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

AWC Volume SE SC SW W AR IN USGS Quad Nulato A-4

Anadromous Water Catalog Number of Waterway 334-30-11000-2532-3551-4101-5311

Name of Waterway California Creek USGS name X Local name ___

Addition X Deletion ___ Correction ___ Backup Information ___

For Office Use

Nomination #	96 024	Regional Supervisor	10-26-95 Date
Revision Year:	96		
Revision to: Atlas ___ Catalog ___ Both X		Dean W. Hughes	1-25-96
Revision Code:	A-2	Drafted	1/31/96 Date

OBSERVATION INFORMATION

Species	Date(s) Observed	Spawning	Rearing	Migration	Anadromous
Chum	21 July 1995	X	X	X	X
Coho	21 July 1995		X		X
King	21 July 1995	X	X	X	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 any other information such as: specific stream reaches observed as spawning or rearing habitat; locations, types, and heights of any barriers; etc.

Comments: Coho and King were upstream as far as 64°09.83' N, 157°41.54' W.
Chum were upstream as far as 64°09.00', 157°42.00'
See attached report.

ALASKA DEPT. OF FISH & GAME
OCT 31 1995
REGION II
HABITAT AND RESTORATION DIVISION

Name of Observer (please print) Keith A. Mueller - USFWS

Date: 8/29/95 Signature: [signature]

Address: 101 12th Box 19, Rm 232
Fairbanks, AK 99708

This certifies that in my best professional judgement 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: [signature] 10-26-95 Rev. 7/93

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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.

Il.10, downstream of the lower road on Illinois Creek, 64°00.93N, 157°52.44W.

CA10, the most upstream site on California Creek, 64°09.83N, 157°41.54W.

CA11, California Creek, 64°04.10N, 157°45.91W.

Mud10, the most upstream site on the Little Mud River, 64°00.38N, 157°58.48W.

Mud11, south of the proposed minesite on the Little Mud River, 64°00.52N, 157°55.46W.

CO10, Colorado Creek, 64°06.88N, 157°43.83W.

Duplicate 1-L grab water samples were collected for all sites except the Little Mud River sites where single samples were collected. All water samples were collected just below the water surface. Samples were filled to the top of the bottle to minimize gaseous exchange. Each sample bottle was labeled prior to collection .

Water samples were analyzed for the following water quality variables: pH, total alkalinity, total hardness, conductivity, turbidity, and settleable solids. Hardness and alkalinity determinations were made using a Hach digital titrator and Hach (1985) methods . Conductivity was measured using a Hach DREL/5 conductivity meter with automatic temperature compensation to 25°C. Conductivity standards were used to check meter performance. Measurements of pH were made using an Orion Model SA250 pH meter. The pH meter was equipped with a combination electrode and automatic temperature compensation. Two-buffer calibrations were performed using pH buffers accurate to ± 0.02 pH units which bracketed the pH of the samples.

Two measures of solids in water were made. Turbidity was measured using a Hach Portable Turbidity Meter Model 16800, calibrated with Gelex secondary standards for 1, 10, and 100 nephelometric turbidity units (NTU). Total settleable solids were measured using the Imhoff Cone Method for 1-L samples (Greenberg et al. 1992). If settleable solids occurred, but did not exceed 0.1 mL/L, "trace" was recorded.

Immature fish were collected with minnow traps baited with salmon eggs. Seven traps were set within approximately 50 m of stream length at each sample site. Each trap was fished for approximately 19 hours. The presence of adult salmon was documented by visual observation from a helicopter.

Results and Discussion

Mean hardness, alkalinity, and conductivity values were lowest for California Creek and highest for Illinois Creek (Table 1). This is likely due to the abundance of springs feeding groundwater into Illinois Creek, which is frequently higher in these variables than surface runoff. All values of

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

streams for these uses.

Literature Cited

Greenberg, A.E., L.S. Clesceri, and A.D. Eaton. 1992. Standard Methods for the Examination of Water and Wastewater. 18th Edition. American Public Health Association, American Water Works Association, and Water Pollution Control Federation. Washington D.C. v.p.

Hach Company. 1985. Water Analysis Handbook. Hach Company, Loveland, CO. 691 pp.

Appendix 1

Number and species of fish caught in minnow traps from California and Colorado creeks, and the Little Mud River, July 1995. Each trap was fished for approximately 19 hours. Species caught include king salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), Dolly Varden (*Salvelinus malma*), slimy sculpin (*Cottus cognatus*) and Alaska blackfish (*Dallia pectoralis*).

Upper California Creek - Site CA10

Trap	Immature Salmon	Immature Dolly Varden	Slimy Sculpin
1	12	12	0
2	2	8	3
3	0	1	1
4	3	4	0
5	4	1	0
6	2	3	0
7	3	0	0
Totals	26	28	4

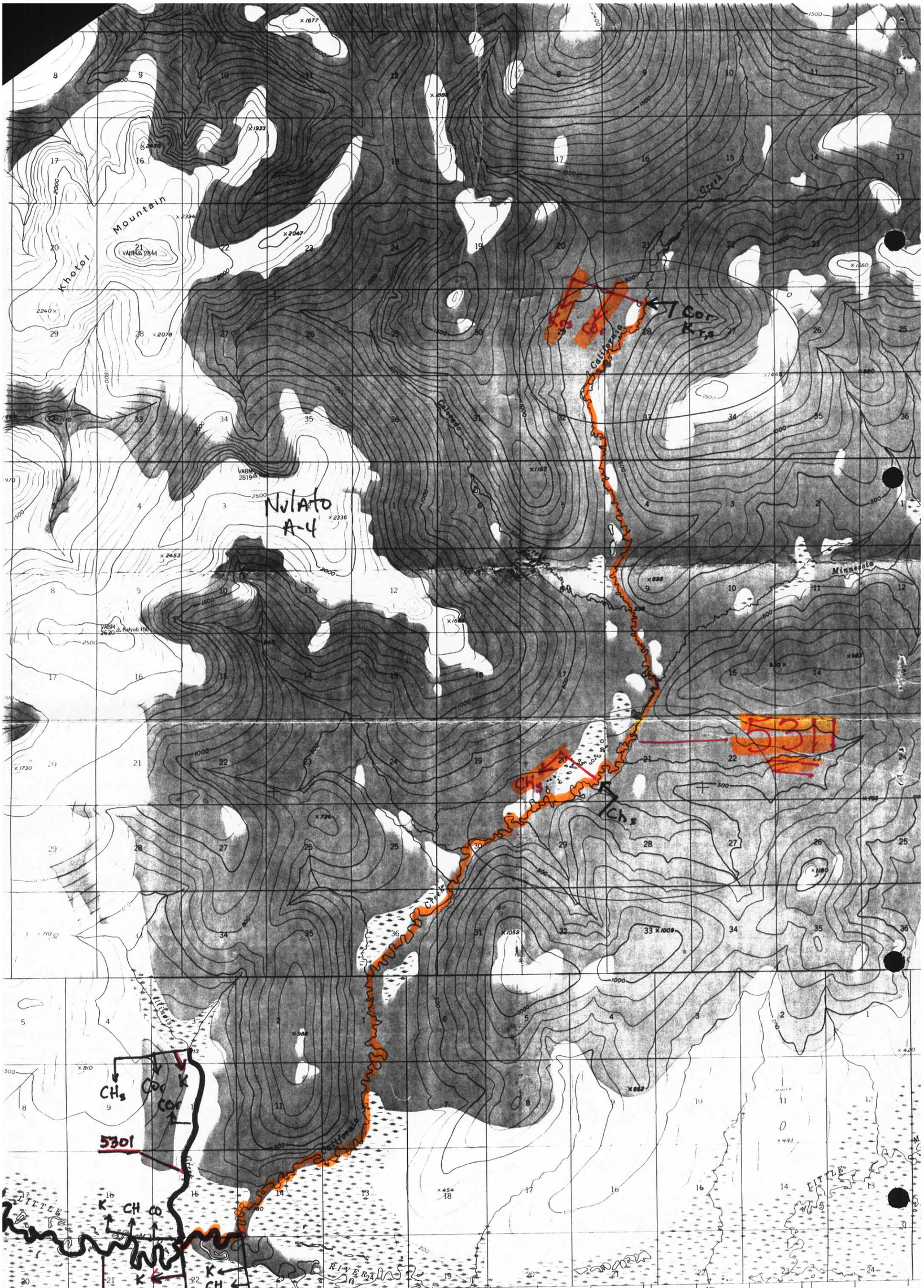
Lower California Creek - Site CA11.

Trap	Immature Salmon	Immature Dolly Varden	Slimy Sculpin	Alaska Blackfish
1	91	0	0	1
2	30	0	2	0
3	6	0	1	0
4	13	0	0	0
5	13	0	1	0
6	15	0	1	0
7	29	1	2	0
Totals	197	1	7	1

Little Mud River - Site Mud10
6 traps - No fish caught.

Little Mud River - Site Mud11		
Trap	Immature Salmon	Slimy Sculpin
1	1	0
2	0	1
3	0	4
4	0	0
5	0	0
6	0	0
7	0	0
Total	1	5

Colorado Creek
One trap - 73 Immature Salmon



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Extend Stream #

Nulato A-4