State of Alaska
Department of Fish and Game
Nomination for Waters
Important to Anadromous Fish

Region: INTERIOR ☐ USGS Quad: NULATO A-4

Anadromous Water Catalog Number of Waterway: 334-30-11000-2532-3551-4101-5809

Name of Waterway: CALIFORNIA CREEK ☒ USGS Name ☐ Local Nam

☒ Addition ☐ Deletion ☐ Correction ☒ Backup Information

For Office Use

Nomination #	97 041		12-5-96
Revision Year:		Regional Supervisor	Date
Revision to: Atlas	N/A Catalog		4/25/97
Both		AWC Project Biologist	Date
Revision Code:	F-4		
		Drafted	Date

OBSERVATION INFORMATION

Species	Date(s) Observed	Spawning	Rearing	Present	Anadromous
COHO SALMON	JULY 19-21, 95	X			☒
CHINOOK SALMON	JULY 19-21, 95	X			☒
COHO SALMON	JULY 19-21, 95		X		☒
CHINOOK SALMON	JULY 19-21, 95		X		☒
					☐

IMPORTANT: Provide all supporting documentation that this water body is important for the spawning, rearing or migration of anadromous fish, including: number of fish and life stages observed; sampling methods, sampling duration and area sampled; copies of field notes; etc. Attach a copy of a map showing location of mouth and observed upper extent of each species, as well as other information such as: specific stream reaches observed as spawning or rearing habitat; locations, types, and heights of any barriers; etc.

Comments:

ATTACHED TRIP REPORT by JACK WINTERS

ATTACHED EXCERPT FROM KEITH MUELLER'S (USFWS) TRIP REPORT

ALASKA DEPT. OF FISH & GAME
DEC 2 5 1996
REGION II HABITAT AND RESTORATION DIVISION

Name of Observer (please print): JACK WINTERS

Date: 12/5/96 Signature:

Address: 1300 College Road
Fairbanks, AK 99709

This certifies that in my best professional judgment and belief the above information is evidence that this waterbody should be included in or deleted from the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes per AS 16.05.870.

Signature of Area Biologist: 12·05·96

Revision 11/96

MEMORANDUM **State of Alaska**

To: Alvin G. Ott
Regional Supervisor
Habitat and Restoration Division
Department of Fish and Game

Date: November 3, 1995

File No:

Telephone Number: 459-7279

From: Jack Winters
Habitat Biologist
Habitat and Restoration Division
Department of Fish and Game

Subject: July Field Work, Illinois Creek Mine Project

On July 17, 1995, Phyllis Weber Scannell and I flew to Illinois Creek and began the Illinois Creek Mine Fish Study. During the first day at the mine, we examined Illinois and California creeks for potential sampling locations. Following this initial reconnaissance, we trapped fish for species characterization and estimation of relative abundance, collected juvenile coho salmon for metals and histological analyses, and counted and collected adult chum salmon.

Streams

The character of Illinois Creek varies considerably within the 1.5 km encompassing the upper reach of observed fish distribution. Illinois Creek ranges in width from about 1 m in its upper forks to about 10 m wide at its widest point near the warm spring. In most locations, it is about 4 to 5 m wide. Depths generally range from 0.2 to over 2 m. Silt to large cobbles forms the stream bottom, depending on location and water velocity.

Three forks emanating from local springs, and springs or runoff from farther up the valley join to form one single channel that characterizes Illinois Creek for its remaining length. The east and middle forks are incised, up to 1 m deep, lined with grasses and sedges, and are from 1 to 2 m wide. The west fork is wider (2 to 3 m), with a bottom of rock and sand, and is derived from springs emanating from the toe of a spruce-covered hillside.

From the forks to the main bridge, the creek is 3 to 5 m wide, from 0.3 to 1 m deep, with a gravel to cobble or rock bottom in most places. Vegetation (alder, willow) is dense along the stream banks and overhangs much of the stream. Springs discharge to the stream at many locations. In the area of the warm spring discharge just upstream of the main bridge, abundant algae grow on the stream bottom.

Downstream of the main bridge, the stream becomes more sinuous, contains deeper pools (deeper than 2 m in places), has higher banks (2 to 3 m in places), and contains numerous logs and woody debris. Occasional riffles have cobble or gravel bottoms. Much of the remainder of the stream appears to have a silt or sand bottom, although the depths of the pools and debris restricts the ability to visually determine the composition of the substrate. Vegetation along the banks also is dense and overhangs much of the stream.

California Creek is a much bigger stream than Illinois Creek. It is about 30 m wide and is deeper than 2 m in many places. Small sand/gravel bars are present on the inside of some meanders. A boat would be needed to do any serious fish investigations on this stream.

Chum Salmon

I counted adult chum salmon in Illinois Creek on July 17 from the main bridge upstream as far as conditions allowed. I found 68 live and 1 dead chum salmon in this reach of Illinois Creek. Fish were found throughout this reach, with no real concentrations in any particular area. Four adult fish were about 50 m upstream of the forks in the middle fork.

I made no attempt to count chum salmon below the main bridge. Downstream of the main bridge, streamside vegetation and general stream characteristics made a thorough assessment of the numbers of adults present difficult if not impossible.

I collected five adult chum salmon with a dip net from Illinois Creek in the area of the main bridge on July 23 for potential metals analyses. All of the fish appeared to have already spawned. The fish were individually wrapped in plastic bags and frozen immediately after capture.

Fish Presence and Relative Abundance

Illinois Creek

On July 18, we set out 10 minnow traps baited with salmon eggs in three reaches of Illinois Creek. One reach was from the main bridge upstream to and including parts of the three main forks of Illinois Creek (about 0.25 km linear distance). The second reach was from the main bridge downstream about 0.4 km. The third reach was about 0.3 km long and was centered around the "plywood bridge" at the downstream access point to Illinois Creek.

We examined the traps 24 hr later, measured all captured fish, and clipped the adipose fin of juvenile coho salmon. Traps contained primarily juvenile coho salmon, mostly young-of-the-year but also a few age 1 fish. Other species caught in the traps (both initial mark and recapture events) were Alaska blackfish, Dolly Varden, slimy sculpin, and burbot. The blackfish were found in the sedge-lined east fork of Illinois Creek, an area at one time inundated by a beaver pond. The slimy sculpin were scattered throughout the creek. Burbot and the one Dolly Varden were found downstream of the main bridge. Ten or so Arctic grayling, 100 to 200 mm long, were found near one of the entry points of discharge from the warm spring upstream of the bridge (these were free-swimming, not in any of the traps).

The juvenile coho salmon ranged in length from 44 to 121 mm, with young-of-the-year generally ranging from about 47 to 65 mm and age 1 cohos generally ranging from about 80 to 110 mm. The total catch was about 500 juvenile coho. The maximum catch was around 60 juvenile coho per trap, 90-95% of which were young-of-the-year fish. Traps set in the reaches downstream of the main bridge and at the "plywood bridge" generally had larger catches than did traps upstream of the main bridge. Several traps upstream of the main bridge did not catch fish.

On July 22, I reset the 30 minnow traps for the recapture run of the coho sampling in Illinois Creek. Of the 583 total juvenile cohos I captured on the recapture run, only 26 were fish we had marked on July 19. This is about a 4.5% recapture rate. The distribution of recaptures was not uniform. Recaptures were found in 10 of 30 traps; 1 in the reach above the bridge; 2 in the reach below the bridge; and 7 in the reach surrounding the "plywood bridge." Recaptures per trap ranged from one to six. The higher incidence of recapture in the "plywood bridge" reach may be the result of fewer fish in the area fished by each trap; a higher attractiveness of the salmon egg trap bait to fish in this area; or greater fidelity to the pool or other habitat associated with the trap site.

I would consider the catches of coho salmon relatively poor upstream of the main bridge. In several instances, we set the traps in the midst or slightly upstream of a school of juvenile coho, yet caught only a few fish in these sets. It may be that the combination of abundant aquatic insects and loose eggs from spawning adults provided such an abundant food supply that the salmon eggs in the traps did not prove to be a significant attractant. Catches were larger in traps downstream of the bridge where chum salmon were not spawning to any degree; however, the stream characteristics and substrate are somewhat different in these more downstream areas than above the bridge. This alone may account for differences in numbers of fish using these areas. These habitat differences also may influence the amount and type of aquatic food resources available to the fish.

California Creek

On July 22, I set 6 minnow traps for 24 hr along about 200 m of the west bank of California Creek at the upper trail access point. I also set 6 minnow traps along about 250 m of the west bank of California Creek at the lower trail access point. I set traps in water generally 1 to 2 m deep along cutbanks, in eddies, behind deadfalls, or in the main current.

The catch in California Creek was primarily juvenile chinook salmon, with a few juvenile coho salmon and slimy sculpin. The chinook salmon ranged 47 to 80 mm in length. Most ranged from about 60 to 74 mm. The total catch was about 60 chinook salmon for the lower California Creek site and about 150 for the upper site. The 12 coho juveniles (from both sampling locations) were mostly age 1 fish.

On July 21, I accompanied Keith Mueller (USFWS) in the Innoko Refuge-chartered helicopter to check minnow traps he had set the previous day in Colorado and California creeks, and in the Little Mud River. The California Creek sites were approximately two and nine miles upstream of the Illinois Creek airstrip. The Colorado Creek site was about two miles upstream of its mouth, and the Little Mud River sites were two to three miles downstream of the mouth of Illinois Creek.

The 14 California Creek traps contained juvenile salmon (mostly chinook, but a fair number of coho were also present), a number of small Dolly Varden, a few slimy sculpin, and one Alaska blackfish. The Colorado Creek trap contained 76 juvenile salmon. Thirteen traps set at the two sites in the Little Mud River caught 4 sculpin and one juvenile salmon.

Metals Sampling

We collected 30 juvenile coho salmon in Illinois Creek for metals analyses on July 19. We selected the larger of the two apparent age classes (80 to 117 mm fish) found in the stream to ensure adequate amounts of tissue for the analyses. We began collecting the fish from the uppermost trap station on Illinois Creek and worked our way downstream. Because the larger size fish were not common in the trap catches and no more than six were found in any one trap (most did not have any), we collected fish from all three sample reaches in Illinois Creek. We took the juvenile cohos from the minnow buckets, measured them, placed them into numbered pre-cleaned plastic bottles, and stored them on ice in a cooler. We shipped the samples to Fairbanks on July 20 where they were place in a freezer pending analyses.

Histological Sampling

We collected 20 juvenile coho salmon (10 of each age class) from Illinois Creek for histological analysis of various tissues. All of the smaller-sized fish (56 to 74 mm) were taken from trap sites upstream of the main bridge. Five of the larger fish were taken from additional traps set upstream of the main sampling reach on Illinois Creek; the other five fish were taken from traps in the "plywood bridge" sampling reach. The fish were killed by severing the spinal column behind the head and were then placed in tissue fixative. The opercula were removed and slits were made in the body wall to facilitate preservation of the gills and internal organs.

JFW/jfw

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Introduction

U.S.M.X., a mining company based in Colorado, intends to build a heap-leach gold mine using a cyanide extraction process on a 45 acre heap (U.S.M.X. 1995). The mine and accompanying facilities will be located above both sides of Illinois Creek, which is located approximately six miles northeast of the Innoko National Wildlife Refuge. A road will be built around the headwaters of Illinois Creek connecting the two areas. Because this will be the first large-scale heap-leach mine in Alaska, therefore; the State of Alaska has neither experience nor regulations regarding this type of an operation. U.S.M.X. intends to operate the mine on a zero-discharge basis; however, any surface discharges from the mine will run into either Illinois Creek or the Little Mud River. According to U.S.M.X., the rock composing the hill on which the mine will be constructed is extremely permeable. Therefore, any discharges to groundwater also may enter these two waterbodies in a relatively short period of time due to the abundance of springs, both warm and cold, feeding these streams.

Proposals to secure funding for baseline studies on Illinois Creek, the Little Mud River, and adjacent waterways prior to the initiation of mining at this site have been submitted by the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service. Field activities conducted in 1995 are is preliminary to those projects. The goals for the 1995 field effort were to:

1. Become acquainted with the study area;

2. Determine concentrations of water quality variables in Illinois and California creeks, and the Little Mud River;

3. Determine the presence of summer chum salmon (*Oncorhynchus keta*) and king salmon (*O. tshawytscha*) adults, in Illinois and California creeks, and the Little Mud River;

4. Determine the presence of king salmon and coho salmon (*O. kisutch*) fry in Illinois and California creeks, and the Little Mud River; and,

5. Collect macroinvertebrate samples from Illinois and California creeks.

Methods and Materials

Field work occurred 19-21 July 1995. Water samples were collected from four sites, two each on Illinois and California creeks, and from two sites on the Little Mud River. Juvenile fish were trapped at two sites each on California Creek and the Little Mud River, and from one site on Colorado Creek. Macroinvertebrate samples were collected from two sites on California Creek and from four sites on Illinois Creek. Sample site descriptions for water and fish collection sites are as follows.

Il Bridge, at the road bridge on Illinois Creek, 64°02.61N, 157°52.00W.

pH were slightly alkaline with the lowest values occuring in the Little Mud River. Turbidity was low in Illinois and California Creeks but much higher in the aptly named Little Mud River. Illinois, California, and Colorado Creeks were clear streams but the Little Mud River was highly colored with dissolved organic matter. This dissolved material might have interfered with measurement of turbidity. Settleable solids were trace for all sites except Site CA10 where it was 0 mL/L. All water quality variables are typical of uncontaminated streams in Interior Alaska.

Table 1. Water quality data from selected sites on Illinois and California creeks, and the Little Mud River, July 1995.

Site	pH	Hardness (mg/L)	Alkalinity (mg/L)	Conductivity (μS/cm)	Turbidity (NTU)	Settleable Solids (mL/L)
Ill. Bridge	7.75	81.8	71.3	145	0.42	Trace
Ill.10	7.76	78.4	68.3	150	0.9	Trace
CA10	7.62	39.6	36.4	83	0.64	0
CA11	7.56	37.7	33.3	80	1.14	Trace
Mud10	7.16	57.5	53.8	118	11	Trace
Mud11	7.26	48.1	43.8	88	8.72	Trace

A total of 338 fish were caught in minnow traps (Appendix 1). These include 297 immature salmon, 29 immature Dolly Varden, 11 slimy sculpin, and 1 Alaska blackfish. The immature salmon were a mixture of king and coho salmon. The ratio of the salmon species is unknown because we were unable to make positive identifications in the field. Positive identifications to species were made after examination of the fish in a laboratory.

All but six fish were caught in the California Creek drainage. All but one Dolly Varden were caught at Site CA10. Immature salmon were most abundant at Site CA11. A single trap in Colorado Creek caught 76 immature salmon, which reinforces the importance of small drainages as salmon rearing habitats. Based on the subsample examined in the laboratory, the great majority of fish caught in Colorado Creek were king salmon. The Little Mud River does not appear to be good rearing habitat for salmon. Thirteen traps were set at two sites on the Little Mud River, and 5 fish were caught, only one of which was a salmon.

Immature salmon caught at California Creek ranged in fork length from 89 mm to 170 mm and from Colorado between 54 mm and 99 mm. Dolly Varden caught from California Creek were between 89 mm and 170 mm fork length.

The presence of spawning king and chum salmon was documented in California Creek. Several hundred chum salmon were sighted, mostly in the vicinity of and below Site CA11. King salmon adults were sighted as far upstream as Site CA10. Many fewer king salmon, approxamately 25, were sighted than chum salmon. No adult salmon were observed in Colorado Creek; however, Colorado Creek is a small stream and thick vegetation on both banks make aerial observations difficult and unreliable. Based on these observations of adult and immature salmon in California Creek and immature salmon in Colorado Creek, a application has been filed with the Alaska Department of Fish and Game to extend their catalog of anadromous fish streams to include these