Technical Report No. DRAFT

Upper Susitna ATV Stream Crossing Locations

Jeffrey C. Davis and David B. Ryland

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Alaska Department of Fish and Game **Habitat and Restoration Division**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used in Habitat and Restoration Manuscripts, Technical Reports, and Special Publications without definition. All others must be defined in the text at first mention, as well as in the titles or footnotes of tables and in figures or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
metric ton	mt
milliliter	ml
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
ounce	oz
pound	lb
quart	qt
yard	yd

Spell out acre and ton.

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
hour (spell out for 24-hour clock)	h
minute	min
second	s

Spell out year, month, and week.

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.
All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.
and	&
at	@
Compass directions:	
east	E
north	N
south	S
west	W
Copyright	©
Corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
et alii (and other people)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.,
id est (that is)	i.e.,
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
number (before a number)	# (e.g., #10)
pounds (after a number)	# (e.g., 10#)
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)

Mathematics, statistics, fisheries

alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	F, t, χ^2, etc.
confidence interval	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
equals	=
expected value	E
fork length	FL
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
mideye-to-fork	MEF
minute (angular)	'
multiplied by	x
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
standard length	SL
total length	TL
variance	Var

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UPPER SUSITNA ATV STREAM CROSSING LOCATIONS

by
Jeffrey C. Davis and David B. Ryland
Habitat and Restoration Division, Anchorage

Alaska Department of Fish and Game
Habitat and Restoration Division
333 Raspberry Road, Anchorage, Alaska, 99518-1599

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ABSTRACT

The use of All-terrain-vehicles as a means to access off-road locations has increased over the past few years. This use has resulted in numerous stream fords. Stream fords can negatively impact fish directly through damage to incubating eggs and rearing juveniles and disrupting fish migration. Fords cause a loss of fish habitat and can cause increasing bank erosion rates and a loss of water quality through the introduction of fine sediment. This study was conducted to determine the number of stream ford in the Upper Susitna drainage north of the Willow Creek confluence and the upper Peters Creek and Cache Creek drainages. Each crossing was ranked on a scale of 0 to 5 based on the degree of changes to stream channel characteristics and potential for sediment input. There were 158 crossing identified, 49% of these on streams supporting salmon. Forty two percent of the crossings were ranked with site scores of 4 or 5.

Key words: All-terrain-vehicles (ATV), sediment, stream fords, off-road-vehicles (ORV), Susitna River, Matanuska-Susitna Borough, Alaska.

INTRODUCTION

The use of all-terrain vehicles (ATV) has been increasing over the past 10 years. These vehicles are used to access remote property, for hunting and fishing, and for recreation. ATV trails often follow historic trails, winter routes, seismic lines, and electrical transmission lines.

ATV trail use, however, has the potential to negatively alter wetland and stream habitats directly and indirectly affecting fish and fish habitat. Direct impacts can occur through damage to spawning redds, disruption of migration and spawning, and direct injury. Indirect impacts can be through changes in water storage and runoff timing, loss of nearshore habitats, migration barriers, and water quality.

Information on trail locations, density, and relative impacts are needed to assess impacts to fish habitat and develop recommendations for alternatives to minimize or avoid habitat losses. This study was conducted to begin this process by locating ATV stream crossing locations and evaluate relative fish and fish habitat impacts.

METHODS

The study area included tributaries to the upper Susitna River. These included Willow Creek north to the Talkeetna River on the east side of the Susitna and the Rabideau, Trapper, Kroto, Peters, and Cache Creek drainages on the west.

Surveys were conducted in October of 2001 and June of 2002. ATV crossing were located by flying over the stream drainages in a Helicopter. The latitude and longitude of the locations was recorded using the global positioning system (GPS) and a handheld receiver (Garmin 12XL) and entered on field data sheets. In October, digital videos (Sony TRV 900) were taken of the crossing locations. In June, locations were photographed using digital (Nikon Coolpics 9000) and 35 mm Nikon camera.

A Site Score was generated at each site by summing positive site impact parameters ranging from 0 to 5 (Wiedmer 2002). Site impact parameters included the following (Figure 1).

Exposed Soil—Visible mineral soil beneath the trail adjacent to the stream.

Denuded Banks—All of the vegetation removed from the trail on both banks.

Increased Width—Stream width two times greater than natural channel.

Surface Erosion—Water pooled or running on the trail surface or evidence of past erosion.

Figure 1. Examples of ATV crossings. Numbers are crossing site scores.

Bank Alteration—Topography of stream banks altered.

Site scores and photographs were used to create the Arcview project (version 3.2) accompanying this report. The photographs are stored on the computer disc with the Arcview project and are stored by site number. The Atlas to the Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fish (ADF&G 1998) was used to determine whether crossings were on specified waterbodies.

RESULTS & DISCUSSION

A total of 158 stream crossing sites were located within the sample area. The stream crossing locations are shown in Figure 2 through Figure 6. The location and parameter data for each crossing is given in Table 1. The location, ranking data, and photographs are projected on an Arcview project (version 3.2) recorded on the accompanying compact disc. Alternatively, photographs for each site identified on the maps or table can be viewed directly. The photographs on the compact disc have the same name as the crossing location.

We found the use of conventional 35 mm camera to produce the best photographs. The digital video created large files that were difficult to manipulate. Also, the quality of still photographs taken from the digital video was poor. The quality of digital photographs was better; however, images were often blurred or missed. Shutter speeds with the digital camera were slow causing blurred photographs when light levels were low. Also the response time (time from when the exposure button was pushed until the exposure taken) was slow often causing repeated attempts to photograph a site.

Seventy-eight crossings (49%) were located on specified anadromous waters. Forty-two percent of all crossings were ranked at site scores of 4 or 5. The portion ranked 4 or 5 was the same when evaluating all of the sites or just the anadromous fish streams. Among the scoring criteria, 83% of the sites had exposed soil. This supports our observation that the vegetation on ATV trails is removed after only limited use. This condition suggests that potential impacts to water quality through the introduction of fine sediment occurs early and often in the development of ATV trails. Following exposed soil, bank erosion is the next most common condition observed (63% of the sites).

On the west side of the Susitna River most of the crossings area associated with major developed trails (Figure 3). Sites 100 through 115 are located on the extension of Oilwell Road off of Petersville Road. This trail is used primarily to access mines and recreational land. Sites 117 through 126 are located on the trail that runs from Shulin Lake north along Peters Creek to the Petersville Road. Sites 141 through 145 are on the Collinsville Trail near the Three Forks Roadhouse. The approximate location of this trail is shown on the U.S. Geological Survey maps (1:43,000). There may be additional stream crossings on this trail that we did not survey during this project due to weather.

Sites 146 through 160 are located on the mining roads of the upper Peters Creek and Cache Creek drainages.

Sites 77 through 86 were crossing tributaries to Rabideaux Creek and seemed to be associated with the “Winter Trail” identified on U.S. Geological Survey maps. Trails is this area likely are limited by extensive wetlands.

The remaining stream crossings west of the Susitna were associated with trails leading to or around recreational cabin, accessed from either the Parks Highway or Petersville

Road. At some locations homeowner associations have formed and constructed ATV bridges at previous ford locations (Figure 7).

Crossings on the east side of the Susitna River were not so clearly identified with trails. Sites 75 and 76 are on the Clear Creek Trail, and sites 72 and 73 are on the trail to Larsen Creek. Many of the ATV crossings in the Upper Answer Creek drainage are along the intrastate transmission line.

There are a number of crossings located at the bridge where Yoder Road crosses Montana Creek. Most of these crossings appear to be due to recreational ATV riding. Most of the additional crossings in the Montana Creek drainage are where the Middle and South Fork trails cross tributary streams.

Sites 25 through 30 are crossings of the North Fork of the Kashwitna and tributary streams. There is what appears to be a hunting trail that travels east along the N.F. of the Kashwitna River.

There are a number of crossings of the upper end of Little Willow Creek (sites 35 through 40). Four out of the six of these crossings are ranked either 4 or 5. This portion of Little Willow Creek currently is not specified as a salmon stream; however, recent surveys have identified that area as salmon habitat. These crossings are located on a trail from the Hatcher Pass road east of Willow Mountain.

Crossings 49 through 52 cross a tributary to Willow Creek and are located on the Willow Mountain trail.

SUMMARY

Many of the 160 stream crossings identified in this study are located on well-developed trails. This is particularly true on the west side of the Susitna River. Constructing bridges at these crossing locations, and conducting other trail improvement project on these trails could reduce potential water quality and fish habitat impacts. Although not as clear, crossings east of the Susitna River also appear to be associated with major trails. Additional work needs to be conducted to determine trail location and use. Once locations and potential environmental impacts of trails are known, possible solutions could be investigated such as closing redundant trails, rerouting trails, and building crossing structures.

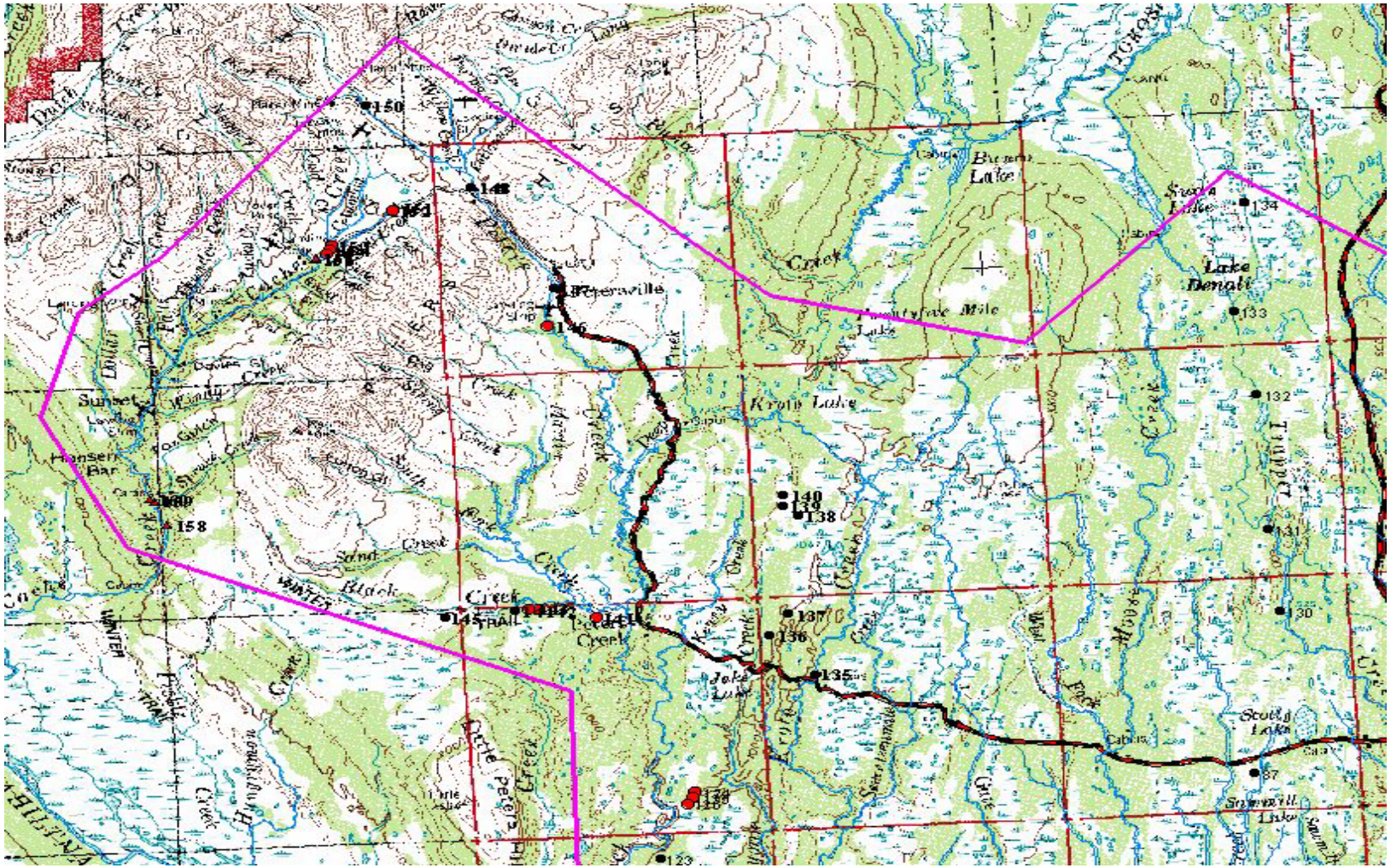

Figure 2. Northwest section of ATV sample area showing numbered crossing locations (black dots rank 0 to 3, red triangles rank 4, and red dots rank 5).

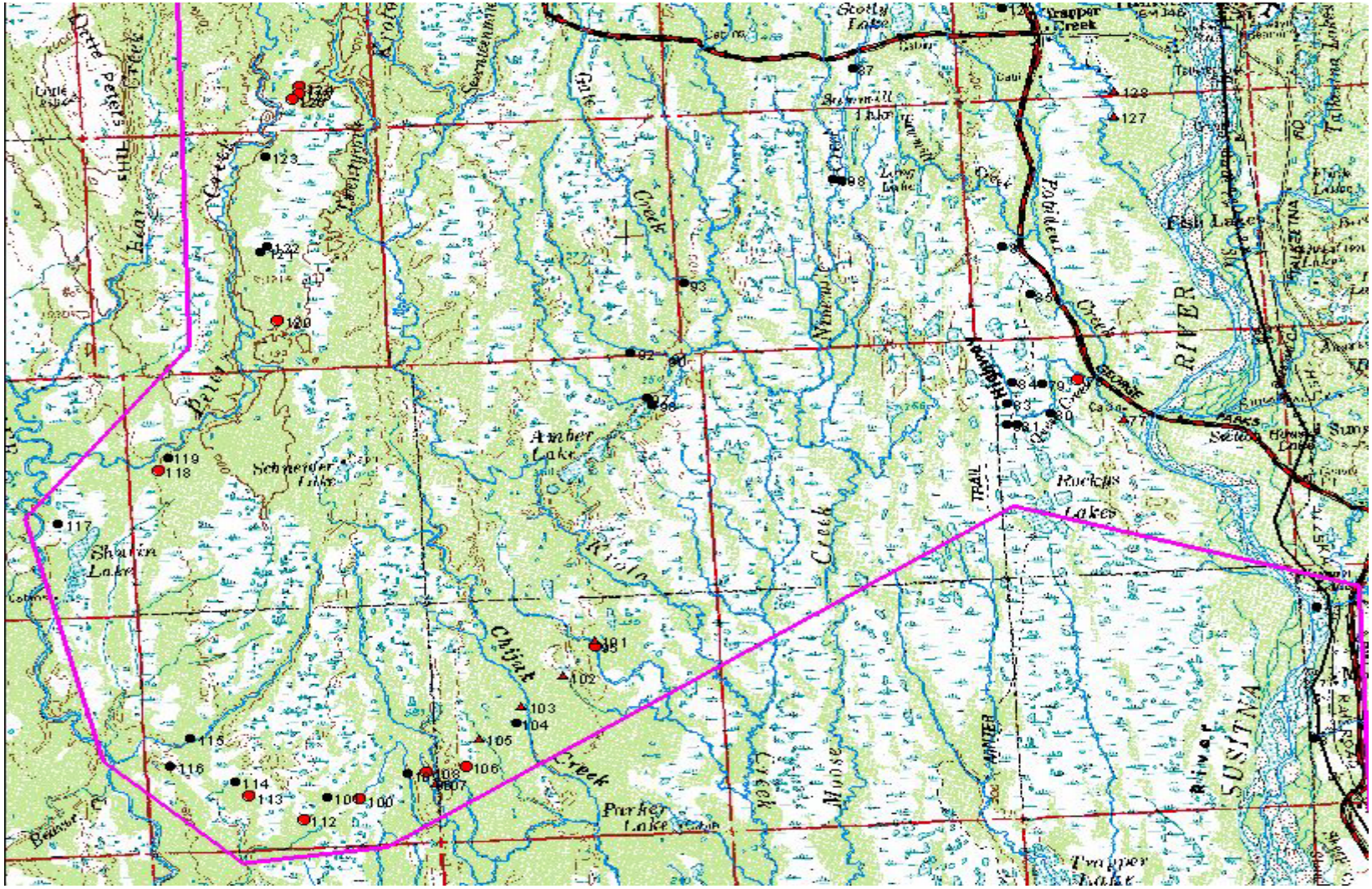

Figure 3. Southwest section of sample area.

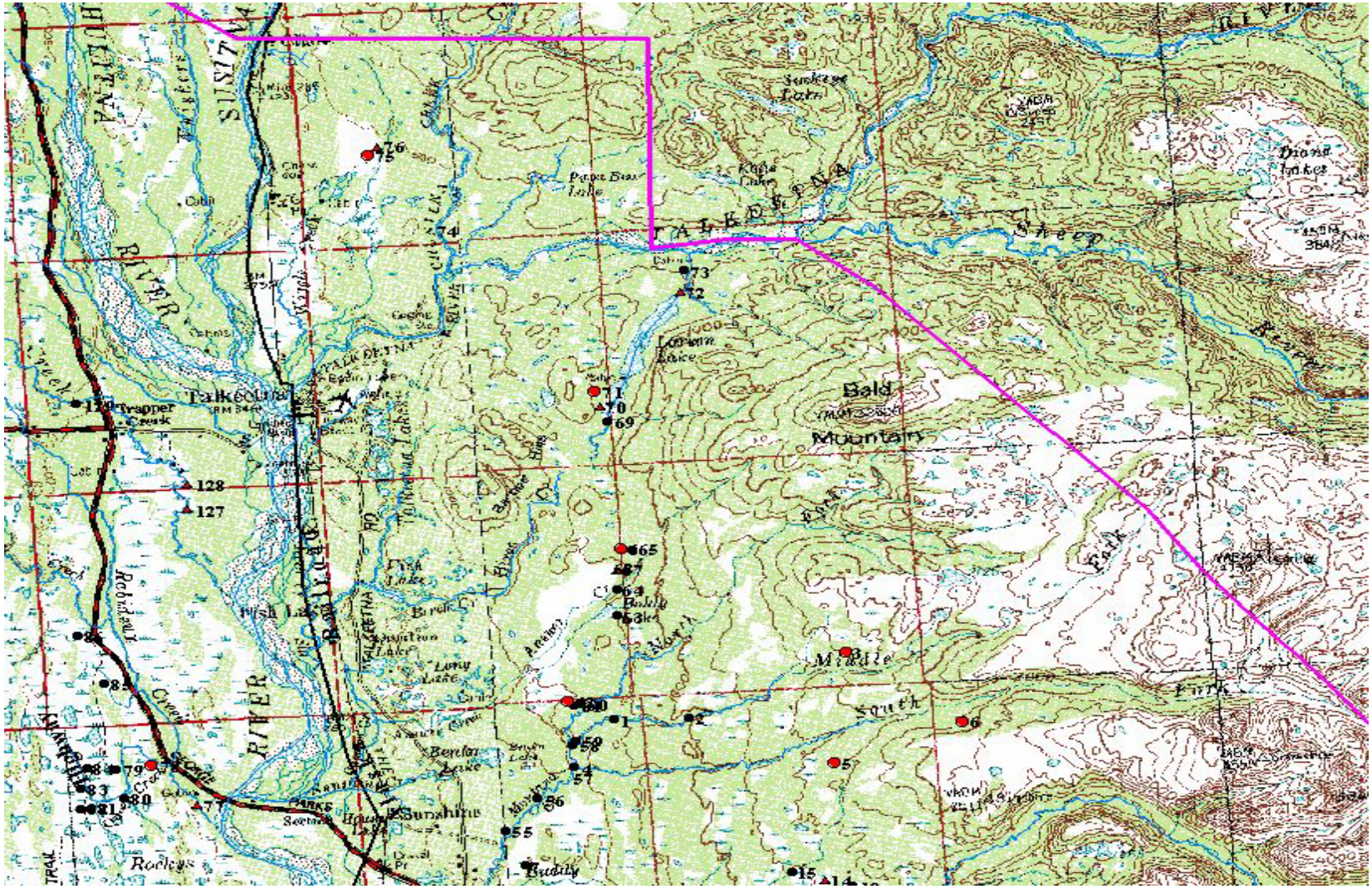

Figure 4. Northeast section of sampling area.

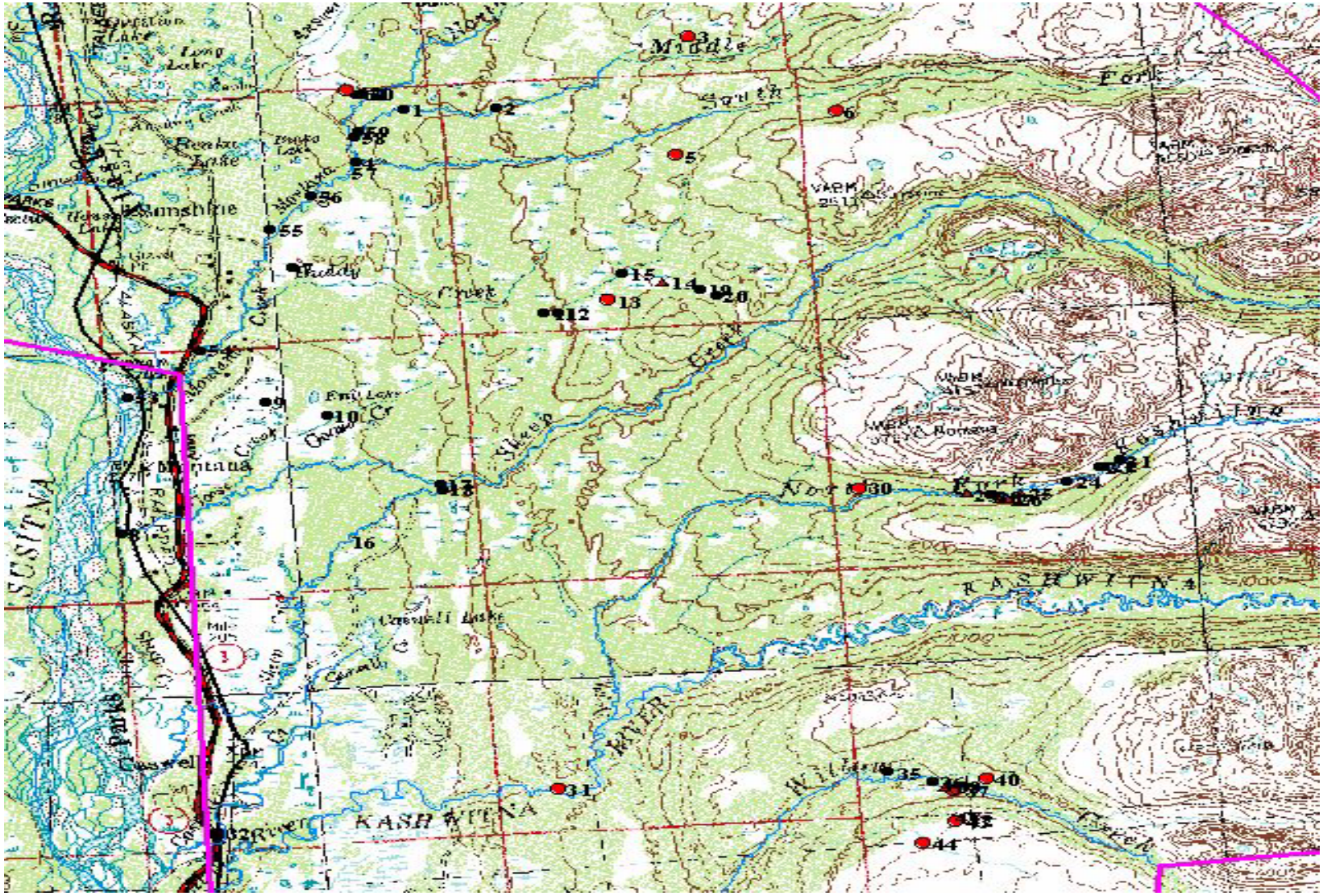

Figure 5. East section of sampling area.

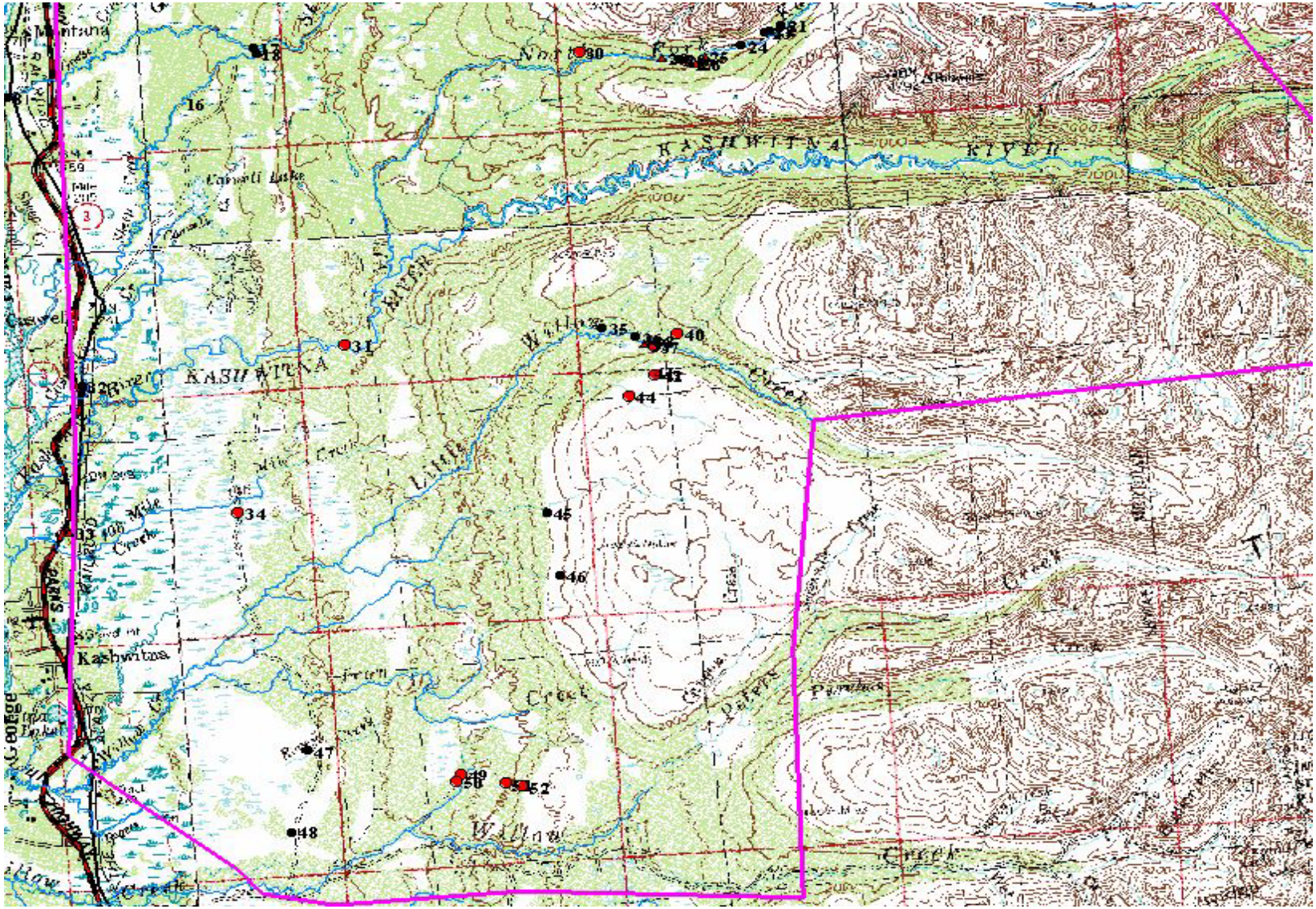

Figure 6. Southeast section of sampling area.

Table 1. Individual parameter and total rank scores for ATV crossing locations. S=single crossing at the location, M= multiple crossings. For specified waters 1=yes and 0=no.

Station	Longitude	Latitude	Exposed Soil	Denuded	Increase in w/d	Trail Erosion	Bank Erosion	Rank	Single or Multiple	Specified Waters
1	-149.9238200	62.1998400	1	0	0	0	0	1	S	1
2	-149.8758300	62.1989300	1	0	0	0	0	1	S	1
3	-149.7738300	62.2205500	1	1	1	1	1	5	S	0
4	-149.9509300	62.1824500	1	0	0	0	0	1	S	1
5	-149.7863500	62.1796100	1	1	1	1	1	5	S	0
6	-149.7024500	62.1926300	1	1	1	1	1	5	S	0
7	-149.9871300	62.1468600	0	0	0	0	0	0	S	0
8	-150.0871000	62.0567500	1	0	0	0	0	1	S	1
9	-150.0076400	62.1003600	1	0	0	1	0	2	S	0
10	-149.9772600	62.0950000	0	0	0	1	0	1	S	0
11	-149.8605600	62.1271700	0	0	0	0	0	0	S	0
12	-149.8544600	62.1270700	1	0	0	1	0	2	S	0
13	-149.8281000	62.1307300	1	1	1	1	1	5	S	0
14	-149.7990700	62.1361800	1	1	0	1	1	4	S	0
15	-149.8191400	62.1398900	1	0	1	1	0	3	S	0
16	-149.9743000	62.0514100	0	0	0	0	0	0	S	1
17	-149.9220600	62.0696600	1	1	1	0	0	3	S	1
18	-149.9213200	62.0676500	1	1	0	0	0	2	S	1
19	-149.7802900	62.1333000	1	1	0	1	0	3	S	0
20	-149.7722100	62.1306000	0	0	0	1	0	1	S	0
21	-149.5734800	62.0674900	0	0	1	0	0	1	S	1
22	-149.5817500	62.0657800	0	0	1	0	0	1	M	1
23	-149.5844400	62.0652500	1	0	1	0	0	2	S	1
24	-149.6009900	62.0608000	1	0	0	0	1	2	S	1
25	-149.6266000	62.0577300	1	0	1	1	1	4	S	1
26	-149.6326900	62.0558800	1	0	1	1	1	4	S	1
27	-149.6365800	62.0560700	1	0	1	1	1	4	S	1
28	-149.6419600	62.0573800	1	0	0	0	1	2	M	1
29	-149.6543400	62.0582300	1	0	1	1	1	4	S	1
30	-149.7084200	62.0620700	1	1	1	1	1	5	S	0
31	-149.8766000	61.9623000	1	1	1	1	1	5	S	1
32	-150.0510600	61.9522000	0	0	0	0	0	0	S	1
33	-150.0669400	61.9004800	1	1	0	1	1	4	S	1
34	-149.9543400	61.9045700	1	1	1	1	1	5	S	1
35	-149.7066100	61.9631700	0	0	1	0	1	2	S	1
36	-149.6846900	61.9590200	1	0	1	0	1	3	S	1
37	-149.6741000	61.9556400	1	1	1	1	1	5	S	1
38	-149.6774600	61.9577100	1	0	1	1	1	4	S	1
39	-149.6800900	61.9569900	1	1	0	1	1	4	S	1
40	-149.6573900	61.9596100	1	1	1	1	1	5	S	0
41	-149.6785500	61.9466600	0	0	0	0	0	0	S	0
42	-149.6724600	61.9455500	1	0	1	1	0	3	S	0
43	-149.6747600	61.9453500	1	1	1	1	1	5	S	0
44	-149.6929000	61.9381900	1	1	1	1	1	5	S	0
45	-149.7514000	61.8984600	1	0	0	0	0	1	S	0
46	-149.7463500	61.8758300	0	0	0	1	0	1	S	0
47	-149.9194400	61.8182800	0	0	0	0	1	1	S	0

Station	Longitude	Latitude	Exposed Soil	Denuded	Increase in w/d	Trail Erosion	Bank Erosion	Rank	Single or Multiple	Specified Waters
48	-149.9337200	61.7896600	0	0	1	1	1	3	S	0
49	-149.8209200	61.8068600	1	1	1	1	1	5	S	1
50	-149.8242700	61.8043500	1	1	1	1	1	5	M	1
51	-149.7924400	61.8028600	1	1	1	1	1	5	S	0
52	-149.7816400	61.8011200	1	1	1	1	1	5	S	0
53	-150.0781900	62.1040600	0	0	0	0	1	1	M	1
54	-150.0396200	62.1194100	0	0	0	0	1	1	S	1
55	-149.9974600	62.1603100	1	1	0	0	1	3	M	1
56	-149.9754100	62.1715000	1	0	0	0	1	2	M	1
57	-149.9564000	62.1789700	0	0	0	0	0	0	S	1
58	-149.9505600	62.1909700	1	1	0	0	1	3	S	1
59	-149.9483600	62.1926000	1	1	0	0	1	3	S	1
60	-149.9440600	62.2062100	1	1	0	0	1	3	S	0
61	-149.9477800	62.2057500	1	0	0	0	1	2	M	0
62	-149.9523100	62.2070300	1	1	1	1	1	5	M	0
63	-149.9167200	62.2380000	1	0	0	0	0	1	S	0
64	-149.9155700	62.2480700	1	0	1	1	0	3	M	0
65	-149.9036700	62.2627600	1	1	0	1	0	3	M	0
66	-149.9110200	62.2629500	1	1	1	1	1	5	S	0
67	-149.9155000	62.2554300	1	0	1	1	1	4	S	0
68	-149.9207500	62.2563400	0	0	0	0	0	0	S	0
69	-149.9128000	62.3105100	1	0	0	0	1	2	S	1
70	-149.9181000	62.3165200	1	1	0	1	1	4	M	0
71	-149.9199000	62.3218800	1	1	1	1	1	5	S	0
72	-149.8616200	62.3572500	1	1	0	1	1	4	S	1
73	-149.8569000	62.3650500	0	0	0	0	0	0	S	1

Station	Longitude	Latitude	Exposed Soil	Denuded	Increase in w/d	Trail Erosion	Bank Erosion	Rank	Single or Multiple	Specified Waters
74	-150.0169100	62.3846600	0	0	0	0	0	0	S	1
75	-150.0535800	62.4137500	1	1	1	1	1	5	S	0
76	-150.0470900	62.4167700	1	1	1	0	1	4	S	0
77	-150.1928500	62.1754300	1	1	0	1	1	4	S	1
78	-150.2191200	62.1904500	1	1	1	1	1	5	S	1
79	-150.2419400	62.1896600	1	0	0	0	1	2	S	0
80	-150.2384800	62.1788000	1	0	0	0	1	2	S	1
81	-150.2603700	62.1756400	0	0	0	0	0	0	S	0
82	-150.2659900	62.1758100	1	0	1	0	1	3	S	0
83	-150.2649200	62.1831000	0	0	0	1	1	2	S	0
84	-150.2608500	62.1906700	0	0	0	1	1	2	S	0
85	-150.2456900	62.2219500	1	0	0	1	1	3	S	0
86	-150.2604100	62.2401100	1	0	0	0	0	1	S	0
87	-150.3487600	62.3068800	1	0	1	0	1	3	S	1
88	-150.3600500	62.2667700	0	0	1	0	1	2	S	1
89	-150.3654100	62.2671600	0	0	1	0	1	2	S	1
90	-150.4811000	62.2041000	0	0	0	0	0	0	S	1
91	-150.4786000	62.2056900	0	0	0	0	0	0	S	1
92	-150.4999900	62.2072600	1	0	0	1	0	2	S	1
93	-150.4644800	62.2315100	1	0	0	0	1	2	S	1
94	-149.9495200	62.7068800	1	0	0	0	0	1	S	0
95	-150.5359000	62.1018900	1	1	1	1	1	5	S	1
96	-150.6451900	62.0545400	1	1	1	1	1	5	S	0
97	-150.4926300	62.1910700	1	0	0	0	0	1	S	1
98	-150.4886100	62.1881100	1	0	0	0	0	1	S	1
101	-150.5354333	62.1037805	1	1	1	0	1	4	S	1

Station	Longitude	Latitude	Exposed Soil	Denuded	Increase in w/d	Trail Erosion	Bank Erosion	Rank	Single or Multiple	Specified Waters
102	-150.5569933	62.0915396	1	1	1	0	1	4	S	0
103	-150.5842072	62.0812781	1	1	1	0	1	4	S	1
104	-150.5881183	62.0752595	1	1	0	0	0	2	S	1
105	-150.6125638	62.0700189	1	1	0	1	1	4	S	0
106	-150.6218019	62.0603956	1	1	1	1	1	5	M	0
107	-150.6419668	62.0546132	1	1	1	0	1	4	S	1
108	-150.6467353	62.0587169	1	1	1	1	1	5	S	1
109	-150.6581667	62.0583577	1	1	0	0	1	3	S	1
110	-150.6891784	62.0499738	1	1	1	1	1	5	S	0
111	-150.7095144	62.0511972	1	1	0	0	0	2	S	0
112	-150.7255703	62.0434676	1	1	1	1	1	5	S	0
113	-150.7587854	62.0525660	1	1	1	1	1	5	S	0
114	-150.7668798	62.0578982	1	0	1	1	0	3	M	0
115	-150.7933246	62.0742973	1	0	0	0	0	1	S	1
116	-150.8067897	62.0646096	1	0	0	0	0	1	M	0
117	-150.8686763	62.1540764	1	1	0	0	0	2	S	0
118	-150.8042228	62.1716326	1	1	1	1	1	5	S	0
119	-150.7978765	62.1763853	1	0	1	1	0	3	S	0
120	-150.7231426	62.2243891	1	1	1	1	1	5	M	0
121	-150.7303289	62.2492849	1	0	0	1	1	3	S	0
122	-150.7261071	62.2512643	1	1	0	1	0	3	S	0
123	-150.7243129	62.2838953	1	1	0	0	0	2	M	0
124	-150.6998658	62.3084848	1	1	1	1	1	5	M	0
125	-150.7011749	62.3059958	1	1	1	1	1	5	M	0
126	-150.7055738	62.3041237	1	1	1	1	1	5	S	0
127	-150.1851571	62.2851308	1	1	1	1	0	4	S	1
128	-150.1838743	62.2943896	1	1	1	0	1	4	S	1
129	-150.2506521	62.3261258	1	0	0	0	1	2	S	1
130	-150.3257010	62.3666865	1	1	0	0	0	2	S	1
131	-150.3296146	62.3972791	1	0	0	0	0	1	S	1
132	-150.3307694	62.4477840	1	0	0	0	1	2	S	0
133	-150.3411952	62.4789185	0	0	0	0	0	0	S	0
134	-150.3300343	62.5191452	1	0	0	0	0	1	S	0
135	-150.6204333	62.3503571	1	1	0	0	1	3	S	1
136	-150.6469533	62.3652381	1	1	0	0	0	2	M	0
137	-150.6340247	62.3729625	1	0	0	0	0	1	S	0
138	-150.6241677	62.4095897	1	0	0	0	1	2	S	0
139	-150.6330882	62.4134307	1	1	0	1	0	3	S	0
140	-150.6320311	62.4174861	1	1	0	1	0	3	S	0
141	-150.7558212	62.3746275	1	1	1	1	1	5	S	0
142	-150.7915097	62.3779110	1	1	1	1	1	5	M	0
143	-150.7967130	62.3785655	1	1	1	1	1	5	M	0
144	-150.8059664	62.3783082	1	1	0	0	1	3	M	0
145	-150.8506566	62.3767158	1	0	0	0	1	2	S	0
146	-150.7739280	62.4838233	1	1	1	1	1	5	S	1
147	-150.7690990	62.4975612	1	0	0	1	0	2	S	1
148	-150.8160980	62.5367589	1	1	0	1	1	4	S	1
149	-150.8169456	62.5366891	1	0	0	0	1	2	S	1
150	-150.8803921	62.5683824	1	1	0	1	0	3	S	1
151	-150.8663084	62.5303279	1	1	0	1	1	4	S	1
152	-150.8679285	62.5289976	1	1	1	1	1	5	S	1
153	-150.9078882	62.5167355	1	1	1	1	1	5	S	1

Station	Longitude	Latitude	Exposed Soil	Denuded	Increase in w/d	Trail Erosion	Bank Erosion	Rank	Single or Multiple	Specified Waters
154	-150.9083765	62.5152979	1	1	1	1	1	5	S	1
155	-150.9110695	62.5140534	1	1	1	1	1	5	S	1
156	-150.9182846	62.5118864	1	1	1	1	1	5	S	1
157	-150.9184294	62.5122940	1	1	1	0	1	4	S	1
158	-151.0212547	62.4145583	1	1	0	1	1	4	S	1
159	-151.0281847	62.4237904	1	1	0	1	1	4	S	1
160	-151.0312101	62.4246809	1	1	0	1	1	4	S	0

Upper Susitna ATV Stream Crossing Locations

Alaska Resources Library and Information Services (ARLIS) is making this PDF available online.

The Alaska Habitat and Restoration Division has released two PDF versions of this report. The first PDF version lacked pages numbered 15 and 16, but Table 1 appeared correctly formatted on pages 10-13. The "Literature cited" page appeared duplicated with a black-and-white photo as page 14 and with a colored photo as page 17.

A second PDF version was also released with better textual formatting, proper page numbering, and without the duplicated "Literature cited" page. However, the columns and rows in Table 1 (on pages 10-16) were out of alignment.

This PDF file comprises chiefly the second PDF version, but pages 10-16 with the poorly formatted table were replaced by pages 10-13 in the first PDF. For that reason, this PDF that ARLIS has made available does not have pages 14-16.

Figure 7. ATV crossing of Trapper Creek at site 130 showing newly constructed bridge in upper right corner.

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