Eklutna Hydroelectric Project

Cultural Resources

Study Report

DRAFT

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Terms, Acronyms, and Abbreviations

1991 Agreement	1991 Fish and Wildlife Agreement
AHRS	Alaska Heritage Resources Survey
AL&P	Anchorage Light and Power
APA	Alaska Power Administration
APE	Area of Potential Effects
ARRC	Alaska Railroad Corporation
AWWU	Anchorage Water and Wastewater Utility
BLM	Bureau of Land Management
cfs	Cubic feet per second
CRC	Cultural Resource Consultants LLC
FPC	Federal Power Commission
MCI	Standard-issue military Meal, Combat, Individual kits
MW	Megawatt
NALA	North Anchorage Land Agreement
NALEMP	Native American Lands Environmental Mitigation Program
National Register	National Register of Historic Places
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPS	National Park Service
NVE	Native Village of Eklutna
OHA	Alaska Office of History and Archaeology
PME	Protection, mitigation, and enhancement measures
Program	Final Fish and Wildlife Program
Project Owners	Municipality of Anchorage, Chugach Electric Association, Inc., and the Matanuska Electric Association, Inc.
SHPO	State Historic Preservation Office
TEK	Traditional environmental knowledge
TU	Trout Unlimited
TWG	Technical Working Group
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USFWS	United States Fish and Wildlife Service
WWII	World War II

1 INTRODUCTION

The 1991 Fish and Wildlife Agreement (1991 Agreement) was executed amongst the Municipality of Anchorage, Chugach Electric Association, Inc., Matanuska Electric Association, Inc. (collectively “Project Owners”), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and the State of Alaska as part of the sale of the Eklutna Hydroelectric Project (Project) from the Federal government to the now Project Owners. The 1991 Agreement requires that the Project Owners conduct studies that examine and quantify, if possible, the impacts to fish and wildlife from the Project. The studies must also examine and develop protection, mitigation, and enhancement (PME) measures for fish and wildlife affected by such hydroelectric development. This examination shall consider the impact of fish and wildlife measures on other resources, including cultural resources, as well as available means to mitigate these impacts. The Project Owners initiated consultation in 2019 and have implemented studies to inform the development of the future Fish and Wildlife Program for the Project. As part of these studies, the Project Owners contracted Cultural Resources Consultants LLC (CRC) to describe and evaluate cultural resources in the Project area. The Project area for the study includes the land surrounding Eklutna Lake and Eklutna River.

1.1. Study Objectives

The goal of the Cultural Resources Study is to determine if historic properties are present within an agreed upon study area and to evaluate the effects, if any, of current Project operations on known historic properties.

The Cultural Resources Study is also designed to develop information that will support the evaluation of potential effects to known historic properties that may result from any approved mitigation efforts, including changes in flows and lake level fluctuation, and potential for increased recreational use and access in the area.

1.2. Study Area

The focus area or Area of Potential Effects (APE) for the Cultural Resources Study encompasses locations of possible project impacts, with a conservative buffer to fully include all potential archaeological and historic properties that could be directly, indirectly, or cumulatively affected (Figure 1.1-1).

The APE in the lower river was modeled on the presumption that there could be future periodic peak flows in the river of up to 1,402 cubic feet per second (cfs), consistent with the bankfull flow presented in the 2019 USFWS report (USFWS 2019). Providing a 1,402 cfs peak flow through the spillway equates to a lake level of approximately 879 feet. Available 2020 LiDAR data for the northeastern shore was used to determine an APE based on the estimate that the average horizontal increase in the width of the lake resulting from an 879-foot level would be approximately 30 feet. Thirty feet was also used to model an APE buffer on the southwestern side of the lake.

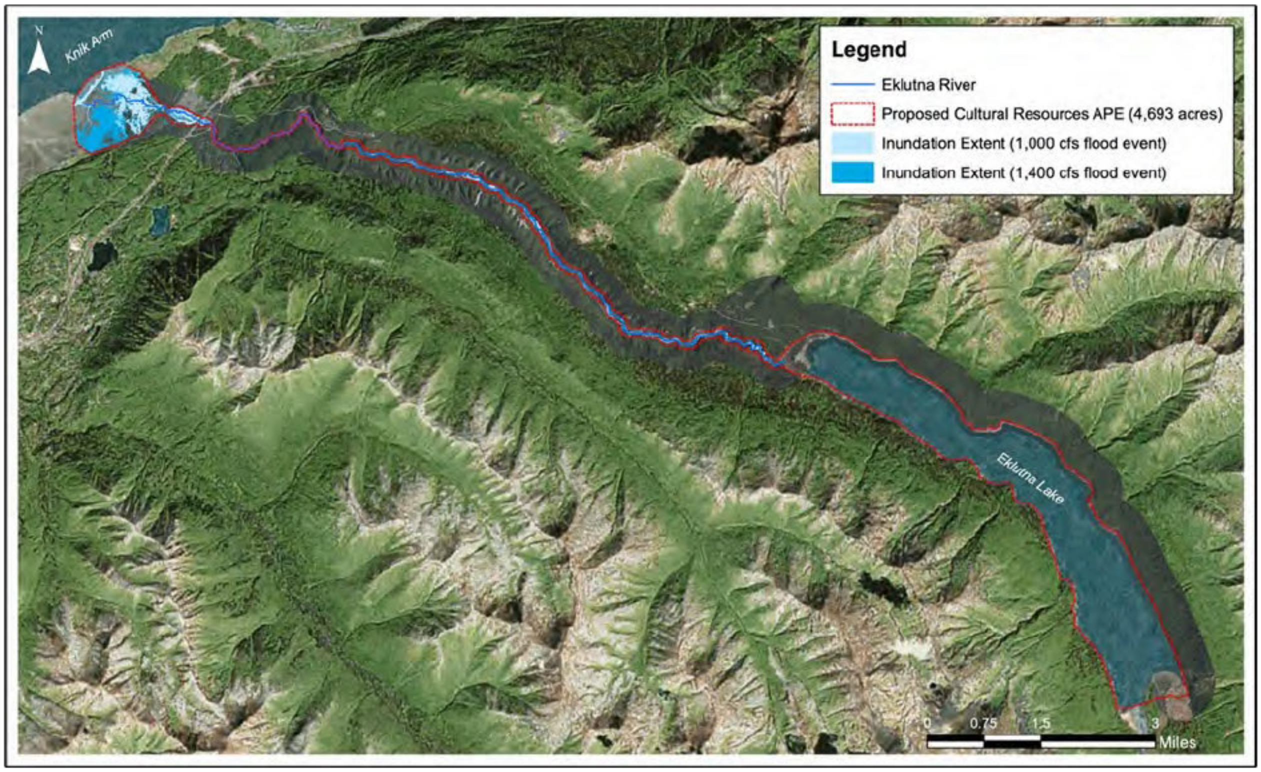

Figure 1.1-1. Eklutna Cultural Resources Study Area.

2 BACKGROUND

2.1. Indigenous Occupation

Eklutna Village is located near the mouth of the Eklutna River in the Cook Inlet Region of Southcentral Alaska. The Indigenous inhabitants of this area are Dena'ina, who are believed to have arrived from interior Alaska sometime between 1,000 and 1,500 years ago (Cook Inlet Historical Society 2020). Dena'ina may have replaced or displaced earlier Yup'ik or Inuit residents in the Cook Inlet area (Lobdell 1984; Chandonnet 1979, 1991; Dumond and Mace 1968). Billy Pete, a former Eklutna elder, stated that "Eklutna is an old, old village. Nobody knows when they first moved there. People came down the Matanuska River then they returned to Cook Inlet after the Ice Age." Johnny Shaginoff, another former elder, recalled "Eklutna was always an old village" (Kari and Fall 2003).

The name Eklutna is derived from the Dena'ina name for the Eklutna River, "Idluytnu," meaning "Plural Objects River." The Dena'ina name for Eklutna village is "Idlughet," meaning "By the Objects." The "objects" referred to in both names are a unique granite formation (two hills) on the shore of the inlet just north of the village, often referred to by the Eklutna people as "The Knobs." [redacted]

The ancient Eklutna Dena'ina considered themselves to be a village people. Although most of the Eklutna people would disperse during the summer months to fish and hunt at various locations, some people would have remained at Eklutna village to hunt, harvest salmon, and lay in food supplies for overwintering at Eklutna (Leggett 2022).

The Eklutna Lake and river system has been an important subsistence hunting area for the people of Eklutna. Eklutna Dena'ina hunted sheep, moose, ground squirrels, and bear in the watershed. In addition, subsistence fishing has always played an important role in the lives of the Dena'ina (U.S. Army Corps of Engineers [USACE] 2011). There are several Dena'ina place names surrounding Eklutna Lake, highlighting its importance. Dena'ina maritime culture also included utilizing ocean-run salmon streams, summer salmon traps, and fish camps.

By the late 1700s, Russian explorers and traders began arriving in Southcentral Alaska, followed by missionaries. At that time, Eklutna was considered the most important of several villages in the Knik Arm vicinity (National Park Service [NPS] 1982). It is believed that there were 3,000 to 5,000 Dena'ina living in the area (Cook Inlet Historical Society 2020). The Russian Orthodox tradition brought by missionaries had a significant following in Eklutna (NPS 1982).

The United States purchased Alaska from the Russian Empire in 1867. This was followed by an influx of newcomers to the area, construction of a railroad through Dena'ina lands beginning in 1915, an influenza outbreak that decimated Dena'ina populations, and the founding of the City of Anchorage in 1920 (Eklutna, Inc. 2021). Other changes in the 1920s included development of the first hydropower facility in the Anchorage area and establishment of a government-run vocational school at Eklutna. Dena'ina Athabaskan people continue to live in Eklutna Village. The Native Village of Eklutna (NVE) is a federally recognized tribe, with a government office re-organized in 1961 by the traditional people of Eklutna Village.

2.2. Post-Contact Development

2.2.1. Alaska Railroad

In 1914 the U.S. Congress authorized the construction of an Alaskan railroad from Seward to Fairbanks. Anchorage was established as a "tent city" in 1915 and selected as the new headquarters for the project. Upon completion of the railroad in 1923, offices and maintenance shops were permanently located in Anchorage, and many of the construction workers stayed to settle the townsite (U.S. Bureau of Reclamation [USBR] 1948). The railbed at Eklutna was moved in 1968 due to shoreline erosion (AECOM 2017). The Alaska Railroad crosses the Eklutna River at rail mile 140.8 (USACE 2011).

2.2.2. Glenn Highway

The Palmer Highway was constructed in the mid-1930s to transport agricultural products from the Matanuska Valley to the markets in Anchorage (Mead & Hunt 2014). As part of the Palmer Highway, a one-lane bridge was constructed across the Eklutna River approximately half a mile upstream from the existing railroad bridge (R&M 2015).

In 1941, during World War II (WWII), the Alaska Road Commission received a one-million-dollar appropriation to construct the Glenn Highway from Palmer to the existing Richardson

Highway (Mead & Hunt 2014). The one-lane bridge at the Eklutna River was expanded to two lanes in 1952 (R&M 2015).

The New Glenn Highway was constructed in 1975. This included construction of two new bridges across the Eklutna River. The original highway was left open for vehicular use and is today known as the Old Glenn Highway. In 2010, an inspection of the Old Glenn Highway bridge across Eklutna River near Thunderbird Falls recommended that the bridge be replaced. The bridge was closed to vehicular traffic in 2012, then replaced and reopened in 2016.

2.2.3. Hydropower Development

Planning for the lower Eklutna dam began in December 1921, when Alaska Engineering Commission engineers John Longacre and C.D. Pollock surveyed Eklutna Lake. After further survey the following year, Anchorage businessman Frank Reed filed a permit application, enlisted John Longacre to help develop the dam project, and formed Anchorage Light and Power (AL&P). The target market for the project, the Alaska Railroad and the City of Anchorage, agreed to become AL&P customers in 1924 and 1927, respectively (Hollinger 2002).

In October 1928, the Federal Power Commission (FPC) issued a 50-year license authorizing construction of a hydropower project at Eklutna. Construction was initiated in 1928 and completed in 1929. The project included both a storage dam at the outlet of Eklutna Lake and a concrete arch diversion dam on the Eklutna River approximately seven miles downstream. There was a spillway at the top of the diversion dam and a sluice gate at the bottom to allow gravel and debris deposits to be released downstream. The diversion dam was removed in 2017 and 2018.

However, the original storage dam was almost destroyed by flooding in 1929 before the power plant ever went online (Hollinger 2002) (Figures 2.2-1 and 2.2-2). To solve this problem, wood piling was driven across the mouth of the overflow channel to permit storage of water to a depth of three or four feet above the natural lake level (USBR 1967). When the lake capacity decreased during dry periods of the year, sections of the piling could be removed to allow water over the spillway (Hollinger 2002).

In 1939, an earth and rock fill dam was built at the lake outlet (“Existing Dam” in Figure 2.2-3), which incorporated portions of the initial structure (USBR 1967). This dam had 15 ten-foot-wide open bays and 19 spillway gates, each six and a half feet high and five feet wide, to control discharge and thereby provide a more dependable water supply for the power plant. The elevation of the crest of the closed spillway gates and the open bays was 867.5 feet.

The new Eklutna project with an installed nameplate capacity of 44.4 megawatts (MW) was authorized by Congress in 1950 and constructed by USBR between 1951 and 1955. It included an earthen dam at the outlet of Eklutna Lake, an intake structure on the northern side of the lake, a 4.5-mile-long tunnel through Goat Mountain (now Twin Peaks), a penstock, a power plant, and a tailrace that conveyed water under the Glenn Highway (now the Old Glenn Highway) and discharged it into the Knik River (USBR 1958). As part of construction of the new Eklutna project, USBR strengthened and reinforced the existing storage dam at the outlet of Eklutna Lake.

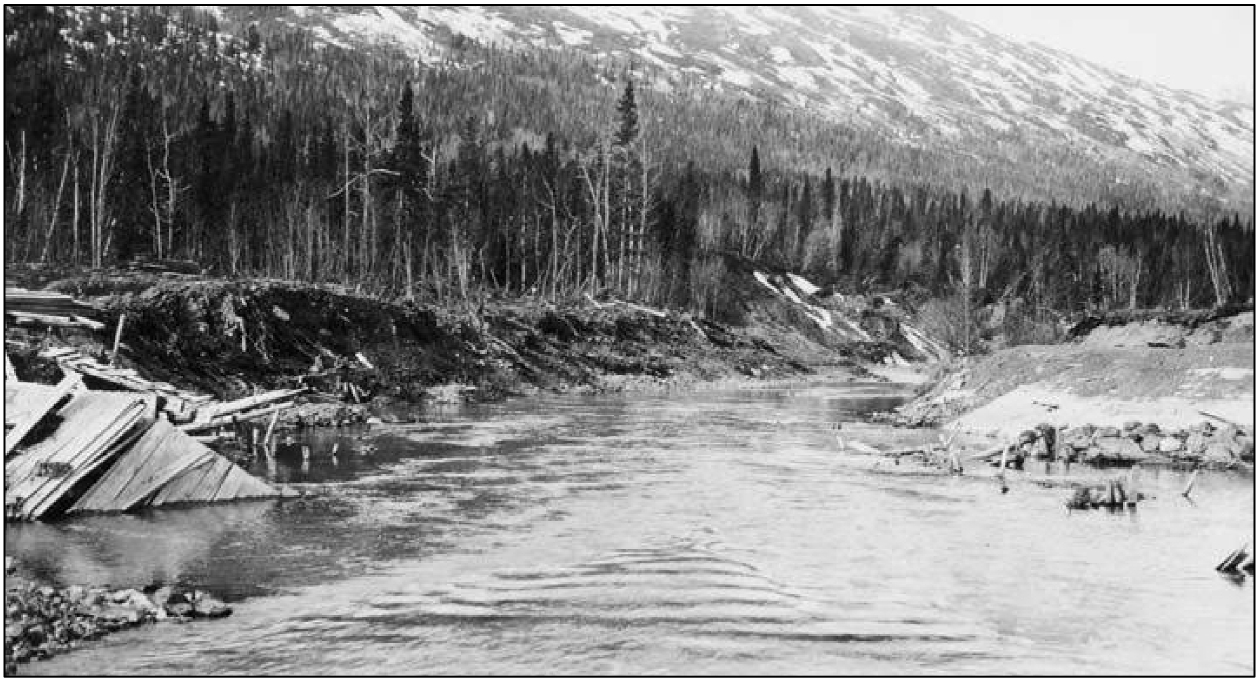

Figure 2.2-1. “Outlet of Eklutna Lake & Head of River” 1930–1932 (Walter W. Hodge Papers, University of Alaska Fairbanks, UAF-2003-63-67).

Figure 2.2-2. “Storage Dam at Outlet of Eklutna Lake” 1930–1932. (Walter W. Hodge Papers, University of Alaska Fairbanks, UAF-2003-63-67).

The 1964 Earthquake caused considerable damage to the Eklutna project, including the dam and intake structure. A new intake structure was constructed about 222 feet downstream from the original structure, and a replacement dam was built in 1965. Excess timbers were removed from the old dam to make it inoperative (USBR 1967).

The following information is summarized, with original references, from Section 3.0, the *History of Development in the Eklutna Basin and Project Tailrace Area,* of the Eklutna Hydroelectric Project Initial Information Package (McMillan Jacobs Associates 2020). Additional information from USBR (1956, 1957, 1964, 1967), Alaska Power Administration (APA) (1968, 1970, 1971, 1972, 1973, and 1992), Recorder's Office (1984), and Simonds (1995) was also added as cited in text.

2.2.3.1. WWII and Increasing Demand

The City of Anchorage purchased the Eklutna project from AL&P in 1943 (FPC 1944). The City sold it to the Federal government by the time USBR constructed the new Eklutna Powerplant and improved the existing dam in the early 1950s (USBR 1967). Historic aerial imagery confirms that Lach Q'atnu Creek was diverted sometime between 1941 and 1950.

Anchorage's energy needs exploded during WWII with the arrival of military personnel, and the existing power plant's capacities could not match the increased population (Hollinger 2022). The military, responding to the need for more power, installed diesel and steam plants around Fort Richardson, and operated a coal power generation station out of the WWII vessel *Sackett's Harbor*, in addition to relying on the old Eklutna plant. Still, rolling blackouts regularly struck Anchorage and threatened military operations. USBR began consultation with Federal agencies like the USFWS in the late 1940s (USBR 1948), and the new 30 MW Eklutna project [redacted] was authorized by Congress in 1950 (Hollinger 2002). USBR constructed it between 1951 and 1955.

After the 1950 construction, the project successfully eliminated power brownouts and reduced electricity costs for the Anchorage and Palmer areas, which, like today, were the highest in the United States (APA 1968). By 1967, Alaskans paid 95 cents less per kilowatt-hour than in 1960, although they still paid $1.20 more on average than the lower-48.

The newest incarnation of the project included an intake structure on the northern side of the lake, a 4.5-mile-long tunnel through Twin Peaks, and a 209-foot-long tailrace that conveyed water under the Old Glenn Highway and discharged it into the Knik River (USBR 1958). As part of construction of the new Eklutna project, USBR strengthened and reinforced the existing dam at the outlet of Eklutna Lake, which included additional fill on the embankment, driving new piling, and placing riprap both upstream and downstream. After modification, the dam had a slightly higher crest elevation of 875 feet. By 1952, the existing storage dam's spillway gates were so damaged that they were required to always be closed (USBR 1967).

In 1957, the dam delivered over 147,812,000 kilowatt hours to customers. That same year in May, construction finished on the "Reed Substation at the Old Eklutna Plant," which Matanuska Electric Association used to supply energy to the Chugiak-Eagle River area and as an emergency power source to the Matanuska-Susitna Valley. An additional bay in the Anchorage substation was constructed in 1957 for Chugach Electric Association (USBR 1957).

2.2.3.2. 1964–Present and the Existing Dam

The 1964 Earthquake caused considerable damage to the Eklutna project. The whole intake structure moved 44 inches toward Eklutna Lake. Ten of 15 conduit joints of the intake structure were separated by up to 10 inches, and some conduit sections were laterally displaced. A substantial amount of gravel and other debris entered the pressure tunnel through these gaps. The earthquake also created a void beneath the existing dam, which began to crack in July 1964 (USBR 1967). Engineers determined that it was not safe to hold any water behind the dam's gates, and recommended that the gates be kept open until the dam could be repaired. Water spilled out of the dam for about two months (USBR 1964). Also in 1964, the Bureau of Land Management (BLM) created several campgrounds and picnic areas on the shore of Eklutna Lake.

Although the debris was cleaned from the pressure tunnel and the conduits temporarily repaired, the spillway gate structure's lack of foundation due to the void made repair more expensive than new construction (USBR 1967).

The replacement was critical, with USBR (1967:Front Matter) stating the explicit purpose was to "restore electric power to the Anchorage, Alaska, area for both civilian consumption and national defense installations." This sentiment would be especially strong considering contemporary Cold War tensions and Fort Richardson and Elmendorf Air Force Base's continued reliance on the Eklutna project for some of their electric power.

USBR constructed a new intake structure about 222 feet downstream from the original structure, and a replacement dam ([redacted] "New Dam" in Figure 2.2-3 below; Figure 2.2-4) was built about 1,400 feet downstream in 1965. The new dam was earth and rock fill on a foundation of firm glacial till. It had a crest length of 815 feet, width of 30 feet, and elevation of 891 feet, and a volume of 85,000 cubic yards (USBR 1967; see Figures 2.2-5 and 2.2-6). It employed a slide gate at the base of the dam and spillway (Figure 2.2-6).

A&B Construction Co. from Helena, Montana, replaced the dam and spillway from April to November 1965 following Specifications No. DC-6240. USBR also removed gates and excess timbers from the existing dam to make it inoperative.

In 1967, USBR transferred responsibility for the Eklutna project to the newly organized APA, created by the Department of Interior (Simonds 1995). In 1970, the project's focus shifted from wholesale energy generation to "peaking, energy storage, spinning reserves, and other power pooling benefits" (APA 1970:4).

This change was due either to several years of lower than average water levels (APA 1971) and/or natural gas-fueled electricity that arrived in Anchorage the 1960s that was cheaper than what the Eklutna project could offer (APA 1968).

In the early 1970s, the APA (1972:6) noted that the "Eklutna dam and reservoirs are key features of the new Chugach State Park and are receiving increased year-round recreational use." In 1984, the BLM and APA agreed to allow the Alaska Department of Natural Resources to manage lands surrounding the dam for recreation purposes, rather than the BLM (Recorder's Office 1984).

Planners realized that Anchorage's water needs would exceed supply by 1988, and work began to identify an additional water source. Eklutna Lake was chosen again, and the Eklutna Water Project was completed by 1988. It diverted water from the Eklutna Lake power tunnel to a mile-long diversion tunnel downstream from the dam at the lake outlet and a 6-mile pipeline to the Eklutna Water Treatment Plant.

In 1992, prior to the ultimate dissolution of the APA, the Eklutna Power Plant supplied 5% of energy in the Anchorage and Matanuska-Susitna Valley areas (APA 1992), which has remained consistent up to today. The project transferred hands once again to private local utility companies in 1997. The lower diversion dam was removed in 2018 to encourage salmon to return to the Eklutna River. With the dam constructed in 1965 and other improvements, Eklutna Lake provides up to 90% of the Municipality of Anchorage's water supply, and 6% of the total energy generated by the Municipality of Anchorage, Chugach Electric Association, and Matanuska Electric Association (McMillan Jacobs Associates 2020).

Figure 2.2-3. Aerial photo of Eklutna Project in 1967 (USBR 1967).

Figure 2.2-4. Historic photograph of completed replacement of Eklutna Dam [redacted] and spillway [redacted] (USBR 1967:Front Matter).

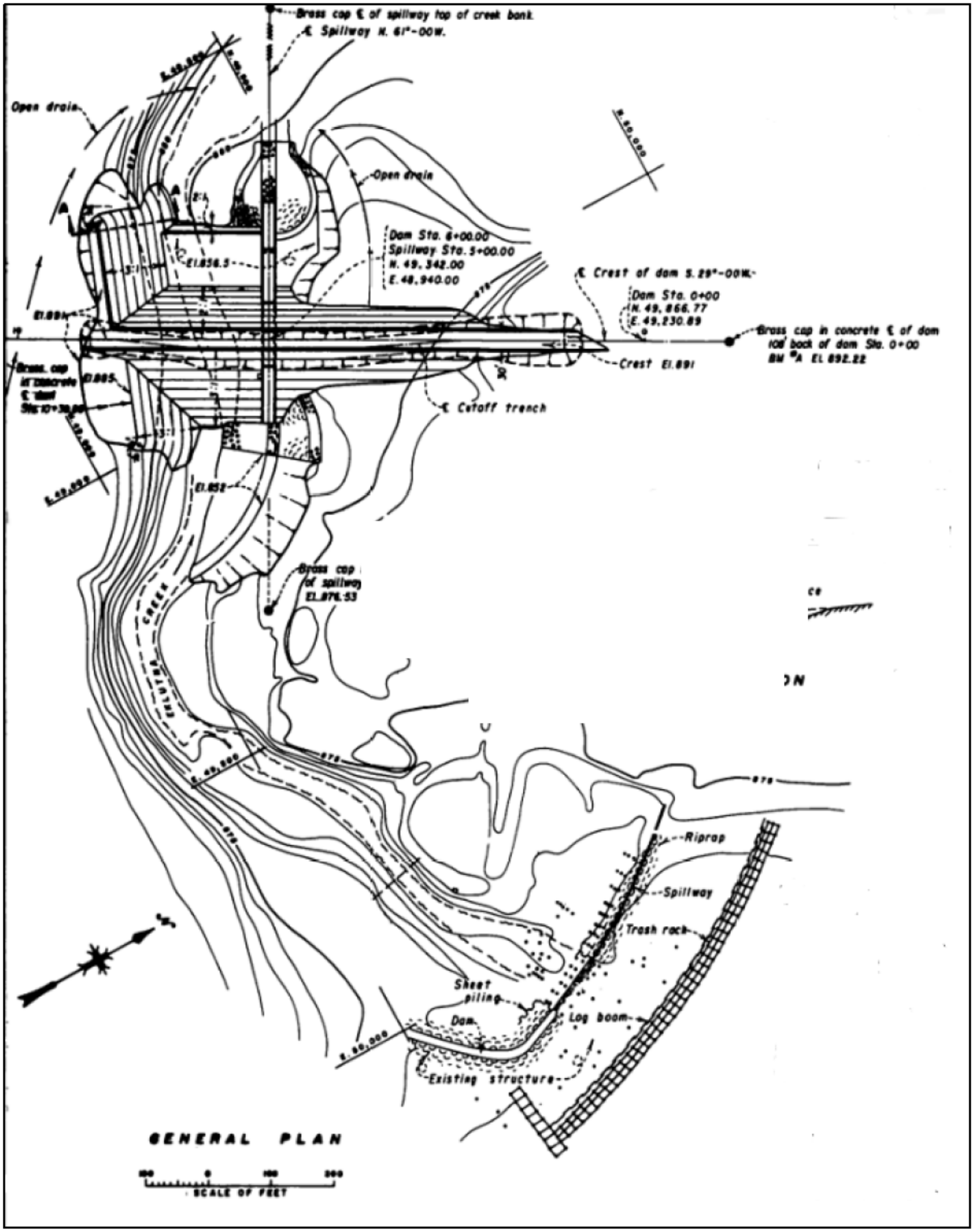

Figure 2.2-5. Plan view of new dam and spillway construction (USBR 1967:Figure 22).

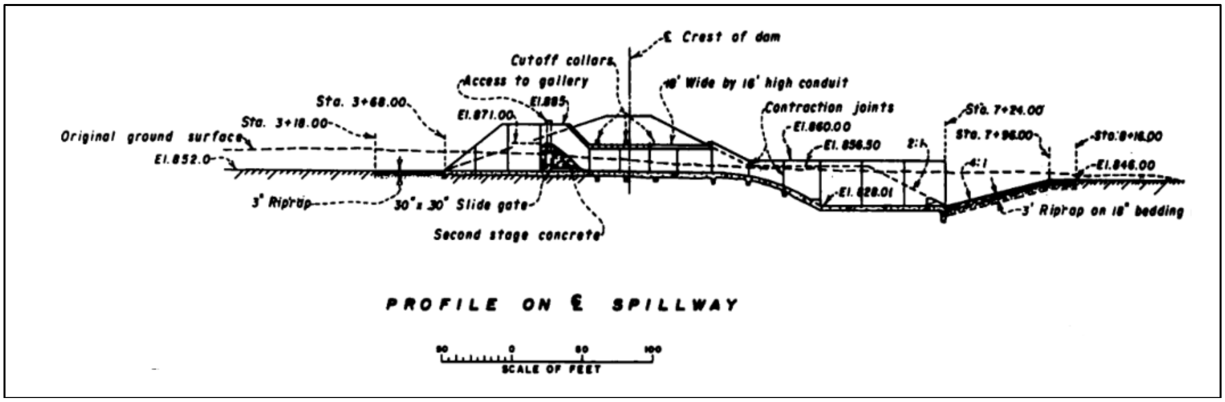

Figure 2.2-6. Profile view of new dam and spillway construction (USBR 1967:Figure 22).

2.2.4. Military Use and Facilities at Eklutna Lake

In 1961, the army started construction of a road along the Eklutna Lake shore to the Eklutna Glacier and conducted glacier training exercises for most of the summer (USBR 1961; see Figure 2.2-7). The following year, the army relocated a section of the road across a narrow spot on the eastern fork of Eklutna Creek (USBR 1962). This road (currently called the Eklutna Lakeside Trail) is now located within Chugach State Park and is managed by the Alaska Department of Natural Resources.

Figure 2.2-7. "Army training exercise, Eklutna" July 1966 (Betzi and Lyman Woodman Papers, 1898–1999. University of Alaska Anchorage, Special Collections, UAA-HMC-0353).

2.3. Previous Archaeological Research

In 1983 and 1984, archaeologists John Lobdell, Robert Mack, and Mary Iandoli conducted a cultural resources investigation for the Eklutna Water Project. This study included a literature review and aerial and pedestrian archaeological surveys of the proposed waterline from Eklutna to Anchorage. The project area included the Eklutna River corridor, where archaeologists focused on terraces above the river. Pedestrian survey and subsurface testing was concentrated on areas judged to have a higher potential for cultural resources (Lobdell 1983, 1984). The survey, which did not identify any new cultural resources, was the only archaeological survey of the Eklutna River corridor prior to 2022. No formal cultural resources surveys have been conducted at Eklutna Lake.

Past previous archaeological work near Eklutna Village has included NVE's documentation of the remains of the Eklutna Army site [redacted] as part of a Native American Lands Environmental Mitigation Program (NALEMP). The Eklutna Army site included the former Bureau of Indian Affairs industrial school buildings and an adjacent Quonset hut area. When the Army stopped using the site in 1971, they demolished most of the buildings and leveled the site. However, many remains dating from 1961 to 1971 were left behind. NVE recommended the site was not eligible for the National Register of Historic Places (National Register) and that the cleanup and removal of the remains would result in no affect to historic properties. The State Historic Preservation Office (SHPO) concurred with this finding (McConnell 2005).

Northern Land Use Research conducted a small survey for the replacement of the bridge over the Eklutna River on the Old Glenn Highway in 2014 (Stern and Gordaoff 2014). Richard Stern and Roberta Gordaoff surveyed a narrow APE on both sides of the Old Glenn Highway from the Thunderbird Falls Parking Area to the intersection with Eklutna Lake Road. They noted one marked grave outside of the APE, some bark-stripped birch trees, a modern bent willow tree, modern trash, and a chain and locks embedded in trees (Stern and Gordaoff 2014:11).

2.3.1. Previously Reported [redacted] Sites

There are 36 archaeological and historical sites in the general project area listed in the Alaska Heritage Resources Survey (AHRS) maintained by the Alaska Office of History and Archaeology (OHA). These are predominantly historic period sites in the vicinity of the NVE or sites associated with hydropower operations. Three sites in the Eklutna area are eligible for the National Register: the Old Eklutna Power Plant, the Old St. Nicholas Russian Orthodox Church, and the Mike Alex Cabin. The Old Eklutna Power Plant was Anchorage's first hydroelectric power facility. The Old St. Nicholas Russian Orthodox Church was constructed around 1870 at the latest, and the Mike Alex Cabin was built in the 1920s by influential Dena'ina chief Mike Alex.

3 METHODS

While this study is not an undertaking under Section 106 of the National Historic Preservation Act (NHPA), the project generally followed the Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation, which establishes a process for identification and evaluation of historic properties.

Cultural resources in the proposed APE were studied using a combination of literature review, consultation, and field surveys. Consultations with Tribal governments and organizations and the SHPO began in 2019 and will continue into 2023. The desktop effort resulted in a summary of existing information related to cultural resources present and their respective locations. The desktop review included analysis of aerial imagery, spherical videography, and LiDAR data.

An archaeological and historical assessment of the APE was conducted in June and July of 2022. The goal of the cultural resources study was to identify, document, and evaluate cultural resources. This effort consisted of an initial desktop study and subsequent field surveys. During the field surveys, all tests excavated in the course of the project measured 40 by 40 cm, were screened through 1/4 inch hardware mesh, and were backfilled. Cultural sites were documented with photographs and field descriptions and mapped with Garmin GPS units.

4 CONSULTATION

A Cultural Technical Working Group (TWG) was established in 2021 and includes representatives from NVE, OHA, USFWS, and the Project Owners. Consultation with the Cultural TWG will continue throughout the duration of the study. A formal traditional environmental knowledge (TEK) assessment of the historic and cultural importance of the Eklutna River is being conducted by NVE in partnership with Trout Unlimited (TU). The Project Owners met with NVE and TU in December 2020 to discuss the schedule and scope of the study. The results of the TEK assessment will be given due weight when developing and comparing potential PME measures.

5 CULTURAL RESOURCES SURVEY RESULTS

Multiple Dena'ina place names along the lake confirm long Indigenous knowledge and use of this landscape (Kari and Fall 2003). Prior to the beginning of field surveys, high resolution LiDAR, satellite imagery, and U.S. Geological Survey (USGS) topographic maps were used to make an initial assessment of the archaeological potential of various portions of the study area. The outlet of Eklutna Lake, the river and lakeshore terraces, tributary creek areas, and peninsulas along the lake were marked as locations with higher potential for past use. In addition, the southeastern end of the lake was judged to have higher potential for cultural resources due to known historic occupations by Eklutna Alex and military training during the 1960s.

The Eklutna River in its deeply incised canyon above the Old Glenn Highway arguably has a lower probability for intact cultural resources due to the steepness of the canyon walls and likelihood that sites near the river may have been washed away by flooding or covered by landslides. The wide braided delta downstream of the New Glenn Highway is also vulnerable to flooding and erosion. However, stable river terraces above this active channel were judged to have higher potential for intact Dena'ina sites.

Ultimately, all areas of the APE were inspected for cultural resources regardless of these landscape and historical criteria. However, efforts such as test pits and close-interval surveys were concentrated in areas with the highest probability for past use.

5.1. Eklutna Lake Shoreline Survey

Investigations around Eklutna Lake encompassed lands within the APE along the northeastern and southwestern shoreline, including adjoining uplands within the Eklutna Lake Campground and at the West Fork of Eklutna Creek at the head of the lake (Figure 5.1-1). The survey covered approximately 16 linear miles of the lake margin. Two historic sites [redacted] and four isolated artifacts were identified in the study area. Other items were associated with modern hunting and camping [redacted]. In particular, several fire rings and a game rack tied together with nylon paracord were located along the south shoreline.

Much of the beach along the northern and southern shore is notably steep (Figures 5.1-2 and 5.1-3). Along most of the lake, excluding its inlet and outlet rivers, the shore is bordered by discontinuous eroding banks at the highwater mark. These exposures were closely inspected as survey teams walked the adjoining beach or trails (Figure 5.1-4). The southern shore is marked by well-developed game trails.

During the survey of the lake shore, four test units were excavated in the uplands above the beach, on landforms in proximity to creeks and lakeshore peninsulas. The first was on a terrace at the mouth of Bold Creek, while the second was along the Eklutna Lakeside Trail adjacent to where a possible lithic artifact was discovered on the surface. The third and fourth tests were near the former Eklutna Alex Cabin site at the head of the lake. None of these tests revealed any cultural materials.

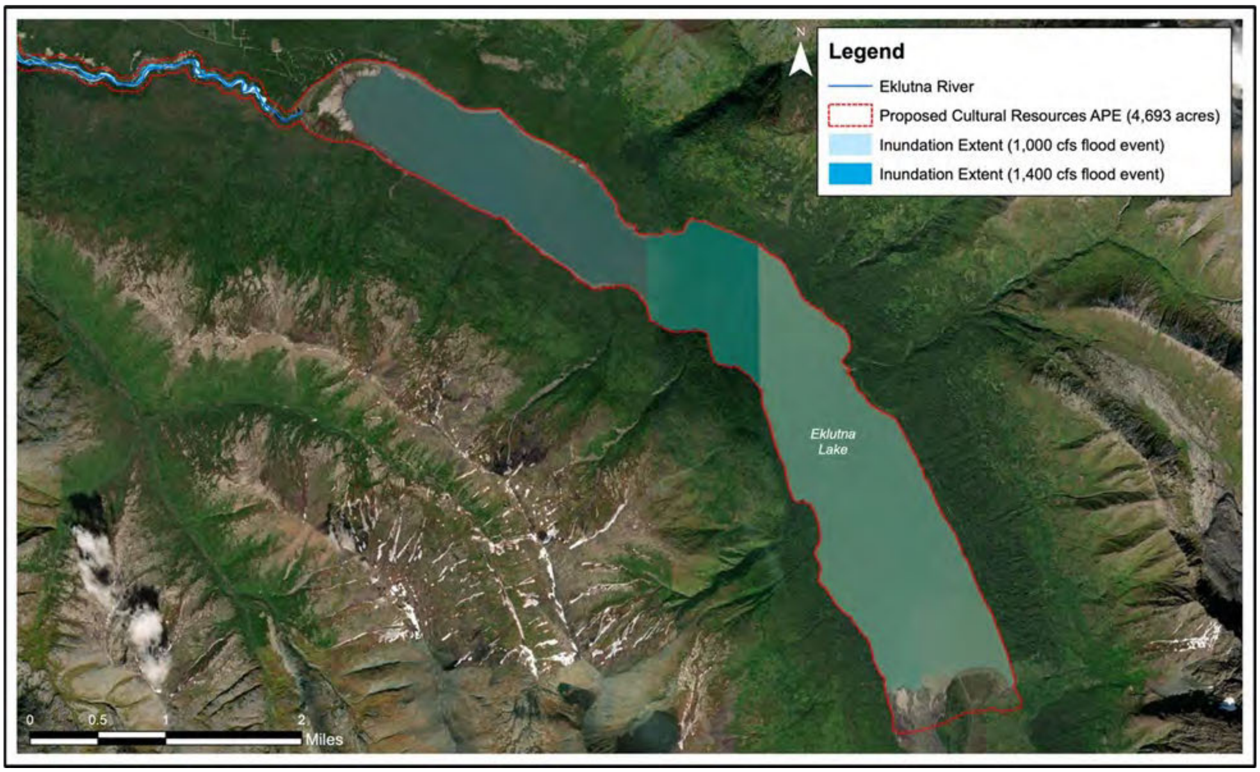

Figure 5.1-1. APE boundary for the Eklutna Lake Shoreline.

Figure 5.1-2. View of the northern shore of Eklutna Lake showing a typical eroded beach surface. View to the east from the Bold Creek area.

Figure 5.1-3. Typical slope and vegetation along the southwestern shore of Eklutna Lake. View to the southeast towards the head of the lake.

Figure 5.1-4. An eroding bank along the northern shore of Eklutna Lake. Exposures of this type were carefully inspected for cultural features and artifacts.

5.2. [redacted] Sites on Shoreline

5.2.1. Storage Dam [redacted]

Several linear arrangements of vertical log piers, sheet metal pilings, retaining walls, and modified gravel dikes at the outlet of Eklutna Lake are all that remain of the Storage Dam initially constructed in 1929. There are three main clusters of pier and earthen elements in this area that, for the purposes of this description, are designated Features 1, 2, and 3. Most of this structure was dismantled in 1965 following damage from the 1964 Earthquake (USBR 1964, 1967). Due to low water conditions in June 2022, many of the dam features were accessible for documentation.

5.2.1.1. Feature 1

The most easterly feature consists of a V-shaped linear alignment of posts connecting the north and south shore of Eklutna Lake. These occur in parallel rows of two and three, separated at 6- and 8-foot intervals. The arrangement is six posts wide where it meets the northern shore of the lake (Figure 5.2-1). Piers are unmodified natural timbers of consistent size, measuring 16 to 18 inches in diameter. These rise upwards of three feet above the beach (Figures 5.2-2 and 5.2-3). One displaced fragment of 3/4-inch braided steel cable occurs near the south end of the alignment (see Figure 5.2-4).

Figure 5.2-1. Feature 1 pier alignment in the foreground and center of the frame. View to the east at the outlet of Eklutna Lake.

Figure 5.2-2. Feature 1 looking northwest with Twin Peaks Mountain in background.

Figure 5.2-3. Feature 1 pier arrangement where it meet the southern Eklutna Lake shoreline at its outlet. View looking northeast.

Figure 5.2-4. Displaced fragment of braided steel cable in proximity to Feature 1 pier alignment. View to the northeast.

The 155 piers observed in Feature 1 are remains of the dam's "breakwater weir" or "log trash collector," a structure used to prevent debris from fouling the dam gate and spillway (Hollinger 2002:38; USBR 1967:Figure 11).

5.2.1.2. Feature 2

Approximately 30 m east of Feature 1 is a second alignment of dam-related elements. Prominent in this area is a 9 m wide and 2 m high rock-lined earthen berm or dike connected to a glacial moraine on the southern side of Eklutna Lake. At its north end is an abutment composed of interlocking 19-inch wide by ½-inch thick steel sheet piling (Figure 5.2-5). These are anchored with 1-inch by 8-foot round iron anchors and angle iron. One sheet section is embossed "USS CARNEGIE ILLINOIS USA." Erosion in this area has partially damaged the structure (Figure 5.2-6).

Directly across the outlet river to the north is a continuation of this same feature, consisting of a roughly 70 m long rock-lined embankment lined of identical sheet-pilings (Figure 5.2-7). Part of it is armored with 14-inch thick formed concrete, as well as rip-rap stones that serve as a retaining wall. This berm is used as an expedient Chugach State Park foot path. Within the active channel of the lake outlet is an irregular cluster of log piers and planks of unknown dimensions (Figure 5.2-8).

Figure 5.2-5. Feature 2 dam abutment on southern bank of the Eklutna Lake outlet. View to the southeast.

Figure 5.2-6. Feature 2 dam abutment on southern bank of the Eklutna Lake outlet showing damage from erosion. View to the west.

Figure 5.2-7. Feature 2 sheet pile and concrete-lined alignment on north side of Eklutna Lake outlet. This is currently used as a Chugach State Park foot path. View looking northwest.

Figure 5.2-8. Feature 2 abutment with an irregular cluster of piers and planks in the center of the lake outlet. View to the northeast.

5.2.1.3. Feature 3

A third primary feature 20 m west of Feature 2 is a wood plank and post structure along the edge of the river and a modified pond. This is a V-shaped enclosure of vertical 2- by 12-inch dimensional lumber planks buttressed with vertical log posts of various sizes. Planks are toe-nailed to the posts with 8-inch-long round iron spikes. Several iron sheet pilings identical to those seen in Feature 2 are part of the wooden structure. The wooden elements are in poor condition (Figures 5.2-9, 5.2-10, and 5.2-11).

Figure 5.2-9. Feature 3, a partial dam abutment at outlet of Eklutna Lake. View to the north.

Figure 5.2-10. Feature 3, a partial dam abutment (foreground), showing its spatial relationship to Feature 2 across the man-made pond. View to the northeast.

Figure 5.2-11. Detail of an iron spike and decayed vertical wood planks within Feature 3.

5.2.1.4. Discussion

The features at the outlet of Eklutna Lake are remains of the storage dam built in 1929 by Frank Reed and AL&P. The first iteration of this dam consisted of a roughly 15- foot high structure of "brush, clay, moss, logs, lumber and rocks" designed to provide a head of stored water for a power plant near Eklutna Village (Hollinger 2002:16; Tibbetts 1929:10; USBR 1967:2–3). Designed elements of the dam included a timber-lined spillway channel, entrance weir, and regulating gate structure (Tibbetts 1929:57; Plate 6). Lumber for various structures was milled on site (Dobbins 1930). Views of this earliest dam are shown in the background chapter (see Figures 2.2-1 and 2.2-2).

The dam was rebuilt in ca. 1939 to 1941 by AL&P. A new 360-foot-long earth and rock embankment was added, incorporating remnants of the first dam (USBR 1967:4). Nineteen hand-operated headgates, steel sheet pilings, and concrete reinforcing were installed (Hollinger 2002:38). In 1952, the structure was modified with additional steel-pilings, rip-rap armor, and earthen dike materials (USBR 1967:2-4; Simonds 1995). This configuration was in place until 1964, when it was irreparably damaged by the 1964 Earthquake. Much of the structure was subsequently dismantled.

The remaining physical elements of the dam are challenging to attribute to individual phases of development. The V-shaped alignment of roughly 155 log piers in Feature 1 is probably the clearest single element of the site. This “breakwater weir” or “log trash collector” was built of interlocking cribs of wood piers. These prevented lake debris from fouling the main gates and spillway, and mitigated wave erosion (Hollinger 2002:28; USBR 1948:27–28; USBR 1967:Figure 11). A fragment of steel cable found associated with Feature 1 may be part of a log boom that was part of the structure (see Figures 5.2-4 and 2.2-2).

Not represented in the Tibbett’s 1928 construction plan or 1930 to 1932 historic photographs, the weir was most likely built between 1939 and 1941. It first appears in a photograph from the early 1940s (Figure 5.2-13), and subsequent 1947 and 1948 views (Bateman 1947:Plate IX) (Figures 5.2-15 and 5.2-16). The structure was in place as late as 1964 (see Figure 5.2-17).

Other log piers observed in Feature 2 and Feature 3 served different purposes. Clusters of piers in Feature 2 were footings of a walkway or deck across the main dam in the 1940s and 1950s (see Figures 5.2-13 and 5.2-6). Piers incorporated into Feature 3 appear to be general reinforcing.

Most elements of Feature 2 are associated with the 1939 to 1941 reconstruction. Diagnostic elements include a prominent steel sheet pile abutment on the southern bank of the outlet stream, and a 70 m long rock, concrete, and steel-armored linear embankment. These durable materials were first used at this time. A 2 m high, rock-lined earthen berm or dike connected to a glacial moraine on the southern side of the outlet stream may relate to the “360-foot long, eight foot high earth and rock structure” incorporated into the earlier 1929 dam abutment (Hollinger 2002:29, 38; USBR 1967:4).

Feature 3 is the least understood structure [redacted]. The partial abutment falls in an area not shown in historic photographs and is not illustrated in a 1947 map of the site (Figure 5.2-12). Steel sheet pilings incorporated into its plank and log construction suggest an association with the 1939 to 1941 or 1952 periods.

Buildings associated with construction and maintenance of the storage dam no longer exist. These included a construction camp established at the lake by Jasper-Stacy Company (Tibbetts 1929:24). The 1930 site had a sawmill, blacksmith shop, gasoline storage house, kitchen, barn, and feed storage tent (Dobbins 1930). In the 1940s and 1950s, the dam was maintained by successive caretakers Ray and Ruth Stevens, Eugene and Olive Shackleton, and workers who lived on site (Hollinger 2002:45). A 1951 plan indicates six buildings on the northern bank of the outlet stream and dam (see USBR 1967:Figure 11). These were moved or bulldozed in the late 1950s or early 1960s, and were gone in a 1964 photograph of the area (Hollinger 2002:52; USBR 1964:Plate 109; Figure 5.2-17).

Archaeological survey of the caretaker’s cabin site did not locate any remains of buildings, foundations, or artifacts. The hard-pan gravel ground surface and young alder and cottonwood vegetation suggests that the area has been bulldozed.

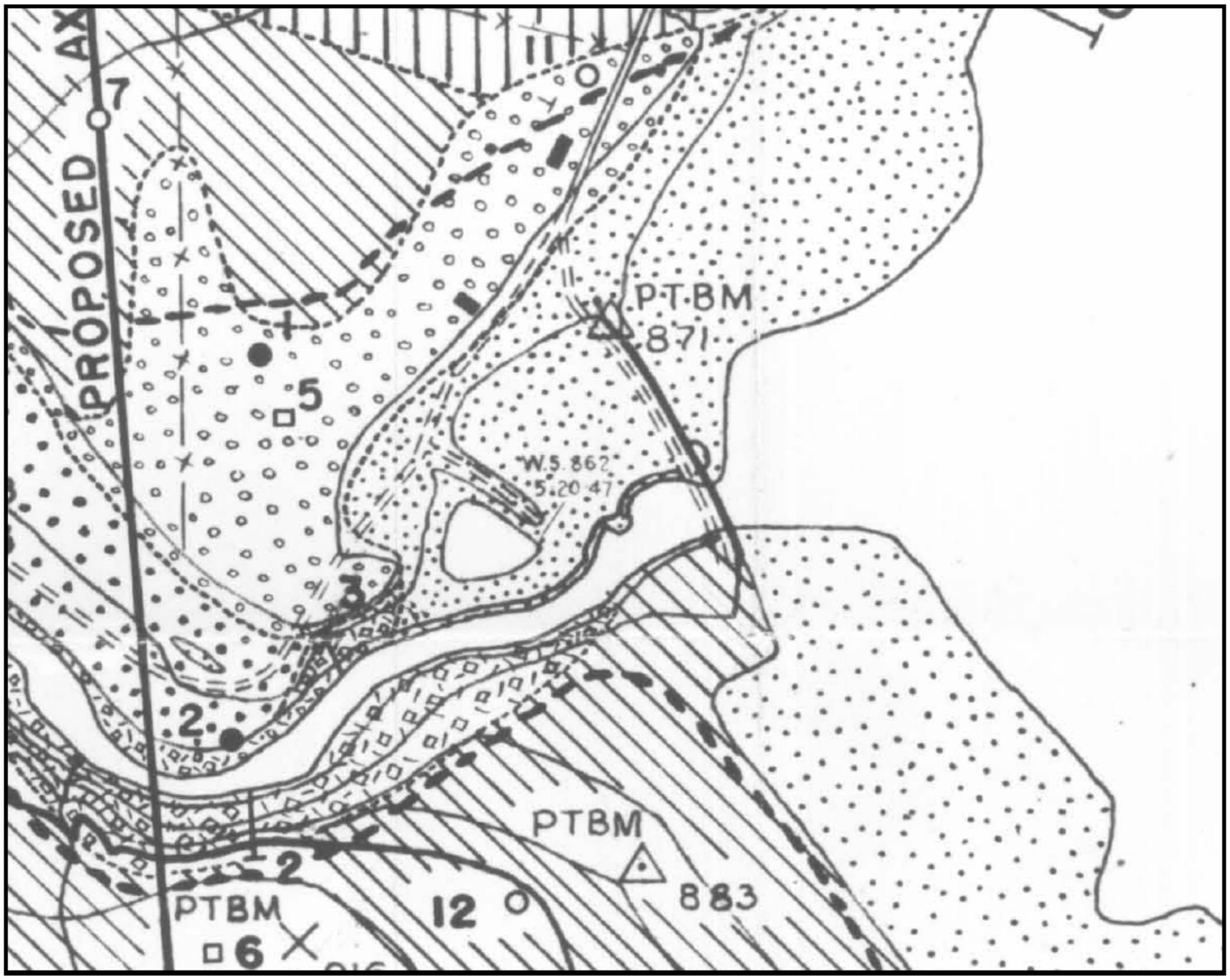

Figure 5.2-12. Sketch of Storage Dam site in 1947 showing general layout and buildings. From Bateman (1947).

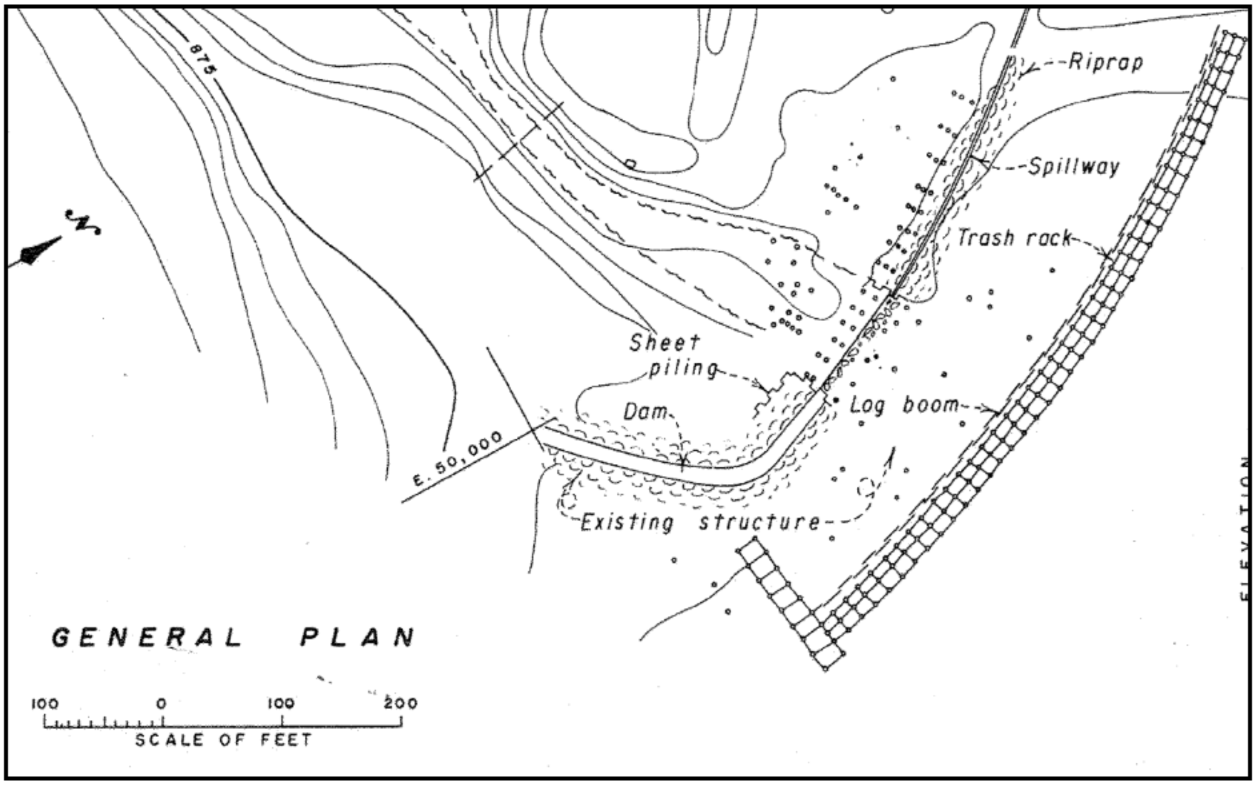

Figure 5.2-13. Plan of the Storage Dam in 1964. From USBR (1964).

Figure 5.2-14. View of the Eklutna Dam in the early 1940s showing the dam and plank walkway in foreground (Feature 2). The separate “breakwater weir” cribbed alignment (Feature 1) is located to the right.

Figure 5.2-15. Cribbed log pier structure of the "breakwater weir" (bottom of frame) that restricted debris from entering the gate and spillway. Footings of this structure occur today as Feature 1. Photo from USBR (1948).

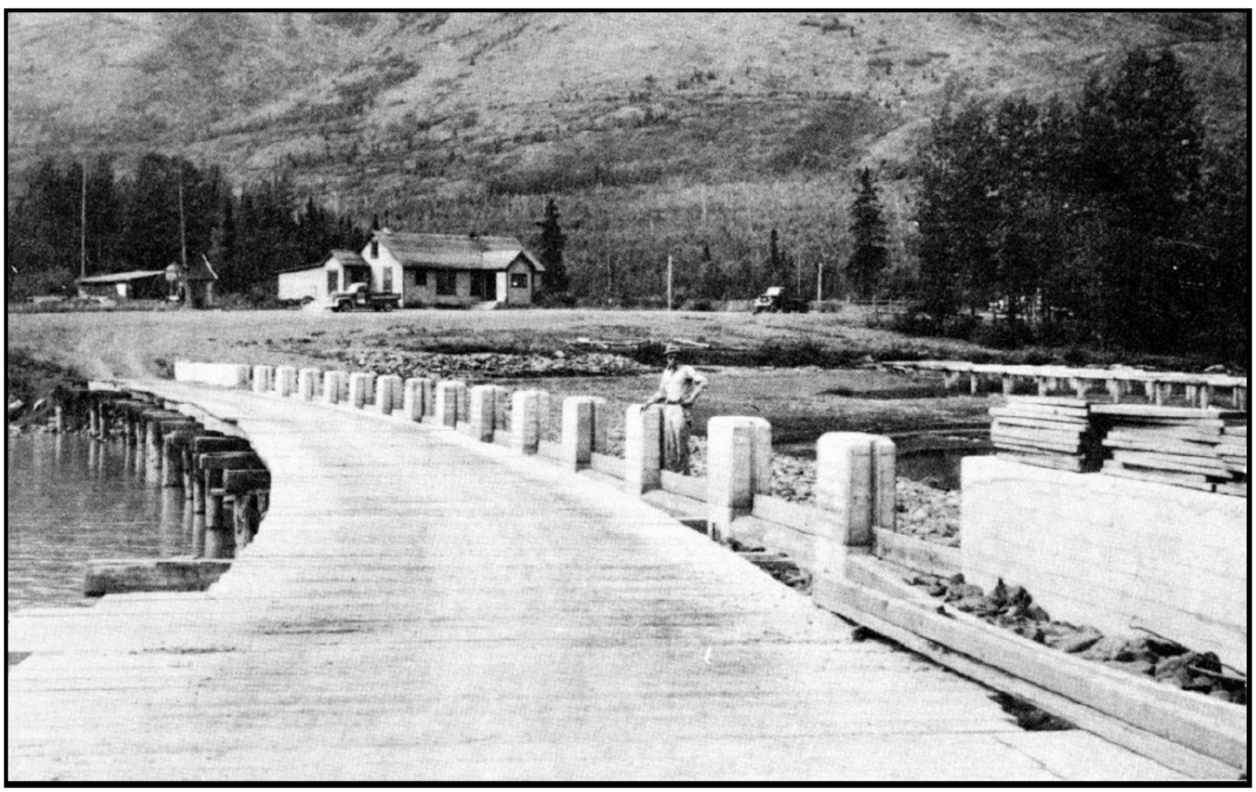

Figure 5.2-16. View of Storage Dam (Feature 2, center); "breakwater weir" (Feature 1, right); and caretaker's house. From USBR (1948).

Figure 5.2-17. Photograph of the Eklutna Dam and Spillway following the 1964 Earthquake (USBR 1964:Plate 109). View to the northwest.

5.2.2. Log Pier Cluster [redacted]

This feature, located near Mile 0.5 of the Eklutna Lakeside Trail, is an arrangement of vertical wooden piers on the beach. The piers are roughly perpendicular to the trail and extend south to the lake edge in an area that is usually underwater (Figures 5.2-18 and 5.2-19). These are remains of a temporary dock or wharf associated with the 1951 to 1954 construction of the Eklutna intake structure (Simonds 1995).

Localized to a 19 by 22 m area are 31 vertical peeled log piers measuring 8 to 14 inches in diameter. These occur as parallel lines of two or four posts, separated at regular 5- and 6- foot intervals. There are threaded ½- by 14-inch iron bolts imbedded in two piers (Figure 5.2-20). Although preserved with creosote, the posts are in poor condition due to weathering and ice shearing. Many are barely discernable under the gravel beach shingle.

Two partially buried sections of iron pipe also occur in this area. Both 8-inch diameter specimens are internally threaded and may be either water pipes, conduit, or well casing (Figure 5.2-21). Splinters of dimensional lumber are scattered throughout in the general vicinity.

Figure 5.2-18. View of the pier arrangement to the south from the Eklutna Lakeside Trail.

Figure 5.2-19. View to the north showing the pier arrangement and Eklutna Lakeside Trial in background.

Figure 5.2-20. One of two log piers with threaded bolts. View to the northwest at the base of the Eklutna Lakeside Trail.

Figure 5.2-21. One of two threaded iron pipes within the pier arrangement. View looking north with Eklutna Lakeside Trail in background.

Figure 5.2-22. View of the temporary dock or wharf (background on shore) used during construction of the Eklutna intake tunnel.

These piers and scattered pipe mark the site of a wharf or dock associated with construction of the Eklutna diversion tunnel between 1951 and 1954. The temporary structure was built by Palmer Constructors, a subsidiary of Peter Kiewit Sons' Co., Morrison-Knudson Company, and Coker Construction Company (Simonds 1995). Palmer Constructors was the primary contractor for the USBR project. One historic photograph, a view west along the shoreline in this area, shows this dock structure, a dragline crane, and barge just offshore (Figure 5.2-22). Several buildings on the shoreline are likely Palmer Constructor's temporary construction camp (Simonds 1995). The archaeological survey did not yield evidence of buildings or artifacts. The former habitation site is heavily disturbed.

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

5.2.4. Culvert and Steel Band [redacted]

Located at approximately Mile 1.0 of the Eklutna Lakeside Trail, this culvert and welded steel band is composed of at least three 55-gallon steel drums on a frame of 4- by 4-inch treated lumber stringers (Figures 5.2-24 and 5.2-25). The handmade culvert extends under the trail. Twelve meters south on the beach is a 3.1 m long, semicircular steel band. It is constructed of two welded sections of 1/4-inch steel stock joined with 6-inch by 1/4-inch threaded bolts (Figure 5.2-26). This is part of an expandable joint repair ring used to rebuild the damaged Eklutna water intake conduit structure following the 1964 Earthquake (USBR 1964: ASBUILT Plan 783-D-650; Figure 5.2-27). These were fabricated under direction of contractor Mason-Olsberg Company during early spring and summer of 1965 (Simonds 1995; USBR 1967:66–68, 77).

Figure 5.2-24. Steel repair band (foreground) and culvert along the Eklutna Lakeside Trail. View to the north.

Figure 5.2-25. Culvert built of 55-gallon drums and wooden stringers. View to the east with the Eklutna Lakeside Trail to the left.

Figure 5.2-26. Steel joint repair band on the shore of Eklutna Lake. View to the east.

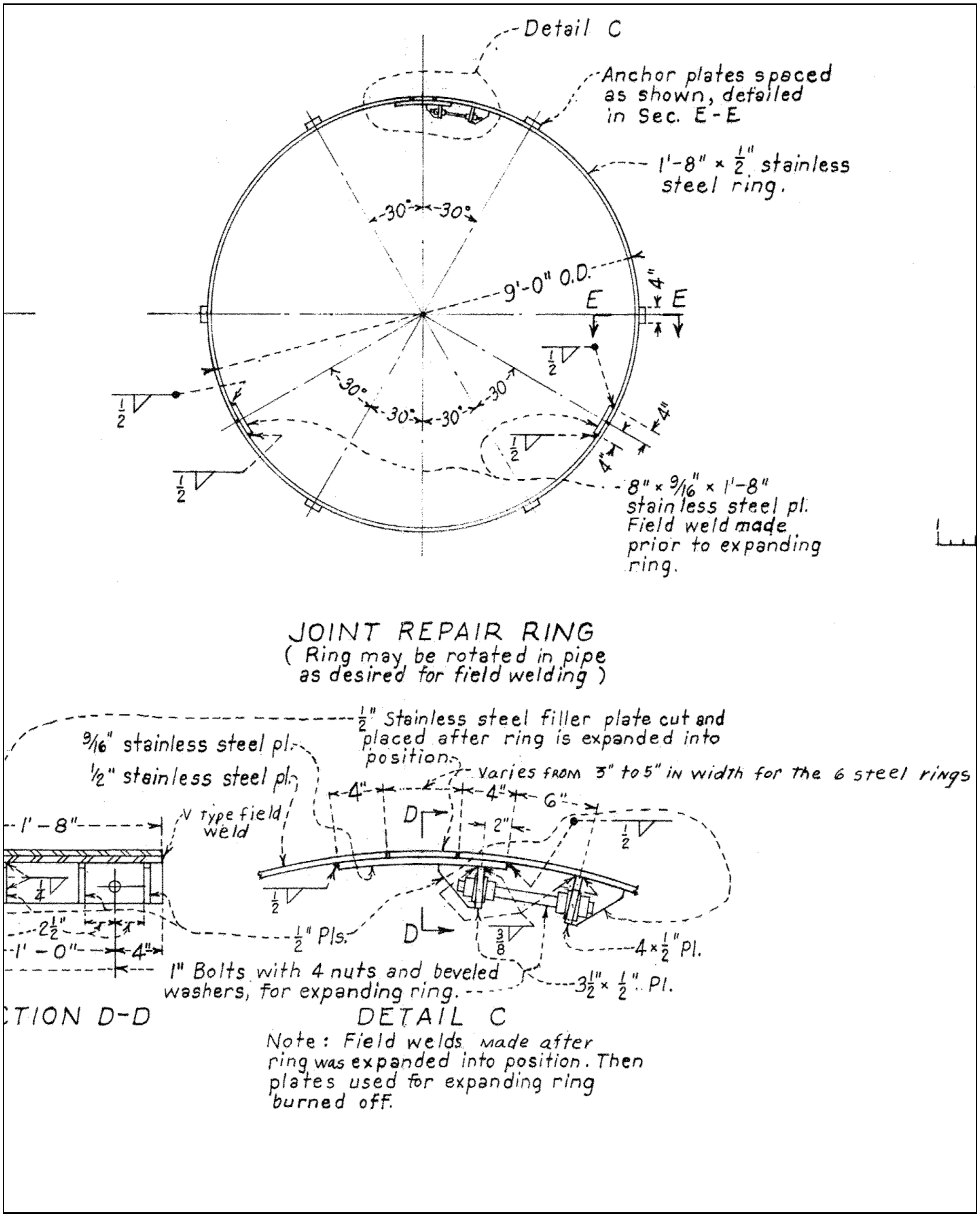

Figure 5.2-27. Schematic of a field-welded steel joint repair ring (USBR: ASBUILT Plan 783-D-650).

Figure 5.2-28. Metal pipe extending from the bank on the southwestern shore of Eklutna Lake.

Located on the southwestern shore of the lake is a 7-foot-long section of 6-inch diameter metal pipe with a valve attachment at one end. It extends out of a gravel bank approximately 0.65 miles (1,004 m) east of the lake outlet and the site of the storage dam. No other cultural materials were located nearby (Figure 5.2-28).

5.2.5. Eklutna Alex Cabin

Investigations of the former Eklutna Alex Cabin site involved interviews, pedestrian survey, and archaeological testing. Although the historic cabin was lost to erosion in 2004, an effort was made to determine if there were still any associated remains, such as midden deposits or outbuildings, in the vicinity. Part of this displaced cabin was located in September 2022.

Much of what we know of the early cabin, which was built in 1927 at the mouth of the West Fork of Eklutna Creek, comes from Kari and Fall (2003). Documents collected by Eklutna Valley historian Rick Sinnott provided key information regarding its later use and demise.

Eklutna Alex, as he was known to Euroamericans, was a Dena'ina chief who lived in the Knik Arm region between 1865 and 1952. Named "Bel K'ikghil'ishen" in the Dena'ina language, he and other Eklutna residents used the upper end of Eklutna Lake for subsistence, especially sheep and ground squirrel hunting. Eklutna Alex maintained trap lines for many years in the area known as "Bendelent," or "Where it Flows into the Lake" (Dobbins 1930; Kari and Fall 2003:324; Leggett 2022).

According to elder Shem Pete,

> He [Eklutna Alex in 1927] just pack a little grub and went up to the upper end of the lake. And he build a cabin there. That's why he never come back for a month. His wife worry about him. He build a big house on the upper end of the lake [Kari and Fall 2003:324].

After his death, the cabin was used by others of Eklutna Village. With passage of the North Anchorage Land Agreement (NALA) in 1982, management of the site fell to Chugach State Park (Meiners 1994; Municipality of Anchorage 1982).

The cabin was popular among park enthusiasts and was the only historic cabin maintained by Chugach State Park on Eklutna Lake. During its later years it was rehabilitated as a ranger patrol cabin (Johannsen 1986). By 1994, when Chugach State Park began charging overnight use fees, the structure was being threatened by erosion of the West Fork of Eklutna Creek. The cabin was lost to the creek around 2004 (Chugach State Park 1994, 1995).

The exact location of the cabin was unknown prior to this survey. A hand-drawn 1993 sketch by the Chugach State Park Advisory Board placed it on the northern bank of the West Fork of Eklutna Creek, where it meets Eklutna Lake (Figure 5.2-29). In June 2022, local residents Steve and Debbie Thon, who used the cabin on multiple occasions in the 1980s and 1990s, were interviewed by CRC archaeologist Daniel Thompson (Steve and Debbie Thon, personal communication 2022). Using maps and satellite imagery, they located it along an abandoned Chugach State Park trail spur. They recalled the interior having a dirt floor, a bunk bed, and wood stove. There was an outhouse about 50 feet north of the cabin. Eklutna Valley resident Rick Sinnott mapped the former cabin site in a similar location (Rick Sinnott, personal communication 2022).

CRC's surveys on June 20 and 22, 2022, did not reveal any remaining evidence of the cabin, its outhouse, or associated cultural remains. Close-interval pedestrian transects did locate an abandoned Chugach State Park trail just east of the former cabin site, with a Chugach State Park sign and barrier posts undercut by the river (Figure 5.2-30). This was the same trail segment described by informants and illustrated in the 1993 Chugach State Park sketch map as a dotted line.

The West Fork of Eklutna Creek's confluence with Eklutna Lake continues to erode, as evidenced by recently downed trees and bank sloughing (Figure 5.2-31). Inspection of exposed soils along the bank did not yield any artifacts or features and tests in the vicinity were culturally sterile. Tests encountered banded alluvial sand deposits, indicating multiple past flooding events.

Figure 5.2-29. General location of the Eklutna Alex Cabin (Existing Cabin #1) prepared by the Chugach State Park Advisory Board (1993).

Figure 5.2-30. Eroded Chugach State Park trail just south of the former Eklutna Alex Cabin site. View to the northwest.

On September 10, 2022, Eklutna Valley resident Steve Thon discovered partial log remains of the Eklutna Alex Cabin on the lake shoreline near the outlet (Figure 5.2-32). Given high floodwaters in late summer 2022, it is presumed the buoyant cabin logs floated seven miles down the lake from the West Fork of Eklutna Creek. It is unclear if, or where, other portions of the displaced cabin might lay along the lake margin.

The discovered remains include two peeled and hand-hewn spruce logs, toe-nailed to each other with round iron spikes. The logs are seven to nine inches in diameter and were saddle-notched with an axe or adze (Figure 5.2-33). The 115-inch-long section is from an upper gable wall of the cabin. In addition to original iron spike fasteners, the logs are bolted together with a weathered aluminum "No Fire" sign (Figure 5.2-34). This fortuitous signage not only ensured that the logs stayed together, but helped confirm this as part of Eklutna Alex's cabin. Comparison of 1980s photographs with its unique log notching style leave little doubt of its origins (see Figures 5.2-35 and 5.2-36).

Following the discovery, CRC senior archaeologist Michael Yarborough and Samantha Owen of McMillan Jacobs Associates notified the Alaska SHPO and interested parties. Following consultation between the SHPO, ADNR Department of Parks and Recreation, and NVE, the logs were transferred to the Eklutna Village for long-term curation and possible future public interpretation.

Figure 5.2-31. Eroding riverbanks of the West Fork of Eklutna Creek near the former Eklutna Alex Cabin. View to the southwest.

Figure 5.2-32. Two log courses of the displaced Eklutna Alex Cabin on the shore of Eklutna Lake, just north of its outlet.

Figure 5.2-33. Detail of a hand-hewn corner notch of the Eklutna Alex Cabin. Ferrous staining of an iron spike can be seen in the log above the photographic scale.

Figure 5.2-34. Weathered Chugach State Park sign bolted on what was once the upper gable wall of the Eklutna Alex Cabin.

Figure 5.2-35. The Eklutna Alex Cabin in 1987 featuring Chugach State Park Ranger Ed Barrett. Photograph courtesy of historian Rick Sinnott and Chugach State Park.

Figure 5.2-36. Front entrance of the Eklutna Alex Cabin in 1984. Photograph courtesy historian Rick Sinnott and Chugach State Park.

5.3. Eklutna River Corridor Survey

The Eklutna River corridor was surveyed over the course of seven field days during June and August 2022. For the purposes of reporting, this area is divided into four segments: the lake outlet to the Anchorage Water and Wastewater Utility (AWWU) portal; AWWU portal to where the AWWU pipeline exits the river valley; where AWWU pipeline exits the river valley to the Thunderbird Creek trailhead; and Thunderbird Creek trailhead to Knik Arm. The APE for the river corridor was defined by a modeled water inundation level of 1,402 cfs (Figures 5.3-1 and 5.3-2).

5.3.1. Lake Outlet to AWWU Portal

Within this survey segment is the Eklutna Power Project Dam [redacted] and Spillway [redacted] that were constructed in 1965 after the 1964 Earthquake damaged the previous dam (see the discussion in Section 2.2.3.2). The crest of the dam is approximately 891 feet above sea level, 16 feet higher than the previous dam. The overflow spillway has an elevation of 871 feet, which is 3.5 feet higher than the previous dam and increases the storage capacity by about 10%.

From the dam to the AWWU portal, the river valley is relatively wide and flanked by steep slopes. This section of the APE was surveyed by three archaeologists walking in transects spaced 20 m apart, surveying within the areas that would be inundated at a flow level of 1,402 cfs.

The upper river between the dam and the AWWU portal is densely vegetated with spruce, cottonwood, and alder, which has grown in older river channels and along the banks of the river. Few older cultural resources were found in this section of the river, although there is a lot of modern debris, including bottles, shoes, and pieces of plastic, along the river margins, likely washed downstream by recent water releases. The few older items, like one cut timber, were clearly displaced and not part of an older site.

5.3.2. AWWU Portal to Where Pipeline Exits the Valley

Survey of this section of the river was conducted by two archaeologists over a period of two days. Downstream from the AWWU portal, beaver activity has altered a large portion of the river valley. The valley is relatively wide, but constrained by steep cliffs, with limited ways for people to have entered the valley in the past. Several alluvial fans enter the valley from both the northeast and southwest sides of the river valley, creating large gravel or silt deltas (Figure 5.3-3).

No cultural resources were found in this section of the APE. Given the topography, with few raised terraces above the river, and frequent scouring by past floods and recent dam releases, this area has little potential for cultural resources.

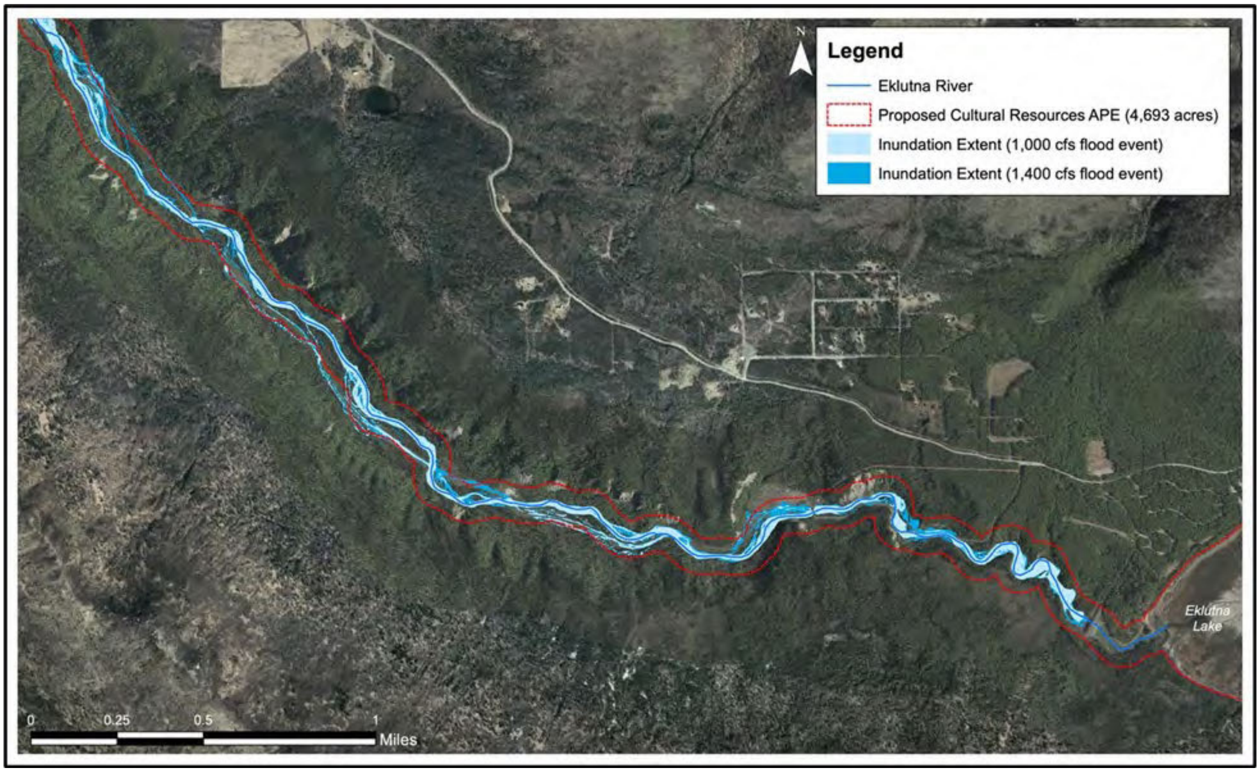

Figure 5.3-1. APE along the Upper Eklutna River Corridor.

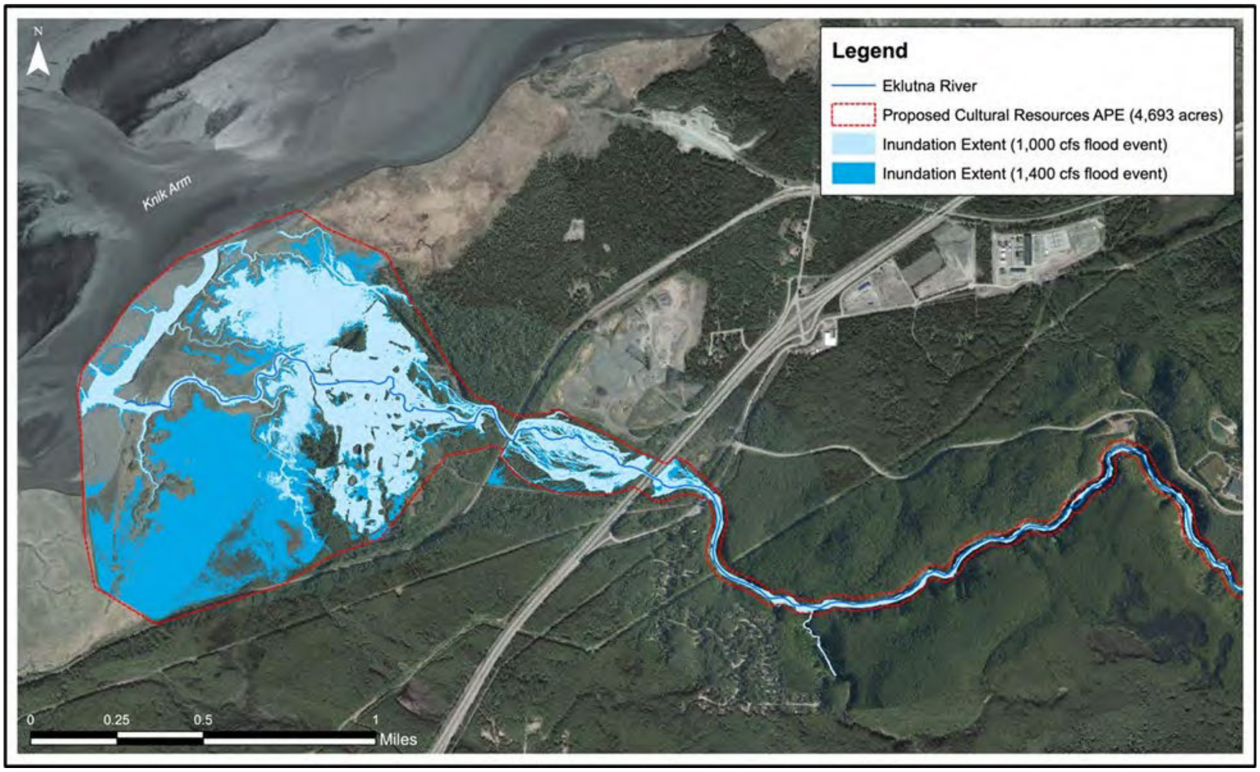

Figure 5.3-2. APE along the Lower Eklutna River Corridor.

Figure 5.3-3. Alluvial fan along the northeastern side of the Eklutna River.

Figure 5.3-4. Debris upstream from the old dam site.

5.3.3. Pipeline Exit to Thunderbird Creek Trailhead

Most of this section of the APE is within a deeply incised canyon. The river canyon narrows significantly downstream from where the AWWU pipeline exits the river valley and is boxed in by steep rocky cliffs that are prone to frequent rockfall and landslides. As there are no access points to the river from the canyon walls, this area can only be accessed by traveling upriver from the confluence with Thunderbird Creek or downriver from above the canyon.

There is a lot of debris associated with former dumping above the old lower dam site in the canyon. CRC archaeologists found numerous car tires, pipes, pieces of plastic, cans, washing machine parts, and car parts in the canyon (Figure 5.3-4). There was formerly a large illegal dump upstream of the old lower dam that was largely cleaned up in the early 2000s, prior to the removal of the dam (Manning 2001).

Aside from the scattering of debris from the dump site that has been spread downriver, no cultural resources were found in this section of the survey. Due to the frequent landslides, flooding, and the difficulty getting into the canyon, this area has a low potential for intact cultural resources.

5.3.4. Thunderbird Creek Trailhead to Knik Arm

Investigations of this segment of the APE involved archaeological surveys and documentation of the Eklutna River Railroad Bridge [redacted]. [redacted] Three 55-gallon drums were located in this study area.

Figure 5.3-5. A typical abandoned gravel pit in the braided outwash plain of the Eklutna River, downstream of the Alaska Railroad.

Much of this area is characterized as a wide outwash plain crisscrossed by multiple braided channels of the Eklutna River. Flooding and past gravel mining have left the floodplain vegetated with regrowth cottonwood and alder. A significant portion of the APE is a disturbed landscape of alder-covered spoil piles, man-made ponds, and bulldozed trails and pits (Figure 5.3-5). The archaeological surveys focused on terraces along the margins of the former gravel pits and relict river terraces, the only undisturbed ground with potential for intact cultural materials.

5.4. [redacted] Sites on the River

5.4.1. [redacted]

The Eklutna River Railroad Bridge, located at Mile 140.8 of the Alaska Railroad, crosses over the Eklutna River in Section 25 of Township 16N, Range 1W of the Seward Meridian (Figure 5.4-1). The current bridge is an 80-foot-long, thru girder span, timber and steel bridge (Alaska Railroad Corporation [ARRC] 2003). The bridge was first described in 1975 by C. M. Brown (AHRS 2022) and more completely documented during CRC's ARRC Historic Bridge Inventory (ARRC 2003).

Like many other bridges in the early period, the original span over the Eklutna River was a timber trestle constructed in 1917 (ARRC 2003). Crews used standard plans and local timber to construct 53 bents and false work. The current bridge was not completed until 1927, although fabrication began in 1925. The Alaska Railroad renewed the ties and guardrail in 1950 and, immediately after the 1964 Earthquake, reset the girders and installed an inner guardrail. The Alaska Railroad painted the bridge in 1969 and they replaced the guardrails in 1980. A current, 2022 photograph of the Eklutna River R.R. Bridge is shown in Figure 5.4-2.

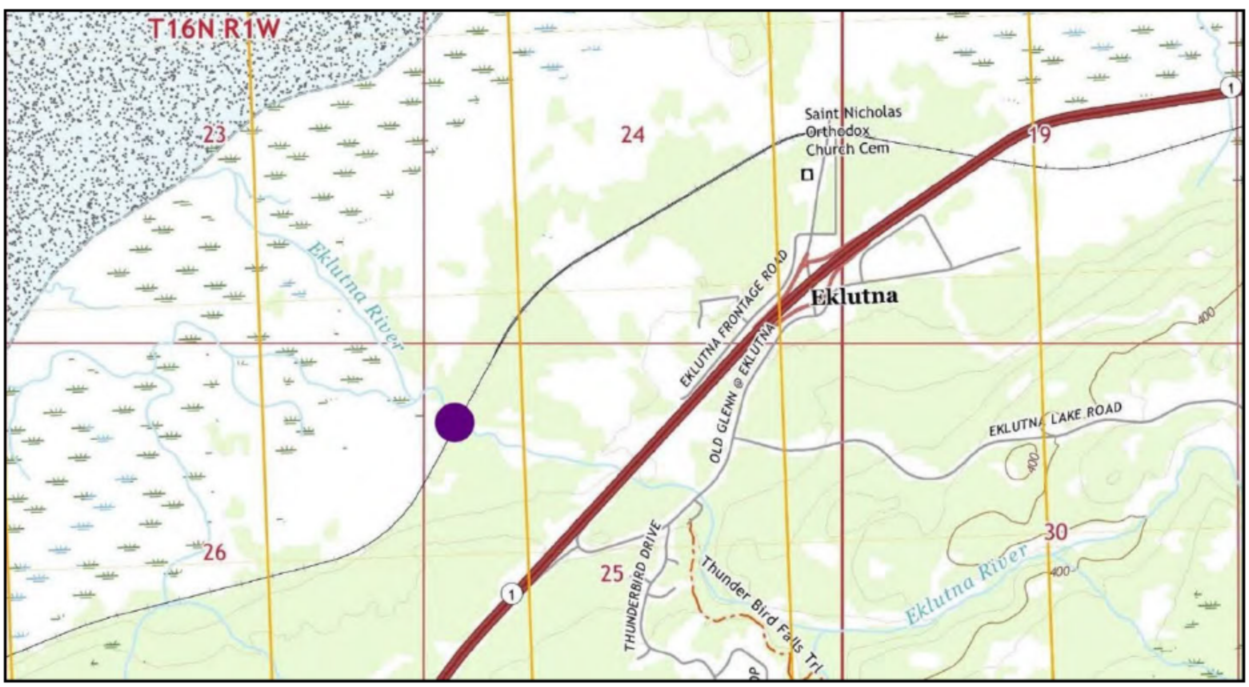

Figure 5.4-1. Location of the Eklutna River Railroad Bridge in purple (USGS 2021).

Figure 5.4-2. View to the west of the Eklutna River Railroad Bridge.

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5.4.4. 55-Gallon Drums [redacted]

One of the three 55-gallon drums found during the survey of this area was approximately 30 m north of the Alaska Railroad. The empty steel fuel or chemical drum lacks any distinguishing features other than faint traces of blue paint and a square perforation (Figure 5.4-4).

There are two additional drums just downstream of the Thunderbird Falls Bridge on the eastern bank of the Eklutna River. Both were filled with concrete and likely served as barriers along an abandoned gravel bridge access road (Figure 5.4-5).

Figure 5.4-4. Single 55-gallon drum near the Alaska Railroad alignment. View to the northwest with the Eklutna River channel in background.

Figure 5.4-5. One of two identical concrete filled drums along the eastern bank of Eklutna River, downstream of the Thunderbird Falls Bridge.

6 CULTURAL RESOURCES EVALUATION

The results and conclusions from this study will be utilized during alternatives analysis to evaluate any potential impacts to cultural resources that may result from future water management changes. Although this is not a Section 106 undertaking, the project team used National Register criteria (36 CFR 60.4) to evaluate the local, regional, or national level significance of identified resources. For a particular property—a district, site, building, structure, or object—to qualify for the National Register, it must meet one or more of the National Register Criteria for Evaluation and retain enough historic integrity necessary to convey its significance (NPS 1998). The National Register Criteria are:

- A: Association with events that have made a significant contribution to the broad patterns of history.
- B: Association with the lives of significant persons.
- C: Embodiment of the distinctive characteristics of a type, period, or method of construction, or representation of the work of a master, or possession of high artistic values, or representation of a significant and distinguishable entity whose components may lack individual distinction.
- D: Having yielded, or having the ability to yield, information important in prehistory or history.

In addition to meeting one or more of the significance criteria, a property must retain integrity, which "is the ability of a property to convey its significance" (NPS 1998:44). The seven aspects of integrity are: location, design, setting, materials, workmanship, feeling, and association.

- Location is the place where the property was constructed or the place where the event took place.
- Design is the combination of elements that make up the form, plan, space, structure, and style of a property.
- Setting is the property's physical environment.
- Materials are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a property.
- Workmanship is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
- Feeling is the property's expressions of the aesthetic or historic sense of a particular period of time.
- Association is the direct link between an important historic event or period and a historic property.

Bulletin 15 states that "To retain historic integrity a property will always possess several, and usually most, of the aspects" (NPS 1998:44). Properties important under Criteria A or B ideally should retain some features of all seven aspects of integrity. However, integrity of design and workmanship might not be as important as other aspects (NPS 1998:46). To be eligible under Criterion C, a property must retain the physical features that characterize its type, period, or method of construction. Retention of design, workmanship, and materials are usually more important than location, setting, feeling, and association. Criterion D is most often applied to archaeological properties, but can apply to buildings if they are, or "must have been," the principal source of important information, and retain sufficiently intact and adequate data to answer relevant research questions (NPS 1998:22, 23).

6.1. Eklutna River Railroad Bridge [redacted]

Criterion A: The Eklutna River Railroad Bridge is recommended as eligible for the National Register under Criterion A for its continued association with the operation of the Alaska Railroad between Anchorage and interior Alaska. During the bridge's initial period of significance, it supported the Alaska Railroad's efforts to develop the Palmer Colony and interior Alaska. During WWII, the bridge and others like it helped move critical military supplies and materials. Since its construction, the bridge has generally been associated with the development of transportation in Alaska, as part of one of the only transportation corridors reaching from Seward into the interior.

Criterion B: The bridge is not recommended as eligible under Criterion B, as it is not associated with any known significant person.

Criterion C: The bridge is not recommended as eligible under Criterion C. It is not especially exemplary of the distinctive characteristics of Alaska Railroad bridges constructed during the 1920s.

Criterion D: The Eklutna River Railroad Bridge is not recommended as eligible under Criterion D. The construction of the bridge is well documented, and further investigation will not yield information important to history.

Integrity. The Eklutna River R.R. Bridge retains its historic integrity. The bridge has not been moved from its original location and, although the Alaska Railroad installed a guardrail in 1964 and replaced it in 1980, the bridge generally maintains its original design. The bridge's integrity of setting is also high. The natural physical environment of this portion of the Eklutna River is only visually altered by the railroad and bridge itself. The bridge's integrity of materials is high, as the Alaska Railroad renewed the ties and guardrail in 1950 with materials like those used during the original construction. The inner guardrail is of similar material. The high integrity of workmanship and feeling are embodied in how the bridge is typical of construction for this period. Finally, the bridge's integrity of direct association with important historic events is strong. The bridge continues to function as a critical part of the railroad's transportation operations.

6.2. Eklutna Power Project Dam [redacted] and Spillway [redacted]

Criterion A: The 1965 Eklutna Power Project Dam and Spillway are recommended as eligible for the National Register under Criterion A as contributing properties to the Eklutna Hydroelectric Project [redacted]. In 1996, the Eklutna Project was determined eligible under Criterion A for its "role in and representation of" the State-level context of "Hydroelectric Development in Alaska, 1898–1980," especially post-WWII; the National "Federal Hydroelectric Development, 1902–1980" context; and the local "Power Development in the Anchorage Area, 1916–1980" context (Woodward-Clyde 1996). The dam and spillway were exempted from the original determination because they were less than 50 years old at the time, and they were not considered exceptionally significant enough to be considered for listing.

Although, as noted in the 1996 evaluation, "[t]he dam, intake structure, and tailrace were substantially rebuilt in 1965 and retain low integrity from the period of original construction," (Woodward-Clyde 1996:3), they have since established association with the development of hydroelectric power in Alaska and all other historic contexts applied to other properties associated with the Eklutna Project.

Criterion B: As noted in the original determination of eligibility, no part of the Eklutna Project is associated with people especially important to the past (Woodward-Clyde 1996). Both Rusty and Russ Dow, an artist and avid photographer, respectively, worked at the Eklutna Power Plant and documented their time there from 1956 to 1987, but they were not associated with the dam itself. Neither seems to have documented the dam in their photographs and papers that are archived at the University of Alaska Anchorage Consortium Library's Archives and Special Collections.

Criterion C: The dam and spillway are not recommended as eligible under Criterion C. They do not embody particularly distinctive characteristics of a type of construction, as they were built from a standard USBR design: Specifications No. DC-6240 (USBR 1967:79).

Criterion D: As noted in the original determination of eligibility, no part of the Eklutna Project is eligible for the National Register under Criterion D, as its construction and design are well documented (Woodward-Clyde 1996).

Integrity: The dam and spillway retain their integrity of location. They have, however, lost some integrity of design. None of the APA reports examined for this document make note of any improvements to the dam (APA 1968, 1969, 1970, 1971, and 1992), but the dam's drainage outlet gate was replaced in 2021 after lack of use and accumulated rocks rendered it unusable (eklutnahydro 2021a). Additionally, minor fencing not present in late 1960s-era photographs has been added to the concrete spillway to prevent people from jumping into the water (Dan Thompson 2022, personal communication). While the general form, plan, space, and style of the dam and spillway are essentially the same as when they were initially constructed, the structure has changed slightly.

The dam and spillway's integrity of setting is high. The area is virtually unchanged since the dam's reconstruction in the 1960s, although there has been some vegetation regrowth (compare Figure 2.2-4 and drone footage in eklutnahydro 2021b). The integrity of materials and workmanship are lessened due to the gate replacement and the addition of fencing, but otherwise the dam is composed of the same materials and crafted in the same way, with earth and rock fill on a foundation of firm glacial till with a concrete spillway.

The dam and spillway's integrity of feeling is not especially notable. Even if relatively unchanged, they do not express the historical sense of the 1960s. However, that does not lessen their aesthetic appeal in general. Both have a high integrity of association, maintaining a direct link between their historic function as a hydroelectric dam for Anchorage and the Matanuska-Susitna Valley. The dam and spillway are directly related to the historic contexts of "Power

Development in the Anchorage Area, 1916–1980," "Hydroelectric Development in Alaska, 1898–1980," and "Federal Hydroelectric Development, 1902–1980."

6.3. Storage Dam [redacted].

Criterion A: The storage dam, located at the lake outlet, is historically significant under Criterion A, although it is not recommended as eligible to the National Register due to lack of integrity (see below). Between 1929 and 1956, this component of Anchorage's first hydroelectric project served as an impoundment to manage water resources of the Eklutna Lake watershed. Water held back by the dam was used to generate electricity at the Old Eklutna Power Plant [redacted]. During this period of significance, the dam was a contributing element of the larger Eklutna Hydroelectric Project [redacted], and previously determined eligible for the National Register for its local and state significance. This hydroelectric project was the first of its kind in Southcentral Alaska and directly contributed to the economic development of Upper Cook Inlet communities.

Criterion B: The dam is not recommended as eligible under Criterion B. Although part of the Eklutna Hydroelectric Project that was conceived and funded by Frank I. Reed and AL&P, the early earthen dam was one of numerous individual elements of the project. The most essential element of Frank Reid's contribution to history was the Eklutna Power Plant [redacted], which is already listed in the National Register. The old dam was not associated with any other known significant individuals.

Criterion C: The dam is not significant under Criterion C, as it was not an example of exceptional engineering. In 1929, the structure consisted of an earthen berm, headgate, and spillway. Between about 1939 and 1941, it was improved with steel pilings, rock rip-rap armor, a new spillway, and regulating gates. Additional elements were added in 1951, with each modification being incorporated into existing parts of the dam. The resulting structure was a palimpsest of over 25 years of vernacular engineering improvements.

Criterion D: The dam is not recommended as eligible under Criterion D as little of the modified dam structure remains for study. The most likely source for new information would be historic documentation such as as-built plans, photographs, and historic records of AL&P, Anchorage Public Utilities, and USBR.

Integrity. The Storage Dam does not retain historic integrity. Due to multiple modifications between 1929 and 1951, the dam site is a discontinuous array of features that represent multiple periods of construction. Few, if any, elements of the 1929 dam survive, having been lost to erosion, scavenging, reconstruction, and repair. Essential engineering components of the 1929 dam and the 1939 to 1941 improvements—specifically the headgate, slide gates, plank and concrete spillways, maintenance walkways, flash boards, and superstructures—are no longer present. Erosion has damaged and obfuscated most traces of the dam. Remains of the 1939 to 1941 structure are limited to a single sheet pile abutment and a deflated mound that once marked its general footprint. It is further obscured by the gravel fill of a Chugach State Park access trail.

Remains of the breakwater weir, a secondary element of the dam added between 1939 and 1941, have succumbed to weathering. This cribbed structure is discernible as an alignment of pier footings without a clear indication of its function. The site of a 1929 to 1930 construction camp and subsequent worker housing was bulldozed in the 1960s and lacks any archaeological signature.

Despite its significance as a contributing element of the Eklutna Hydroelectric Project [redacted] under Criterion A, the Storage Dam lacks the physical integrity and essential features to portray its historical significance.

6.4. Cluster of Log Piers [redacted]

Criterion A: The arrangement of vertical wooden piers on the beach near Mile 0.5 of the Eklutna Lakeside Trail is not recommended as eligible to the National Register under Criterion A. Built between 1951 and 1954, this wharf or pier was a temporary structure associated with construction of the Eklutna Diversion Tunnel. Although associated with the larger Eklutna Hydroelectric Project [redacted], the wharf was not an essential part of the intake structure or associated elements, such as its concrete pressure tunnel, gate shaft, conduit, and trash rack (USBR 1958). It was built as an expedient landing in support of general construction.

Criterion B: The structure was built by Palmer Constructors, a subsidiary of Peter Kiewit Sons' Company, Morrison-Knudson Company, and Coker Construction Company. Palmer Constructors was the primary contractor for the USBR project. No known significant individuals are associated with its design or construction.

Criterion C: The structure is not recommended as eligible under Criterion C. As a temporary wharf, it was simply built of vertical log posts without exceptional design characteristics.

Criterion D: Remains of this structure are not recommended as eligible under Criterion D. Traces of the wharf are limited to little more than irregular constellations of post footings.

Integrity. The wharf or pier remains consist of vertical log post footings in poor condition due to weathering and ice shearing. Many are barely discernible under the gravel beach shingle. The superstructure of the wharf, such as its plank deck and joists, are no longer present. The temporary structure was likely removed by the contractor upon completion of the Eklutna Diversion Tunnel in 1955.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

7 RECOMMENDATION OF EFFECT

Again, although this is not a Section 106 undertaking, the project team referred to NHPA regulations to evaluate the Project's possible effects on identified resources. According to 36 CFR 800, an undertaking has an effect on a historic property when the undertaking may alter characteristics of the property that qualify it for inclusion on the National Register (36 CFR 800.16(i)). An adverse effect "is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association" (36 CFR 800.5(1)).

The Eklutna River Railroad Bridge [redacted], one of the two properties recommended as eligible as the result of this study, should not be adversely affected by continuation of the Project. The railroad bridge's integrity has not been adversely impacted by river water levels influenced by the Project over the past two decades and likely will not be in the future.

The second pair of properties recommended as eligible, the Eklutna Power Project Dam [redacted] and Spillway [redacted], could possibly be substantially modified in the future by addition of a new gate and/or fish passage facilities. This would likely constitute an adverse effect that would need to be documented in a findings letter and addressed by a memorandum of agreement.

8 REFERENCES

AECOM Technical Service, Inc.
2017 *Final Phase II Remedial Investigation Eklutna Army Site Formerly Used Defense Site (FUDS) F10AK009701, Eklutna, Alaska*. Prepared for the U.S. Army Corps of Engineers, Alaska District by AECOM Technical Services, Inc., Anchorage, Alaska.

Alaska Heritage Resources Survey (AHRS)
n.d. Data Repository. Office of History and Archaeology, Alaska Department of Natural Resources. http://dnr.alaska.gov/parks/oha/ahrs/ahrs.htm, accessed 2022.

Alaska Power Administration (APA)
1969 First Annual Report: 1968.

1970 1969: 2nd Annual Report.

1971 1970: 3rd Annual Report.

1972 1971: 4th Annual Report.

1973 Fifth Annual Report: 1972.

1992 Divestiture Summary Report: Sale of Eklutna and Snettisham Hydroelectric Projects. https://eklutnahydro.com/wp-content/uploads/2020/03/APA-1992-Divestiture-Summary-Report.pdf

Alaska Railroad Corporation (ARRC)
2003 *Alaska Railroad Corporation Historic Bridge Inventory Form: Eklutna River Bridge*. From a study completed by Cultural Resource Consultants LLC, Anchorage. Alaska Railroad Corporation, Anchorage.

Bateman, A.F. Jr.
1947 *Reconnaissance Report of Geology of Eklutna Lake Dam Site and Conduit Route near Anchorage, Alaska*. U.S. Department of the Interior, U.S. Geological Survey Report 48–13, Great Falls.

Brown, Dee
1978 *Hear That Lonesome Whistle Blow-Railroads in the West*. Bantam Books, New York.

Busch, Jane
1981 An Introduction to the Tin Can. *Historical Archaeology* 15(1):95–104.

Carberry, Michael E., and Donna Lane
1986 *Patterns of the Past: An Inventory of Anchorage's Historic Resources*. Municipality of Anchorage, Community Planning Department.

Chandonnet, Ann
1979 *The Once & Future Village of Ikluat/Eklutna (A History of a Tanaina Athapaskan Settlement)*. Adams Press, Chicago.

1991 *On the Trail of Eklutna*. Adams Press, Chicago.

Chugach State Park
1994 *Weekly Report June 15, 1994.* On file Chugach State Park Headquarters, Potter Section House State Historic Site, Anchorage.

1995 *Weekly Report August 1, 1995.* On file Chugach State Park Headquarters, Potter Section House State Historic Site, Anchorage.

Chugach State Park Advisory Board
1993 *Potential Public Use Cabin Sites, Eklutna Lake Valley*. Chugach State Park Advisory Board. Draft Plan dated December 9, 1993.

Clifford, Howard
1981 *Rails North: Railroads of Alaska and the Yukon.* Superior Publishing Company, Seattle.

1999 *Alaska/Yukon Railroads-An Illustrated History.* OSO Publishing, Arlington.

Comp, T. Allan, and Donald Jackson
1977 *Bridge Truss Types: a guide to dating and identifying*. HAER Technical Leaflet 95. National Park Service and American Association for State and Local History, Nashville.

Cook Inlet Historical Society
n.d. Anchorage History. https://www.cookinlethistory.org/anchoragehistory.html.

Crittenden, Katharine Carson.
2002 *Get Mears! Frederick Mears: Builder of the Alaska Railroad*. Binford & Mort, Portland.

Dixon, E. James, Robert A. Sattler, and Andrew S. Higgs
1993 *Golden Valley Electric Association Ft. Knox Transmission Line Cultural Resources Survey*. Northern Land Use Research, Inc., Fairbanks.

Dobbins, J. L.
1930 *Letter to Mr. J.L. Dobbins dated March 4, 1930.* Russell-Colvin and Company unpublished internal memo. Courtesy archives McMillan Jacobs Associates, Anchorage.

Dumond, D. E. and Robert L. A. Mace
1968 An Archaeological Survey along Knik Arm. *Anthropological Papers of the University of Alaska* 14(1).

eklutnahydro
2021a Updates. https://eklutnahydro.com/project-updates/, accessed November 16, 2022.

2021b September 2021 Drone Footage of Flow Releases. https://eklutnahydro.com/september-2021-flow-releases/, accessed November 16, 2022.

Eklutna, Inc.
n.d. Eklutna Dam Removal and Diversion Project. https://www.eklutnainc.com/eklutnadam-project/, accessed February 2020.

Federal Power Commission (FPC)
1944 Order Approving Transfer of License (Major): Project No. 350. March 1, 1944.

Fitch, Edwin M.
1967 *The Alaska Railroad*. Praeger, New York.

Frontier Army Museum
2021 *A Brief History of U.S. Army Rations*. Frontier Army Museum, Fort Leavenworth, Kansas.

Fuglestad, T. C.
1979 *The Alaska Railroad and the Earthquake of March 27, 1964*. http://www.alaskarails.org/historical/earthquake/fuglestad.html

Holbrook, Stewart H.
1958 *The Age of the Moguls.* Doubleday, Garden City, New York.

Hollinger, Kristy
2002 *The Early Electrification of Anchorage*. Center for Environmental Management of Military Lands CEMML TPS02-8. Colorado State University, Fort Collins, CO. July 2002.

Johannsen, Neil C.
1986 *Chugach State Park Trail Plan.* Alaska Department of Natural Resources, Division of Parks and Outdoor Recreation, Anchorage.

Kari, James, and James A. Fall
2003 *Shem Pete's Alaska: The Territory of the Upper Cook Inlet Dena'ina*. University of Alaska Press, Fairbanks.

Leggett, Aaron
2022 *Bel K'ikghil'ishen (Eklutna Alex)*. Anchorage Cook Inlet Historical Society, Anchorage Legends and Legacies 1910–1940 biographies. https://www.alaskahistory.org/biographies/bel-kikghilishen-eklutna-alex/

Lobdell, John E.
1983 *An Archaeological Assessment of the Eklutna Water Project, Upper Cook Inlet, Alaska.* Eklutna Water Project, Municipality of Anchorage Water and Wastewater Utility, Anchorage.

1984 *An Archaeological Assessment Phase II, Upper Cook Inlet, Alaska.* Eklutna Water Project, Municipality of Anchorage Water and Wastewater Utility, Anchorage.

Manning, Elizabeth
2001 "Village wants to remove junked cars and other trash and restore salmon runs." *Anchorage Daily News.* Online resource: http://www.adn.com/ nation/story/0,2360,270364, 00.html. Accessed on May 2, 2019.

Mason, Vera C., Alice I. Meyer, and Mary V. Klicka
1982 *Summary of Operational Rations*. United States Army Natick Research and Development Laboratories. Technical Report NATICK/TR-82/013. Natick, Massachusetts.

Matanuska-Susitna Borough
1989 *Survey of Historic Sites in the Matanuska Coal Field, Alaska*. Matanuska-Susitna Borough Cultural Resource Division, Palmer.

McConnell, Guy R.
2005 Letter report: Cleanup of the Eklutna Army Site with NALEMP Funding. On file, Office of History and Archaeology, Anchorage.

McMillan Jacobs Associates
2020 *Initial Information Package*. Eklutna Hydroelectric Project, 1991 Fish & Wildlife Agreement Implementation. McMillan Jacobs Associates, Seattle.

Mead & Hunt
2014 Alaska Roads Historic Overview, Applied Historic Context of Alaska's Roads.

Meiners, Al
1994 *Draft notes for public use cabin brochure dated April 26, 1994*. On file Chugach State Park Headquarters, Potter Section House State Historic Site, Anchorage.

Municipality of Anchorage
1982 *North Anchorage Land Agreement*. Alaska Department of Natural Resources. Amended map available at https://cdn.ancgis.com/mapbooks/MuniManager/NALA/NALA_18x24_Map.pdf

National Archives and Records Administration
1915–1954 *Annual, Monthly, and Miscellaneous Reports of the Alaska Railroad.* Record Group 322 P2258. National Archive and Records Administration, Anchorage.

National Park Service (NPS)
1982 Mike Alex Cabin. National Register of Historic Places. https://npgallery.nps.gov/NRHP/GetAsset/NRHP/82002071_text. Photos: https://npgallery.nps.gov/GetAsset/9c05ae4a-795f-4044-bed6-748bd13bebcf.

1998 *How to Apply the National Register Criteria for Evaluation*. National Register Bulletin 15. Department of the Interior, Washington, D.C.

Orth, Donald J.
1967 *Dictionary of Alaska Place Names*, U.S. Government Printing Office, Washington, D.C.

Prince, Bernardine Lemay
1964 *The Alaska Railroad in Pictures.* Ken Wray's Printshop, Anchorage.

R&M Consultants, Inc.
2015 Eklutna River Bridge Replacement Project, Hydrologic and Hydraulic Report. Anchorage, Alaska.

Recorder's Office
1984 Cooperative Land Management Agreement between the United States of America through the Alaska Power Administration and the Bureau of Land Management and the State of Alaska through the Alaska Division of Parks and Outdoor Recreation for the Management of Certain Lands in the Upper Eklutna Valley. http://dnr.alaska.gov/ssd/recoff/search/docdisplay?District=301&SelectedDoc=19840393100

Reger, Douglas, Terrence Cole, and Michael Brown
1975 Report of Archaeological and Historical Investigations along the Copper River, Tasnuna River to Chitna. *Miscellaneous Publications History and Archaeology Series No. 10*. Alaska Division of Parks.

Rock, James T.
1984 Cans in the Countryside. *Historical Archaeology* 18(2):97–111.

Russ Dow papers
Archives and Special Collections, Consortium Library, University of Alaska Anchorage. https://archives.consortiumlibrary.org/collections/specialcollections/hmc-0396/?highlight=%22Eklutna%20Dam%201964%22

Rusty Dow papers
Archives and Special Collections, Consortium Library, University of Alaska Anchorage. https://archives.consortiumlibrary.org/collections/specialcollections/hmc-0397/

Seager-Boss, Fran, and Lawrence E. Roberts
1991 *Major Coal Towns of the Matanuska Valley: A Pictorial History*. Matanuska-Susitna Borough, Palmer.

Simonds, Joe
1995 The Eklutna Project (Second Draft). https://www.usbr.gov/history/eklutna.html.

Stern, Richard and Roberta Gordaoff

2014 Cultural Resources Survey of the Eklutna River Bridge Replacement at Old Glenn Highway. Report prepared by Northern Land Use Research Alaska, LLC for R&M Consultants and Native Village of Eklutna. On file, Office of History and Archaeology, Anchorage, Alaska.

Tibbetts, Fred H.

1929 *Report to Anchorage Light and Power Co., Anchorage, Alaska on Eklutna Hydro-electric Project*. Report No. 416; Project Report No. 5. February 1929.

U.S. Army Corps of Engineers (USACE)

2011 Eklutna River Aquatic Ecosystem Restoration Technical Report. Joint Base Elmendorf-Richardson, Alaska.

U.S. Bureau of Reclamation (USBR)

1948 Eklutna Project to serve 25% of all Alaskans. Juneau, Alaska. October 1948.

1956 Eklutna Project, Annual Project History, Calendar Year 1956, Volume VI.

1957 Eklutna Project, Annual Project History, Calendar Year 1957, Volume VII.

1958 Technical Record of Design and Construction: Eklutna Dam, Powerplant and Tunnel. Denver, CO. March 1958.

1962 Eklutna Project, Annual Project History, Calendar Year 1962, Volume XII.

1963 Eklutna Project, Annual Project History, Calendar Year 1963. Volume XIII.

1964 Eklutna Project, Annual Project History, Calendar Year 1964. Volume XIV.

1967 Rehabilitation of Eklutna Project Features Following Earthquake of March 1964: A Supplement to Eklutna Dam, Tunnel, and Powerplant, Technical Record of Design and Construction, March, 1958. A Water Resources Technical Publication. Denver, CO. June 1967. https://babel.hathitrust.org/cgi/pt?id=uc1.$c191571&view=1up&seq=1

U.S. Fish and Wildlife Service (UFWS)

2019 Upper Eklutna River Survey, Preliminary Fish habitat Flow Assessment. Anchorage Fish and Wildlife Conservation Office. July 14, 2019.

Wilson, William H.

1977 *Railroad in the Clouds: The Alaska Railroad in the Age of Steam 1914–1945*. Pruett Publishing, Boulder.

Woodward-Clyde

1996 Eklutna Hydroelectric Project Mitigation Plan. Prepared for Western Area Power Administration, Golden, Colorado.

Appendix 1: Alaska Railroad Historic Context

Initial Construction of the Alaska Railroad—1912 to 1923

In August 1912, President Taft convinced Congress to establish the Alaska Railway Commission to investigate Alaska's transportation problems. Members visited various locations in the state and prepared a report recommending construction of a government railroad from Kern Creek through the Matanuska coal fields to the Kuskokwim Valley. In 1914, Congress passed the Alaska Railway Act, authorizing the president to locate, construct, and operate railroads in Alaska. That same year, President Wilson appointed members to the new Alaska Engineering Commission (AEC), which set up offices in Seattle and organized teams to resurvey the proposed line and repair the existing track. The commission pursued negotiations to purchase the Alaska Northern Railway's holdings, eventually agreeing on a price of $1,150,000, a fraction of the private investment made during the preceding decade.

Wilson also appointed Colonel Frederick Mears as Chief Engineer of the AEC in May 1914. Mears came from the Panama Canal construction project, where his engineering skills, drive, and devotion to the job ultimately led to his promotion to general superintendent of the canal railroad (Crittenden 2002:46). His work in Panama gave Mears valuable knowledge about methods and equipment that prepared him well to face the enormous challenges posed by building a railroad through the interior of Alaska (Crittenden 2002:117).

One of the original reasons cited for the construction of the railroad was to exploit the coal resources in the Matanuska Valley. Seeking to quickly provide a shipping terminus for coal from the Matanuska Valley, the AEC established a headquarters camp at Ship Creek in 1914(Carberry and Lane 1986:1–2).

A short-lived tent city began to form in March of 1915 on the northern side of the Ship Creek below what is now known as Government Hill. By May 1915, the U.S. government had surveyed a town site and laid out 121 blocks. The largest of the reserves established by the town site plan was the Terminal Reserve on the flats of Ship Creek where there was ample room for docks, railyards, shops, and warehouses (Carberry and Lane 1986:2–3, 5). On July 10, 1915, 655 of the lots were sold and the settlement began moving from the tent city along Ship Creek to the new town site on the bluff. The U.S. Post Office named the growing town Anchorage over objections from the AEC, which had proposed the name Ship Creek. In 1916, the AEC governed a town with a population of 6,000 people.

Anchorage developed rapidly, in both size and general importance. In 1917, the railroad transferred its headquarters from Seward to Anchorage and constructed a depot, hospital, warehouse, and office building near Ship Creek. It also built several cottages for use by the managers and their families in the area of West Second Avenue, south and uphill from the depot.

AEC crews worked both south from Anchorage and north from Seward. The line through the mountains of the Kenai Peninsula between Seward and Anchorage, crossed by narrow, swift flowing streams and rivers, was completed first. Once past Ship Creek, the tracks proceeded northward across a plain dotted with lakes, streams, and swamps stretching from the foothills of the Chugach Mountains over one hundred miles to the Talkeetna Mountains. The earliest track alignments to the north utilized easy grades along waterways such as the Susitna. This selection of routes in the rough Alaskan country was understandable, but it left the line open to attacks by glacial streams (Wilson 1977:137).

Bridge building was pushed during the winter when bridge sections could be more easily put into place and piling sunk to the required depths by use of steam points (Fitch 1967:54). Various types of bridges would be required as the tracks proceeded north of Ship Creek toward the Matanuska Valley and beyond. The terrain north of Anchorage is much flatter than that between Seward and Anchorage and the rivers are much broader. By January 1919, the AEC had completed all the bridges between Anchorage and Cottonwood Creek (AEC Annual Report, CY 1919, Appendix A:8). The first bridges constructed along this section, including the spans over Eagle River and the Matanuska and Knik Rivers, were constructed from heavy timbers milled by AEC crews (Crittenden 2002:174). None of these timber bridges survive.

Ultimately, the ARR would construct over 800 bridges and trestles (Wilson 1977:157), most from standard plans. These included Howe truss spans, a combination of wooden diagonals and metal verticals that were built in standard lengths of 24 to 121 feet, and Pony truss spans, parallel superstructures with no cross bracing at the top that came in standard lengths of 28 to 70 feet. Many of the timber trestles were intended only to be temporary and it was realized at the time that they ultimately would have to be replaced with more permanent materials (Crittenden 2002:188). The standard wooden trestle span was 14 or 15 feet long (ARRC Engineering Department Records) and several spans might be needed to cross a given obstacle. The *General Specifications for Piling for Trestle Bridges* (AEC, May 25, 1915) called for the use of spruce, with the bark removed, for piling for all timber trestle bridges. “All piling shall be cut from sound live trees, of slow growth, firm grain, free from shakes, decay, large unsound knots or other defects that will impair their strength and durability.” Because of the high cost of other materials, timber was also used to construct the long approach spans to the steel bridges. This was but one of many economic measures resorted to during construction of the line.

Early Operation and Stagnation—1924 to 1938

Throughout the remainder of the 1920s, the ARR reported annually on efforts to complete the railroad and on the scarcity of funds to do the job. The annual reports for 1925 and 1926 noted progress in the substitution of permanent steel bridges for wooden trestles:

> …in the early construction the early completion of the line was considered important and it was found necessary to adopt many expedients such as the construction of wooden trestles from hastily cut and prepared native piling, the building of bridges on pile foundations instead of permanent masonry…The result of this character of construction is that the costs of maintenance are entirely out of proportion to what they will be when the road is completed as the road as it is now requires constant repairing to keep it in a safe condition for transportation (ARR Annual Report, FY 1926).

The 1925 report also described another reason for the high operating costs of the railroad. After the bridge at Milepost 49.5 was demolished by a snowslide:

> [t]he construction forces had to be taken from their regular work to rebuild this bridge. The cost of rebuilding being $18,141.00. This case affords a good illustration of why the cost of maintenance on the Alaska Railroad is high, due to the temporary nature of many structures. The proper construction at this point would be an arch culvert and solid fill which would not have been damaged by the snow slide. The necessity of opening the road for travel made it impractical to build a culvert and make a solid fill at this time as it would have taken several months to complete while a wood trestle was replaced in twelve days (ARR Annual Report, CY 1925:4).

The ARR completed 37 steel spans or bridges between 1924 and 1929. Almost all of these were replacements for timber bridges built during the initial construction of the railroad. The American Bridge Company was involved in 26 of these and was especially active between Mileposts 127.5 (Eagle River) and 329.6 (Clear Creek).

During the 1920s and 1930s, the ARR had an interest not only in the construction of the railroad, but in the economic development of Interior Alaska. The ARR encouraged the efforts of the Alaska Road Commission, and was instrumental in establishing the Alaska Rural Rehabilitation Corporation carrying agricultural colonists from Seward to Palmer. The railroad was involved in tourism from its earliest days, and during the late 1930s recruited Civilian Conservation Corps volunteers to work at Curry and at the McKinley Park Hotel, its two prime tourist destinations. Another area of interest and potential profit was the exploitation of mineral resources (ARR Annual Report, FY 1933:11).

However, for all its efforts, the ARR did not prosper in the 1930s. Although the jobs it provided kept may individuals employed, the organization stagnated. Bridge and building gangs concerned themselves with upkeep and maintenance of a decaying roadway, but the ARR’s inventory of bridges lists only four erected during the decade. During the Depression, funding was so scarce that all the ARR could do was maintain the existing railbed.

Revitalization and World War II—1938 to 1945

Anchorage and Fairbanks experienced explosive growth beginning in 1939 and 1940 when the Army built Fort Richardson and Ladd Air Force Base (now Fort Wainwright), respectively, just outside the cities. Construction and related maintenance of bases in Anchorage and Fairbanks required an enormous amount of supplies and materials. These were all transshipped through Anchorage from the “gateways” of Seward and, most importantly, Whittier. Freight handled by the railroad increased from 157,904 tons in 1939, the beginning of the military buildup, to a high of 627,874 tons in 1944. By comparison, the Alaska Highway is estimated to have carried only 350,000 tons of freight during its peak year of 1943.

The ARR reported a profit for the first time in 1938. This was the harbinger of much greater profits during World War II. From 1939 to 1945, the ARR devoted itself almost exclusively to military concerns. The thousand soldiers of the U.S. Army’s 714th Railroad Operating Battalion kept the railroad running in the absence of the many employees sent to other war fronts. The war years were profitable, but terribly wearing on a transportation system patched together from second hand equipment and supplies, and provided with little money for maintenance. From

1940 to 1945, contractors erected only three bridges or spans. Profits aside, the most important result of the war was the acknowledgement by Congress of the strategic military value of the railroad and recognition of the fact that, in disrepair, it was more of a liability than an asset.

Rehabilitation and Early Cold War—1946 to 1958

After the war, as the population of Alaska increased, so did railroad freight traffic. The general upgrade of ARR properties and equipment in the late 1940s and early 1950s was due in part to the infusion of money by the Federal government in response to the Soviet threat at the beginning of the Cold War. In 1948, Congress appropriated $4,000,000 in cash and authorized $15,000,000 in contracts for rehabilitation of the railroad. Eventually $100,000,000 would be appropriated for the reconstruction, much of it from the Department of Defense in recognition of the strategic importance of Alaska during the Cold War:

> In light of the Alaska Railroad's economic and strategic importance in the development and strengthening of the Territory, [a] program of expansion and improvement was inaugurated most opportunely to enable the Railroad to fulfill its task of supplying military and civilian requirements at the same time holding its own against increasing competition from airline and motor carrier alike (ARR Annual Report, FY 1949:5).

New construction during this period included the Eielson branch of the railroad, extending approximately 15 miles along the Richardson Highway from Fort Wainwright to Eielson Air Force Base. The track and appurtenances were constructed and used by the Air Force from 1947 to 1951, when the spur was transferred to the ARR.

When the post war rehabilitation program ended in 1953, the ARR was a modern railroad with 115-pound rails, diesel locomotives, and a realigned and ballasted roadbed. Fifteen bridges were wholly or partially replaced between 1945 and 1953. Of these, nine (or perhaps as many as 12) were "military surplus" bridges. These structures, used to replace untreated timber trestles, had already been purchased by the federal government, were made available to the railroad without cost, and were "…adequate for the loading and light density of traffic being handled at the time, and in the foreseeable future" (ARR memo from the Assistant Chief Engineer to the Chief Engineer, May 10, 1968). About 1949, creosote-treated piling and timber began to be used for trestle construction and rehabilitation, instead of the untreated timber that had be used in earlier years (Standard Open Deck Pile Trestle, File No. 1192.01). In 1950, the passenger mainline north of the Anchorage Depot and general office building was rerouted to bypass the freight yards and connect with the original mainline at the north end of the Anchorage yard via a new steel bridge at Mile Post 115 (Prince 1964:792, 800).

Recent History—1959 to present

The ARR suffered massive damage during the March 27, 1964, Alaska Earthquake. As described by retired Chief Engineer T. C. Fuglestad in 1979:

> When the ground had stopped shaking and the earthquake generated waves had subsided, much of the Railroad south of Anchorage lay in ruins. The work of

> years, including both original construction and the newer construction of the rehabilitation period, was gone in those few terrible minutes.

The railroad north of Anchorage, across the Knik and Matanuska River flats to the Palmer branch, was also heavily damaged. "Light damage, which was limited to bridges, diminished in severity to its furthest limit at Hurricane Gulch Bridge, 170 miles north of Anchorage or 284.2 miles north of Seward (Fuglestad 1979). In all, three miles of main line track were carried away by landslides and tidal waves, and 47 miles of the main line and five miles of side tracks were rendered unsafe for service. Five hundred and sixty-seven spans of wood trestles were badly damaged or totally destroyed, and 34 steel bridges required major repair work in order to make them safe for traffic (Fuglestad 1979).

Work to repair the railroad began immediately, and by the end of 1966, approximately $31,000,000 had been spent to restore railroad facilities and purchase new equipment. Bridge work alone required $1,500,000:

> Rebuilding the main line south of Portage to Seward was begun during late June. The dominant feature of this particular effort was the repair of the numerous wood bridges on Spencer and Hunter Flats. Photographs of these bridges show some of the most spectacular earthquake damage on the Railroad. This type of bridge damage was due to a phenomenon known as "land spreading" which occurred in the unconsolidated gravels of extensive flat areas and valley floors…Our bridges gave a more spectacular evidence of this land spreading because each stream had became a compression zone as the stream and river banks moved perceptibly towards each other, sometimes in inches, others as much as four to six feet. Under this compression, our wood bridges failed and took on appearances that were not within our design standards. One bridge jackknifed several feet into the air looking much like an A-frame cabin. Other longer trestles took on a long cambered arch appearance as the spreading soil pushed the ground up in the middle of river channels, thereby raising the middle of our bridges. Others failed horizontally as the bridge ends moved out of line as much as 10 feet with respect to each other (Fuglestad 1979).

In 1969, the Alaskan economy changed forever with the discovery of huge oil fields on the North Slope. The boom that followed brought thousands of people to work on construction of the Trans-Alaska-Pipeline. President Ronald Reagan signed legislation authorizing the transfer of ARR to the State of Alaska in 1983. In 1984, Governor Bill Sheffield established the quasi-public Alaska Railroad Corporation, and on January 5, 1985, the railroad becomes the property of the State of Alaska in transfer ceremonies held in Nenana and Seward.