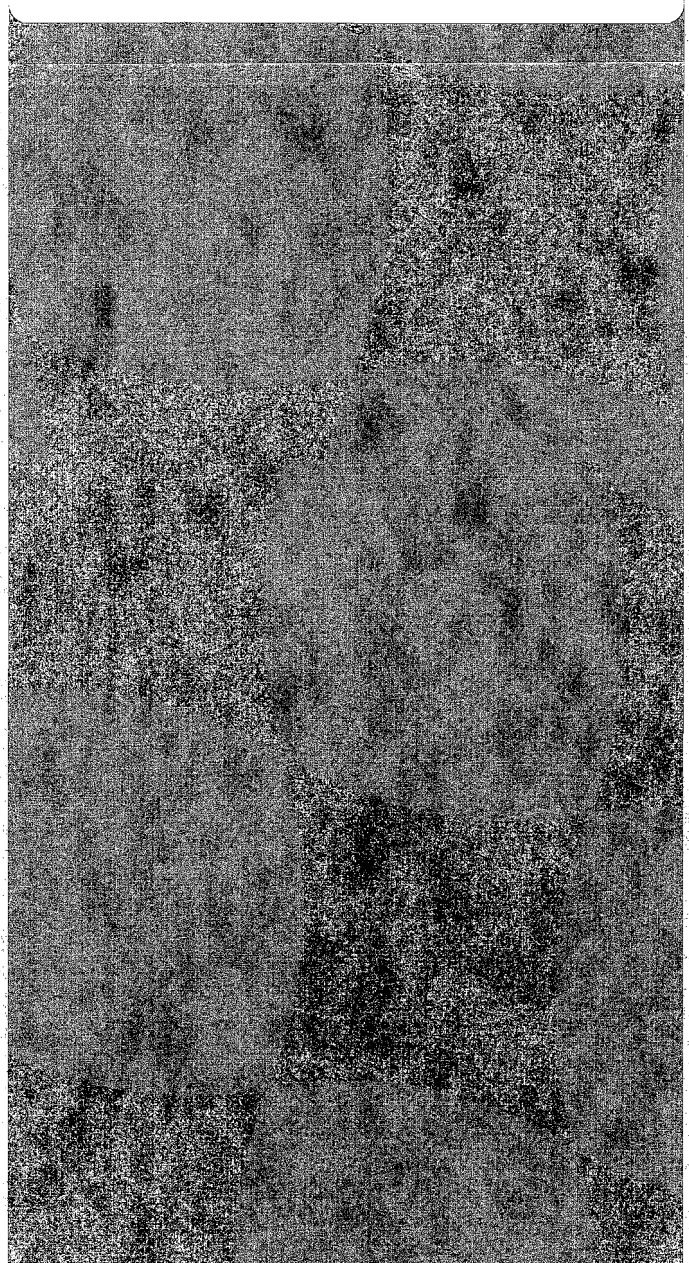
DECEMBER INVESTIGATIONS ON THE UPPER SUSITNA RIVER WATERSHED BETWEEN DEVIL CANYON AND CHULITNA RIVER



December Investigations on the Upper Susitna River Watershed Between Devil Canyon and Chulitna River

INTRODUCTION

In December of 1974 the Division of Commercial Fisheries, contracted by the National Marine Fisheries Service, commenced a series of monthly winter investigations on the Upper Susitna River below Devil Canyon. Previous investigations denoted 21 relativly major and minor salmon spawning and rearing sloughs adjoining the Susitna River between Devil Canyon and the Chulitna River (Figure 1). Chum salmon were the primary spawning species and coho fry the dominate rearing species.

The presence of age 0.0 coho fry and the absence of adult coho spawners in the sloughs suggests that fry immigrate, in early spring, from the spawning streams to the Susitna River and enter the sloughs for rearing. Some emigration into the Susitna River was observed in the late fall of 1974 corresponding with partial slough dewatering. Rearing fry may inhabit both the Susitna River and the sloughs during winter months. Sloughs void of adult spawning populations may be due to their incapability to buffer winter conditions. The winter investigations are intended to provide qualative information on fry distribution and abundance and winter conditions in the sloughs and in the Susitna River.

PROCEDURES

The first survey was conducted during the period of December 3 through 6 from a field station established at Gold Creek. Travel to the sloughs was achieved primarily through the use of two twin track snow vehicles. Sloughs that were accessible were sampled for D.O., pH, relative water height, ice thickness and cover, snow depth, temperature and flow. Minnow traps baited with salmon roe were fished in sloughs having sufficient water depth.

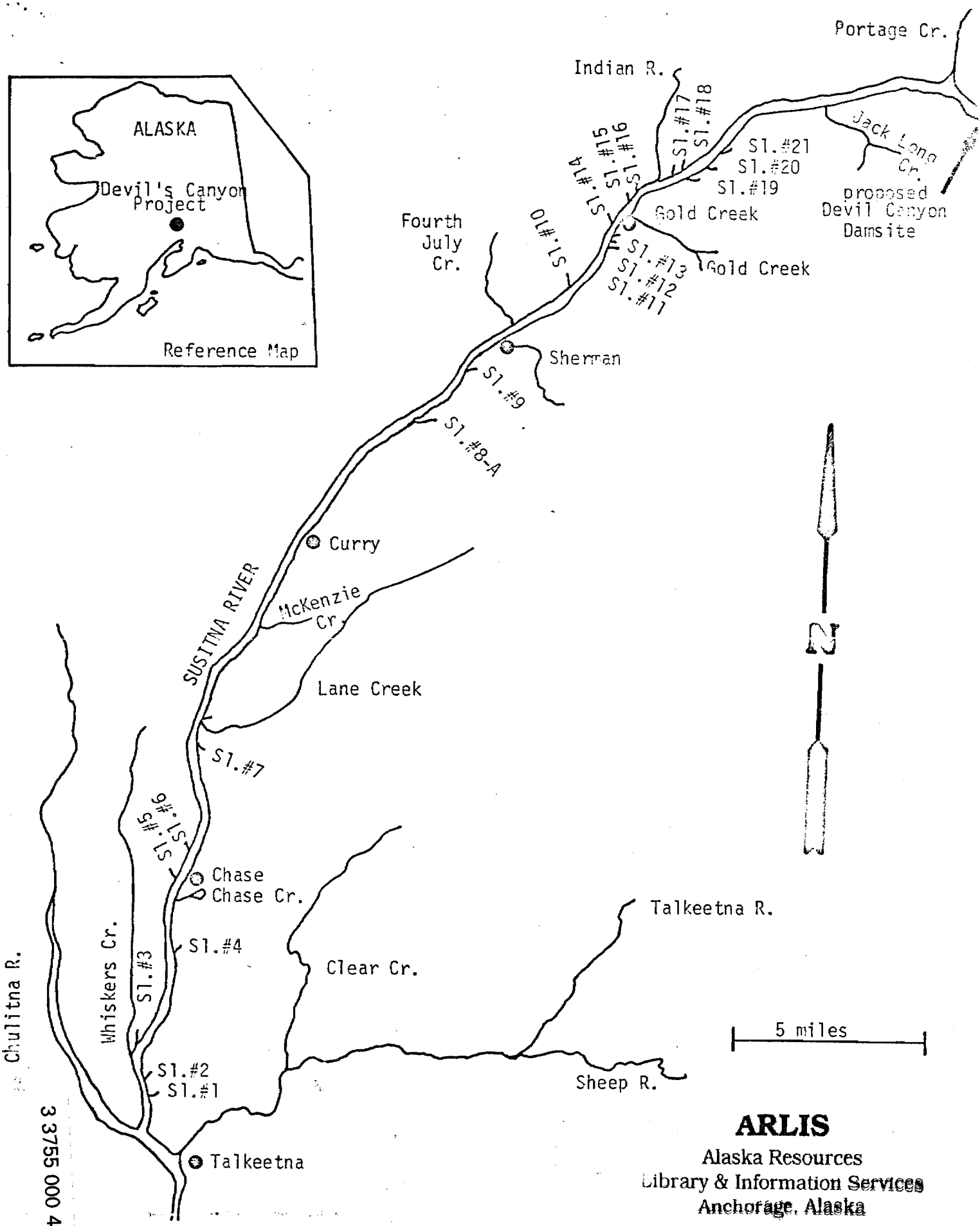


Figure 1. Map of the area encompassed in the Devil Canyon investigations on the upper Susitna River Watershed, Devil's Canyon Winter Project, 1974.

A Ryan thermograph was installed at Gold Creek and at Chase on the Susitna River. Water samples were collected for suspended sediment analysis and pH and D.O. levels were monitored at the thermograph sites and at the Fairbanks-Anchorage highway crossing.

RESULTS

Sloughs No. 8, No. 9, No. 11, No. 12, No. 13, No. 14, No. 15, were accessible by track machine or by foot. Table 1 presents a summary of the survey results. Aside from Slough No. 14 and No. 15, sloughs west of the Susitna River were inaccessible due to instability of the river ice.

A major portion of Slough No. 8 was dewatered; the remaining portion was approximately 70 percent ice free. The dissolved oxygen level was 13.6 ppm. Insufficient water depth prohibited the employment of a fry trap. Rearing fry were not observed.

Slough No. 9 was 20 percent ice free. Water temperatures and dissolved oxygen level was 34°F. and approximately 11ppm, respectively. Water depth averaged approximately 17 inches. No fry were observed, but with the employment of two minnow traps, 10 age 0.0 coho fry were caught during a 25.5 hour period. Their mean length, weight and condition factor was 64.3 centimeters, 31.1 grams and 1.166 (Table 2).

Slough No. 11 was approximately 20 percent clear of ice. Dissolved oxygen level was 9.6 ppm and water temperature was 34°F. Two minnow traps, fished twenty yards apart, caught eight age 0.0 coho fry. The mean length, weight and condition factor of the fry was 61.0 centimeters, 2.8 grams and 1.242, respectively (Table 2).

Slough No. 12 was completely ice covered except for a relatively small portion located approximately 130 yards above its mouth. Three sites were sampled. Anchor ice was observed at two sites. Water temperature was 34°F.

Table 1. Survey of winter conditions and rearing fry distribution in Sloughs No. 8, No. 8A, No. 9, No. 11, No. 12, No. 13, No. 14 and No. 15, Devil's Canyon Winter Project, 1974.

Slough No.	Survey Site	Date	Time (military)	Temperature (°F) Air	Temperature (°F) Water	Dissolved Oxygen (ppm)	pH	Ice Thickness (inches)	Ice Cover (%)	Snow Depth On Ice (inches)	Water Depth (inches)	Water Flow Detectable	Anchor Ice Present	No. Hours Fished	Minnow Trap Catch Fish Species Coho	Grayling	Whitefish
8	A	12/6/74	1530	28	35	13.6	5.1	0.3-0.5	30	0.5-24	3.0	Yes	No	0.0			
8A	A	12/6/74	1200	26	34	12.8	5.4	0.5-1.0	20	0.5-24	5.0	Yes	No	0.0			
	B	12/6/74	1215	26	34	11.7	5.5	0.3-1.0	20	1.0-24	7.0	Yes	No	0.0			
9	A	12/5/74	0930	30	34	11.0	5.5	2.0	80	0.0-36	16.5	Yes	No	25.5	4	0	0
	B	12/5/74	1000	30	34	10.5	5.3	2.5	80	0.5-2.0	17.3	Yes	No	25.5	6	0	0
11	A	12/4/74	1300	15	34	9.6	5.6	0.5	80	1.0-2.0	14.5	Yes	No	43.5	2	0	0
	B	12/4/74	1320	-	-	-	-	-	-	-	-	Yes	No	43.2	6	0	0
12	A	12/4/74	1330	15	32.5	5.0	6.0	4.6	95	0.1	7.8	No	Yes	0.0			
	B	12/4/74	1345	15	32.5	-	-	4.3	95	2.0-36	5.8	No	Yes	0.0			
	C	12/4/74	1400	15	34	5.2	5.8	1.0-2.0	95	0.1	2.0	Yes	No	0.0			
13	A	12/4/74	1440	15	33	6.8	5.6	0.8	95	0.3-48	1.9	Yes	No	0.0			
	B	12/4/74	1500	15	33	5.2	5.6	1.0	95	1.0	7.6	Yes	No	0.0			
14	A	12/5/74	1530	25	34	11.8	5.4	1.0	50	8.0-36	3.3	Yes	No	0.0			
15	A	12/4/74	1000	10	-	-	-	9.8	100	19.5	0.0	No	No	0.0			
	B	12/4/74	1015	10	34	12.4	5.2	9.0	100	11.0	7.3	Yes	No	0.0			

Table 3. Survey of winter conditions in the Susitna River at Gold Creek, Chase and Anchorage-Fairbanks Highway crossing, Devil's Canyon Winter Project, 1974.

Susitna River Site	Date	Time (Military)	Temperature (°F) Air	Temperature (°F) Water	D.O. (ppm)	pH	Sample Size (l)	Suspended Solids Settlable (mg/l)	Suspended Solids Non-Filterable (mg/l)	Suspended Solids Total Suspended (mg/l)	Water Depth (inches)	Ice Cover (%)	Ice Thickness (inches)	Snow Depth On Ice (inches)	Anchor Ice Present
Gold Cr.	12/5/74	1400	30	33.5	>6.4	5.6	2.0	21	4	25	48	30	4-6	0.5-6	No
Chase	12/6/74	1700	28	34	14.8	6.7	2.0	6	6	12	>96	95	7-12	1.0-24	No
Fair.-Anch.	12/19/74	1440	16	32.5	14.2	6.8	2.0	2	2	4	>96	75	8-10	9.7-13	-

Table 2. Age and length samples of coho fry collected at Sloughs No. 9 and No. 11, Devil's Canyon Winter Project, 1974.

Slough No.	Date	Sample Size	0.0 Age Class						
			Percent Composition	Mean Length (mm)	Standard Deviation	Mean Weight (g)	Standard Deviation	Condition Factor	Brood Year
9	11/6/74	10	100.0	64.3	5.8	3.1	1.1	1.166	1973
11	11/6/74	8	100.0	61.0	6.5	2.8	0.9	1.242	1973

Table 4. Survey of winter conditions in Indian River, Lane Creek and Gold Creek, Devil's Canyon Winter Project, 1974.

Stream	Survey Site	Date	Time (military)	Temperature (°F)		Ice Thickness (Inches)	Ice Cover (%)	Snow Depth On Ice (Inches)	Water		Anchor Ice Present
				Air	Water				Depth (Inches)	Flow (C.F.S.)	
Indian River	3.0	12/6/74	0930	21	34	1.5-3.5	50	4.0-24	12-14	+	No
Lane Cr.	0.1	12/6/74	1500	28	35.5	0.5-1.0	90	6.0-24	8-12	7.21	No
Gold Cr.	0.3	12/6/74	0830	21	32.5	12-14	98	24-48	6-9	+	No

at the ice free station and at the other two stations the temperature was 32.5 °F. Dissolved oxygen levels were approximately 5 ppm. Fry were not observed. Insufficient water depth prevented use of a minnow trap.

The surface of Slough No. 13 was approximately 3 percent ice free. Fry were not observed. Water temperature was 33°F. and the D.O. levels ranged from 5.2 to 6.8 ppm. Water depth averaged approximately eight inches and anchor ice was not observed.

Slough No. 15 was completely ice covered and its water temperature was 34°F. Dissolved oxygen level exceeded twelve ppm. Mean water depth was 7.25 inches. Water flow was undetectible at the two sampling stations. At the confluence of the slough with the Susitna River only subsurface (inter-gravel) water was present.

Slough No.14 was approximately 50 percent ice free and mean water depth was 3.3 inches. The water temperature and dissolved oxygen level was 34°F. and 11.8 ppm. Fry were not observed.

A slough (No. 8A) paralleling the Alaska Railroad at Mile 254 was located and identified for the first time (Figure 2). Cursory observations of the slough suggest that it may be a significant spawning and rearing area. Water temperature was 34°F. and dissolved oxygen levels ranged from 11.7 to 12.8 ppm. Approximately 80 percent of the slough was ice free. No fry were observed and minnow traps were not fished due to time limitations.

Susitna River water collected at Gold Creek averaged 25 mg/l(ppm) of suspended solids. The settling rate was approximately 50 percent at 24 hours. Samples at Chase contained an average of 12 mg/l of suspended solids; the settling rate was approximately 50 percent at 24 hours. River samples collected at the Anchorage-Fairbanks Highway crossing contained 4 mg/l of suspended solids with a 50 percent settling rate at 24 hours.

Indian River, Lane Creek, and Gold Creek were surveyed. The results are presented in Table 4.

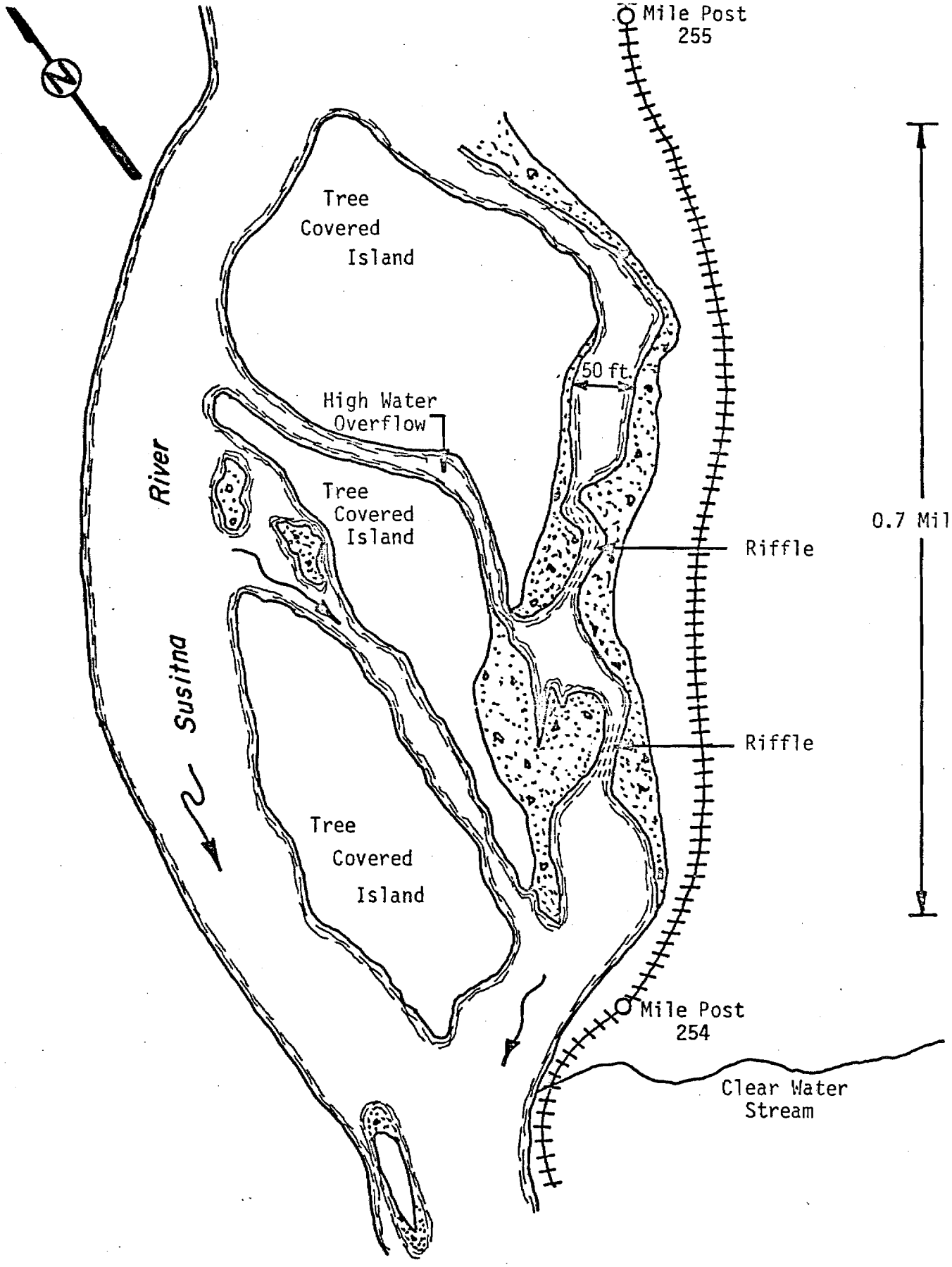


Figure 2. Map of Slough No. 8-A as composed on December 6, Devil's Canyon Winter Project, 1974.

DISCUSSION

Coho fry were rearing in Sloughs No. 9 and No.11 and possibly in Slough No. 8A. An analysis of length and weight samples indicate that the fry were in "good" condition. Sloughs No. 12, No. 13, No. 14 and No. 15 can probalby be considered sub-quality rearing habitat primarily due to their extreme dewatered state.

The Susitna River was clear with a suspended load of less than 26 ppm. At Gold Creek approximately 70 percent of the Susitna River was open, although 70 percent of the open flow was slush ice. Mid-river depth exceeded five feet at Gold Creek and the river substrate was visibly clear from the railroad trestle. At Chase, approxiamtely 5 percent of the river was ice free with 40 percent of the open flow being slush ice, and the Susitna River below the confluence of the Chulitna and Talkeetna Rivers was 25 percent open with surface flow comprised of approximately 30 percent slush ice.

RECOMMENDATIONS

Sloughs No. 19, No. 20 and No. 21 may be accessible with the aide of a ski aircraft and if permissible at least one winter survey should be conducted on them. Minnow trapping should be initiated in the Susitna River.

JANUARY INVESTIGATIONS IN THE UPPER SUSITNA RIVER WATERSHED BETWEEN DEVIL CANYON AND CHULITNA RIVER

INTRODUCTION

Winter investigations in the Upper Susitna River between Devil Canyon and the Chulitna River are intended to provide qualitative information on fry distribution and abundance and winter conditions in the sloughs and in the Susitna River (Figure 1). Investigations conducted in December 1974 documented the presence of coho fry (Oncorhyncus kisutch) rearing in Sloughs No. 9 and No. 11, extreme dewatered conditions in Sloughs No. 12, No. 13, No. 14, and No. 15, and suspended solid levels of less than 26 ppm in the Susitna River.

METHODS

Field operations were conducted from January 13 through 17, based from a field camp located at Gold Creek. Access to sampling areas was obtained primarily with the aid of single and twin track snow vehicles. Snowshoes afforded access when snow and ice conditions prohibited vehicle operation. Sloughs were sampled for dissolved oxygen and pH levels, relative water height, ice cover and thickness, snow depth, and water flow and temperature. Streams were monitored for temperature, water flow and relative depth, and ice cover and thickness. Minnow traps baited with fresh salmon roe were fished in sloughs having sufficient depth.

Thermographs installed the preceding month in the Susitna River at Chase and Gold Creek were checked and reinstalled. Suspended solid, dissolved oxygen and pH levels, ice cover and thickness and snow depth were monitored at the thermograph sites and at the Anchorage-Fairbanks highway crossing.

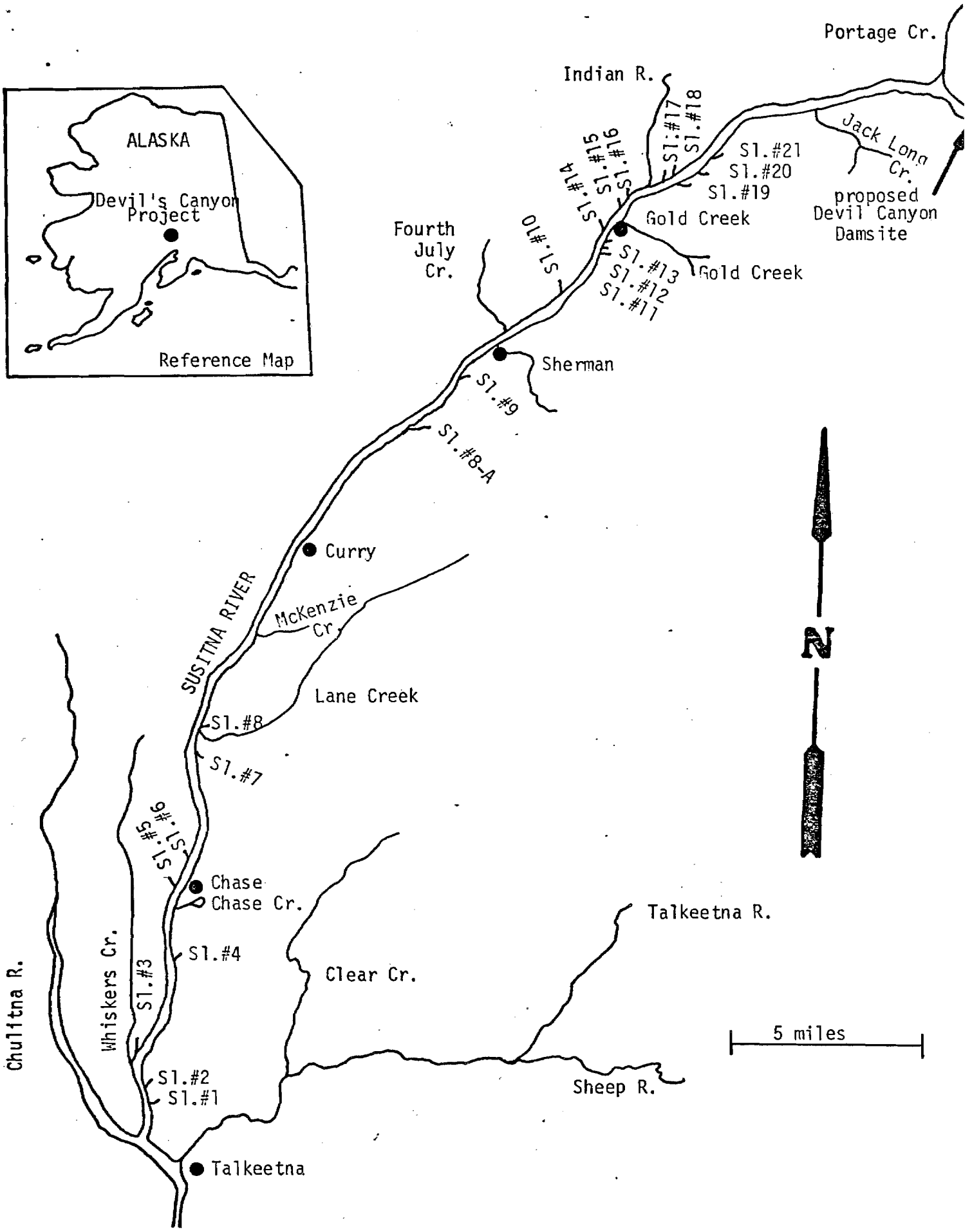


Figure 1. Map of the area encompassed in the Devil Canyon investigations on the upper Susitna River Watershed, Devil's Canyon Winter Project, 1975.

RESULTS

Open leads and overflow conditions, prevalent from the Anchorage-Fairbanks highway crossing to Devil Canyon on the Susitna River, hampered track vehicle travel along the river banks and prevented river crossing. A Gold Creek, Chase, and the Anchorage-Fairbanks highway crossing the river was approximately 25 percent, 0 percent, and 10 percent free of surface ice, respectively (Table 1). Susitna River water samples collected at Gold Creek averaged 58 mg/l suspended solids with 98 percent settlable within 24 hours. Samples collected at Chase averaged 18 mg/l suspended solids with 94 percent settlable at 24 hours. Water samples at the Anchorage-Fairbanks highway crossing contained an average of 228 mg/l suspended solids with 98 percent settling occurring within 24 hours.

Thermographs operating in the Susitna River at Chase and Gold Creek recorded the river temperature at a relatively stable 31-32° F during the period of December 7 through December 30 (Figure 2).

Minnow trapping was conducted from January 15 through 17 in the Susitna River at Gold Creek. One coho fry was captured in 52 hours of fishing (Table 2). This fish, produced from the 1973 parent year, had a length, weight, and condition factor of 62 mm, 2.7 g, and 1.133, respectively.

Slough No. 8 averaged approximately 75 percent ice cover (Table 3); water temperature and the dissolved oxygen level was 34° F and 13.4 ppm. No rearing fry were observed.

Slough No. 8-A averaged approximately 85 percent ice cover. Water temperature was 34° F and dissolved oxygen levels were not monitored at the sampling station due to equipment failure. The author suggests that the oxygen levels were within fish tolerances as water flow was detectable and portions of riffles in the slough were ice free.

Table 1. Survey of winter conditions in the Susitna River at Gold Creek, Chase and Anchorage-Fairbanks Highway crossing, Devil's Canyon Winter Project, 1975.

Susitna River Site	Date	Time (Military)	Temperature (°F) Air	Temperature (°F) Water	D.O. (ppm)	pH	Sample Size (l)	Suspended Solids Settlable (mg/l)	Suspended Solids Non-Filterable (mg/l)	Suspended Solids Total Suspended (mg/l)	Water Depth (inches)	Ice Cover (%)	Ice Thickness (inches)	Snow Depth On Ice (inches)	Anchor Ice Present
Gold Cr.	1/14/75	1200	6	32	10.4	5.7	2	57	1	58	48	75	12.0	0.5-12	No
Chase Cr.	1/13/75	1145	-9.0	32	9.5	5.7	1.5	17	1	18	96	100	27.5	6.0-24	No
Fair.-Anch.	1/12/75	1306	2	33	12.8	5.6	2	224	4	228	42	90	24.0	9.0	No
	1/22/75	1300			12.1			2	2	4		90	24.0		

Table 2. Age and length samples of coho fry collected in Sloughs No. 8-A, No. 9, No. 11 and in the Susitna River at Gold Creek, Devil's Canyon Winter Project, 1975.

			0.0 Age Class							1.0 Age Class					
Sampling Site	Date	Sample Size	Percent Composition	Mean Length (mm)	Standard Deviation	Weight	Standard Deviation	Condition Factor	Brood Year	Percent Composition	Mean Length	Standard Deviation	Weight	Standard Deviation	Condition Factor	Brood Year
8-A	1/17/75	2	50.0	64		3.0		1.144	1973	50.0	74		4.8		1.185	1972
9	1/17/75	2	50.0	64		3.0		1.144	1973	50.0	83		5.8		1.014	1972
11	1/15/75	6	85.7	62.3	5.0	3.4	0.8	1.406	1973	14.3	83		8.6		1.504	1972
Susitna River Gold Cr.	1/16/75	1	100.0	62		2.7		1.133	1973	0.0						

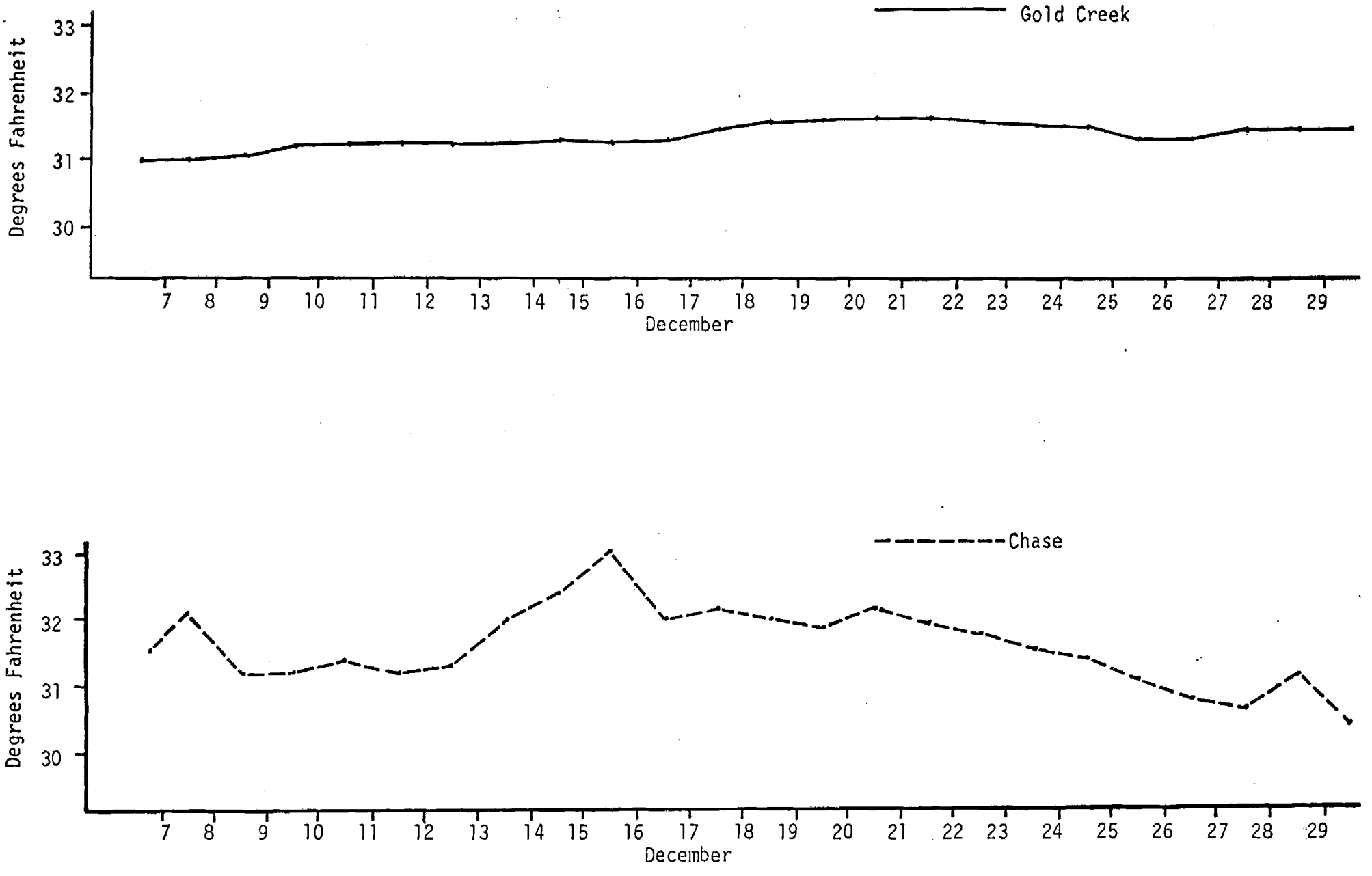


Figure 2. Profile of water temperatures recorded daily in the Susitna River at Gold Creek and Chase, Devil's Canyon Winter Project, 1975.

Table 3 . Survey of winter conditions and rearing fry distribution in Sloughs No. 8, No. 8A, No. 9, No. 11, No. 12, No. 13, No. 14, No. 15, No. 17 and No. 18, Devil's Canyon Winter Project, 1975.

Slough No.	Survey Site	Date	Time (Military)	Temperature (°F) Air	Temperature (°F) Water	Dissolved Oxygen(ppm)	pH	Ice Thickness (inches)	Ice Cover (%)	Snow Depth On Ice (inches)	Water Depth (inches)	Water Flow Detectable	Anchor Ice Present	No.Hours Fished	Minnow Trap Catch Fish Species: Coho	Grayling	Rainbow	Sculpin
8	A	1/13/75	1415	6	34	13.4	5.5	1.0-3.0	75	0-12	4.5	+	No	0.0				
8A	A	1/17/75	1210	29	34	-	5.4	0.5-2.0	80	6.0-12	4.0	+	No	68.1	0	0	0	0
8A	B	1/17/75	1225	29	34	-	5.4	0.3-1.8	90	1.0-10	8.5	+	No	68.0	2	0	0	3
9	A	1/17/75	1107	25	34	11.4	5.5	0.5-4.0	95	2.0-36	13	+	No	66.0	2	0	0	0
9	B	1/17/75	1128	25	33		5.5	0.2-3.0	80	0.5-15	13	+	No	66.5	0	0	0	0
11	A	1/14/75	1445	4	35	7.0	5.7	0.5-3.0	95	0.5-3.0	12	+	No	24.8	1	0	1	0
11	B	1/14/75	1430	4	35	8.8	5.7	0.5-2.5	95	1.0-3.0	9.0	+	No	24.8	6	0	0	0
12	B	1/14/75	1515	4	33	5.8	5.7	6.25	100	3.0-24	8.0	+	No	0.0				
12	C	1/14/75	1506	4	34	6.8	5.6	1.0-3.0	70	0.5-36	4.0	+	No	0.0				
13	A	1/14/75	1531	8	34	7.4	5.5	0.5-2.0	90	1.0-12	3.5	+	No	0.0				
13	B	1/14/75	1541	8	34	7.0	5.6	0.5-4.5	90	0.5-12	8.0	+	No	0.0				
14	A	1/14/75	1105	6	35	9.1	5.5	0.5-3.0	98	0.5-9.0	5.0	+	No	0.0				
14	B	1/14/75	1035	6	35	8.2	5.5	2.5-5.0	100	5.0-12	3.0	+	No	0.0				
15	B	1/15/75	1000	18	32	6.4	5.4	10.0	100	36-48	14		No	0.0				
15	C	1/15/75	0930	18	34	7.4	5.3	0.5-2.0	95	2.0-24	3.0	+	No	0.0				
17	A	1/16/75	1138	28	35	9.6	5.7	0.5-1.0	20	5.0-36	10.5	+	No	0.0				
17	B	1/16/75	1145	28	34	10.2	5.7	0.2	10	8.0-24	3.0	+	No	0.0				
18	A	1/16/75	1225	29	34	9.2	5.5	6.50	100	12-24	6.0	+	No	0.0				

Table 4. Survey of winter conditions in Indian River, Lane Creek and Gold Creek, Devil's Canyon Winter Project, 1975.

Stream	Survey Site	Date	Time (Military)	Temperature (°F) Air	Temperature (°F) Water	Ice Thickness (Inches)	Ice Cover (%)	Snow Depth On Ice (Inches)	Water Depth (Inches)	Water Flow (c.f.s.)	Anchc Ice Pres
Indian River	3.0	1/15/75	1155	18	34	3.0-5.0	100	8-36	12	+	No
Lane Cr.	0.1	1/13/75	1405	6	33	1.0-12	99	2.0-36	5	+	No
Gold Cr.	0.3	1/15/75	1006	21	33	2.0-12	100	12-48	7	+	No

Minnow traps were fished at two locations in Slough No. 8-A for approximately 68 hours each. Two coho fry and three sculpin were captured. One coho fry was from the 1973 brood year and the second was produced from the 1972 brood year. The length, weight, and condition factor for the former was 64 mm, 3.0 g, and 1.144, and the latter fish had a length, weight, and condition factor of 74 mm, 4.8 g, and 1.185.

Slough No. 9 averaged approximately 88 percent ice cover. Water temperature averaged 34° F and the dissolved oxygen level was 11.4 ppm. Two minnow traps were fished for a total of 132.5 hours. One coho fry from the 1973 brood year and one from the 1972 brood year were caught. Their lengths were 64 mm and 83 mm, respectively.

Slough No. 11 averaged approximately 95 percent ice cover. The mean water temperature and dissolved oxygen level was 35° F and 7.9 ppm. Two minnow traps were fished for a total of 59.6 hours; seven coho and one rainbow trout (Salmo gairdneri) fry were captured. Approximately 86 percent of the coho fry caught were from the 1973 brood year; their mean length, weight, and condition factor was 62.3 mm, 3.4 g, and 1.406. The remainder of the catch represented a 1972 brood year fish; its length and weight was 83 mm and 8.6 g. The length and weight of the rainbow trout was 71 mm and 5.0 g.

In Slough No. 12 only a small portion located approximately 130 yards above its confluence with the Susitna River was clear of ice cover. Water temperatures averaged 33.5° F and dissolved oxygen levels averaged 6.3 ppm. In the ice free section organic material consisting primarily of cottonwood and alder leaves ranged from one to two inches on the substrate. The decomposition of such is probably resulting in a significant oxygen demand. No rearing fry were observed during the survey.

The surface of Slough No. 13 was approximately 10 percent free of ice cover, and water temperature and dissolved oxygen levels averaged 34° F and 7.2 ppm. Fry were not observed.

Ice cover exceeded 98 percent in Slough No. 14. The water temperature and depth averaged 35° F and 4 inches. The dissolved oxygen levels ranged from 7.0 to 7.4 ppm. Fry were not observed.

Slough No. 15 had in excess of 95 percent ice cover. Water temperature and dissolved oxygen levels averaged 33° F and 6.9 ppm. Water flow was not detectable at the lower sampling site located approximately 15 yards above the confluence of the slough with the river, but flow was observable at a station located approximately 110 yards above the confluence.

Slough No. 17 and Slough No. 18 were surveyed for the first time this season. Access to both of these sloughs was obtained by crossing the confluence of Indian River and the Susitna River with tracked vehicles. Slough No. 17 was approximately 85 percent free of ice cover. Water temperature and depth averaged 34.5° F and 6.8 inches. The dissolved oxygen levels averaged 9.9 ppm. No fry were observed.

Slough No. 18 was completely ice covered. The water temperature and depth at the sampling station was 34° F and 6 inches. The dissolved oxygen level was 9.2 ppm and water flow was not detectable. Fry were not observed.

Indian River, Lane Creek, and Gold Creek were surveyed, and the results are presented in Table 4.

DISCUSSION

The Susitna River was relatively low in suspended solids with water samples collected ranging from 18 ppm at Chase to 228 ppm at the Anchorage-Fairbanks highway crossing; subsequent sampling at the Anchorage-Fairbanks highway crossing on January 22, 1975 revealed suspended solids at the level of 4 ppm. These suspended solid levels are within anadromous fish tolerances as suggested in the Fisheries Handbook of Engineering Requirements and Biological Criteria by Milo Bell.

The capture of a coho fry in the Susitna River near the community of Gold Creek is a major breakthrough toward documenting the presence of anadromous fish wintering in the Susitna River.

Coho fry representing both the 1972 and 1973 brood years were captured in Slough No. 8-A, No. 9, and No. 11.

In an interview, a local trapper residing at Indian River stated that in late fall of 1973 he found a "few" chum salmon carcasses in a riffle portion of Slough No. 8-A. This represents the first record, although unofficial, of adult salmon present in this slough. Department personnel did not locate this slough until December of 1974, consequently no spawning ground surveys were conducted last season.

RECOMMENDATIONS

Minnow trapping should be initiated in Slough No. 17. A major effort should be expended to obtain access to Sloughs No. 19, No. 20, and No. 21. Trapping in the Susitna River should be expanded beyond the Gold Creek area.

FEBRUARY INVESTIGATIONS IN THE UPPER SUSITNA RIVER WATERSHED BETWEEN DEVIL CANYON AND CHULITNA RIVER

INTRODUCTION

Winter investigations in the Upper Susitna River watershed from Devil Canyon to the Chulitna River are directed toward assessing anadromous fry distribution and abundance, and winter conditions in the sloughs and main stem Susitna River (Figure 1). Studies conducted during the previous two months have established that coho fry (Oncoryhnchus kisutch) are wintering in Sloughs No. 8-A, No. 9, No.11 and the Susitna River, and that the Susitna River was transporting suspended solid loads ranging from 4 ppm to 228 ppm.

METHODS

Field investigations were conducted from a camp established at the confluence of Indian and Susitna Rivers from February 12 through 18. Access to the sampling stations was obtained primarily with the aid of a single track snow vehicle. Sloughs were monitored for dissolved oxygen and pH levels, relative water depth, ice cover and thickness, snow depth, and water flow and temperature. Minnow traps baited with salmon roe were fished in the sloughs affording sufficient operational depth.

The Susitna River was monitored at Gold Creek, Chase, and the Fairbanks-Anchorage Highway bridge for water temperature, dissolved oxygen and pH levels, ice cover and thickness, and snow depth. At the Gold Creek Station, a Ryan thermograph was installed to assess daily water temperature fluctuations. Indian River, Gold Creek, and Lane Creek were sampled for water temperature, water flow and relative depth, and ice cover and thickness.

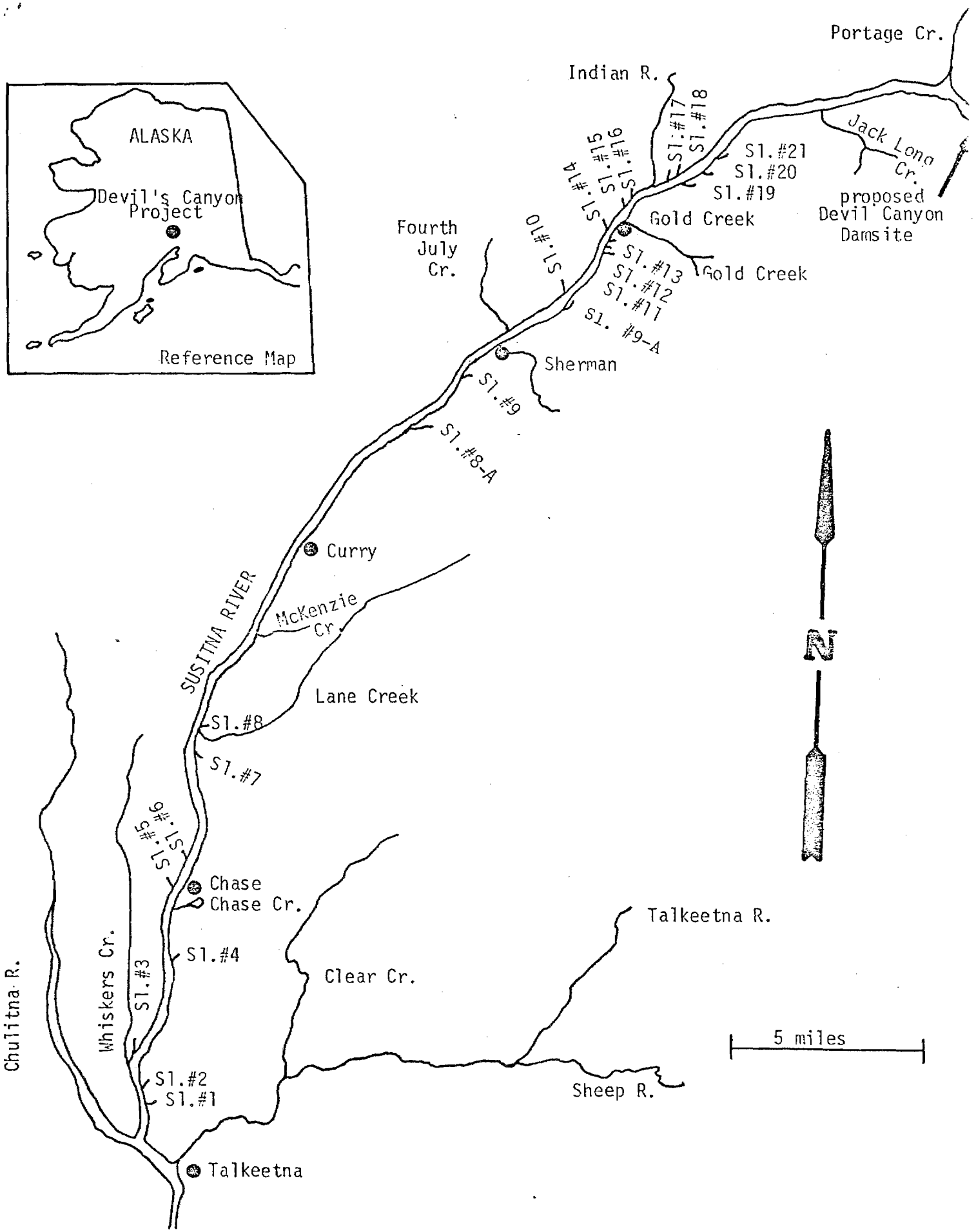


Figure 1. Map of the area encompassed in the Devil Canyon investigations on the upper Susitna River Watershed, Devil's Canyon Winter Project, 1975.

RESULTS

The Susitna River was completely ice covered at the Chase and Anchorage Highway stations, and at the Gold Creek station ice cover was approximately 95 percent (Table 1). Total suspended solid levels at these stations averaged approximately 14 mg/l with a range of 9 mg/l at Chase at 20 mg/l at Gold Creek. The settables, referring to that portion of the total suspended solids which settle within a 24 hour period, comprised approximately 90 percent of the samples. River temperature was 32° at the three sampling stations and dissolved oxygen levels averaged 9.3 ppm.

Presented in Figure 2 is a transposition of the thermograph data collected between January 14 and February 15, in the Susitna River at the Gold Creek sampling station.

Minnow trapping was conducted in the Susitna River from the Gold Creek railroad trestle to Slough No. 17, and produced a catch of six age 0.0 coho fry. The average length, weight, and condition factor of these fish was 70.0 mm, 3.9 gm, and 1.137, respectively (Table 2).

A summary of the winter components monitored in Sloughs No. 8, No. 8-A, No. 9, No. 9-A, No. 10, No. 11, No. 12, No. 13, No. 14, No. 15, No. 16, No. 17, No. 18, No. 19, No. 20, and No. 21 is presented in Table 3. Rearing coho fry were trapped in Sloughs No. 9, No. 9-A, No. 11, and No. 19. A length and weight analysis of these fry by slough is presented in Table 2. The entire catch represented fry produced from the 1973 brood year. Their mean length, weight, and condition factor was 70.5 mm, 41.1 gm, and 1.170, respectively.

On February 17, Slough No. 9-A was located and identified for the first time (Figure 3). Approximately twenty hours of minnow trapping in this slough afforded a relatively high catch of 21 coho fry.

Table 1. Survey of winter conditions in the Susitna River at Gold Creek, Chase and Anchorage-Fairbanks Highway crossing, Devil's Canyon Winter Project, 1975.

Susitna River Site	Date	Time (Military)	Temperature (°F) Air	Temperature (°F) Water	D.O. (ppm)	pH	Sample Size (l)	Suspended Solids Settlable (mg/l)	Suspended Solids Non-Filterable (mg/l)	Suspended Solids Total Suspended (mg/l)	Water Depth (inches)	Ice Cover (%)	Ice Thickness (inches)	Snow Depth On Ice (inches)	Ancho Ice Preser
Gold Creek	2/14/75	1515	14	32	10.1	5.8	2	19	1	20	47	95	32	0.0-18	No
Chase	2/18/75	1630	27	32	9.0	5.8	2	8	1	9	50	100	14	24-30	No
Fairbanks Anchorage Highway	2/18/75	2030	23	32	8.8	5.9	2	10	2	12	50	100	27	12	No
	2/20/75	1200			9.7		2	6	1	7					No

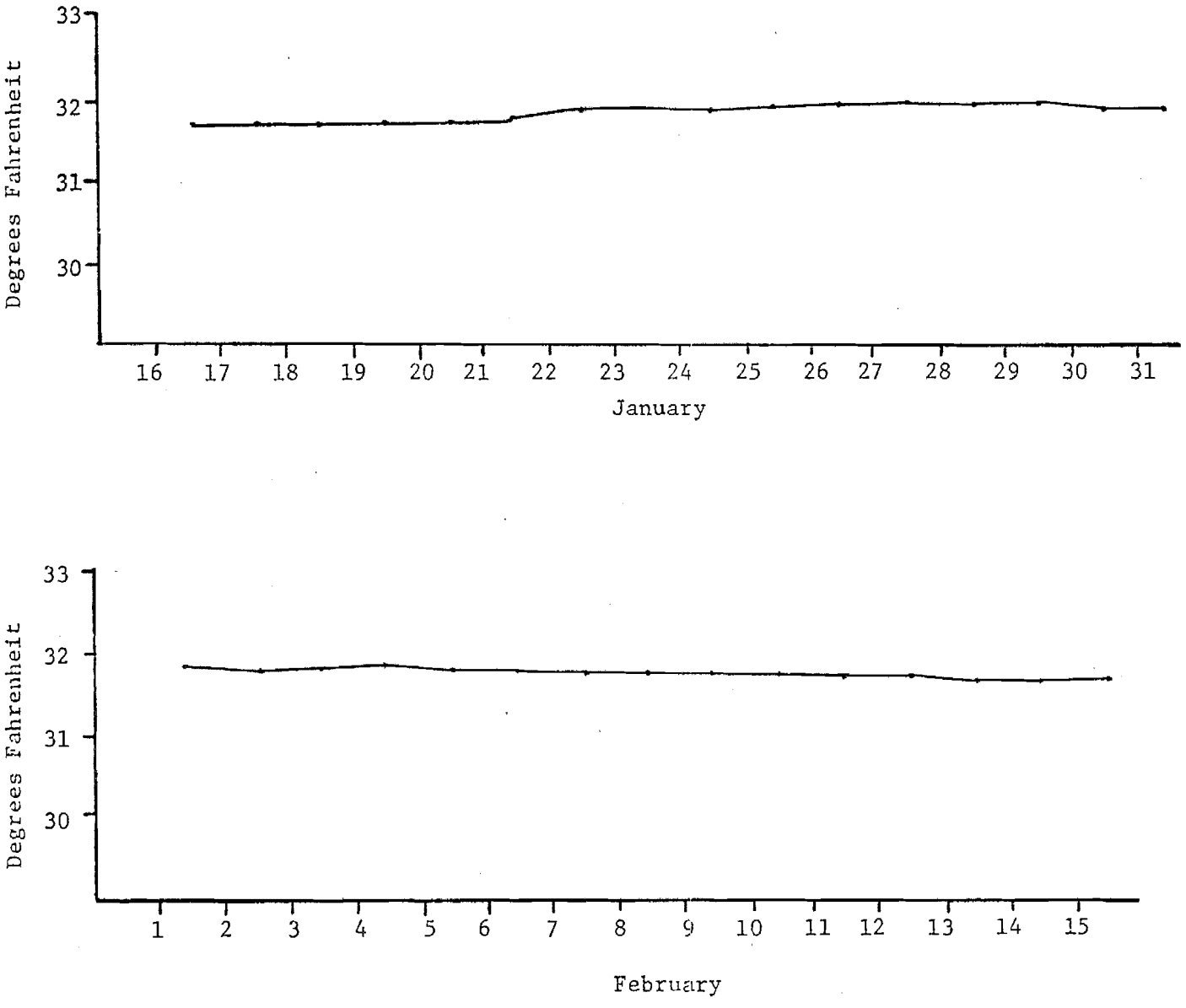


Figure 2. Profile of water temperatures recorded daily in the Susitna River at Gold Creek, Devil Canyon Winter Project, 1975.

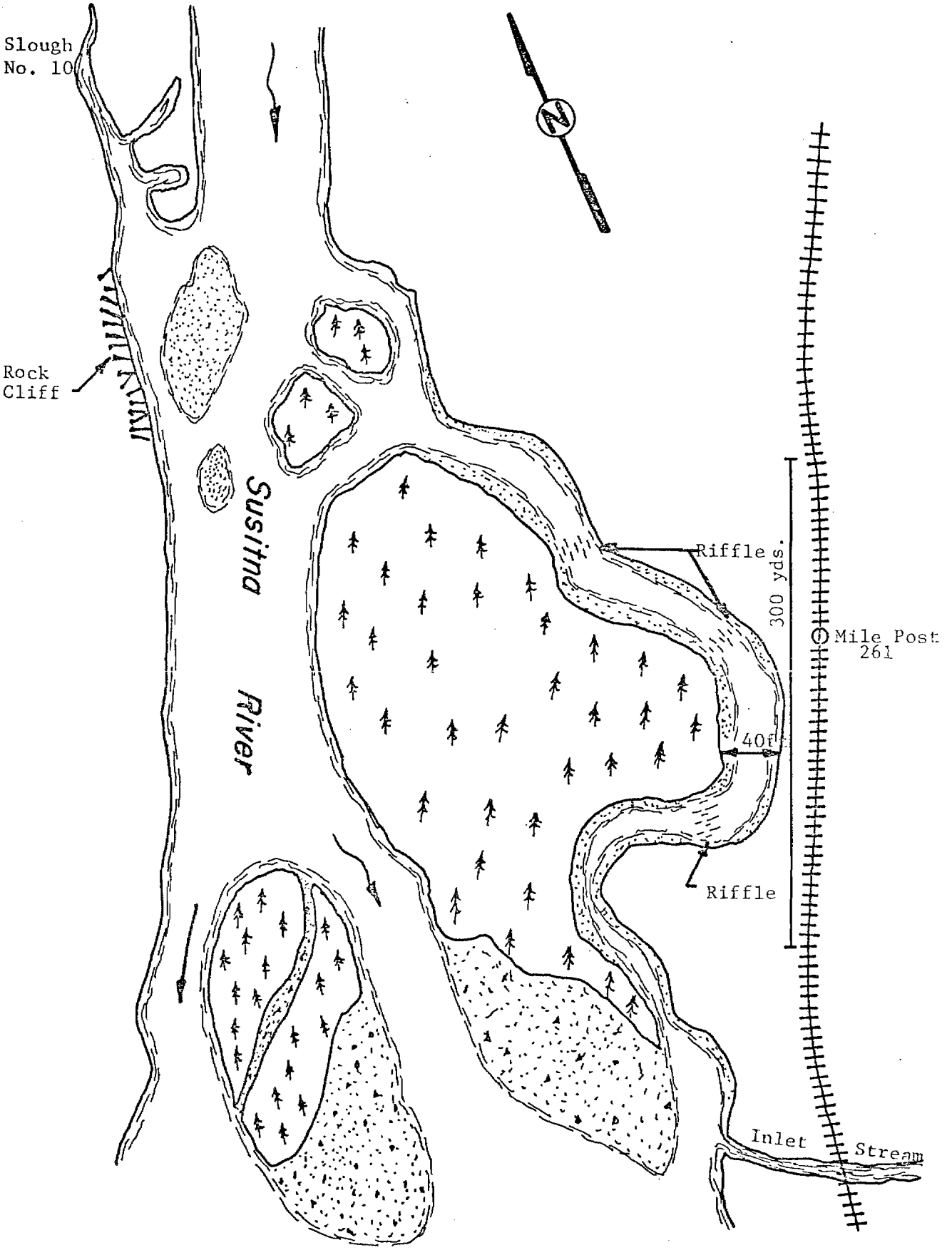


Figure 3. Map of Slough No. 9-A as composed on February 17, Devil's Canyon Winter Project, 1975.

Table 2. Age, length and weight analysis of coho fry collected in Sloughs No. 9, No. 9-A, No. 11, No. 19 and in the Susitna River, Devil's Canyon Winter Project, 1975.

Sampling Site	Date	Sample Size	0.0 Age Class Percent Composition	Mean Length (mm)	Standard Deviation	Mean Weight (g)	Standard Deviation	Condition Factor	Brood Year
Sl. 9	2/18/75	7	100.0	70.1	4.3	3.7	0.6	1.074	1973
Sl. 9-A	2/18/75	8	100.0	73.5	4.5	4.9	0.9	1.234	1973
Sl. 11	2/15/75	2	100.0	62.0	2.8	2.8	0.1	1.175	1973
Sl. 19	2/17/75	1	100.0	67		3.4		1.130	1973
Susitna River (Gold Cr.-Sl. 17)	2/14-16/75	6	100.0	70.0	4.9	3.9	0.9	1.137	1973

Table 3. Survey of winter conditions and rearing fry distribution and abundance in Sloughs No. 8, No. 8-A, No. 9, No. 9-A, No. 10, No. 11, No. 12, No. 13, No. 14, No. 15, No. 16, No. 17, No. 18, No. 19, No. 20, and No. 21, Devil's Canyon Winter Project, 1975.

Slough No.	Survey Site	Date	Time (Military)	Temperature (°F) Air	Temperature (°F) Water	Dissolved Oxygen(ppm)	pH	Ice Thickness (inches)	Ice Cover (%)	Snow Depth On Ice (inches)	Water Depth (inches)	Water Flow Detectable	Anchor Ice Present	No.Hours Fished	Minnow Trap Catch Fish Species: Coho	Grayling	Rainbow	Sculpin
8	A	2/18/75	1344	30	36	8.8	5.4	1.0-3	50	4-28	2.0	+	No	0.0				
8-A	A	2/17/75	1420	25	33	8.5	5.8	0.5-4	95	2-14	3.0	+	No	0.0				
	B	2/17/75	1448	24	33	7.2	5.8	0.5-6	99	2-30	4.5	+	No	21.8	0	0	0	0
9	A	2/17/75	1245	27	33	9.0	5.3	0.8-10	95	1-30	9.5	+	No	0.0				
	B	2/17/75	1315	26	34	7.4	5.3	0.4-10	95	0.5-16	10.0	+	No	45.4	7	0	0	0
9-A	A	2/17/75	1545	24	35.5	6.1	5.4	0.5-2	65	2-5	9.5	+	No	20.3	21	0	0	0
10	A	2/17/75	1615	24	34.5	7.4	5.4	1.0-4	55	0.3-16	6.0	+	No	0.0				
11	A	2/13/75	1025	-6	36	8.1	5.8	0.4-9	95	0.0-0.3	20.0	+	No	24.5	0	0	0	0
	B	2/13/75	1100	-2	36	7.4	5.4	0.3-8	95	0.0-0.3	14.0	+	No	68.5	2	0	0	0
12	B	2/13/75	1230	0	34	8.5	5.8	0.5-2	99	8-18	11.5	+	No	0.0				
	C	2/13/75	1155	3	34	9.4	5.2	0.3-9	98	1-24	4.5	-	No	0.0				
13	A	2/13/75	1355	1	34	9.2	5.7	0.5-2	75	0.0-10	4	+	No	0.0				
	B	2/13/75	1420	0	34	9.2	5.6	0.5-2	75	0.5-10	7.5	+	No	0.0				
14	A	2/16/75	1140	16	34	8.8	5.7	0.3-10	90	1-15	3.3	+	No	0.0				
	B	2/16/75	1210	16	33	9.7	5.7	0.3-3	100	1-14	4.5	+	No	0.0				
15	B	2/15/75	1205	9	33	8.1	5.5	12	100	7-16	9.0	-	No	0.0				
	C	2/15/75	1230	8	34	7.4	5.3	1.0-7	100	0.5-30	5.0	-	No	0.0				
16	A	2/17/75	0942	26	35	6.5	5.2	0.5-3	70	1.0-18	3.0	+	No	0.0				
17	A	2/13/75	1700	-2	33	8.5	5.3	0.3-3	95	0.0-12	13.0	+	No	23.5	0	0	0	0
	B	2/13/75	1740	-3	36	8.3	5.5	0.3-4	50	0.0-8	4.0	+	No	0.0				
18	A	2/14/75	1035	6	33.5	7.2	5.7	5-9	100	0.0-28	6.5	-	No	0.0				
19	A	2/16/75	1720	16	34	9.0	5.5	0.5-6	98	14-28	9.5	-	No	16.6	1	0	0	0
20	A	2/16/75	1430	17	32	10.3	5.5	6-15	100	23-36	2.0	+	No	0.0				
	B	2/16/75	1530	16	32		5.4	14	100	23-36	9.0	-	No	0.0				
21	A	2/16/75	1620	17	34	9.4	5.7	1.0-12	100	0.5-10	5.0	+	No	0.0				
	B	2/16/75	1635	16	32.5	9.4	5.4	3-10	100	0.5-16	8.5	-	No	0.0				

Indian River, Lane Creek, and Gold Creek were surveyed, and the results are presented in Table 4.

DISCUSSION

Susitna River water samples contained relatively minor amounts of suspended solids. Minnow trapping near the community of Gold Creek established the presence of rearing coho fry in the main stem Susitna River. It was also documented that coho fry were rearing in Sloughs No. 9, No. 9-A, No. 11, and No. 19. Based upon an analysis of length and weight data, the coho fry captured in the sloughs and Susitna River were in relatively good condition.

Stable ice conditions on the Susitna River permitted the first winter access to sloughs No. 10, No. 17, No. 19, No. 20, and No. 21. Although these sloughs were appreciably dewatered from their summer/fall state, the author suggests that only "harsh" egg incubation conditions were present in Slough No. 20 where water temperatures were 32° and ice thickness averaged in excess of 10 inches.

RECOMMENDATIONS

Discontinue minnow trapping in Sloughs No. 9 and No. 11, but expand trapping efforts in the other sloughs. Locate and fish minnow trap sites near the community of Curry. Install permanent depth stakes at the sampling stations.

Table 4. Survey of winter conditions in Indian River, Lane Creek and Gold Creek, Devil's Canyon Winter Project, 1975.

Stream	Survey Site	Date	Time (Military)	Temperature (°F) Air	Temperature (°F) Water	Ice Thickness (Inches)	Ice Cover (%)	Snow Depth On Ice (Inches)	Water Depth (Inches)	Water Flow (c.f.s.)	Anchor Ice Present
Indian River	0.2	2/18/75	0934	27	32	7-12	100	14-40	7.0	+	No
Lane Creek	0.1	2/18/75	1538	28	33	6-14	100	5-36	7.0	+	No
Gold Creek	0.3	2/16/75	1100	15	32.5	1.0-7	100	28.36	7.2	+	No