Fisheries Evaluation

Draft

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State of Alaska
Department of Transportation and
Public Facilities

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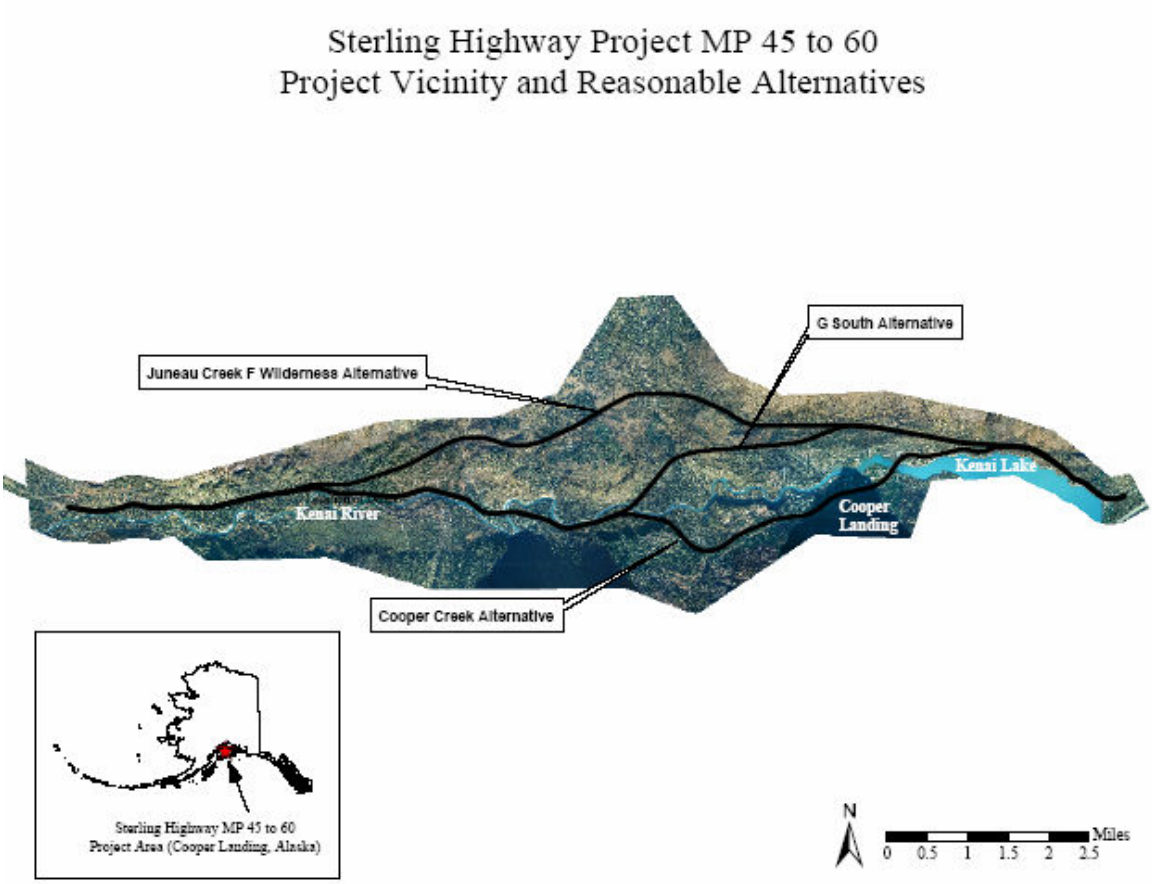
Introduction

The Alaska Department of Transportation and Public Facilities (DOT&PF) is evaluating alternatives to improve the Sterling Highway in the Cooper Landing area. The proposed project is located between Mileposts (MP) 45 and 60 on the Sterling Highway along the Kenai River. The intention of the project is to resolve seasonal traffic congestion which results in delays to residents, travelers, and businesses. HDR Alaska, Inc. (HDR) has been contracted by DOT&PF to provide engineering and environmental support for preparation of a Supplemental Environmental Impact Statement (SEIS).

Kenai River Valley

Three build alternatives, as well as the no-build alternative, are being considered in the SEIS. The three build alternatives include the Cooper Creek, G South, and Juneau Creek F Alternatives, shown on Figure 1. The three build alternatives share the same route at both the eastern and western ends of the project. For the purposes of this study, these shared areas are referred to as the "All Build" (ALL) area.

Figure 1



Study Purpose

This report summarizes the findings of the fish presence study conducted on all the streams intersecting the three build alternative alignments being considered in the SEIS. The primary objective of the study were to determine which species of fish currently reside in streams within the project area, and to identify streams with high probabilities of fish use, either seasonally or year-round. This information will be used as part of the essential fish habitat assessment and to help determine potential fish passage structures to be used at potential crossings.

The fieldwork was conducted on September 7 and 8, and 14 through 17, 2004. The work was completed by HDR and Alaska Department of Natural Resources staff under permit number SEW243 issued by the U.S. Department of Agriculture.

Study Area

Site locations were determined according to where the proposed alignments would intersect streams. This work included 43 sites located on 28 streams, including tributaries.
Eleven sampling sites were located within the ALL area (see Table 1). Additionally, 13 sampling sites were located on the Cooper Creek Alternative (see Tables 2 and 3), 14 sampling

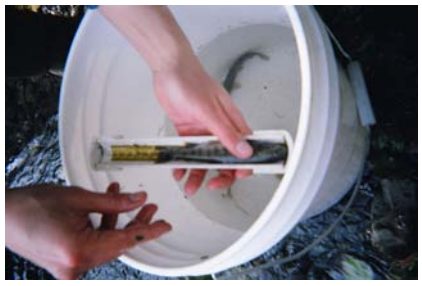
sites on the Juneau Creek F Alternative (see Tables 5 and 6), and 5 sampling sites were located on the G South Alternative (see Tables 3, 4, and 6).

Sampling Methods

Each site that had sufficient water level was sampled using Gee ¼-inch mesh minnow traps baited with cured salmon eggs. Traps were not set at sites with insufficient water levels. Between one and four traps were used at each site, and were left at the site for 24 hours. All captured fish were identified, measured, and released at the point of capture. Additional data collected included stream gradient, channel width, average water depth, culvert condition (where applicable), primary substrate, and macro-habitat. Aerial photos, GIS photos, and GPS were used to identify each site.

Sampling Results

Fish were found at 9 of the 43 sites, and trapping resulted in a total of 39 captured fish. Twenty coho salmon (51.3 percent of total), 18 Dolly Varden char (46.2 percent), and 1 sculpin (2.5 percent) were captured. Fish were found in small concentrations, and overall density appeared low at the sample sites.



A total of 43 sampling sites were located within the 28 streams and 3 tributaries in the project area. Locations of sampling sites are shown on Figures 1 of 10 through 10 of 10. Fourteen streams were dry and five streams were either too shallow or narrow to install minnow traps. Twelve of the dry streams were ephemeral and had evidence of recent scour and/or damp channel bed; the other two streams (location of sampling sites GSJC5 and ALL26) had no sign of recent scour and may be dry most of the year. Where streams were too shallow or narrow to install minnow traps, visual observations were noted. Many of the streams' upper reaches were located on steep slopes, and contained few pools for placing minnow traps. It should be noted that due to unusually dry seasonal conditions, some of the streams that are listed in this report as dry or ephemeral may actually have flow during periods of greater precipitation.

The following sites correspond to the locations marked on Figures 2 of 10 through 10 of 10. GPS locations for each site are listed in Tables 1 through 6.

All Build Areas

Sampling Site ALL1 (Figure 10 of 10)
Stream currently has low flow and the habitat is mainly riffles and step-pools. The channel is less than 1 meter (m) in width and at a gradient of 15 percent. A small pool is on the upstream side of the culvert. Approximately 6 m upstream from the confluence with Kenai Lake is a 0.45-m bedrock step. Substrate is predominantly large gravels. No fish were captured.

Sampling Site ALL2 (Figure 10 of 10)
Stream is currently dry at the Sterling Highway road crossing. Approximately 150 m upstream there is a very low flow. The channel width averages 0.2-m with a depth of 0.04- m. The substrate is predominately large gravel at the site and organic/gravel upstream, with a 10 percent grade. Culvert outlet is set within rip-rap and perched approximately 18 m higher than the lake, appearing to act as a fish barrier. No traps were set due to insufficient water depth. The stream is ephemeral.

Sampling Site ALL22 (Figure 3 of 10)
Perennial stream with moderate flow; less than 1 m in width and at a gradient of 25 percent. Water depth ranged from 0.08 to 0.30 m. Habitat is made up of step-pools and is overgrown. Substrate is organic and small cobble. There is a 2.5 m cascade waterfall directly upstream of the culvert; this appears to be a fish barrier. Culvert is in good structural condition but is perched a few inches above the stream bed on the downstream side. No fish were captured.

Sampling Site ALL23 (Figure 3 of 10)
Stream has moderate flow, is 1 m in width and at a gradient of 35 percent. Water depth ranges from 0.10 to 0.36 m. Habitat is steep, terraced step-pools. Substrate ranges from gravel to large cobble. Culvert outlet is raised 0.45 m above stream bed. No fish were captured.

Sampling Site ALL24 (Figure 3 of 10)
Channel is dry and overgrown with no recent signs of scour. Large gravels were observed in the channel bed.

Sampling Site ALL25 (Figure 3 of 10)
This perennial stream has moderate flow, is less than 1 m in width and averages 0.20 m deep. There is a 4.5 m bedrock cascade directly upstream of culvert. This cascade appears to be a fish passage barrier. Substrate consists of large gravel in the lower reaches to smaller gravels upstream. Traps were set above the waterfall to verify resident fish population. No fish were captured.

Sampling Site ALL26 (Figure 3 of 10)
Channel is dry and overgrown with no recent signs of flow. Large gravels were observed in the substrate.

Sampling Site ALL27 (Figure 3 of 10)
Streambed appears to have been dry for many years and is currently being used as a trail. Large gravels were observed in the streambed. Neither culverts nor sign of a new channel were observed.

Sampling Site ALL28– (Figure 2 of 10)
Perennial stream (Fuller Creek) that is currently dry due to an unusually dry season. This creek was verified as flowing in September, 2003. This stream is also listed as anadromous in the Alaska Department of Fish and Game (ADF&G) Anadromous Streams Catalog. Streambed is 3.5 m in width, contains large gravel to small cobble and is at a 12 percent gradient. Substrate shows very recent scour.

Sampling Site ALL29 (Figure 2 of 10)
This site is dry with no defined channel. Large gravel and small cobbles were observed. There is a ditch relief culvert located between sites ALL29 and ALL28.

Sampling Site ALL30 (Figure 2 of 10)
Channel is dry and overgrown with no recent signs of flow. Substrate consists of large gravel to small cobbles.

Table 1: Summary of data collected from All Build Area sampling sites

Site Number	Location	Status	Species	Length (mm)	Stream Substrate	Habitat	Width (m)	Depth (m)	Gradient (percent)
ALL1	N60° 29.222' W149° 44.176'	No Fish			Large gravel	riffles step-pools	<1	0.03 to 0.30	15
ALL2	N60° 29.486' W149° 44.902'	Dry			Large gravel		0.2	0.04	10
ALL22	N60° 29.312' W150° 01.420 '	No Fish			Organic/small cobble	step-pools	<1	0.08 to 0.30	25
ALL23	N60° 29.272' W150° 01.954'	No Fish			Gravel to large cobble	Terraced step-pools	1	0.10 to 0.36	35
ALL24	N60° 29.226' W150° 02.499'	Dry			Large gravel				
ALL25	N60° 29.209' W150° 02.658'	No Fish			Small to large gravel		<1	0.20	
ALL26	N60° 29.135' W150° 03.174'	Dry			Large gravel				
ALL27	N60° 29.106' W150° 03.475'	Dry			Large gravel				
ALL28	N60° 29.127' W150° 04.720'	Dry			Large gravel to small cobble		3.5		12
ALL29	N60° 29.142' W150° 05.069'	Dry			Large gravel / small cobble				
ALL30	N60° 29.078' W150° 05.702'	Dry			Large gravel / small cobble				

Cooper Creek Alternative

Sampling Site CC31 (Figure 9 of 10)
Completely dry channel, approximately 0.3 m wide, containing large gravel substrate. Approximately 427 m upstream is site GSJC4, which has moderate flow. Approximately 304 m upstream is a 3.6 m bedrock cascade acting as a barrier, and approximately 245 m upstream the stream is either sub-terrain or is being pumped out. A black hose was found in the stream bed.

Sampling Site CC32 (Figure 9 of 10)
Stream has low flow, running approximately 0.04-m deep with a few deeper pools. Stream ranges from 1 to 1.5 m wide and contains organic and gravel substrates at a 1 percent gradient. The habitat is mainly riffle/glide, with organic and medium gravel substrate. This tributary flows along the Sterling Highway and passes under Snug Harbor Road. The site is in close proximity (18 m) to the Kenai River and provides off-channel rearing habitat for coho salmon fry. Ten coho salmon, ranging from 35 to 61 millimeters (mm) long, and one Dolly Varden (53 mm) were captured.

Sampling Site CC33 (Figure 9 of 10)
Stream has low flow, running approximately at 0.03 to 0.10 m deep with a few pools. The stream has an organic and gravel substrate. Channel is less than 0.5 m wide and has a 3 percent gradient. Site is located 182 m upstream from road in a housing development. Stream was too shallow to set traps. No fish were observed but coho salmon may be present at times of higher flows.

Sampling Site CC34 (Figure 8 of 10)
Located in Cooper Creek, a perennial stream with moderate flow composed primarily of boulder and gravel substrate. Channel width is 10 to15 m and the stream gradient is 3 percent. Stream habitat is pools and riffle/glide. Coho salmon, sockeye salmon, and Dolly Varden are present at this site based on personal communication with Mr. Paul McLarnon of HDR (HDR 2004). The ADF&G Anadromous Streams Catalog lists rearing coho in both upper and lower reaches of Cooper Creek (ADF&G 2004).

Sampling Site CC35 (Figure 8 of 10)
Stream is ephemeral with predominately organic substrate. Channel width is less than 0.5 m. Previous studies indicated that no fish were present (HDR 2004).

Sampling Site CC36 (Figure 6 of 10)
Perennial stream channel with low flow, approximately 2 m wide, and at 1 percent gradient. Stream flow spreads into surrounding muskeg and several small ponds. Stream substrate is organic. One Dolly Varden char, measuring 113 mm long, was captured.

Table 2: Summary of data collected from Cooper Creek Alternative sampling sites

Site Number	Location	Stream Status	Species	Length (mm)	Stream Substrate	Habitat	Width (m)	Depth (m)	Gradient (percent)
CC31	N60° 29.640' W149° 48.087'	Dry			Large gravel		0.3		
CC32	N60° 29.477' W149° 48.647'	Fish	Coho	53	organic/med. gravels	riffle/glide	1 to 1.5	0.04	1
			Coho	46					
			Coho	39					
			Coho	35					
			Coho	44					
			Coho	55					
			Coho	61					
			Coho	48					
			Coho	48					
			Coho	46					
			DV	53					
CC33	N60° 29.270' W149° 49.455'	Too shallow			Organic/gravel		0.5	0.30 to 0.10	3
CC34		Fish	Coho, DV Sockeye		Boulder/gravel	pool/riffle glide	10 to 15		3
CC35		No fish			organic		<0.5		
CC36	N60° 29.007' W149° 54.155'	Fish	DV	113	Organic		2		1

Cooper Creek and G South Alternatives

Sampling Site CCGS3 (Figure 6 of 10)
Stream has low flow and is running approximately 0.05 to 0.30 m deep at a 1 percent gradient. Traps were set in pond directly below channel. Substrate is organic and the area is marshy. No fish were captured.

Sampling Site CCGS39 (Figure 4 of 10)
Channel is completely dry with recent signs of scour.

Sampling Site CCGS40 (Figure 4 of 10)

Stream has moderate flow, is 2.5 m wide, 0.25 m deep, contains predominately large gravel substrate, and is at a 5 percent gradient. Outlet of culvert is raised 0.3 m off of the streambed. Seven Dolly Varden char were captured, ranging from 50 to 149 mm in length.

Sampling Site CCGS41 (Figure 4 of 10)
Stream has low flow with a few pools on upstream side of culvert. The habitat is riffle/pool, and the stream is between 0.05 and 0.20 m deep. Substrate is mainly large gravel with a gradient of 3 percent. Seven coho salmon (41 to 58 mm) and one sculpin (79 mm) were captured.

Sampling Site CCGS42 (Figure 4 of 10)
Stream has low flow with shallow, terraced step-pools. Channel is 0.2 m wide and at a gradient of 25 percent. Substrate is organic and large gravel. No fish were captured.

Sampling Site CCGS43 (Figure 3 of 10)
Channel is completely dry.

Sampling Site CCGS44 (Figure 3 of 10)
Stream is currently a series of small stagnant pools and is not flowing. Channel width is 0.3 m with a gradient of 15 percent, with an organic and gravel substrate. Culvert outlet is 7.6 m above stream bed and is creating a barrier. No traps were set and no fish were observed.

Table 3: Summary of data collected from Cooper Creek and G South Alternatives' sampling sites

Site Number	Location	Stream Status	Species	Length (mm)	Stream Substrate	Habitat	Width (m)	Depth (m)	Gradient (percent)
CCGS38	N60° 28.832' W149° 55.685'	No Fish			organic	pond		0.05 to 0.30	1
CCSG39	N60° 29.282' W149° 58.634'	Dry							
CCGS40	N60° 29.310' W149° 58.743'	Fish	DV	140	large gravel		2.5	0.25	5
			DV	110					
			DV	92					
			DV	104					
			DV	149					
			DV	80					
			DV	50					
CCGS41	N60° 29.252' W149° 59.034'	Fish	Coho	48	large gravel	riffle/pool		0.05 to 0.20	3
			Coho	51					
			Coho	42					
			Coho	41					
			Coho	55					
			Coho	58					
			Coho	49					
			sculpin	79					
CCGS42	N60° 29.270' W149° 59.981'	No Fish			organic/large gravel	step-pools	0.2		25
CCGS43	N60° 29.277' W150° 00.576'	Dry							
CCGS44	N60° 29.297' W150° 00.980'	No Flow			organic/gravel	stagnant pools	0.3		15

G South Alternative

Sampling Site GS8 (Figure 7 of 10)
Bean Creek tributary has moderate flow, at a 7 percent gradient and composed of small to large gravels and small cobbles. Channel width averages 1 m, with a depth of 0.08 to 0.20 m. The habitat is riffle/pool. Four Dolly Varden char (79 to 130 mm long) were captured.

Sampling Site GS9 (Figure 7 of 10)
Main stem of Bean Creek has moderate flow, at a 5 percent gradient, and is composed of small to large gravels and small cobbles. Channel width averages 1.5 m, and the depth ranged from 0.20 to 0.25 m. No fish were captured. Anadromous streams catalog lists sockeye, king, coho, pink, chum, Dolly Varden char, and whitefish.

Sampling Site GS10 (Figure 5 of 10)
Channel is completely dry upstream at site GS11. No traps were set.

Sampling Site GS11 (Figure 5 of 10)
Channel is completely dry with no recent scour evident. A previously existing log bridge has been removed. Channel is less than 1 m wide with large and small gravel substrates and at a 2 percent gradient.

Sampling Site GS37 (Figure 6 of 10)
Stream has moderate flow, averages 1 m in width and at a 5 percent gradient. Stream depth ranged from 0.05 to 0.20 m. Substrate is organic and silts. Three coho salmon were captured (52 to 70 mm long).

Table 4: Summary of data collected from G South Alternative sampling sites

Site Number	Location	Stream Status	Species	Length (mm)	Stream Substrate	Stream Habitat	Width (m)	Depth (m)	Gradient (percent)
GS8	N60° 29.743' W149° 51.305'	Fish	DV	79	small gravel to small cobbles	riffle/pool	1	0.08 to 0.20	7
			DV	130					
			DV	80					
			DV	110					
GS9	N60° 29.731' W149° 51.903'	No Fish			gravel; small cobble		1.5	0.20 to 0.25	5
GS10	N60° 29.486' W149° 53.651'	Dry							
GS11	N60° 29.904' W149° 54.452'	Dry			Small to large gravel		<1		2
GS37	N60° 28.855' W149° 55.623'	Fish	Coho	52	Silt and organic		1	0.05 to 0.20	5
			Coho	70					
			Coho	65					

Juneau Creek F Alternative

Sampling Site JC6 (Figure 7 of 10)
Stream has low flow averaging 0.03 to 0.05 m deep, 0.5 m wide, and 12 percent gradient. Organics and small gravel are the predominant substrate, and the habitat is step-pool and riffle. Stream is flagged in orange as "Streamside Management Zone." Channel narrows and flows underground intermittently. Five Dolly Varden char (66 to 125 mm long) were captured.

Sampling Site JC7 (Figure 7 of 10)
This is a small ephemeral tributary off of Bean Creek tributary with very low flow. Channel terraced with roots and small cobble and is 0.1 m wide with a gradient of 25 percent. Substrate is comprised of organics and small cobbles. Channel is very overgrown, incised, and flows underground intermittently. Channel is narrow and shallow so no traps were set. No fish were observed.

Sampling Site JC12 (Figure 4 of 10)
Perennial stream with moderate flow; habitat is riffles and pools throughout. Channel is 2 m wide, 0.10 to 0.25 m deep, with an 8 percent gradient. Substrate is predominantly gravel and sand. No fish were captured.

Sampling Site JC13 (Figure 4 of 10)
Perennial stream with moderate flow; composed of riffles and pools. Channel is 2 m wide and at a gradient of 6 percent, and 0.10 to 0.25 m deep. The substrate is mainly large gravels and sand. There is large woody debris throughout. No fish were captured.

Sampling Site JC14 (Figure 4 of 10)
Stream has moderate flows and is composed of riffles and pools. Channel is 2 m wide and at a gradient of 3 percent, and is 0.15 to 0.30 m deep. The substrate is mainly large gravels and sand. There is large woody debris throughout. No fish were captured.

Sampling Site JC15 (Figure 4 of 10)
Stream has moderate flows and the habitat is composed of riffles and pools. Channel is 2.5 m wide and at a gradient of 3 percent, with a depth of 0.15 to 0.30 m. The substrate is mainly large gravels and sand. There is large woody debris throughout. No fish were captured.

Sampling Site JC16 (Figure 4 of 10)
No sign of stream channel near this site. Channel begins approximately 213 m down slope. There is a 0.2 m wide, very light trickle flow, with highly organic substrate. No traps were set here due to insufficient depth. Sampling site CCGS41 is located downstream.

Sampling Site JC17 (Figure 4 of 10)
Stream has very light flow with water depth less than 0.05 m. Channel is less than 0.2 m wide and flows underground at multiple points. Channel is very overgrown.

Sampling Site JC18 (Figure 4 of 10)
Stream has light flow and the habitat is mainly step-pools with organic substrate. Channel width is 0.3 m and water depth ranges from 0.05 to 0.25 m. Stream flows underground at multiple points, and channel is heavily overgrown. No fish were captured.

Sampling Site JC19 (Figure 3 of 10)
Stream has light flow and the habitat is step-pools with organic substrate. Channel width is less than 2 m and the average water depth is 0.05 m. Stream flows underground at multiple points. Stream was too shallow to set traps.

Sampling Site JC20 (Figure 3 of 10)
Stream is shallow (approximately 0.02 m deep) and the majority of flow is underground with small shallow pools emerging sparsely throughout channel. Substrate was organic and large gravel. No traps were set at this location.

Sampling Site JC21 (Figure 3 of 10)
Channel is dry with organic and small gravel substrate. The stream is ephemeral.

Sampling Site Pond (Figure 3 of 10)
This pond is located directly below Sampling Sites JC20 and JC19. Both the main-stem and the tributary flows into the pond. Due to both streams being too shallow for trap installation, it was decided to utilize the pond for traps as it is directly connected to both upper sites. The pond was

approximately 0.9 m deep at the center and consisted of organic and sandy substrate. No fish were captured.

Table 5: Summary of data collected from Juneau Creek F Alternative sampling sites

Site Number	Location	Stream Status	Species	Length (mm)	Stream Substrate	Stream Habitat	Width (m)	Depth (m)	Gradient (percent)
JC6	N60° 29.977' W149° 51.024'	Fish	DV	125	Organic and small gravel	step-pool / riffle	0.5	0.03 to 0.05	12
			DV	109					
			DV	120					
			DV	68					
			DV	76					
JC7	N60° 29.912' W149° 51.222'	Too narrow			Organic and small cobble		0.1		25
JC12	N60° 29.782' W149° 57.126'	No Fish			gravel and sand	riffle and pools	2	0.10 to 0.25	8
JC13	N60° 29.841' W149° 57.949'	No Fish			large gravel and sand	riffle/pool	2	0.10 to 0.25	6
JC14	N60° 29.796' W149° 58.098'	No Fish			large gravel and sand	riffle/pool	2	0.15 to 0.30	3
JC15	N60° 29.752' W149° 58.432'	No Fish			large gravel and sand	riffle/pool	2.5	0.15 to 0.30	3
JC16	N60° 29.496' W149° 59.359'	Dry			Organic		0.2		
JC17	N60° 29.432' W149° 59.651'	Too shallow					<0.2	<0.05	
JC18	N60° 29.354' W149° 59.853'	No Fish			Organic	Step-pool	0.3	0.05 to 0.25	
JC19	N60° 29.350' W150° 00.489'	Too shallow			Organic	step-pool	<2	0.05	
JC20	N60° 29.344' W150° 00.561'	Too shallow			Organic and large gravel			0.02	
JC21	N60° 29.348' W150° 00.900'	Dry			Organic and small gravel				
Pond	N60° 29.305' W150° 00.558'	No Fish			Organic/sandy			0.9	

G South and Juneau Creek F Alternatives

Sampling Site GSJC3 (Figure 10 of 10)
Channel is completely dry. Culvert is perched approximately 1.8 m off above stream bank on the downstream side.

Sampling Site GSJC4 (Figure 9 of 10)
Stream has moderate flow with larger step pool habitat. The 1.3-m wide channel has medium to large gravels and is at a gradient of 25 percent, with a depth of 0.10 to 0.25 m. Approximately 126 m downstream is a 3.6 m bedrock cascade which appears to create a fish barrier. The stream flows underground approximately 182 m downstream, and channel is completely dry below that point.

Sampling Site GSJC5 (Figure 9 of 10)
The site and surrounding area are dry, with no sign of an old channel. A dry channel and culvert were observed at the inferred intersection of the channel with Bean Creek Road.

Table 6: Summary of data collected from G South and Juneau Creek F Alternatives' sampling sites

Site Number	Location	Stream Status	Species	Length (mm)	Stream Substrate	Stream Habitat	Width (m)	Depth (m)	Gradient (percent)
GSJC3	N60° 29.696' W149° 46.567'	Dry							
GSJC4	N60° 29.822' W149° 47.769'	No Fish			small cobble	step-pools	1.3	0.10 to 0.25	25
GSJC5	N60° 29.887' W149° 48.371'	Dry							

References

Alaska Department of Fish and Game 2004. Anadromous Streams Catalog. Anadromous streams listing for upper and lower Cooper Creek and Kenai Lake.

McLarnon, Paul HDR Alaska, Inc. 2004. Personal communication regarding the Cooper Lake Project Report (FERC No. 2170) for fisheries information on sites within Cooper Creek. (2003).