (or about 25% and 70%) of the 17.2 nights identified for vacation or pleasure visitors in the AVSP study (ADCCED 2017)

The $107.7 million estimate from the 2022 NPS study (NPS 2023g) is within this range. The lower estimate uses the lower visitation level and the lower minimum overnight stay length, while the higher estimate is based on the higher visitation levels and the higher length of overnight stay. Actual estimates are likely to be somewhere in between these two estimates. However, visitation levels have been growing at an annual rate of 3.9% over the past 20 years (Section 9.2.4.1, Visitation) so it is likely that the upper estimate could be exceeded in the future. Additionally, the estimates could be higher if the census area increases its fall, winter, and spring travel.

8.3.2.2 Other Economic Generators

The Copper River Census Area could benefit from increased federal spending on infrastructure. The Infrastructure Investment and Jobs act (also known as the Bipartisan Infrastructure Law [BIL]) has set aside funds to expand broadband availability in rural areas (USDA 2023). Improved broadband access could spur investment in remote technical work that could bring jobs to the area. The BIL and the earlier Inflation Reduction Act also provide investment in the energy sector with specific emphasis on the development of clean energy and creating clean energy jobs (USDOE 2023). Additionally, the BIL provides increased funding to the NPS under the Federal Lands Transportation Program. Under the BIL, funding for this program is expected to increase by 22% to more than $1.73 billion over 5 years (NPS

2023h). Some of the additional funds are likely to be used to fund improvements and continued maintenance in WRST. Changes in state funding for schools and roads could also potentially contribute to future economic growth in the region.

8.3.3 Impact of COVID-19

The projected future increase in visitation and the associated increase in visitation spending does not consider unforeseen circumstances, such as the recent COVID-19 pandemic, and their impact on visitation to Alaska in general and to WRST in particular. At the time of this analysis, most of the U.S. as well as the rest of the world is recovering from the almost 2 years of lockdowns necessitated by the COVID-19 pandemic. These lockdowns had a detrimental effect on local, state, national, and international economies. Additionally, starting in mid-2021, the U.S. and the rest of the world started experiencing inflationary pressures that have made goods and services more expensive than they were before the pandemic. Generally, households respond to inflationary pressures by reducing their discretionary expenditures on services such as leisure and travel. This would be expected to have a negative impact on visitation to WRST and Alaska in general and although visitation to WRST appears to have bounced back in 2022 (with 65,236 in total visitors) from the low number in 2020 (with 16,665 in total visitors), it has yet to get back to the level seen in 2012. Part of this could be due to the continued effects of the inflationary pressures. However, in the long run and after the economy fully recovers, visitation levels would be expected to return to pre-COVID-19 levels or higher especially if access to WRST is improved.

The COVID-19 pandemic's detrimental impact on local, state, and national economies resulted in reductions in government tax revenues in Fiscal Years 2020 through 2021 with the attendant postponement or scaling down of planned government-supported projects. The pandemic's effect as well as the subsequent inflation is expected to result in postponement of any private development as well. Especially considering the continued escalation in the interest rate pursued by the Federal Reserve Bank over the past 1.5 years.[4] However, with the passage of the BIL as well as the earlier Inflation Reduction Act, funding is now available for infrastructure programs (e.g., the proposed fiber optic cable installation project along the McCarthy Road corridor). In addition to providing funding for infrastructure, these two pieces of legislation are also providing funding for investment in the energy sector with specific emphasis on the development of clean energy and creating clean energy jobs. The development of clean sustainable energy sources is one of the State of Alaska's 2022 to 2027 CEDS. The creation of jobs would also meet the one the goals of the CVDA.

8.4 Summary

The analysis of the existing economic generators and the identification of future economic generators relies heavily on secondary sources of data including government databases as well as studies that include WRST. The existing economy of the Copper River Census Area is tied to the tourism industry, though there are other contributors to the economy such as the state and federal government.

The fact that tourism contributes so much to the census area's economy is a function of the uniqueness of WRST. The *2022 National Park Visitor Spending Effects* (NPS 2023g) study estimates that the 65,236 visitors to the park in 2022 spent a total of $107.7 million and supported a total of 1,510 jobs. The employment estimate includes both the direct employment in the tourism sector as well as the secondary employment in other sectors. The 2022 NPS study relies on survey data across all of Alaska

[4] The Federal Reserve Bank has raised interest rates 12 times since March 2022 with the most recent hike in September 2023 (Forbes 2023).

and bases the WRST-specific economic contribution on visitors' responses to survey questions at four exit points. Additionally, the Visitor Spending Effects model in the 2022 NPS study used to develop the estimates identified with WRST are based on visitor spending at Katmai National Park and Preserve and Southeast Alaska, thus not capturing the uniqueness associated with WRST. A potential improvement on this study would be one that targeted all visitors (from within Alaska and outside the state) to WRST and gathered trip expenditure data specific to WRST. This trip expenditure data would capture the expenditures associated with all the recreation activities within the WRST as well as outside the WRST but within the census area. The WRST direct visitor expenditures and the direct visitor expenditures outside the WRST but within the census area could then be run through a regional economic impact model such as the IMPLAN model (IMPLAN Group LLC) to estimate the secondary (indirect and induced) employment and income that would be generated within the census area as a result of the direct expenditures associated with the tourism sector. Assuming direct estimates are available for the other sectors (e.g., fishery, hunting, resource development, state, and federal spending), the same model could be used to estimate the secondary employment and incomes that would be generated within the census area. The direct and secondary estimates combine to represent the total economic contribution of each of these sectors. Running an economic impact model was the beyond the scope of this effort. However, existing documentation was reviewed, and the retrieved data demonstrates the economic contribution of WRST (and to a lesser degree other economic generators) to the corridor and region.

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9. Environmental Setting

This section includes a basic description of the environmental setting and resources within the study corridor that may be affected and could inform the decision-making process. The intent of this environmental resources scan is to identify potential constraints and opportunities to inform the development of improvement options. A mapbook in Appendix D (Figures A through G) depicts many of the environmental resources mentioned in this section.

For purposes of determining environmental features within the study corridor, unless otherwise noted in this section, a 500-foot buffer on both sides of the centerline was used to determine resources near the roadway. Due to the length of the study corridor (approximately 64 miles), many environmental resource categories in the corridor were broken down into 10-mile increments for this scan. As for the boundary of analysis, the PEL study corridor begins just east of Chitina, where the road enters the rock cut, and extends to the Kennicott River crossing and beyond to just south of the Kennicott subdivision.

Throughout the course of the PEL study, the area of the study corridor may be expanded or reduced based on public and stakeholder input as well as potential identified improvements that may extend beyond the 500-foot buffer used in this analysis (e.g., a road realignment).

9.1 Land Ownership and Management

Land ownership in the region and along the study corridor is complex, consisting somewhat of a checkerboard pattern, as shown on Figure 9-1. Table 9-1 summarizes land ownership adjacent to the McCarthy Road by number of miles and percentage. About two-thirds of the land adjacent to the McCarthy Road is under federal or state ownership, with the NPS having the greatest proportion.

Table 9-1. Land Ownership (by Percentage and Number of Miles) Adjacent to the Study Corridor Roadway

Landowner	Land Ownership Adjacent to the McCarthy Road (percentage)	Land Ownership Adjacent to the McCarthy Road (number of miles)
Alaska Native Allotment	3.8%	2.37
Alaska Native Lands Patented or Interim Conveyed	17.2%	10.85
National Park Service	44.0% ^	27.84
Private	13.6%	8.59
State	21.2%	13.32
Undetermined (waterway classification)	0.4%	0.28

Note: Percentage is based on an area that includes a buffer of 500 feet from the road centerline.
^ = denotes greatest percentage compared to other landowners.

Table 9-2 shows the number of parcels adjacent to the road by landowner type. Eight parcels consisting of Native Allotments occur on the western end of the study corridor (in the segments between MP 0 and MP 40). Ahtna, Inc., an Alaska Native Regional Corporation, is one of the largest landowners in the study corridor.

Table 9-2 shows private landowners are consistently found throughout the study corridor, comprising both seasonal and permanent residents.

Table 9-2. Land Ownership (by Number of Parcels and Segment) Adjacent to the Study Corridor Roadway

Road Segment	Alaska Native Allotment (number of parcels)	Alaska Native Lands Patented or Interim Conveyed (number of parcels)	National Park Service (number of parcels)	State (number of parcels)	Private (number of parcels)	Undetermined (waterway) (number of parcels)
MP 0 to 10	2	4	0	0	2	2
MP 10 to 20	1	2	3	5	2	1
MP 20 to 30	1	0	3	0	1	0
MP 30 to 40	4	0	2	0	2	5
MP 40 to 50	0	0	1	3	2	2
MP 50 to 59	0	0	1	3	2	1
East of Kennicott River to Study End	0	0	1	2	3	3

Source: BLM 2023.

Note: Number of parcels by land ownership is based on an area extending 500 feet from the road centerline.

Table 9-3 shows the number of acres by landowner type located adjacent to the road. NPS-managed lands adjacent to the roadway are largely concentrated in the middle of the study corridor between MP 20 and MP 40. Aside from a number of other landownership types sprinkled throughout the segment from MP 16 to MP 44, NPS manages a substantial portion of this land. State-managed lands adjacent to the roadway are largely concentrated on the east end between MP 40 and MP 59, as well as a large pocket on the west end between MP 10 and MP 20.

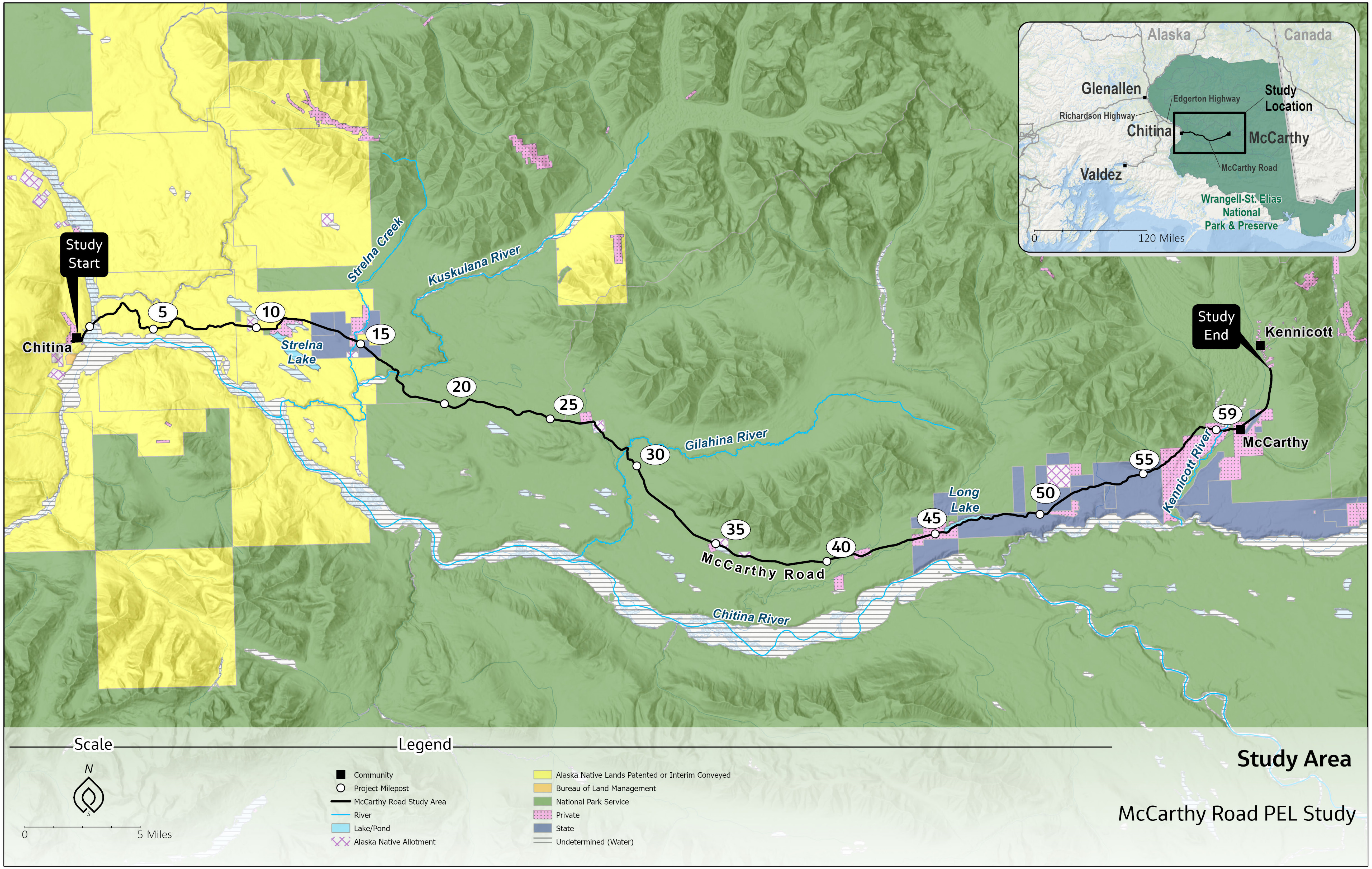
Table 9-3. Land Ownership (by Acreage and Segment) Adjacent to the Study Corridor Roadway

Road Segment	Alaska Native Allotment (acres)	Alaska Native Lands Patented or Interim Conveyed (acres)	National Park Service (acres)	State (acres)	Private (acres)	Undetermined (waterway) (acres)
MP 0 to 10	51.2	**1085.2 ^**	0	0	15.7	61.1
MP 10 to 20	8.1	222.0	**504.1 ^**	362.8	110.2	4.0
MP 20 to 30	69.0	0	**1093.5 ^**	0	46.4	0
MP 30 to 40	110.5	0	**1069.7 ^**	0	5.9	30.7
MP 40 to 50	0	0	404.3	377.7	311.9	106.4
MP 50 to 59	0	0	99.0	**709.6 ^**	317.2	3.0
East of Kennicott River to Study End	0	0	266.4	63.1	151.4	6.4

Source: BLM 2023.

Note: Acreage is based on an area extending 500 feet from the road centerline.
^ = denotes considerably higher amount in this segment compared with other landowners.

Figure 9-1. Land Ownership in Study Corridor



Three 17(b) easements[5] are located on the west end of the study corridor. This includes two near the Copper River Campground near approximate MP 1.5 (Easement IDs VALC2_33aE and VALC2_14aD1) and one near approximate MP 14.5, west of the Strelna Landing Strip (Easement IDVALC1_1gC3C5D1L).

The NPS is the federal agency overseeing management of WRST. The NPS's applicable management plan for WRST is the General Management Plan (NPS 1986). Nearly 75% of WRST is designated and managed as a wilderness area (NPS 2022). The closest the road gets to the wilderness boundary is between approximate MP 25.5 (east of Chokosna Lake) and MP 29 (near the Gilahina River crossing); the wilderness boundary that runs close to the study corridor is on the northern side of the road corridor (NPS 2013). The proximity to wilderness is ironically one of the appreciated values of the roadway.

The state's applicable land use plan for which the study corridor falls within is the Copper River Basin Area Plan, which is currently being updated by DNR as of late 2023. Refer to Section 6.4.3, which describes the DNR plan revision and its management focus of the area, which includes development, recreation, habitat values, and maintaining a balance between settlement and preservation of habitat, recreation, and other values.

Table 9-4 lists the Revised Statute (RS) 2477 ROWs that occur in the study corridor. [6] RS 2477s are managed by DNR.

Table 9-4. RS 2477s in the Study Corridor

Road Segment	Number of RS 2477s	RS 2477 Route Name (ID) and Approximate Location near Road
MP 0 to 10	2	Bellum's (Billum's) Crossing (RST 1794), between MP 1 and 2 Chitina-Elliot Trail (RST 1416), between MP 2 and 3
MP 10 to 20	3	Chitina River-Strelna Trail (RST 1805), between MP 10 and 12 Nikolai Mine Trail (372), between MP 14 and 15 Strelna-Kuskulana Trail (RST 194), between MP 14 and 15
MP 20 to 30	0	None
MP 30 to 40	0	None
MP 40 to 50	0	None
MP 50 to 59	1	Nikolai Mine Trail (372), along the road corridor between MP 54 and east of the Kennicott River crossing before the turnoff to McCarthy
East of Kennicott River to Study End	1	Nikolai Mine Trail (372), refer to description in previous road segment

Source: BLM 2023 and DNR 2023b.

Note: Number of RS 2477s is based on an area that includes a buffer of 500 feet from the road centerline.

[5] When the federal government conveyed lands to Native Corporations, they reserved specific easements to ensure access to public lands and waters. Section 17(b) of the Alaska Native Claims Settlement Act authorizes the Secretary of the Interior to reserve public easements on lands conveyed to Native Corporations to guarantee access to public lands or waters. These easements are linear easements across Native lands.

[6] RS 2477 is found in Section 8 of the Mining Law of 1866, which grants states and territories ROWs over federal lands that had no existing reservations or private entries. Congress repealed the law in 1976 in the Federal Land Policy and Management Act, retaining the pre-existing rights though no new ROWs could be established. RS 2477s was included originally in the mining law because it was used initially by miners and homesteaders on federal land. With RS 2477s, the federal government retains ownership of the land but the State of Alaska is granted a ROW for a public highway. Alaska Statute 19.45.001(9) defines a highway several ways, which includes road, street, trail, walk, bridge, tunnel, drainage structure or other similar or related structure or facility. DNR has documented hundreds of historic routes that qualify as RS 2477 ROWs. (DNR 2021)

If proposed improvements require federal public lands to be withdrawn, reserved, leased, or otherwise used, Section 810 of ANILCA details specific procedures required to evaluate the effect such use, occupancy, or disposition will have on subsistence uses and needs, and the availability of other alternatives which would reduce or eliminate the effects on subsistence uses or needs.

9.2 Recreational Resources

An abundance and variety of recreational opportunities exist in and from the study corridor, such as backpacking, day hiking, mountaineering, dog sledding, floating and boating, sport hunting and fishing, motorized recreation such as snowmachining, and sightseeing. Recreation resources include both developed and dispersed areas. Developed recreation resources are actively managed for recreational purposes and have a specific location, such as a trail or trailhead; whereas dispersed recreation is generally occurring throughout a larger area and not confined to a specific place. Recreational activities occur year-round.

The importance of recreational resources in the study corridor is evidenced in the state and federal land management planning documents mentioned previously. One of NPS's specific purposes of WRST is to ensure continued access for a wide range of wilderness-based recreational opportunities. One of DNR's management intents for its lands, among other purposes, is to provide opportunities for recreation.

Aside from campgrounds, trails and wayside facilities as described in this section, there are numerous informal small pullouts found along the study corridor that provide scenic viewpoints for travelers and dispersed recreation access points (depending upon land ownership).

9.2.1 WRST

WRST is the largest recreational resource in the study corridor; it was established in 1980, as a result of ANILCA. At 13.2 million acres, WRST is the largest national park in the U.S. The McCarthy Road is the more heavily used of the two roadways that provide access into WRST. The other is the Nabesna Road, which enters into WRST farther north from MP 60 of the Tok Cutoff Highway, northeast of Glenallen. WRST recreation visitor counts are further described in Section 9.2.4.1. There are few visitor facilities within WRST, no single park entrance, and many visitors will never come into contact with NPS staff or facilities.

9.2.2 Campgrounds

There are a handful of private campgrounds found toward the beginning or end of the McCarthy Road. The Copper River Campground is located east of the Copper River bridge crossing near MP 1.6. A number of upgrades were completed to this campground in 2023, which was funded through WFL's FLAP. Improvements included upgrades to individual campsites for Americans with Disabilities Act requirements, restroom repairs, access road resurfacing, and providing a turnaround area for boat trailers accessing the Copper River. Maintenance of the campground is partially paid for by the $15 fee associated with the greater area Chitina personal use dipnet permit. Privately managed RV and tent camping is also available near the end of the McCarthy Road, prior to the crossing of the Kennicott River.

9.2.3 Waysides and Information Station

Located just west and outside of the study corridor is the Chitina Wayside, as shown in Figure 9-2. It is a paved pull-out with picnic tables, vault toilets, and interpretive panels. It is the most developed facility near the western end of the study corridor, in the absence of a formal WRST park entrance facility.

Figure 9-2. Chitina Wayside

Other waysides along the study corridor include the following:

- Kuskulana Bridge Wayside (near MP 17.3) is owned and managed by the NPS. This rest area is a gravel pull-out with vault toilets, picnic table, and interpretive panels.
- Gilahina Trestle Wayside (near MP 29) is owned and managed by the NPS. This rest area is a gravel pull-out with vault toilets. There is a short 0.5-mile hiking trail from the rest area. The remnant Gilahina Trestle is located on the other side of the road.
- State Wayside (near MP 55.2) is located on state land and managed by the NPS. This rest area is a gravel pull-out with vault toilets, a picnic table, and interpretive panels.
- East of the second crossing of the Kennicott River (dry bed) are vault toilet facilities that are maintained by MAC. These are located on federal land in the DOT&PF easement.

The NPS maintains the McCarthy Road Visitor Center information station at MP 59 during the summer where visitors can obtain maps and use vault toilets.

9.2.4 Trails and Trailheads

Trails and trailheads comprise some of the more formalized recreation facilities in the study corridor, as included in the following list:

- Bellum's (Billum's) Crossing (RST 1794) (near approximate MP 1.6) is an RS 2477 trail that intersects the road and goes through the Copper River Campground.
- Chitina-Elliot Trail (RST 1416) (near approximate MP 2.7) is an RS 2477 trail that comes close to the road.
- Chitina River-Strelna Trail (RST 1805) (near approximate MP 11.7) is an RS 2477 trail that intersects the road north of Sculpin Lake.
- Kotsina River Trailhead (near approximate MP 14.5) is located west of the Strelna Landing Strip. Several miles north of this trailhead provides access to other trails, including Nugget Creek and Dixie Pass.
- Nikolai Mine Trail (372) is an RS 2477 trail located near the Kotsina River Trailhead.
- Strelna-Kuskulana Trail (RST 194) is also an RS 2477 trail located near the Kotsina River Trailhead.

- Crystalline Hills Trailhead (near approximate MP 34.8) is located north of the road, providing access to the scenic Crystalline Hills and a 2.5-mile loop trail.
- Nikolai Mine Trail (372) runs along the road corridor between MP 54 and east of the Kennicott River crossing before the turnoff to McCarthy.

9.2.5 Sport Hunting and Fishing, Subsistence

Sport hunting and fishing in Alaska is regulated through a variety of different licenses and permits. Permits for both recreational and subsistence hunting and fishing are available through ADF&G. These activities can be authorized within designated areas and can be limited to a particular season depending on the species. Subsistence hunting plays a key role in the lives of Alaska residents and are critical and central to many rural Alaskans; as such, regulations for subsistence harvesting is different than sport fishing or hunting.

The study corridor falls primarily within the ADF&G game management unit (GMU) 11, with the exception of the approximate 1.5-mile segment from the beginning of the study corridor to the Copper River bridge crossing. That small segment falls within GMU 13D.

For NPS lands, the NPS and ADF&G cooperatively manage the wildlife resources in the area. Sport hunting is only allowed within the national preserve portion of WRST. Subsistence hunting occurs in the study corridor and in both portions of the park and preserve of WRST. Depending upon the species and season, hunting access is largely by road or aircraft, but snowmachines, motorboats, horses, and dog-teams are also used (NPS 2015).

The NPS issues concession contracts for a variety of activities, including for sport hunting guides. While these do not operate in the vicinity of the McCarthy/Kennicott area, there are operators that use other areas from the roadway corridor.

The Copper River Chitina Subdistrict Personal Use Salmon Fishery is a popular fishery in the summer for Alaska residents, which brings an influx of visitors into the region. ADF&G issued 6,810 permits in 2020, the latest available reporting period (ADFG 2023a). Residents access the fishery from near Chitina, from either onshore or by motorboat and from both outside of and from within the western end of the study corridor. Refer to Section 8.2.4.2 for more information about the economic boost of summer visitors into the region related to the fishery. Figure 9-3 shows an ATV going through the rock cut east of Chitina with fishing gear, a common sight seen during the summer.

Figure 9-3. Dipnetting Season in Vicinity of Chitina

One of the NPS's specific purposes of WRST is to provide continued opportunities for subsistence use. Subsistence fishing and hunting involves more than harvesting food. Subsistence can be a way of life that is rooted in a strong sense of place that is passed down through generations. Subsistence is important for the economies and cultures of families and communities throughout Alaska. Harvesting of fish, wildlife, and other natural and wild resources occur within the study corridor. The primary fish species harvested by subsistence users in the WRST and in the Upper Copper River are salmon, burbot, lake trout, whitefish, and Arctic grayling (NPS 2020). Sheep, bear, beaver, lynx, marten, otter, sheep, wolf, and wolverine are types of animals harvested in the region. The fishwheels located upstream of the Copper River bridge crossing for catching salmon is a popular subsistence activity occurring in the study corridor.

Aside from subsistence and dipnetting at the Copper River, other fishing spots along the study corridor include Strelna Lake accessed by a 0.3-mile trail north of the road (approximate MP 10); Silver Lake accessed south of the road (approximate MP 10.6); and Sculpin Lake accessed by a 0.25-mile trail (approximate MP 12.3). ADF&G stocks some lakes along the study corridor, including these three. Long Lake (near MP 45.4) has a unique sockeye salmon run as it has the longest known annual spawning durations (August through April) of any sockeye salmon population in North America (NPS 2022).

9.3 Cultural and Historic Resources

Section 106 of the National Historic Preservation Act as amended, and its implementing regulations in 36 CFR 800 requires federal agencies to consider the effects of their undertakings on historic properties. Historic properties are defined as "any prehistoric or historic district, site, building, structure, object, or property of traditional religious and cultural importance to an Indian tribe included in, or eligible for inclusion in, the National Register of Historic Places [NRHP]." Section 106 of the National Historic Preservation Act requires identification, evaluation, and consideration of impacts on "historic properties" that may result from a proposed project. Historic properties also have special protections under Section 4(f) of the Transportation Act; refer to Section 9.4.

Historic properties and archaeological sites are present within the study corridor. Historic properties within the study corridor consist of historic sites—primarily associated with the railroad, mining, and homesteading—as well as prehistoric sites. Some of the sites within the corridor have been evaluated for their eligibility for inclusion on the NRHP, but the majority of the sites have not yet been evaluated. The two sites comprising the McCarthy Road (VAL-00593 and XMC-00495) and the CR&NW roadbed (XMC-00114) have all been determined Not Eligible for the NRHP.

Table 9-5 shows the number of Alaska Heritage Resources Survey (AHRS) sites located in the vicinity of the road centerline. Within a 500-foot buffer of the road centerline, there are 165 AHRS sites. Extending the buffer to within 1 mile of the centerline, there are 189 AHRS sites. These numbers differ slightly from the number of sites within each segment, as listed in the following table, because some of the linear sites show up in more than one segment. Of note, the McCarthy Road (MP 0-18 [VAL-00593] and MP 18-59[XMC-00495]) and the CR&NW roadbed (XMC-00114) are present in each of the road segments for this study, so there is some duplication in the AHRS sites per segment. The total number of sites for each buffered area (500 feet and 1 mile) has taken this into account by removing all duplicates to represent the total number of individual sites, as opposed to the total number of sites per road segment.

Table 9-5. AHRS Sites in the Study Corridor

Road Segment	AHRS Sites (within 500 feet of road centerline)	AHRS Sites (within 1 mile of road centerline)
MP 0 to 10	22	27
MP 10 to 20	32	32
MP 20 to 30	30	31
MP 30 to 40	14	14
MP 40 to 50	27	34
MP 50 to 59	29	38
East of Kennicott River to Study End	14	25

Source: Weinberger, pers. comm. 2023.

During early coordination scoping with agencies, the State Historic Preservation Office (SHPO) submitted a memorandum to WFL dated December 22, 2023, which contained additional information regarding known cultural resources within 100 feet of the roadway. SHPO identified 95 known historic resources within 100 feet of either side of the roadway; 39 of those have not been evaluated pursuant to NRHP criteria and thus lack determinations of eligibility.

9.4 Section 4(f)

Section 4(f) of the U.S. Department of Transportation Act of 1966, as amended, is a federal environmental protection statute specific to U.S. Department of Transportation projects. This statute prohibits using land from publicly owned parks, recreation areas, wildlife refuges, or historic sites for transportation projects unless specific criteria are satisfied. Section 4(f) prohibits use of these properties for transportation projects unless there is "no prudent and feasible alternative" and the project includes "all possible planning to minimize harm," or the impacts are "de minimis."

Recreational areas may be protected under Section 4(f). Recreation facilities typically qualify as Section 4(f) properties if they are publicly owned, open to the public during normal hours of operation, and serve recreation activities as a major purpose as stated in adopted planning documents. Historic properties listed or eligible for listing on the NRHP also qualify as Section 4(f) properties.

Recreational and historic properties within the study corridor are—or may be—Section 4(f) resources and eligible for protection under Section 4(f).

Depending upon the location of proposed improvements, project proponent or project funding, some of these properties may require additional coordination with the Official with Jurisdiction to determine if they are Section 4(f) properties.

DOT&PF is responsible for determining whether Section 4(f) applies, coordinating with the Official with Jurisdiction, determining whether a use of the Section 4(f) property will occur, and if so, determining what approval option is appropriate. It is also possible that an exception to Section 4(f) may apply, per 23 CFR 774.13.

9.5 Wetlands, Waterbodies, and Water Quality

Executive Order (EO) 11990, Protection of Wetlands, directs federal agencies to avoid, to the extent possible, adverse impacts associated with the destruction or modification of wetlands, and to avoid supporting new construction in wetlands whenever there is a practicable alternative. Wetlands are also protected under Section 404 of the Clean Water Act, which regulates discharges of dredge or fill material into waters of the U.S., including wetlands.

Wetlands and waterbodies are found within the study corridor, as listed in Table 9-6.

Table 9-6. Wetlands and Waterbodies in the Study Corridor

Road Segment	Freshwater Emergent Wetland (acres)	Freshwater Forested/Shrub Wetland (acres)	Freshwater Pond (acres)	Riverine (acres)	Lake (acres)
MP 0 to 10	0.13	2.26	2.21	59.10	0
MP 10 to 20	13.27	216.02	9.52	3.76	0
MP 20 to 30	54.31	470.04	7.49	0	11.14
MP 30 to 40	36.81	304.62	2.50	0	0
MP 40 to 50	37.08	392.81	18.09	15.68	112.91
MP 50 to 59	76.10	279.42	10.42	2.44	0
East of Kennicott River to Study End	0	14.67	0.34	14.62	0

Source: National Wetland Inventory data provided by the NPS.

Note: Acreage is based on an area that includes a buffer of 500 feet from the road centerline.

In its agency scoping letter, the USACE provided comments to WFL on November 28, 2023, regarding its regulatory authorities and permitting guidelines related to water resources.

Proposed improvements should incorporate design features to avoid and minimize adverse impacts on wetlands to the maximum extent practicable. Unavoidable impacts to wetlands must be compensated through mitigation in accordance with applicable regulatory requirements. Authorization under a Section 404 permit and Section 401 Water Quality Certification would be required for impacts to waters of the U.S., including wetlands.

9.6 Floodplains

EO 11988, Floodplain Management, requires federal agencies to avoid direct or indirect support of floodplain development whenever a practicable alternative exists. EO 11988 and 23 CFR 650 Part A requires an evaluation of project alternatives to determine the extent of any encroachment into the base floodplain.

As stated earlier in Section 6.2.4, a search of the FEMA database found there are no delineated 100-year floodplains or regulatory floodways within the study corridor.

9.7 Navigable Waters

Both the USCG and USACE define navigable waters of the U.S. as those which are subject to the ebb and flow of tides or which are presently or could be susceptible to use in interstate and/or foreign commerce (USACE n.d.). Federal law, specifically Section 9 of the Rivers and Harbors Act of 1899, as amended, and the General Bridge Act of 1946, as amended, prohibits the construction or alteration of bridges and causeways across navigable waters of the U.S. unless first authorized by the USCG. Under the Rivers and Harbors Act of 1899, a Section 10 permit is required for construction or placement of structures, dredging, channelization or other work in or affecting navigable waters of the U.S.

A review of the USACE Alaska District's List of Navigable Waters webpage indicates there is one navigable waterway within the study corridor: the Copper River (USACE 2023). Refer also to Section 6.2.4.

9.8 Fish and Wildlife

A review of the ADF&G AWC mapper indicates there are several anadromous streams in the study corridor, as listed in Table 9-7 and mentioned earlier in 6.2.5 (ADF&G 2023b, 2023c, 2023d). These streams include various species such as coho salmon, chum salmon, Chinook salmon, pink salmon, and sockeye salmon in multiple life stages throughout each stream.

Table 9-7. ADF&G-Identified Anadromous Fish Streams in the Study Corridor

Road Segment	Stream Count	Stream Name	AWC Number	Fish Species (and Life Stage)
MP 0 to 10	1	Copper River	212-20-10080	at mouth: • Coho Salmon (present) • Chinook Salmon (present) • Pink Salmon (present) • Sockeye Salmon (present) • Cutthroat Trout (present) • Dolly Varden (present) • Eulachon (present) • Pacific Lamprey (present) • Steelhead Trout (present)
MP 10 to 20	1	Strelna Creek[a]	212-20-10080-2300-3041-4021	north of road: • Coho Salmon (present, spawning)
MP 20 to 30	3	1. Chokosna River 2. Gilahina River 3. Unnamed	1. 212-20-10080-2300-3371-4041 2. 212-20-10080-2300-3371 3. 212-20-10080-2300-3371-4041-5105	1. north of road: • Coho Salmon (spawning) • Chinook Salmon (present, spawning) 2. north of road: • Steelhead Trout (present) • Chinook Salmon (spawning, rearing) • Sockeye Salmon (spawning) 3. south of road: • Coho Salmon (spawning, rearing)
MP 30 to 40	0	None	N/A	N/A

Road Segment	Stream Count	Stream Name	AWC Number	Fish Species (and Life Stage)
MP 40 to 50	3	1. Long Lake Creek 2. Crystal Creek 3. Lakina River	1. 212-20-10080-2300-3421-4062 2. 212-20-10080-2300-3421-4021 3. 212-20-10080-2300-3421	1. at mouth: • Coho Salmon (spawning, rearing) • Sockeye Salmon (present) • Steelhead Trout (spawning) 2. north of road: • Coho Salmon (rearing) 3. at mouth: • Coho Salmon (present, rearing) • Sockeye Salmon (present, rearing) • Steelhead Trout (present)
MP 50 to 59	0	None	N/A	N/A
East of Kennicott River to Study End	2	1. Unnamed[b] 2. Unnamed[c]	1. 212-20-10080-2300-3511-4035-5018 2. 212-20-10080-2300-3511-4035-5019	1. Coho Salmon (rearing) 2. Coho Salmon (spawning, rearing)

Source: ADF&G 2023b, 2023c, 2023d; Giefer and Graziano 2023.

Note: Streams located within 500 feet of the road centerline. (e.g., Chitina River [AWC Code 212-20-10080-2300) is beyond 500 feet of the road.)
[a] Kuskulana River (AWC Code 212-20-10080-2300-3041) is downstream of the crossing of Strelna Creek. The AWC does not show the Kuskulana River as anadromous where the road crosses it.
[b] ADF&G refers to this as the “swimming hole” and that it is located along the “McCarthy Town Road.” This is an upstream fork of the Kennicott River (AWC Code 212-20-10080-3511-4035).
[c] ADF&G refers to this as “Clear Creek” and that it is located along the “McCarthy Town Road.” This is an upstream fork of the Kennicott River (AWC Code 212-20-10080-3511-4035).
N/A = not applicable.

In addition to anadromous streams, the AWC also identifies two waterbodies that are anadromous within or near 500 feet of the road centerline; these include the following:

- Near approximate MP 26, AWC 212-20-10080-2300-3371-4041-5105-0010 is an unnamed lake located nearby an unnamed AWC stream. The lake is located north of the road. The AWC identifies the presence of coho salmon.
- Between approximate MP 45 and MP 48, Long Lake (AWC 212-20-10080-2300-3421-4062-0010) is located north of the road. The AWC identifies the presence of coho salmon and sockeye salmon spawning.

Other lakes in the greater vicinity of the Chitina River valley contain other species such as grayling and burbot (DNR 2023a).

Resolving fish passage barriers along the road corridor is an important identified need, as discussed in Section 6.2.5. Several agencies submitted scoping comments on this topic. CRWP maintains a database of culvert conditions and fish passage priorities. Culvert or bridge replacements or repairs in fish streams will require an ADF&G fish habitat permit for the installation and any temporary bypass that may be required.

A search of the NOAA EFH mapper database did not identify any EFH locations in the study corridor (NOAA 2023). However, NOAA National Marine Fisheries Service submitted agency scoping comments to WFL dated December 18, 2023, indicating the study corridor contains AWC-identified streams that support Pacific salmon, and therefore the study corridor has designated EFH for Pacific salmon.

The study corridor contains no threatened or endangered species according to the USFWS Information for Planning and Consultation (IPaC) database (USFWS 2023).

Within the study corridor and greater vicinity, a variety of mammal species can be observed such as brown and black bears, mountain goats, moose, Dall sheep, mountain goats, wolves, fox, lynx, caribou, beaver, porcupine, and Arctic ground squirrels, as well as transplanted bison (NPS 2019).

Section 9.2 also discusses fisheries, subsistence, hunting, and trapping from a recreation perspective.

9.9 Migratory Birds

EO 13186 directs federal agencies to avoid or minimize negative impacts of their actions on migratory birds, and to take active steps to protect birds and their habitat. The Bald and Golden Eagle Protection Act prohibits the take of bald eagles and their nests and eggs either directly such as by shooting or indirectly such as by disturbance of nesting eagles without a permit. The Migratory Bird Treaty Act was passed in 1918 and is a law aimed to protect birds from people; the law has been amended over the last century and prohibits the take (including killing capturing, selling, trading, and transport) of protected migratory bird species without prior authorization from the USFWS.

Migratory birds are present in the study corridor. The IPaC database indicated the presence of bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*); these bird species are not birds of conservation concern. The lesser yellowlegs (*Tringa flavipes*) and olive-sided flycatcher (*Contopus cooperi*) are considered birds of conservation concern across their ranges which include the study corridor. (USFWS 2023)

A variety of other bird species can be found in the study corridor and greater vicinity, including the alder flycatcher, trumpeter swan, nesting geese, ducks, and other waterfowl (NPS 2019, Drazkowski et al 2011).

9.10 Invasive Species

EO 13112 defines "invasive species" as a species: 1) that is non-native to the ecosystem under consideration, and 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health. The State of Alaska has regulations and laws to protect native fish and wildlife from invasive species. To prevent the introduction of invasive species a person may not take, possess, transport, sell, offer to sell, purchase, or offer to purchase wild fish, game, or marine aquatic plants, or any part of wild fish, game, or aquatic plants, or nest or egg of fish or game.

According to the Alaska Exotic Plants Information Clearinghouse (AKEPIC) database, the study corridor contains invasive, non-native plant species (UAA 2023). The highest concentration of invasive species counts occur at the beginning and end of the McCarthy Road.

In its agency scoping letter to WFL dated December 21, 2023, the U.S. Environmental Protection Agency (EPA) provided input on invasive species and mitigation measures to prevent further spread.

Table 9-8. Invasive Species in the Study Corridor

Road Segment	Invasive Species Counts
MP 0 to 10	346
MP 10 to 20	174
MP 20 to 30	182
MP 30 to 40	167
MP 40 to 50	207
MP 50 to 59	391
East of Kennicott River to Study End	200

Source: UAA 2023.

Note: Invasive species counts located within 500 feet of the road centerline.

9.11 Contaminated Sites

A review of the Alaska Department of Environmental Conservation (ADEC) contaminated sites database (2023) indicates there are no contaminated sites within 500 feet of the existing road centerline.

9.12 References

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10. Public Involvement and Outreach

10.1 Project Advisory Committee

At the onset of the outreach process for this PEL study, a PAC was formed to guide project development and build consensus on corridor needs and opportunities, appropriate solutions, and recommendations. The PAC includes representatives from the following stakeholder organizations:

- Ahtna, Inc.
- Alaska Division of Forestry & Fire Protection
- Alaska Travel Industry Association
- Chitina Native Corporation
- CRWP (and Chitina area resident)
- CVDA
- Copper Valley Regional Planning Organization
- DOT&PF Northern Region M&O
- Greater Copper Valley Chamber
- MAC (and McCarthy area resident and business owner)
- MAC Road and Access Committee
- NPS Alaska Regional Office
- NPS WRST
- Native Village of Chitina
- University of Alaska, Land Management

The study team held one PAC meeting during this phase of the study. The PAC meeting was held on November 16, 2023, and included exercises related to seeking input on corridor vision/purpose statement and emerging themes related to corridor goals. During this meeting, each PAC member shared their “top 3” (or more) related to needs, opportunities, and/or issues for the corridor. PAC members identified the following top needs and opportunities:

- Provide safe roadway corridor for travelers
- Maintain access to public lands
- Ensure access to rest areas and provide adequate pullout areas for enjoyment and traveler safety breaks
- Improved signage (e.g., mileposts, speed limit, interpretive panels) would help improve safety and visitor experience
- Need for lower speeds in certain areas
- Improve road in a way that does not encourage substantial increases in traffic, trash, and irresponsible behavior (e.g., speeding, retaining historic road character)
- There is no public consensus on desired amount of access (e.g., public vehicular bridge across the Kennicott River)
- Address geohazards such as landslides (e.g., Kotsina bluffs, MP 58) to ensure road stays open
- Road conditions, such as glaciation and drainage issues, are safety hazards.
- Need to improve safety and visibility by resolving blind corners, conducting brush clearing more frequently, and widening the roadway
- Limitations of emergency response is an issue
- Not only avoid environmental impacts but improve environmental conditions when road improvements occur (e.g., improving salmon habitat and passage)

- Consider non-motorized roadway users, such as pedestrians, bicyclists, and horseback riders
- Consider the improvements and community interests included in previous plans

Based on some of the public comments submitted during Public Meeting 1 about the PEL process and representation on the PAC, it's important to note that PAC and public input are equally important. A comment submitted by the PAC does not hold any more importance than any other comment submitted.

10.2 Public Involvement

The study team hosted an online public open house ("Public Meeting 1") from November 29, 2023, through January 10, 2024. The open house was expanded beyond a typical month-long period to accommodate the holidays and provide ample opportunity for the public to explore the website and provide comments on needs and opportunities for the road corridor. Public comments will continue to be solicited for the duration of the study. See Appendix E for a detailed summary of Public Meeting 1, including public comments submitted.

General public notification activities during this phase included the following:

- Initiated a project website (www.McCarthyRoadPEL.com)
- Transmitted emails to study contact list inviting people to visit the online open house (on November 29, 2023 and January 4, 2024)
- Distributed printed newsletters to the PEL study contacts for which mailing addresses were available
- Distributed posters to corridor communities to display in public locations in the study corridor, including at the post office/mail shack and community centers
- Published State of Alaska public online notice that ran from December 8, 2023 through January 11, 2024
- Published display ad in the Copper River Record on November 30 and December 14, 2023 advertising the online open house
- Other updates were provided through social media posts and the What's Up nonprofit listserv.

The public accessed the online open house through a link on the top of the main project website. During the dedicated online open house, the project website received 770 unique visitors and the online open house had 325 views by 203 unique visitors. Several hundred unique comments were submitted. Public comment themes largely mirror those that have been discussed in prior plans (as mentioned in Section 3.1).

A high-level overview of needs and opportunities themes from the public include the following:

- Improve the safety of the road corridor caused by:
  - Inadequate cross section
  - Narrow road widths
  - Narrow bridge widths
  - Limited sight distance/ road curvature
  - Steep grade and roadbed slopes
  - Speeding
- Improve road/infrastructure conditions and maintenance by addressing:
  - Dusty road conditions
  - Overgrown vegetation (e.g., brush clearing needs)

  - Poor road surface (e.g., potholes)
  - Drainage
  - Erosion and poor soils (e.g., erosion occurring near bridges such as the Kennicott River footbridge)
  - Glaciation over roadway during winter
  - Limited winter road maintenance
  - Need for new or improved culverts
- Improve road reliability and protection (resiliency) of the roadway and facility infrastructure from natural hazards (e.g., landslides, avalanches)
- Reliably maintain and enhance access and support land uses (including enhancing visitor experience)
  - Improve road junctions (e.g., near MP 50.5; near MP 55 [near the Sage Subdivision turnoff])
  - Improve signage
  - Provide adequate pullouts (for both safety and visitor experience)
  - Ensure adequate trash removal services and outhouse facilities
  - Expand recreation opportunities (e.g., trails, access to lakes)
- Accommodate multi-modal users and uses: consider all roadway users, not just vehicles
- Opportunity to enhance the natural environment alongside proposed infrastructure improvements (e.g., enhance fish habitat and/or passage)

Public comment clearly indicates that maintaining the rural and scenic character of the road is overall very important. While some people commented on wanting the road paved and made into a superhighway, the majority of comments submitted on this topic were in favor of retaining a road that embraces the rural, wild, scenic, and historic environment.

One of the most commented on topics is the existing bridge crossing options over the Kennicott River (DOT&PF footbridge and private vehicular bridge). Some comments were supportive of constructing a public vehicular bridge, but an overwhelming number of responses were in favor of retaining the current scenario.

10.3 Tribal and Agency Outreach

To solicit input and initiate coordination, WFL transmitted letters via email to the following Alaska Native Tribes and Corporations on October 19, 2023: Native Village of Chitina, Chitina Native Corporation, and Ahtna, Corporation. WFL sent several follow up emails to solicit input.

The PEL study team met with representatives from the Native Village of Chitina and Chitina Native Corporation on January 23, 2024, to discuss the PEL process and how to notify Native allotment owners within the corridor. Methods were discussed on how to reach out to Native allotment holders. The Native Village of Chitina expressed concern whether there would be sufficient due diligence for cultural resource identification for proposed alignment changes. Other concerns included the increases in dust in the community due to the drier seasons. The Chitina Native Corporation indicated concern about any ROW changes and the broader issue of DOT&PF’s claims for ROW within the Ahtna lands region. They also commented on wanting to advocate for more maintenance, preservation of subsistence practices, and issues that arise during the dipnetting season which results in some trespassing.

WFL transmitted agency scoping letters via email on November 22, 2023, requesting early agency coordination. WFL sent letters to the following agencies: ADEC, ADF&G, Bureau of Land Management, DNR, NOAA, USACE, USCG, EPA, and USWFS. Several agencies expressed interest to stay involved in the study process and offered data regarding baseline conditions in the study area, as listed in Table 10-1. Appendix F contains the letters and emails submitted by agencies.

Table 10-1. Early Agency Scoping Coordination Responses and Topics included in Correspondence

Agency	Water Resources	Fish and Wildlife, Birds, Ecology, Invasive Species	Contaminated Sites	Land Management (including access)	Cultural/ Historical Resources (including Subsistence)	Permitting, Mitigation, Design Input	Other[a]
DNR	Yes			Yes	Yes		
NOAA	Yes	Yes				Yes	
USACE	Yes					Yes	
ADEC			Yes				
ADF&G	Yes	Yes		Yes		Yes	Yes
EPA	Yes	Yes		Yes	Yes	Yes	Yes
SHPO					Yes		

[a] Other resource categories commented on includes Environmental Justice, climate change, permafrost, and socioeconomics.

11. Next Steps

Using the information collected during the Needs and Opportunities Assessment phase and as summarized in this report, the study team will move into the next phase of the PEL study: to identify and develop potential improvement options to address the identified needs and issues in the corridor. These options will be evaluated and screened for consideration as recommendations to be moved forward for future project development (e.g., design, environmental approval, and construction) when/if funding becomes available in the future. Input from the public and other stakeholders will be important in the next phase of the PEL study. PEL study documentation will be presented to the public for review and comment. The final PEL study will include a framework for implementing future transportation improvements along the corridor. If certain criteria are met during the PEL process, analysis and decisions made now can be appended or incorporated by reference in subsequent environmental review processes.