Regional Operational Plan CF.2A.2016.15

Operational Plan-Upper Cook Inlet Sockeye Salmon Escapement Studies, 2016-2018

by

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June 2016

Alaska Department of Fish and Game Divisions of Sport Fish and Commercial Fisheries

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

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

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

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

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
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
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
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	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
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.
minute (angular)	'
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
variance	
population	Var
sample	var

REGIONAL OPERATIONAL PLAN CF.2A.2016.15

OPERATIONAL PLAN-UPPER COOK INLET SOCKEYE SALMON ESCAPEMENT STUDIES, 2016-2018

by

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Division of Commercial Fisheries

June 2016

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Signature Page

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Approval

Title	Name	Signature	Date
Project leader	William Glick		6/8/16
Project leader	Mark Willette		6/8/16
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PURPOSE

DIDSON (Dual-frequency Identification Sonar) is used annually to estimate sockeye salmon (*Oncorhynchus nerka*) escapement into the Kenai and Kasilof rivers of Upper Cook Inlet (UCI) Alaska (Figure 1). "Escapement" refers to estimates of the number of salmon, by species, migrating upstream to spawn past a fixed point on the river. When any number of salmon are harvested upstream of the enumeration point, such as in sport fishing, the number of fish that survive to spawn will be less than the escapement calculated at the end of the season. Escapement estimates of sockeye salmon are used to manage for maximum sustained yield of UCI salmon stocks. Escapement goals considering both biological and allocative issues have been established and revised by the Alaska Board of Fisheries since the late 1970s and early 1980s. Alaska Department of Fish and Game (ADF&G) manage the Kenai and Kasilof rivers inriver goals dependent upon forecasts and daily inseason evaluations of run strength. The current (2011) inriver escapement goal for the Kenai River is 900,000–1,100,000 if the return estimate is <2,300,000; 1,000,000–1,200,000 for a return of 2,300,000–4,600,000; and 1,100,000–1,350,000 fish for a return 4,600,000 (Shields and Dupuis 2012). The Kasilof River optimal escapement goal (OEG) is 160,000–390,000 (Fair et al. 2013).

Fish wheels capture returning salmon for 1) species apportionment 2) to estimate age, length, and sex composition of the sockeye salmon escapement for each river and 3) collect genetic samples as needed. Historical escapement data for the Kenai and Kasilof rivers (Table 1) is provided in yearly Regional Information and Fishery Data Series reports as exhibited by Westerman and Willette (2013). This plan outlines how sonar, sampling and logistical operations will be conducted for each of these sonar enumeration sites.

Key words: DIDSON, sockeye salmon, *Oncorhynchus nerka*, Upper Cook Inlet, escapement, acoustic assessment, Kenai River, Kasilof River, riverine sonar, fisheries sonar, fish wheel.

Background

The Kenai River is a glacially occluded river that drains approximately 5,200 km^2 of the western Kenai Peninsula and is the major sockeye salmon producing watershed in Cook Inlet. It is also a major producing system for coho salmon (*Oncorhynchus kisutch*), pink salmon (*O. gorbuscha*), and Chinook salmon (*O. tshawytscha*). Since 1968, sonar operations for enumerating sockeye salmon runs have been conducted annually at a site 32 km (RM 19.1) upstream from the river mouth (Namvedt et al. 1977; Davis 1971). Various combinations of Bendix Corp. sonar counters have been used to enumerate escapement. Bendix sonar in Upper Cook Inlet was eventually replaced with DIDSON beginning in 2007 (Belcher et al. 2001, 2002). Sockeye salmon sampling has been conducted annually since 1966, establishing a long term historical age composition database.

Originating from Tustumena Lake, the Kasilof River drains 190 km^2 of the east/central Kenai Peninsula. A small run of sockeye salmon enters the river between late May and mid-June, with a second larger escapement (200,000–300,000) entering between late June and early August.

Kasilof inseason escapement enumeration in the 1960s and 1970s was limited by the glacial nature of the river and Tustumena Lake. To monitor the escapement, test fishing at the mouth of the river was conducted to sample the stock for age, weight, and length and sex analysis. In the early years of sonar operations, surveys provided an index of reliability of the sonar generated escapement counts. The testing, modifying and use of Bendix sonar counters for management purposes began in 1968 and was conducted annually near the outlet of Tustumena Lake, 26.9 km (RM 16.7) upstream from Cook Inlet. In 1983 the counting site was relocated nearer Cook Inlet to 12.4 km (RM 7.7), adjacent to the Sterling highway bridge. Between 2007 and 2009, comparison tests were conducted between DIDSON and Bendix units and by 2010, DIDSON replaced the Bendix counters.

OBJECTIVES

Annual objectives of these studies:

1. Estimate the daily and seasonal abundance of sockeye salmon into the Kenai and Kasilof rivers at each sonar site such that the seasonal estimate is within 10% of the true value 95% of the time.
2. Estimate the age and sex compositions and the mean length of each age class in the sockeye salmon run passing each sonar site such that the estimates are within 5% of the true value 90% of the time.

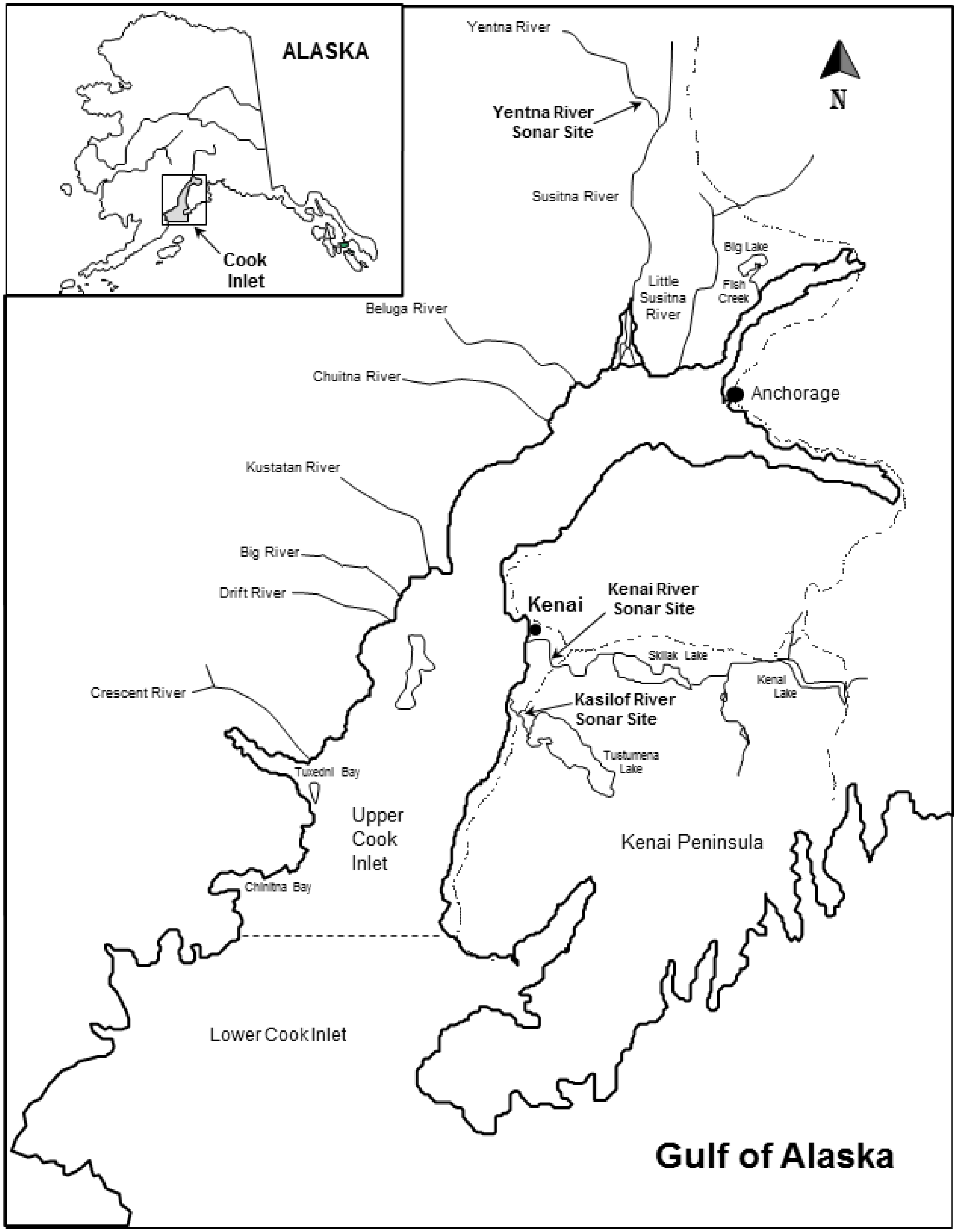

Figure 1.– Map showing location of the Kenai and Kasilof rivers sonar sites used to enumerate the sockeye salmon escapement into Upper Cook Inlet tributaries.

Table 1.–Sockeye salmon escapement estimates (Bendix and DIDSON) for the Kenai and Kasilof rivers 1978–2015.

	Kenai R.[a]		Kasilof R.[b]	
Year	Bendix	DIDSON	Bendix	DIDSON
1978	398,900	ND	116,600	ND
1979	285,020	412,978	152,179	ND
1980	464,038	667,458	184,260	ND
1981	407,639	575,848	256,625	ND
1982	619,831	809,173	180,239	ND
1983	630,340	866,455	210,271	215,731
1984	344,571	481,473	231,685	238,413
1985	502,820	680,897	505,049	512,827
1986	501,157	645,906	275,963	283,054
1987	1,596,871	2,245,615	249,250	256,707
1988	1,021,469	1,356,958	204,000[c]	204,336
1989	1,599,959	2,295,576	158,206	164,952
1990	659,520	950,358	144,136	147,663
1991	647,597	954,843	238,269	233,646
1992	994,798	1,429,864	184,178	188,819
1993	813,617	1,134,922	149,939	151,801
1994	1,003,446	1,412,047	205,117	218,826
1995	630,447	884,922	204,935	202,428
1996	797,847	1,129,274	249,944	264,511
1997	1,064,818	1,512,733	266,025	263,780
1998	767,558	1,084,996	273,213	259,045
1999	803,379	1,137,001	312,587	312,481
2000	624,578	900,700	256,053	263,631
2001	650,036	906,333	307,570	318,735
2002	957,924	1,339,682	226,682	235,731
2003	1,181,309	1,656,026	359,633	353,526
2004	1,385,981	1,945,383	577,581	523,653
2005	1,376,452	1,908,821	348,012	360,065
2006	1,499,692	2,064,728	368,092	389,645
2007	867,572	1,229,945	336,866	365,184
2008	614,946	917,139	301,469	327,018
2009	745,170	1,090,055	297,125	326,285
2010	970,662	1,334,769	267,013	295,265
2011	ND	1,599,217	ND	245,721
2012	ND	1,581,555	ND	374,523
2013	ND	1,359,893	ND	489,654
2014	ND	1,520,340	ND	440,192
2015	ND	1,709,051	ND	470,677

Note: Bendix counts were converted to DIDSON estimates (equivalents) for Kenai (1979–2006) and Kasilof rivers (1983–2007). Estimates after these dates are actual DIDSON generated estimates.

[a] Counting began 22 June, 1978–1987, and 1 July (1988–present).

[b] Includes counts or estimates prior to 15 June (1978–1988) and post enumeration estimates (1981–1986).

[c] Combined counts from weirs on Bear and Glacier Flat Creeks and surveys of remaining spawning streams.

METHODS

FIELD OPERATIONS

Acoustic Sampling

Crews are responsible for maintenance and operation of sonar and fish wheel equipment. Sonar crews may also be responsible for daily collection of age, sex and length (ASL) data from samples of captured sockeye salmon when Catch and Escapement sampling crews are not available. Enumeration begins on July 1 for Kenai River and June 15 for Kasilof River. Unless extenuating circumstances dictate otherwise, counting operations at each of the sites may cease when the daily escapement of sockeye salmon is ≤1% of the total escapement for three consecutive days. The 1% criteria will not apply for the Kasilof and Kenai rivers until after the cessation of commercial fishing.

For both rivers, the DIDSON alternates between one of 2 frequencies, one of 1.8 MHz with an acoustic beam consisting of 96, 0.3° x 14° beams and a range limit of 10 m, and the other of 1.1 MHz with an acoustic beam consisting of 48, 0.4° x 14° beams and a range limit of 30 m. The range limit is extended on the north bank of the Kenai River by installing a unique lens on the DIDSON unit. The river channels, bank to bank, will not be completely ensonified with these range limits, but will encompass the expected traveling path of sockeye salmon for each river. The nearshore files, set at high frequency, will usually be recorded at 8 frames per second while the offshore files (low frequency) recorded at 6 frames per second. The pulse length of the DIDSON makes it difficult to field-test target strengths (TS); however, a 38.1 mm calibration sphere was clearly seen in DIDSON images from early field tests (Maxwell and Gove 2007). The TS of the sphere is theoretically between -38 dB and -39 dB for each frequency at a water temperature of 9° C.

Schematics which outline cables, batteries and power cords will be used to hook up all equipment (Appendix A). DIDSON transducers will be mounted on appropriate stands in about 0.6 m of water and ~15 cm above the bottom in a horizontal side-looking position on each bank (Figure 2). Transducers will be placed 1–1.5 m from the offshore end and immediately upstream of a short weir, which will extend approximately 3–6 m into the river. An automated rotator coupled with an attitude sensor will be used to assure proper aim once the transducer is deployed. The aiming protocol of Maxwell and Smith (2007) is used as a guideline to determine the best aim for each river. Silt buildup behind the DIDSON lens is a problem, so lenses will be cleaned at least once a week on the Kenai and Kasilof rivers to maintain signal strength integrity and visual acuity.

Operation of sonar will follow steps as outlined in the DIDSON manual (2008) and summarized in this operational plan (Appendix B). In effect, DIDSON is comparative to a counting tower, allowing DIDSON's video like images to be manually counted on a computer screen. DIDSON produces black and white sonogram-like video images of swimming fish. In these videos, fish are seen as moving or, "swimming" across a predominantly static background or river substrate. To date, trial auto-counting methods for enumerating moving fish images have not been very accurate; therefore, the video-like DIDSON images of individual fish will be manually counted with a tally whacker from a computer screen (Faulkner and Maxwell 2015).

DIDSON units operate on both banks of each river 24 hours per day and once each hour, two 10 min image files of fish passage within ranges of 1–10 m and 10–20 or 10–30 m from shore depending on fish distribution will be recorded (Figure 3). Laptop computers collect data in a DIDSON video file and backed it up on 1 TB external hard drives. Technicians play back each image file containing a video recording, and count all migrating fish observed with 2 tally whackers, 1 for fish swimming upstream and 1 for fish swimming downstream. Counts will be entered into an excel spreadsheet, which automatically calculates hourly and daily totals. Resident fish species or holding salmon are ignored as only migrating salmon are enumerated for escapement purposes. Fish images which are substantially larger than average salmonid images and which are outside the immediate migration pattern are likely Chinook salmon and are not included in the daily count.

To process and count the raw images as quickly and accurately as possible, a DIDSON background subtraction algorithm will often be used to view the images of fish against a black background. For counting purposes and to produce the best contrast and to ensure counting ease and accuracy, an initial intensity setting of 40 dB and threshold of 4–5 dB will be recommended. Playback frame rates will vary from 8 to 30 frames second, depending on fish densities and the ability to accurately differentiate fish images by individual observers. Intensity and threshold levels used by technicians will be relatively constant with small variations between individuals for personal preference. Hourly fish counts from image files will be continuously compiled and frequently relayed to management biologists for inseason and timely commercial fishery applications.

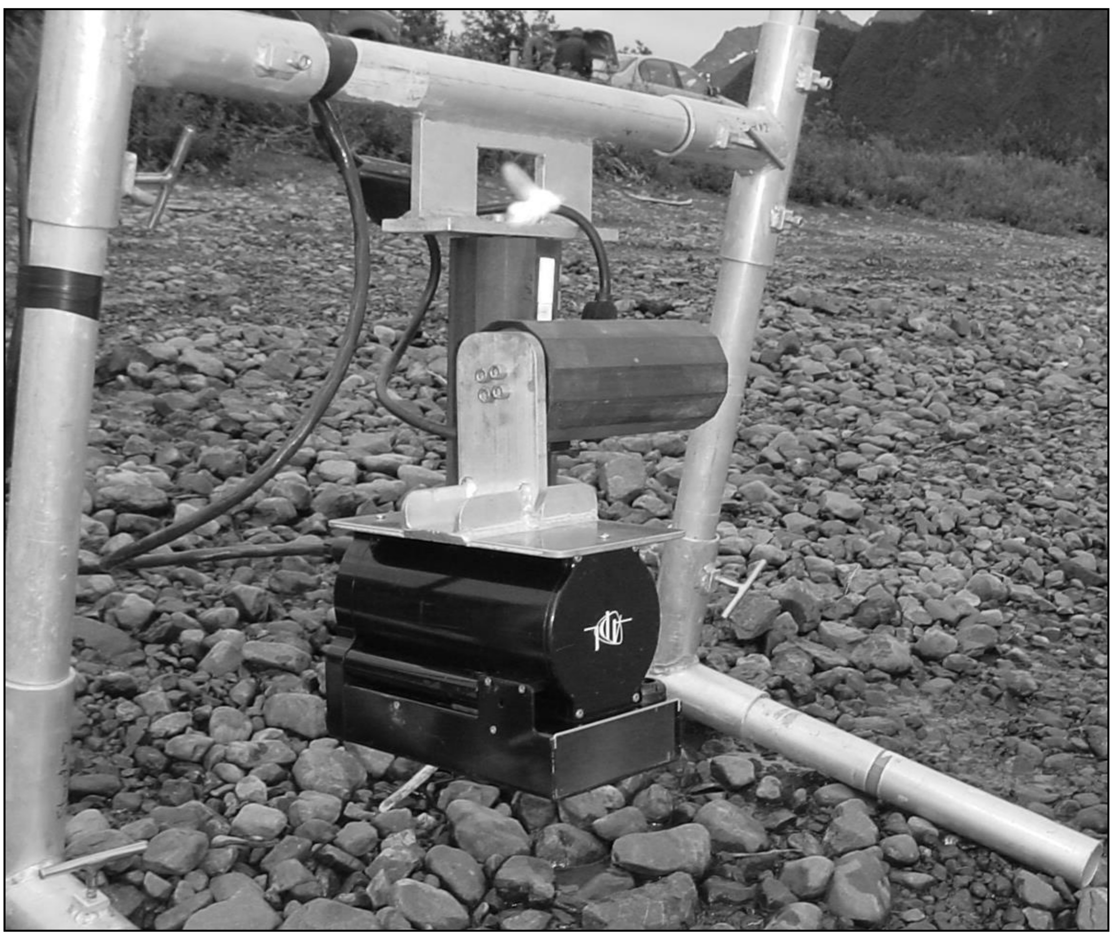

Figure 2.–DIDSON transducer (black unit) and rotator mount (top).

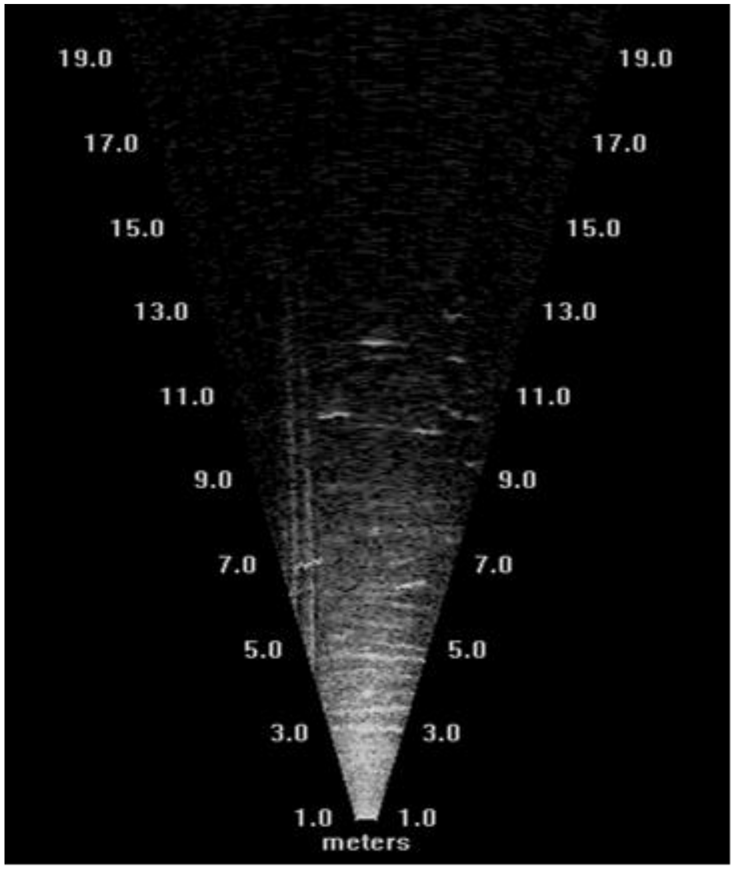

Figure 3.–Computer image of a DIDSON frame indicating fish at 7 m and 10–12 m.

Fish Wheel Sampling

Fish wheels will be operated on the north banks of the Kenai and Kasilof rivers to catch fish for apportionment purposes and to collect ASL information from sockeye salmon (Tables 2, 3). Installation and operation for fish wheels will follow step by step procedures with slight modifications depending upon site specific needs (Appendix C).

Table 2.–Average age composition (%) and mean length of UCI sockeye salmon sampled from fish wheels in the Kenai and Kasilof rivers.

	% Age Composition							
	Age Class							
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	Other
Kenai River								
Average age (1970–2011)	0.4	15.4	55.0	0.8	1.7	10.4	15.4	~1.0
Average length (mm)		489	576			508	576	
Kasilof River								
Average age (1969–2011)	0.3	32.8	35.4	0.2	0.3	20.9	9.2	<1.0
Average length (mm)		473	541			474	536	

Table 3.–Historic average species composition of fish wheel catches and CPUE's (catch per hour) by species.

	Average catch by species (%)					CPUE by species					Total
Kenai River north bank	Sockeye	Pink	Chum	Coho	Chinook	Sockeye	Pink	Chum	Coho	Chinook	CPUE
Odd years	97.7	0.8	0.0	1.0	0.4	7.2	0.1	0.0	0.1	0.0	7.4
Even years	90.1	7.5	0.0	1.9	0.5	6.7	0.6	0.0	0.1	0.0	7.5
Average: (1978–2012)	93.5	4.5	0.0	1.5	0.5	5.7	0.5	0.0	0.1	0.0	7.4
Minimum: (1978–2012)	29.4	0.0	0.0	0.1	0.0	0.4	0.0	0.0	0.0	0.0	0.4
Maximum: (1978–2012)	99.8	69.8	0.0	7.3	2.2	22.1	2.2	0.0	0.8	0.2	23.0
SD: (1978–2012)	12.3	12.0	0.0	1.6	0.5	5.8	0.5	0.0	0.2	0.0	6.1
Kasilof River north bank											
Average: (1983–2012)	96.6	1.5	0.0	0.1	1.8	3.6	0.1	0.0	0.0	0.1	3.8
Minimum: (1983–2012)	92.1	0.2	0.0	0.0	0.1	1.6	0.0	0.0	0.0	0.0	1.7
Maximum: (1983–2012)	99.4	5.1	0.0	1.4	5.2	11.7	0.2	0.0	0.0	0.2	12.0
SD: (1983–2012)	1.8	1.1	0.0	0.3	1.2	2.1	0.0	0.0	0.0	0.0	2.1

All fish wheels are of similar design consisting of framework that supports aluminum or foam-filled plastic floats, an axle and live box (Figure 4). Partitioned, custom made aluminum floats, prevents the fish wheel from sinking should a float develop a leak. Two baskets and 2 paddles are mounted to the axle at 90° angles to each other that rotate in the river. As the axle rotates in the current, baskets scoop fish from the river, dropping them in a live box mounted to the outside of the fish wheel frame. The baskets are fitted with 2–2.5 in (5–6 cm) tarred netting and a slide, which funnel the fish toward an opening in the basket netting and into the live box. The live box is mostly submerged in the river, where constant flows of freshwater keep fish alive and vigorous. All fish wheels are anchored to shore using a boom (either a wooden or steel 4 x 4) to station the wheel in current deep and fast enough to allow the axle to turn. The baskets rotate as close to the bottom as possible where most fish migrate. Cables or rope secure the front end to shore and keep the fish wheel parallel to the current. Spinning speed of the fish wheel should range between 2 and 5 revolutions per minute (rpm) with optimum speed at 3–4 rpm (any slower or faster will reduce its effectiveness). A short weir, 3–6 m wide (depending on river) with pickets spaced no more that 7 or 8 cm apart, extend from shore diverting near shore fish toward the spinning baskets. These weirs are either aligned with or just downstream of the axle or immediately below the fish wheel (near shore) float.

Age, Sex and Length Sampling

Sample sizes for estimating ASL compositions will be 0.1% of the previous day's sockeye salmon escapement estimate on the Kenai River and 0.2% on the Kasilof River (Appendix C). A single scale for age analysis will be collected from a preferred area on the left side of each fish, on a line between the posterior edge of the dorsal fin and anterior portion of the anal fin about 2 or 3 scale rows above the lateral line. If the preferred area is scarred or void of scales, the scale will either be taken in front of the preferred area or from the same spot on the right side of the fish. Lengths are measured from mid eye to fork of tail (MEFT). Additional ASL or genetic data may be collected from other salmon species for comparative studies (Appendix D).

Age and sex compositions of sockeye salmon will be estimated as a series of proportions p_{ij} defining a multinomial distribution:

$$\hat{p}_{ij} = n_{ij} / n, \tag{1}$$

where n is the number in the sample and n_{ij} is the number in the sample of age i and sex j. The sample variance for p_{ik} will be estimated from

$$s_{jk}^2 = p_{jk}(1 - p_{jk}) / (n_{jk} - 1). \tag{2}$$

Mean lengths of sockeye salmon will be estimated for each age and sex class, i.e.

$$\overline{L}_{ij} = \frac{\sum_{m=1}^{n} L_m}{n}. \tag{3}$$

The sample variance for L_{jk} will be estimated from

$$s_{jk}^2 = \sum (L_i - \overline{L})^2 / (n - 1). \tag{4}$$

Climatological Data Collection

Water and air temperatures, water depth (staff gauge), and general weather conditions will be recorded at each of the sonar sites. Turbidity or water clarity (secchi disc) will be measured in the Kenai and Kasilof rivers. All data will be recorded approximately the same time every day and 12 hours apart if done more than once a day (Figure 5). When moving the water depth gauge, the depth will be recorded before and immediately after resetting the gauge.

Stream Surveys

Stream survey salmon counts are important indicators of run strengths in UCI and may be conducted as time and available personnel allow. When conditions allow, a foot stream survey may be conducted on Quartz Creek by ADF&G, Division of Commercial Fisheries during the historical peak of sockeye salmon spawning activity (late August) to assess tributary escapements in the upper Kenai River drainage. All observed fish, living and dead sockeye salmon and other species of fish, will be counted and evidence of predation noted. The Quartz Creek survey covers the lower 7.5 km of the creek starting at the Matanuska Electric Association substation on the Sterling Highway and ends at Kenai Lake. A stream survey (foot) of the lower 2.5–3.0 km of Ptarmigan Creek may also be conducted by Division of Commercial Fisheries.

DATA ANALYSIS

Estimating Total Fish Passage

For each bank separately, all fish images on a computer screen will be counted with a tally whacker for each near shore $_{(n)}$ and offshore $_{(o)}$ 10-minute file, differentiating upstream (n_u) from downstream (n_d) swimming fish. Counts will be entered into excel spreadsheets where the number of salmon migrating upstream on bank *b* in hour *h* will be estimated by

$$N_{bh} = 60\frac{(n_{u(n)} - n_{d(n)}) + (n_{u(o)} - n_{d(o)})}{10}. \tag{5}$$

All 24 hourly estimates for a calendar day will be summed to estimate daily fish passage (N_{bd}) for each bank (*b)*, i.e.

$$N_{bd} = \sum_{h=1}^{24} N_{bh}, \tag{6}$$

Then, the fish passage estimates for both banks will be summed to estimate the total daily fish passage (N_d).

Estimating Missing Data

When temporary equipment failure or intentional shutdowns for maintenance result in missing data for a given bank, hourly fish passage for any given hour, $\bar{x}_y$, will be estimated by averaging valid counts for the same bank in adjoining hours, usually 1 hour before and 1 hour after $\bar{x}_y$.

$$\bar{x}_y = \frac{\sum s_{(xz)}}{n_{(xz)}}, \tag{7}$$

where:

$\sum s_{(xz)}$ = sum of all valid counts in adjoining hours of $\bar{x}_y$, (*xz*), and

$n_{(xz)}$ = number of valid adjoining hours of $\bar{x}_y$, (*xz*).

If a sonar unit does not operate for more than a day due to electronic problems or high water, a ratio of fish passage estimates between banks will be used to estimate missing daily data. For example, if the daily estimate for bank 1 was unobtainable, daily fish passage will be estimated from the ratio of the fish passage between banks for the previous 3 days and the fish passage on the opposite bank, i.e.

$$\widehat{N}_{1d} = \left(\frac{\sum_{d=1}^{3} N_{1d}}{\sum_{d=1}^{3} N_{2d}} \right) \cdot N_{2d} . \quad (8)$$

Estimating Salmon Species Composition

The primary objective of the project is to estimate sockeye salmon escapement, but escapement estimates will also be reported for coho, pink and chum salmon without variances. Fish wheel catches will be used to apportion total daily sonar counts to species. Kenai or Kasilof river sonar counts will not be apportioned until the species composition of the daily fish wheel catch is at least 5% pink and/or coho salmon and the evidence of a trend is obvious. This guideline was developed to accommodate situations where run timing of sockeye and pink salmon (and sometimes coho salmon) overlap, usually during even-numbered years.

At the Kenai and Kasilof rivers, the daily escapement of each salmon species N_{sd}, will be estimated by multiplying the total daily fish passage estimate (N_d) by the proportion of each species captured in the fish wheels (p_s), i.e.,

$$N_{sd} = N_d \cdot p_s . \quad (9)$$

When the fish wheel catch is low (<20 fish) or does not operate during a 24-h period, the catches from the 2 previous days will be combined with the low catch to estimate p_s. The abundances of non-salmon in fish wheel catches, such as rainbow trout (*O. mykiss*) and whitefish (*Coregonus spp.*), are typically small (<1%) so these species will not be apportioned from the total sonar count.

A simple method to observe relative abundance and fish wheel catch efficiency of any given fish species will be determined by calculating catch per unit effort (CPUE).

$$CPUE = \frac{c}{e} \quad (10)$$

where:

c = total number of fish caught

e = total number of hours each fish wheel was fished

Figure 4.–Typical fish wheel installation, Kenai River fish wheel and weir.

Variance of Sockeye Passage Estimates

The variance of the sockeye salmon passage estimate on bank *b* and day *d*, due to systematic sampling in time and adjustments for missing data, will be approximated using Wolter's (1985) successive difference method, i.e.

$$\hat{V}\left[\hat{N}_{bd}\right] \cong (1-\frac{1}{j})\cdot\left(\frac{1}{m}\right)\cdot\left(\frac{1}{3.5(m-4)}\right)\cdot\sum_{h=5}^{m}(\frac{N_{bh}}{2}-N_{bh-1}+N_{bh-2}-N_{bh-3}+\frac{N_{bh-4}}{2})^2, \tag{11}$$

where *m* is the number of hourly counts in a day (usually 24) and *j* is the hourly sampling expansion factor (usually 60 minutes/10 minutes=6). If sonar count data are missing in a day, the sample size *m* will be adjusted accordingly. The total variance on day *d* will be estimated by summing the variances from the 2 banks.

When total daily fish passage estimates are apportioned to species using fish wheel catches, the daily variance will be estimated as

$$\hat{V}\left[\hat{N}_{sd}\right] = \hat{N}_d^2\cdot\hat{V}(\hat{p}_s)+\hat{p}_s^2\cdot\hat{V}(\hat{N}_d)-\hat{V}(\hat{p}_s)\cdot\hat{V}(\hat{N}_d) \tag{12}$$

Goodman (1960). The variance of the sockeye salmon passage estimate for the season will be estimated by summing the daily variances. The 95% confidence intervals on the total sockeye salmon passage estimate will be estimated as described by Zar (1984).

Evaluation of Observer Variability

Previous studies by Westerman and Willette (2011) indicate that differences between observers increases for rivers with higher densities, especially for the Kenai River. Each observer will recount between 24 and 34 (~30), 10 min DIDSON subsample files which were recorded during or near the peaks of the Kenai and Kasilof river runs in previous years. Observer counts will be stratified for every 100 fish based on averages (Equation 8) of each sample (100–199, 200–299, etc.), then averages determined from these strata will be compared against those of each observer.

For each river, the number of fish counted by each observer per subsample is compared against the crew average for that subsample:

$$\bar{f}_i = \frac{\sum f_i}{n_i} \tag{13}$$

where:

$\bar{f}_i$ = average number of fish for a given subsample (i),

$\sum f_i$ = sum of fish counts of all observers for a given subsample, and

n_i = number of observers for a given subsample.

The observer average of all subsample counts (30) will also be compared to the crew average of all subsamples (30_x):

$$\overline{F}_o = \frac{\sum f_o}{30x} \tag{14}$$

where:

$\overline{F}_o$ = average of all observers, and

$\sum f_o$ = sum of all subsample counts for all observers.

The standard deviation (SD) will be used as a measure of error between observers, and correlation (R^2) values will be used to indicate the relationship between an individual's subsample count and the average for the crew. These values will be compared against the averages for each sample and for all samples (n = 30). The goal of these recounts is to achieve an observer to average relationship as close to 1:1 as possible ($R^2 \geq 0.95$) for each file.

Environmental Data

River________________________ **Year**_________________

1-sunny
2-sunny, hazy
3-p. cloudy (< 50%) mostly sunny
4-m.cloudy (> 50%) partly sunny
5-overcast
6-rain

Date	Time	Level (Feet)	Water Temp (C)	Air Temp (C)	Cloud Cover *	Wind Dir.	Wind Speed	Turbidity (in)	H2O Velocity- Distance from shore and Depth				Comments

Figure 5.–Environmental form used to record temperature, turbidity, water depth, etc.

SCHEDULE AND DELIVERABLES

The annual schedule of activities is as follows:

June 1–August 31	Kasilof River preparation, operation, maintenance
June 15~August 15	Kasilof sonar operational, data collected, ASL sampling
June1–August 31	Kenai River preparation, operation, maintenance
July 1~August 20	Kenai sonar operational, data collected, ASL sampling
October 31	Field data error checked
January 1	Data is summarized into tables for report preparation

RESPONSIBILITIES

Project Fisheries Biologist III	Supervise Commercial Fisheries research projects for Upper Cook Inlet
Project Fisheries Biologist II	Supervise escapement projects, assist in field as needed
Project Fisheries Biologist I (2)	Crew leader, supervise daily activities and training of new personnel in sonar procedures and assist in field as needed. Summarize the daily enumeration results. Report results to Soldotna daily.
Fish and Wildlife Tech III (2)	Operate and follow sonar procedures in the field. Supervise and train Fish and Wildlife Tech II's when necessary. Act as field crew leader when necessary.
Fish and Wildlife Tech II (4)	Operate and follow daily sonar procedures.
Fisheries Biologist III	DIDSON support and research.
Fisheries Biologist II	DIDSON field support.

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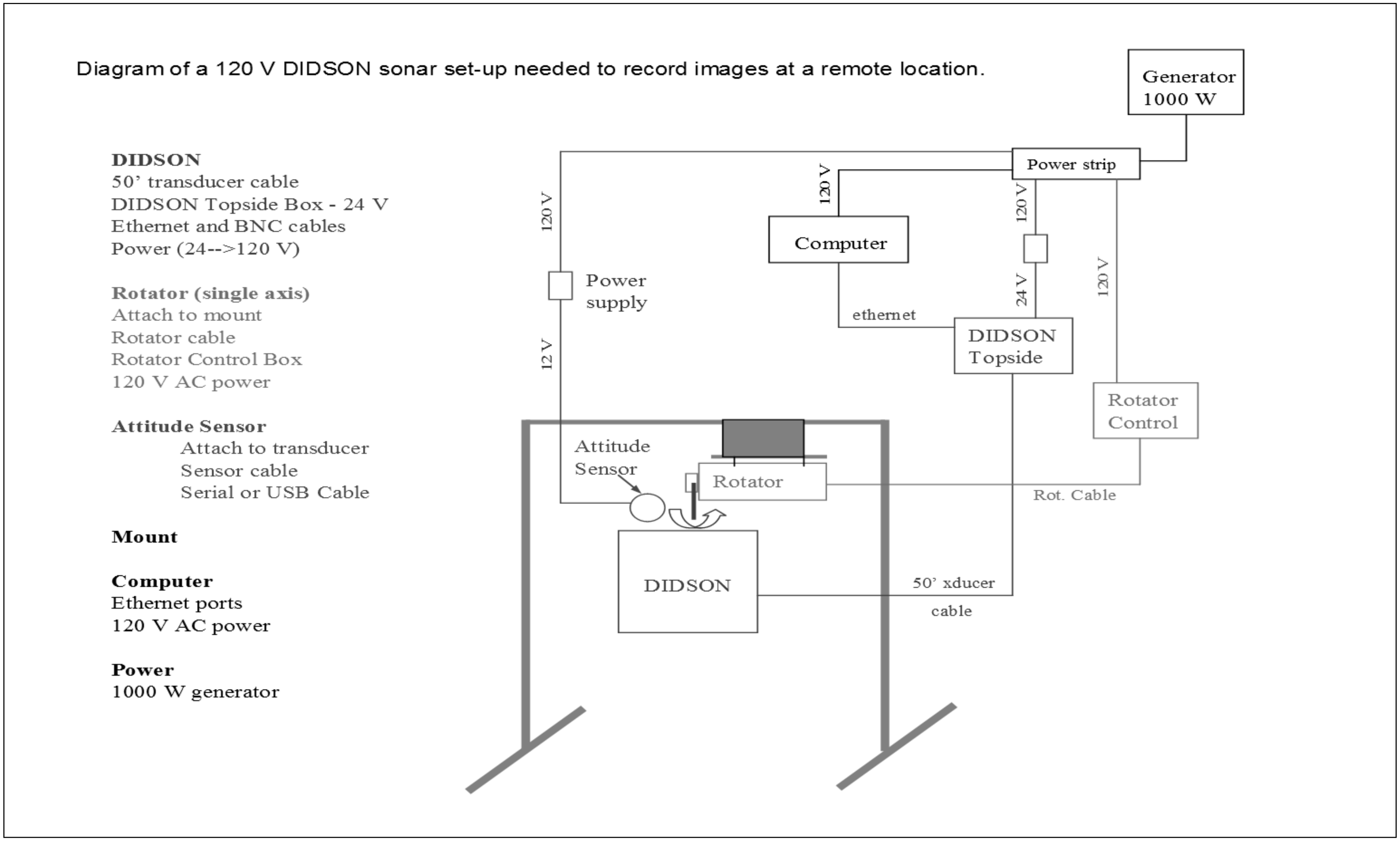
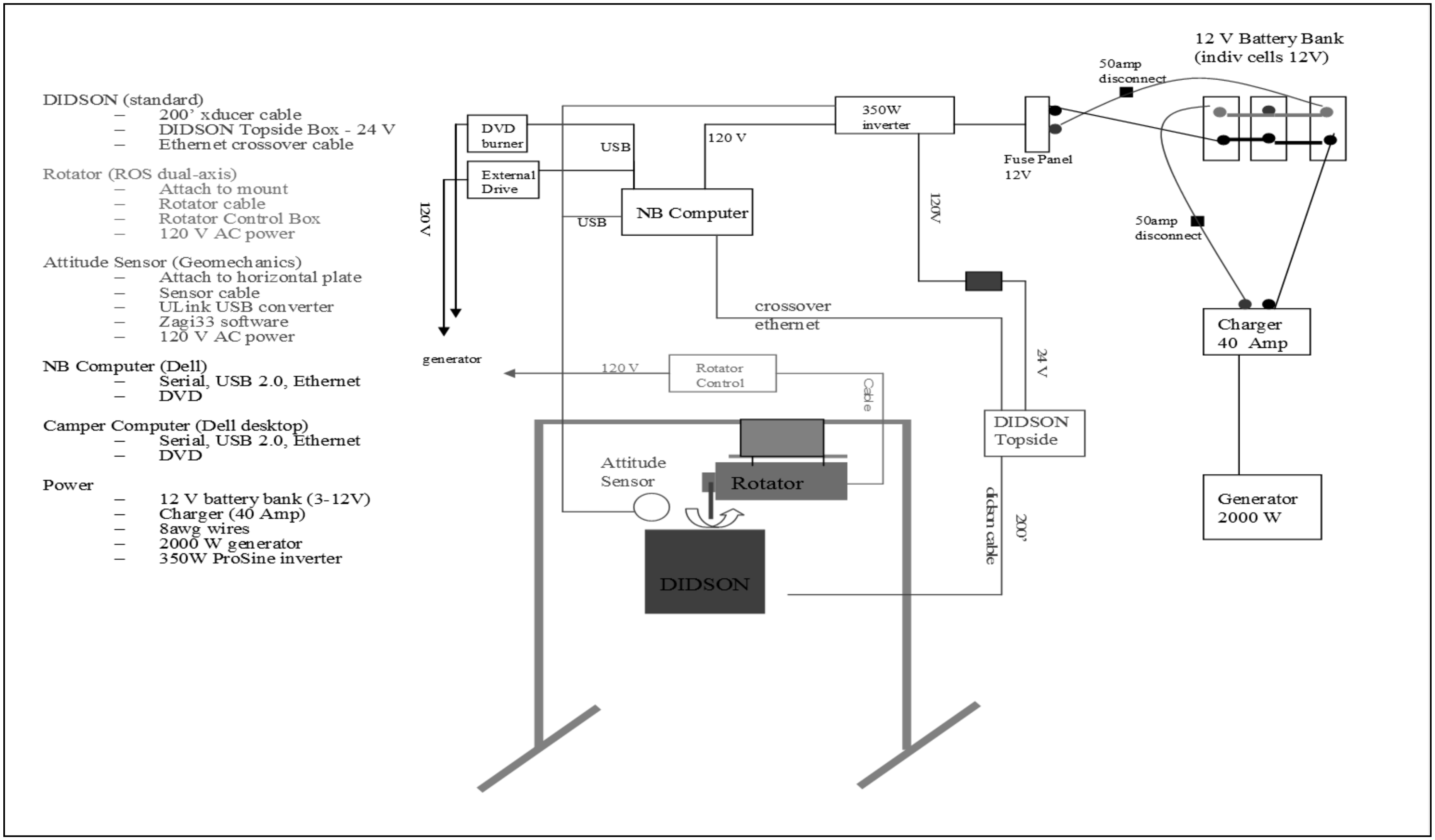
APPENDIX A: DIDSON CONNECTIONS



Appendix A 1.–DIDSON schematic showing a generator as a power source. This setup is also applicable to an AC power source used on the Kenai River south bank. Not shown is DVD burner and external hard drive, which connects to the power strip and computer.



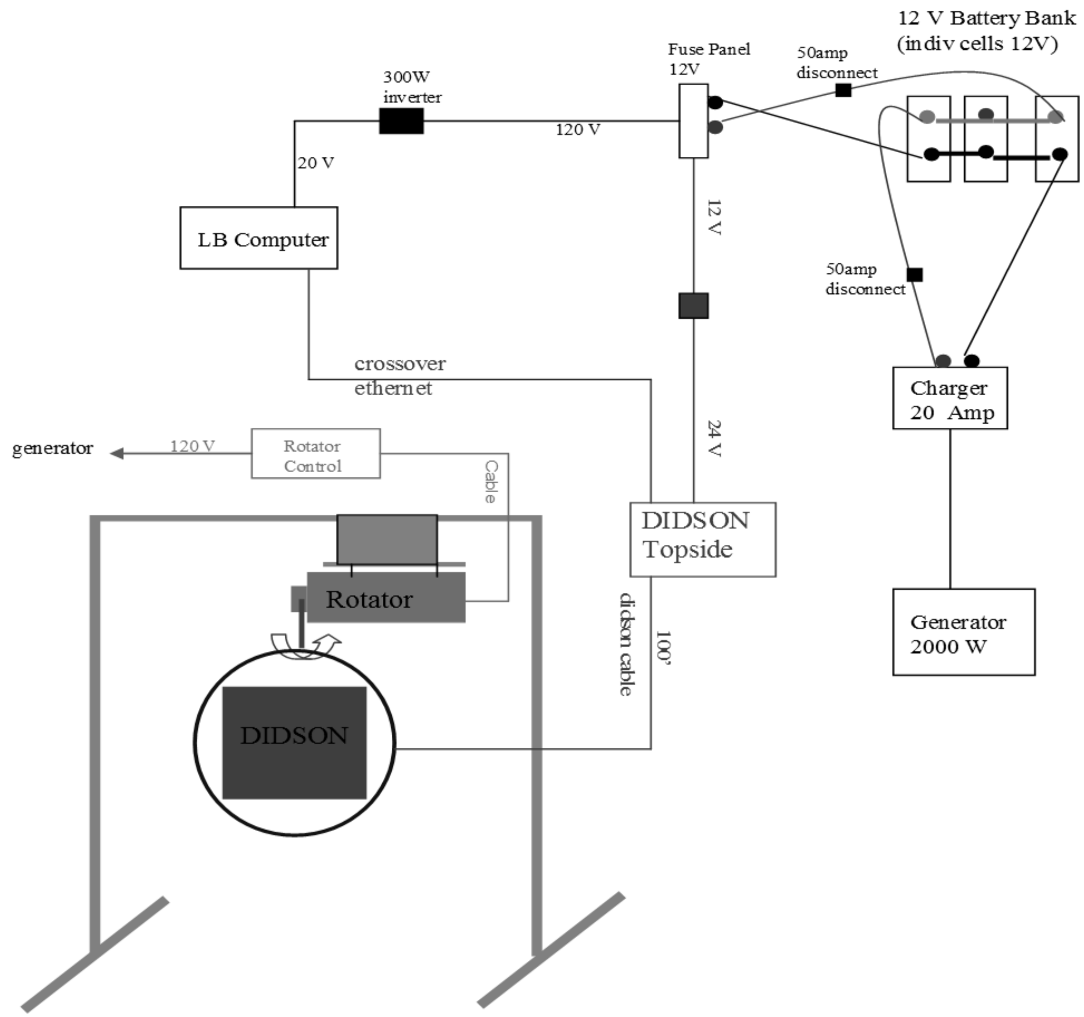
Appendix A 2.–DIDSON schematic showing batteries as a main power source and a DVD burner and external hard drive interfaced with the laptop.

DIDSON (standard w/ compass)
- 200’ xducer cable
- DIDSON Topside Box - 24 V
- Ethernet crossover cable
- 24/12V power adapter

Rotator (HTI single axis)
- Rotator cable
- Rotator Control Box
- 120 V AC power

SB Computer (Dell)
- Serial, USB 2.0, Ethernet
- DVD
- Lind power adapter

Power
- 12 V battery bank (3 -12V)
- Charger (20 Amp)
- 8awg wires
- 2000 W generator
- 300W inverter



Appendix A 3.–DIDSON schematic for Kasilof River north bank and Kenai River north bank.

APPENDIX B: DIDSON OPERATION AND DAILY PROCEDURES

Appendix B 1.–Step by step DIDSON operation and daily procedures.

Connecting the parts

1. Power switch on the topside box must be **OFF**.
2. Connect the black sonar cable between the DIDSON and topside box.
3. Connect the (blue) Ethernet cable between the topside box "PC" port and the computer Ethernet port.
4. Connect the 24 VDC power supply to an AC power outlet and to the topside box power supply port.

Startup

Set the DIDSON in the water. The DIDSON Operation Handbook will be available at all sites and is recommended reading.

1. Check that the DIDSON Box, external Drive, computer and power strip is OFF.
2. Turn ON Generator.
3. Turn ON power strip
4. Turn ON topside box. (O is off and – is on); allow 1–2 minutes for connections
5. (Turn on external hard drive when moving data from the computer to storage).
6. Turn ON computer
7. Once all units are on, connect the USB port (white cord) to the back of the computer and plug in the fire wire to the port on the RH side of the computer
8. Double click on the DIDSON icon, located on the right side of the screen. Be sure DIDSON program is set at high priority in the task manager; right click **Task>Prioritize>DIDSON**.
    a. It could take a minute for the computer screen to indicate a connection indicated at the bottom of the screen. A red TIMER block on the lower right of the sonar image will also be visible. If the TIMER is not visible, go to:
9. If the program is in demo mode, click **Edit>Mode>Uncheck Demo**.
10. Click **Image** and check the **Timer Recorder** and close. If it still isn't visible, be sure the computer is connected or call for assistance.

Data Collection and Setup

The following parameters will be found on the left side of the screen under Sonar Controls.

1. Make sure **Auto Freq** and **Auto Rate** are checked in **Sonar Controls**.
2. Click the up or down arrow and set **Window Start** and **Window Length** (range).
    a. When the maximum range exceeds 15 m, the sonar changes from 1.8 MHz (high frequency) to 1.1 MHz (low frequency).
3. Click the up or down arrow and set frame rate, (red square will blink if too high).
4. In the **Display Controls,** increase or decrease **Threshold or Intensity** effects system noise and brightness.
5. Click **Image>Capture>Timer Data** entry: If already set, clear and set the time sample to be collected, set date and save.
6. Check written text for accuracy then click OK. Set up for next strata and repeat step 2 above.
7. To turn on and off recording at different times each day;
    a. Exit DIDSON (save settings) and reopen.

b. Be sure DIDSON program is set at high priority in the task manager on the computer. Right click, **Task**, prioritize, DIDSON.
c. Click **Image>Capture>Timer Recording** (Red Timer flag should appear in window).
d. Go to **Edit>Header** ID. Type name of River, NB or SB (Kasilof NB).
e. Click once (or point the arrow) on the small, green arrow located on the bar at the bottom right of the screen. Three lines should appear which will confirm connections to all the appropriate gizmos. Two lines will indicate the F Drive is active ("Stop Maxter…F drive") and the sensor is active ("…US485TB…")

Recording Data

1. Click DIDSON icon.
2. Before recording data (within the DIDSON program)
   a. Click **File/Set Save Dir**/Name.
   b. Navigate to the DIDSON folder where the data will be filed or create a new folder if necessary, before beginning this step; name the folder DIDSON.
   c. Leave the default name, click **Save**.
   d. Replace HHMMSS etc. - **NO**
   e. Append frequency – **YES**
3. DIDSON settings for recording – Make sure these are correct! There are some automatic defaults which may change some of your numbers as you enter new ones. Example: the frame rate may change after you enter the intensity and threshold. The last recording remains on the screen after the recording is finished; this is the active, connected DIDSON. Most observers prefer to see the onshore active, connected view between recordings; therefore, it is the second stratum, or last recording event.

Timer Data Entry (automatic recording)

1. Set up the parameters or sonar controls (left side of DIDSON screen) for the 1st stratum to be recorded.
2. Go to **Image / Capture / Timer Data Entry**.
3. Click **hourly**. Set time to the next top of the hour and date to be sampled.
4. Duration = **10**
5. Save. Click **OK**.
6. Change the (sonar controls) window start, length and frame rate to the 2nd stratum.
7. Go to **Image / Capture / Timer Data Entry**.
8. Set time to **15 min** after top of the hour.
9. Duration = **10**
10. Save. Click **OK**.
11. Go to **Image** / **Capture** / check **Timer Recording.** The red Timer box should appear in the bottom right corner of the window.

   Below are examples of settings used at Kenai. Settings could be slightly different at other sites.

South Bank

1st stratum: low freq, offshore

- Frame Rate = 5 frames/sec

- Receiver Gain = 40 dB
- Window Start = 10 m
- Window Length = 20 m
- Focus is automatic
- Intensity (90) and
- Threshold (13)

2nd stratum: high freq, onshore

- Frame Rate = 8 frames/sec
- Receiver Gain = 40 dB
- Window Start = 0.4 m
- Window Length = 10 m
- Focus is automatic
- Intensity (90) and
- Threshold (13)

North Bank

1st stratum/low freq/offshore

- Frame Rate = 4 frames/sec
- Receiver Gain = 30 dB
- Window Start = 10 m
- Window Length = 30
- Focus is automatic
- Intensity (90) and
- Threshold (13)

2nd stratum/high freq/onshore

- Frame Rate = 8 frames/sec
- Receiver Gain = 30 dB
- Window Start = 0.4 m
- Window Length = 10
- Focus is automatic
- Intensity (90) and
- Threshold (13)

Note: smooth and auto freq boxes may be checked, but not critical

Subsample counts

For every hour of fish passage, DIDSON records 2, 10 minute subsamples of fish passing between 0.4 and 10 m (high frequency) and between 10 m and 20–30 m (low frequency) from the transducer.

1. Always minimize but do not close the DIDSON window that displays for recording. (Be sure DIDSON v5.25 is loaded onto your computer – see Maxwell)
2. Click on the DIDSON icon that brings the program into demo mode (**Edit / Demo Mode checked**). Click off Timer if it appears in the window (**Image / Timer Recording not**

checked). To open the first file, go to **File / Open** / then navigate to C:/Kenai (year) or Kasilof or Yentna NB (or SB) followed by year / DIDSON data files.

3. Open the desired file **File>Open** (i.e. 2015-07-25_130000_HF.ddf).
4. Before the counting can begin, set the parameters on display to the left of the screen. Increase or decrease the frame rate according to passage density and at a rate that is easiest to view and count. Use these suggested rates as a guideline;
    a. >300 fish/10min, use ~6–8 fps;
    b. At 100–300 fish/10min, use ~16–20 fps;
    c. At 0–100 fish/10min, use ~24–30+ fps;
5. Slower frame rates may be needed for near shore files because of a greater abundance and compactness of fish.
6. The intensity and threshold setting is important, it will make the fish images more visible and easier to count. Intensity should be set by clicking and holding on the slide and moving the slide one way or the other. Set intensity at or near 18 and Threshold to 4, adjusting to each person's preference**.** Once the intensity, threshold and frame rate are set, you shouldn't need to adjust anything unless you close out of the DIDSON program and return. Check these criteria after each file has been counted nonetheless.
7. If the background complicates the ability to see fish and count, remove the background from view by clicking the background subtraction button or go to the menu and click **Processing/Background subtraction**.
8. Note the start time and date on the field form (Figure B1-1), and record intensity, threshold and frame rate on the data sheet under comments.
9. To start processing the file, click the blue, right-hand triangle at the top of the window. The fish will appear as moving, fish-like figures on the screen and will appear bigger with high frequency, smaller with low frequency. (Low frequency is used for longer range monitoring.) Count all visible fish when starting the files except but those that are not 100% visible while leaving the "cone of visibility". Conversely when the file stops, count all visible fish but not those just entering the screen and are only partly visible. Remember, these files contain 10 minutes of passage, no more and no less.
10. **Valid fish counts**: Count upstream and downstream fish using a tally counter for each direction. DO NOT count fish that are obviously holding (or are the size of Chinook salmon for those sites that do not apportion) until that fish leaves the screen. For valid near shore counts; enumerate all fish that enter from the top of the screen and exit upstream. We will consider these nearshore fish. Count all fish that exit the screen through the top only if they are moving upstream. This may be a judgment call; don't count if the fish looks as if it was turning and could possibly move downstream by exiting through the top. Use your best judgment. When the file starts or ends, count those fish on the screen that were definitely moving but not partials of fish just entering the beam-don't count heads, count entire bodies. For valid offshore counts; follow the same guideline already provided except do not count fish that <u>fully</u> exit through the bottom. These fish will be considered nearshore fish although they spent time in the offshore zone. Remember, we are counting fish in the nearshore that enter from offshore. In some rivers, Chinook should be ignored, especially if they spawn in this section.
11. Record counts as upstream or down, depending on near shore or off shore movement as shown in Figure B1-1.

12. To count the next file click on the forward arrow on the tool bar and the next file will appear. The file name will appear at the top of the window, make sure it's the next file you want to count.
13. To stop; click the blue block
14. To rewind, click the left-hand triangle or arrow
15. To return to the start; click the left hand arrow with the line to its left
16. To advance to the end, use the right-hand arrow with the line to its right.
17. If you hold the cursor on the triangle, a small window will appear explaining the purpose of the icon.
18. After each file is completely counted, record the upstream and downstream counts and time on the data sheet and start on the next file.
19. To move quickly to the next file, click the right- pointed BLACK arrow in the window above the main image. The next file will open and you're ready to count again. (The left-hand black arrow will open the previous file.)

Saving data

1. Click **File/Set Save Dir/Name**. Save to DIDSON data
2. Navigate to folder (ie; C:/Kasilof 2015/NB or SB/DIDSON data) where you want to put the data or create a new folder before beginning this step. File organization and names must be consistent between rivers.
3. Leave the default name, click **Save**.
4. Replace HHMMSS etc. – **NO**
5. Append frequency – **YES**

Bank ____________ **River:** ________________________ **Year:** ______

			Subsample										
			Near-shore (0-10 m)		Off-shore (>10 m)		File Time		Total Sample Time				
Date	Obs	Hour	Upstream	Dnstream	Upstream	Dnstream	start	stop	Minutes	Seconds	Intensity	Threshold	Frame Rate
		0											
		1											
		2											
		3											
		4											
		5											
		6											
		7											
		8											
		9											
		10											
		11											
		12											
		13											
		14											
		15											
		16											
		17											
		18											
		19											
		20											
		21											
		22											
		23											

Figure B1-1.–Raw data form to record 10-minute DIDSON subsample counts. Data will be entered into an electronic Datsum file which will be linked to a calculation and adjusted count worksheet.

External Hard Drive

All DIDSON files will be moved to an external hard drive within 24–48 hours of recording to maintain adequate memory space on the computer. Connect the external hard drive to the computer and plug to the power source. A special directory letter will appear, if not, assign one for the external drive. To do so;

1. Click on **START** (bottom left of the screen),
2. Then, **SETTINGS**,
3. Followed by **CONTROL PANEL**,
4. **ADMINISTRATIVE TOOLS**,
5. **COMPUTER MANAGEMENT**
6. And finally, **DISK MANAGEMENT**.
7. Right click on hardware device (F drive) and assign a drive letter (use J). {Change the drive title (example; Yentna DIDSON) and path, change (click 2 x) and assign the letter.}
8. Close
9. (If formatting is not necessary, skip this step) Formatting External Drive
10. Go to control panel
11. Admin tools
12. Computer management
13. Disk management
14. Disk 2
15. Initial with right
16. Right click-mark partition
17. Perform quick format
18. Next, next
19. Observe formatting message and then healthy message

Data Transfer

There have been problems when transferring files to the external hard drive while the computer was recording so: **DO NOT transfer data while the computer is recording**. Also, be sure that the firewire or USB is connected between the hard drive and the computer. (A fire wire may not be required in some cases, be aware of this.)

1. Turn on the hard drive and wait for it to be recognized by the computer. The hard drive will have its own unique letter and may vary from site to site.
2. Create folders on the hard drive similar to those on the laptop: example – River name & year/NB or SB/ (Kenai, Kasilof or Yentna 2015/NB/DIDSON data). Add a folder for each bank by date (mmddyy).
3. Scroll through data files making sure there is a file for each hour and strata. Highlight the files to be moved and either cut and paste or drag to the proper hard drive folders.
4. Check to make sure all data was copied to the hard drive.
5. Right click the icon with the green arrow in the lower menu bar:
6. Click the “Safe removal, Unplug or eject hardware”.
7. On menu that pops up, select the external drive and click stop. If the drive is not ready to release, because it is still in use, try again.
8. It will say it is safe to unplug when ready.

9. Unplug the cable from the External drive.
10. Click close on the Unplug or Eject Hardware window.

Copying to Disk

Below are 3 different instructions for copying files to disk. Use the instructions that is best suited to your computer. In all 3 cases, the external hard drive must be turned off.

#1 - Roxio

1. Put in a new disk
2. Add files using Roxio, OK
3. Direct to Disc
4. Format
5. Label 2015 Kenai SB
6. Start
7. Yes
8. OK
9. Explore; go to file(s) to transfer
10. 0000–1115 or 1200–2315; only half a day will fit on a disk
11. Highlight and drag/drop file to Roxio
12. Make compatible
13. Label disk; 15Ke0701

#2 – Sony DVD Burner

1. The external hard drive must be OFF
2. remove firewire from external
3. plug firewire into Sony DVD
4. turn on Sony
5. open Record now program
6. click create data disk
7. change from slim drive to Sony drive if slim drive shows up on menu list
8. insert disk
9. next
10. drag files from explore go to file(s) to transfer
11. 0000–1115 or 1200–2315; only half a day will fit on a disk
12. Highlight and drag/drop file
13. next
14. observe "writing disc"
15. observe "verifying"
16. click done

#3 – RecordNow

1. Insert blank disk-one disk per day on NB
2. RecordNow! Plus opens
3. Drag file from explore
4. click burn
5. takes about 25 min/24 hrs of data
6. click done

Attitude sensor settings (Geomechanics)

1. Click Zagi33 icon/ Communications/ switch to com 3/ Continue/ Data Access/ Start.
2. Create a new sensor file under C:/river 2015/bank/Sensor/
3. Click Stop & uncheck save to file
4. Click Start
5. Click save to file
6. The window for directory C:/Kasilof/ NB (or SB) 2015/sensor will open.
7. Name the new file by river abbrev, bank, _date and _ time (i.e. KeNB_070510_0800). File extension of .dat is automatically added.
8. Click Save

Attitude sensor settings (HPR)

1. Be sure USB cable is connected.
2. Right click green arrow icon
3. Click safely remove hardware
4. Check the com port the device is connected to
5. Close
6. **Start**: Double click on the HPR icon (be sure correct port is selected).
7. In the Upper right of the HPR box is a button or toggle, which should be red. Click (double click if necessary) on the red button until it turns green. The attitude sensor is operating when in the green and not operating when red.
8. Go to **File**, open **Log File** and name the file. Type HPR, the date (year and day) and military time, including the dashes and underline where shown. Example; HPR2015-06-28_0950. Save the file in a separate directory such as >C:/KenaiSB/HPR. Don't add an extension, the program will do that automatically. Click **OPEN**.
9. Click **START LOGGING** and minimize the box. (The – symbol in the little box in the extreme upper right corner.)
10. Note the HPR in a log book whenever the HPR headings are checked or changed for reference purposes.
11. **Stop**: Stop logging to file and close.
12. Click the green toggle, which will turn red, and close.
13. Right click green arrow icon in bottom bar of screen, click safely remove hardware, select Model US485TB (com 5) and stop.
14. Ok and close, unplug USB from computer.
15. TROUBLE SHOOTING HPR
    a. Check all inside connections
    b. Check power
    c. Check USB connection (reconnect) and restart
    d. Check in-water connection and entire cable

Data Summary (Datsum)

1. The Datsum file, used in all UCI escapement projects, is a file with linked worksheets that summarizes hourly and daily escapements and fish wheel catches for the season.

2. There are 2 raw writable sheets, 1 for each bank, for entering hourly subsample counts.

3. Linked to both the raw and adjusted sheets are 2 calculations sheets (1 per bank) for determining average counts (protected and not for writing). This sheet takes missing data from the raw sheet as denoted by an *, calculates an average which is inserted into the adjusted sheet to replace the missing data.
4. The 2 adjusted sheets, 1 per bank, (Figure B1-2) tabulate final hourly and daily estimates.
5. Record fish wheel on/off times and catches onto the fish wheel(s) sheet (Figure B1-3).
6. Final escapement and fish wheel catch data is automatically inserted into a single, write protected summary sheet (Figure B1-4). Daily totals won't show up in the Datsum until all entries are complete.
7. Check that data is displayed on the adjusted (hourly counts) and Datsum (daily total only) sheets. The data between sheets should also match each other if the formatting is correct. Periodically, check all formatting. DO NOT CUT AND PASTE-this will delete formatting for the cut cells and cause problems with the estimates.
8. Enter any comments about debris, sliders, large fish, etc. on the field form.
9. Escapement and fish data needs to be completely entered sometime after midnight or early morning (pre 0900)
10. The templates for each project site should have been set up and checked for proper formatting before taken to the field. Start with the Datsum template for the respective river and save as 15KaDatsum or 15KeDatsum (15 is the year). The template will remain blank but a new file will have been created and saved under the directory provided below. Be sure the headings and file names are complete and correct – these files will be analyzed by the project leader at the end of the season so file names must be in accordance with the instructions in this plan.
11. Note: escapement estimates determined in the field often may not match the numbers tabulated and reported in the office. This is because of a number of possibilities; 1) unreported corrections made in the office or the field, 2) transcription errors, 3) wrong data is reported, 4) escapement program rounding discrepancy (differs slightly from excel rounding) and 5) format glitches in any 1 of a number of excel worksheets/files. The crews will report daily numbers (along with fish wheel catch data) so the project leader can match the data generated by the escapement program to that being reported. (Report only daily fish wheel catches by species and hours fished; cum fish wheel catch data does not have to be reported.) If the discrepancy is tens of fish, then such discrepancies are acceptable and can be corrected post season. Larger discrepancies need to be investigated and corrected at the source.

ADF&G/CFMD - Upper Cook Inlet Sonar Program
Adjusted Hourly Sonar Counts

Location: 21 (North) **River:** Kasilof **Year:** 2014

		Near-shore (0-10 m)		Off-shore (>10 m)							
		Subsample Count		Subsample Count		Sum	Sample time		DIDSON Count		
Date	Hour	Upstream	Dnstream	Upstream	Dnstream	NS+OS	minutes	seconds	Hourly	Daily Cum.	Total Cum
15-Jun	0	3	0	4	0	7	10	0	42	42	42
15-Jun	1	8	0	1	0	9	10	0	54	96	96
15-Jun	2	8	0	4	0	12	10	0	72	168	168
15-Jun	3	5	0	5	0	10	10	0	60	228	228
15-Jun	4	8	0	3	0	11	10	0	66	294	294
15-Jun	5	23	1	2	0	24	10	0	144	438	438
15-Jun	6	32	0	1	0	33	10	0	198	636	636
15-Jun	7	11	0	0	0	11	10	0	66	702	702
15-Jun	8	9	0	0	0	9	10	0	54	756	756
15-Jun	9	9	0	5	0	14	10	0	84	840	840
15-Jun	10	8	1	7	0	14	10	0	84	924	924
15-Jun	11	9	0	4	0	13	10	0	78	1002	1002
15-Jun	12	7	0	2	0	9	10	0	54	1056	1056
15-Jun	13	16	0	0	0	16	10	0	96	1152	1152
15-Jun	14	1	0	0	0	1	10	0	6	1158	1158
15-Jun	15	8	0	2	0	10	10	0	60	1218	1218
15-Jun	16	4	0	1	0	5	10	0	30	1248	1248
15-Jun	17	4	0	1	0	5	10	0	30	1278	1278
15-Jun	18	3	0	0	0	3	10	0	18	1296	1296
15-Jun	19	11	0	0	0	11	10	0	63	1359	1359
15-Jun	20	5	0	1	0	6	10	0	36	1395	1395
15-Jun	21	29	0	1	0	30	10	0	180	1575	1575
15-Jun	22	18	0	0	0	18	10	0	108	1683	1683
15-Jun	23	4	0	1	0	5	10	0	30	**1713**	1713

Figure B1-2.–Adjusted data sheet example, linked to raw data form which calculates hourly and daily escapement estimates. The second to last cell, bottom right, is linked to the summary sheet, containing the final daily escapement estimate.

Missing hours

1. DIDSON power problems often result in a failure to record image files. Such equipment failure has been known to last for as long as 6-8 hours especially if the failure occurs at night when crews are off. The average from 3 valid hours before and after the affected time will be inserted into the missing hour(s) to compensate for the missing data. Excessive hours of missing data may have to be adjusted postseason by the project leader if the number of valid counts used in the averaging is inadequate. Environmental conditions can put a unit out of action for longer periods, sometimes for more than 24 hours, which has occurred at Yentna where high water has caused temporary cessation of operations on one bank. If escapement estimates from a bank is missing for an entire day or more, then a ratio with the opposite bank (assuming opposite bank is operating properly) will compensate for missing data. If both banks are out of commission for a day or more, escapement estimates will be determined at the area office by the project leader.

FISH WHEEL CATCH SUMMARY																	
River ________								Bank ________				Year ________					
Open		Closed		Total Hours	Date Counts	SOCKEYE		PINK		CHUM		COHO		CHINOOK		OTHER (Note Sp)	
Date	Time	Date	Time	Opened	Reported	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum
				0.0													
				0.0													
				0.0													
				0.0													
total				0.0													
				0.0													
				0.0													
				0.0													
				0.0													
total				0.0													
				0.0													
				0.0													
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				0.0													
total				0.0													
				0.0													
				0.0													
				0.0													
				0.0													
total				0.0													
				0.0													
				0.0													
				0.0													
				0.0													
total				0.0													

Figure B1-3.–Fish wheel spreadsheet linked to the data summary (Datsum).

(sockeye = password)

UPPER COOKINLET Sockeye Salmon Escapement - DAILY DATA SUMMARY

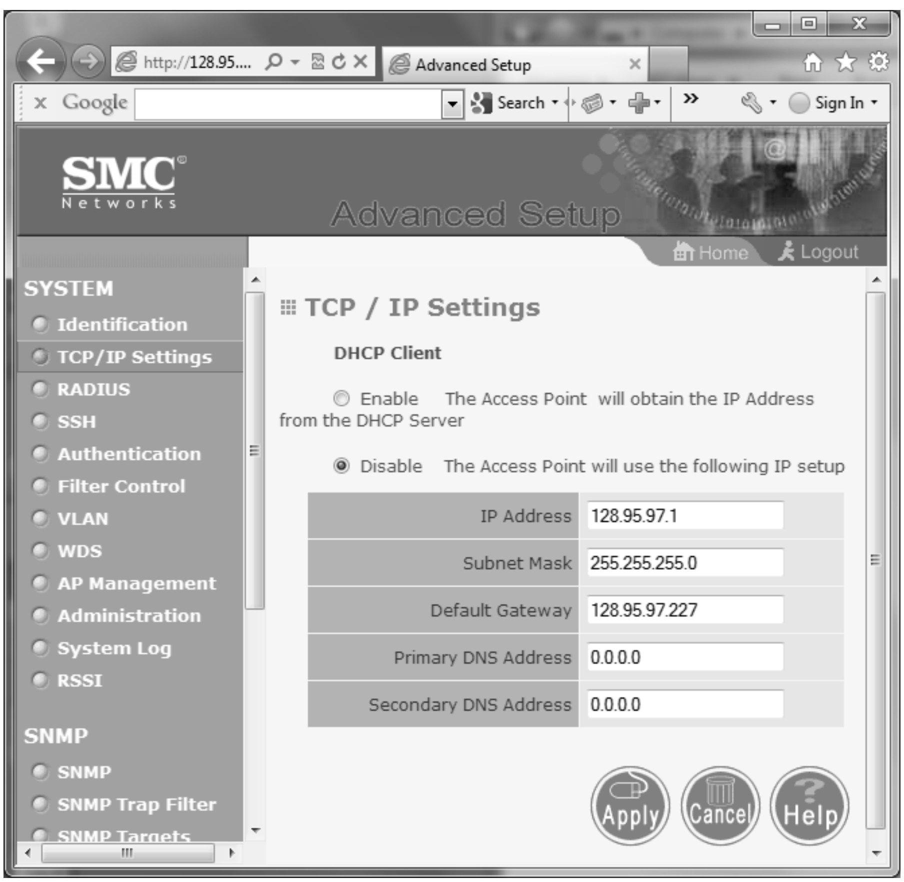
DO NOT CUT AND PASTE

RIVER:					YEAR:			Crew:						
	Sonar Count							Actual Fish Wheel Catch						
	DIDSON count													
	Bank:	NORTH	Bank:	SOUTH	Both Banks			Time						Other
Date	Day	Cumulative	Day	Cumulative	Day	Cumulative		(hours open)	Sockeye	Pink	Chum	Coho	King	(note sp)
6/15	1713	1713	5874	5874	7587	7587	N	0.0	0	0	0	0	0	0
							S							
6/16	1391	3104	4961	10835	6352	13939	N	19.7	43	0	0	0	0	0
							S							
6/17	2347	5451	4854	15689	7201	21140	N	29.7	57	0	0	0	0	0
							S							
6/18	4902	10353	8394	24083	13296	34436	N	8.3	73	0	0	0	0	0
							S							
6/19	7716	18069	10134	34217	17850	52286	N	7.0	56	0	0	0	0	0
							S							
6/20	7992	26061	8214	42431	16206	68492	N	0.0	0	0	0	0	0	0
							S							
6/21	3012	29073	6708	49139	9720	78212	N	2.5	116	0	0	0	0	0
							S							
6/22	3078	32151	4746	53885	7824	86036	N	0.0	0	0	0	0	0	0
							S							
6/23	2856	35007	4698	58583	7554	93590	N	14.5	95	0	0	0	0	0
							S							
6/24	2099	37106	2136	60719	4235	97825	N	2.3	14	0	0	0	0	0
							S							
6/25	5016	42122	5604	66323	10620	108445	N	3.0	45	0	0	0	0	0
							S							
6/26	8398	50520	11396	77719	19794	128239	N	2.0	90	0	0	0	0	0
							S							

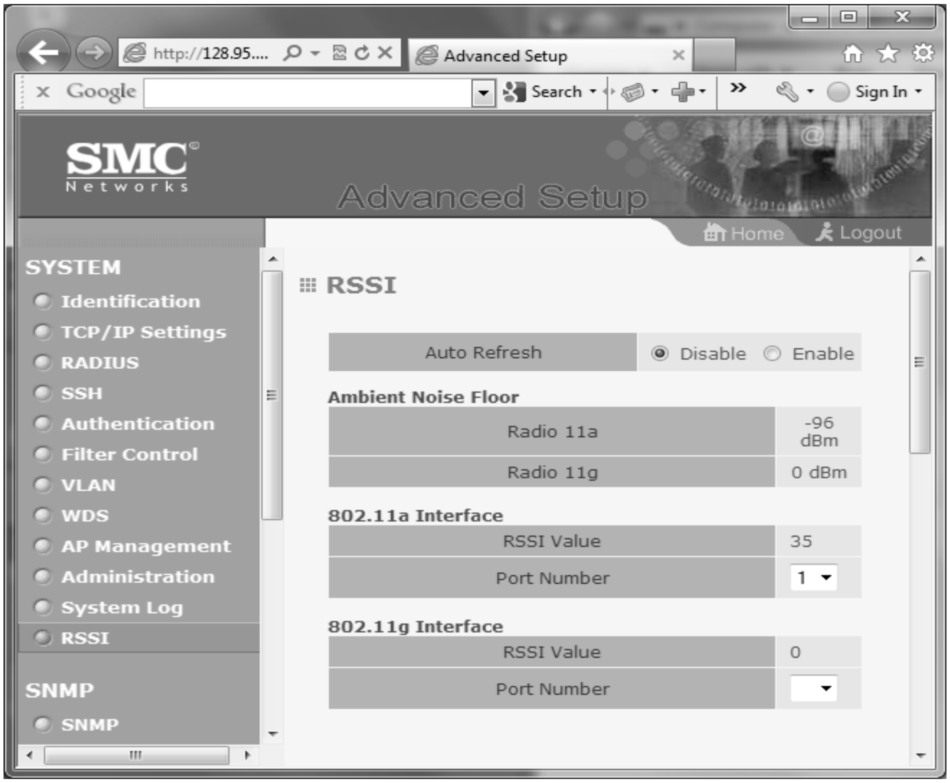
Figure B1-4.–Datsum example used to summarize daily escapement estimates. Adjusted sonar and fish wheel data is linked to this spreadsheet.

Wireless Network (As prepared by April Faulkner)

1. We are currently using wireless connections at the Kenai and Kasilof sonar sites. The description provided here pertains to Kasilof but is not much different from the way the Kenai is set up.
2. *Username: admin Password: sonar*
3. *Kasilof IP address: North Bank=128.95.97.1 South Bank = 128.95.97.2*
4. *Need to add IP address for Kenai.*
5. Mount the wireless units on each bank and point them toward each other by using line of sight; finer adjustments can be made after they are connected to a computer. During initial setup connect both units to a computer and verify that both are working before plugging the Kasilof SB/Kenai NB wireless into the DIDSON. For each unit connect the 100ft black Ethernet cable to the PoE connector on the unit and the Output connection on the black power box. Connect the shorter Ethernet cable to the port labeled Input on the power box and the Ethernet port on the computer. Plug in the black box to power unit. Plug in the black box to power up unit.
6. To communicate with the wireless unit open the Internet Explorer and in the address bar type in the IP address of the unit and press Enter. The SMC login window should appear, then enter the user name (admin) and password (sonar) and click Login. Under Advanced Setup > TCP/IP Settings the menu should appear as below. The IP addresses of the computer, DIDSON, and wireless should have the same numbers except for the last number. (Example: computer = 128.95.97.101, DIDSON = 128.95.97.227, wireless = 128.95.97.1)



7. Under Advanced Setup > RSSI > 802.11a Interface > the RSSI Value is the signal strength. When aligning the 2 units try to get this value as high as possible. A value >30 is a good connection. The Link lights on the back of the wireless unit will also give you an indication of the signal strength between the units.



8. After both wireless units are confirmed to be working and a connection is established between the 2, open the DIDSON program on the NB and SB computers. On the Kasilof SB (or Kenai NB), unplug the Ethernet cable from the Input port on the wireless black box and plug it into the DIDSON. Establish a DIDSON connection on the computer first then unplug the Ethernet cable from the computer and plug it into the Input port on the wireless black box. The DIDSON signal should now be transmitting to the opposite bank computer and appear on the opened DIDSON program. Turn off computer on the Kasilof SB (Kenai NB). On the (Kasilof) NB, the DIDSON frame rate should be at least 7 frames per second (fps) on the high frequency mode and between 3–5 fps on the low frequency mode. Link speed under network connections should be 10mbps full. The DIDSON Ethernet mode should be checked by Frame Request (Sonar>Configure>Ethernet Transfer Mode>by Frame Request).

Wireless Troubleshooting

1. If there are problems establishing a connection on the NB, make sure the DIDSON program is not in demo mode. Reduce the frame rate to 1 during the initial connection so it is easier for the wireless connection to keep up. Then gradually increase the frame rate to normal speed.
2. Recycle power on the DIDSON by getting the DIDSON connected on the SB computer first then resending the signal over to NB. Turn on the SB computer, open the DIDSON program, remove the Ethernet cable from the Input port on the wireless black box, plug it

into the computer, and wait for it to connect. It will take a minute, may have to close program and reopen. If it doesn't work then recycle the DIDSON power.

3. Check signal strength.
4. Check the power and link lights on the back of the wireless unit. Top right light is the power and should be on; bottom right light is the link and it should be on and possibly blinking; bottom lights to the left of the link light are the 11a signal strength and there should be at least one lit up.
5. Check signal strength in dB: Internet Explorer Browser / in address bar type in 128.95.97.1/ (NB) or 128.95.97.2 (SB) and hit enter. In the SMC window type in the username; (admin) and the password (sonar). Go to Advanced / RSSI / check signal strength of the 802a.11 radio. Ideally should be above 30 dB, but we have seen it often at 26 dB. Look at Noise Ambience, should be a large negative number, i.e., -98 dB.
6. To increase signal strength, move the wireless unit to line up with the unit on the opposite bank.
7. Refresh the signal strength value after moving by clicking on RSSI.
8. If unable to establish a wireless connection to the NB, then turn on the SB computer and set up for regular sampling as same as the NB DIDSON and save data to the computer or an external drive. (Call for help)

DIDSON Maintenance

1. Silt will accumulate inside the lens housing. To clean:
2. Select a time when the DIDSON will not be recording-remember that cleaning takes about 10 minutes so allow for 15 minutes cleaning time. After shutting down the DIDSON (do so when there is adequate time between recordings), tilt the DIDSON out of the water then remove the 4 tiny Philips screws from the top of the housing. Keep spares on hand.
3. Lift the cover straight up.
4. Clean the lens with water using a soft bristle brush or wet cloth. DO NOT scratch or use alcohol to clean.
5. Replace housing and do not over-tighten screws! Do not tighten gasket to less than 90% uncompressed thickness. Clean area around the array too.
6. Restart DIDSON as per instructions above.
7. Use 3M Silicone Lubricant to maintain all connectors prior to and after the season.

DIDSON Troubleshooting

1. If DIDSON is not connecting**:**
2. Make sure the program is not in Demo Mode. Edit>Mode>uncheck Demo Mode.
3. The Ethernet transfer mode should be by frame request. **Sonar>Configure>Ethernet Transfer Mode>**check by Frame Request.
4. Make sure parameters and IP address in Didson.ini file (**Edit>Sonar>Didson.**ini File) are correct. Didson IP = 128.95.97.227, netmask = 255.255.255.0

5. Check IP address on Computer (**Control Panel>Network Connections>Local Area Connection>Internet Protocol>Properties**). Should obtain automatically or type in 128.95.97.100 for IP & 255.255.255.0 for netmask
6. Check all connections inside and outside and reset.
7. Plug monitor into topside box and to see if sonar is booting up. Will help narrow down problem to sonar or computer. The sonar boot up process is also shown and the address it is trying to connect to.
8. Close down program and recycle topside power. Reopen program to see if it connects. Sometimes it is good to completely shut down computer and start over.
9. If the sensor malfunctions there is no need to repair immediately. As long as the DIDSON is recording properly and a visual image confirms proper aim, the lack of a sensor won't inhibit operations.

Shut Down

1. Close the DIDSON program by clicking the in the upper right, then
2. Click the 'hidden icons' arrow (bottom right of screen),
3. Click the image that looks like a floppy disk in lower right corner.
4. Click on the message that appears and the external hard drive will close or shut down. When a "safe to disconnect…" message appears then turn off the external hard drive and disconnect the firewire. THE EXTERNAL DRIVE MUST BE CLOSED OUT THIS WAY TO AVOID ANY DAMAGE.
5. Right click green arrow icon on bottom bar of screen, click safely remove hardware, select Model US 485TB (com 5) and stop.
6. Unplug USB from computer
7. Turn off the DIDSON
8. Turn off the power switch
9. Turn off the generator

Daily Duties

First thing every shift, each crew member must:

1. Examine the transducer mount to ensure that transducers are always upright, submerged and free of debris. REMOVE any debris ASAP. Check weirs too.
2. To ensure that the DIDSON program is running and that files are being recorded to the DIDSON file, go to Windows Explorer; **C:/Kasilof/ DIDSON/**Data & Image files and find the date of interest – if not found, see DIDSON troubleshooting section below.
3. Be sure the red lights on the Bendix are flashing alternately or in unison, depending on beam mode, and the printer is functioning properly.
4. Check the DIDSON sensor readings (either in the DIDSON or Zagi33 program). Record the pitch/tilt (Y) and roll(X); if different from the prior entry by more than 0.5 pitch, or

1.0 roll recheck transducer mount. Return the aim to previous setting. Early morning shift, or after midnight, create a new sensor log file (see below).

5. Keep the daily log updated.
6. Record times of data copying.
7. Changes in transducer and weir position.
8. Document any problems and solutions-including the exact time when they occurred if possible, and any other pertinent information
9. Call in daily totals to the 260-2917 and leave a message any time after midnight, or call in daily total and updates at 0900. Call in updates at 1200 and 1500 when required. When calling in numbers to the office, always speak clearly and not too fast and include:
    a. Total daily escapement numbers by bank
    b. Daily cumulative numbers.
    c. Fish wheel hours fished, catch by species (report 0 even if it is zero fish) and bank.
    d. Hourly fish passage rate
    e. And anything that needs immediate action
10. Call- in recordings should be something similar to this and in this order:
    a. "*This is Joe Biologist calling from the ______ River for ______ (date). Total count for the north bank* (always give north bank counts first) *is ______ fish; the south bank count is _____ fish for a daily cum of _____ fish. That brings the cum total for the season to ______ fish*. (Report total number of fish, do not report the estimates by species…apportionment will be done in the office.) *The fish wheel ran for ___ hours and caught ____ sockeye, ___ pinks, __ chum, __ coho and __ chinook* (report in that order). If the catch for a species is 0, say 0 or simply say there were no other species in the fish wheel." Report catches of Dolly Varden if requested. If there is something urgent that needs to be reported, do so as briefly as possible...do not ramble about things that can wait (not interested in listening to a recording about cleaning the weir or needing to buy waders…that can be discussed between 0900 and 0930, when the project leader calls each of the 4 sonar sites for a brief update of activities).
11. Other duties include:
    a. Clean all weirs every day at least once each shift. Check the image on the computer screen, a fuzzy or dark image along the edges could mean too much silt on the lens. Kenai and Kasilof should be cleaned once a week or sooner if needed.
    b. Check water temperature and adjust sound speed at 10:00 and 20:00.
    c. Check free space on computer and empty recycle bin if space is needed.
    d. Record environmental data twice daily at Kenai and Kasilof.

APPENDIX C: FISH WHEEL OPERATION AND PROCEDURES

Appendix C 1.–Fish wheel operation and sampling procedures.

Fish Wheel Assembly

At all sites except the Kasilof River, the fish wheel floats are stored already assembled on the river bank.

1. All fish wheel parts, including nuts and bolts, should be stored with the floats and never separated.
2. Three to four people are needed for assembly.
3. Tools: ¾” and 9/16” wrenches and sockets (2–3 sets), poker bars (two), sledgehammer, pliers, wire, wire cutters and electricians tape, plus, extra nuts and bolts.
4. Push floats into the river first, then, install front and back walkways. Tie floats assembly to shore.
5. Bolt the axle to the stanchions (mount both plates in the top holes of the stanchion). Stanchions that support the axle are permanently attached to the floats with one axle mounting plate already in place; while the other mounting plate is attached to the axle. The mounting plate has one central hole and four small holes to accommodate the end of the axle.
6. Install both baskets (opposite each other) and one paddle on the axle. Upstream basket will scoop down, while the downstream basket will scoop up.
7. Secure the baskets and paddle with cables equipped with a turnbuckle on one end and a shackle on the other. The cables attach to brackets on the side of each basket and paddle and should be tightened just enough to take out some, but not all of the slack.
8. Bolt live-box supports (2, 4” aluminum channel approximately 4 ft long) to the off shore float.
9. Tow the fish wheel to where it will operate for the summer. Secure the baskets/axle to prevent rotation while in transit.
10. Attach upstream and downstream anchor booms. Attach two upstream anchor ropes. Secure ropes upstream to anchors or trees on shore. Push the fish wheel offshore and position parallel to shore and where water depth will allow the baskets and paddles to turn without bumping the river bottom.
11. Check depth by taking a piece of conduit approximately 10 ft long and measure the depth at the near shore side of the axle, bottom to axle. Mark the depth on the conduit and compare the distance between the axle and basket. The depth should be 2–4” greater than the distance between the axle and basket. Some adjustment may need to be made once everything is in place. Temporarily anchor the booms to shore with re-bar but do not drive too deep.
12. When water depth is adequate to spin the baskets, insert the second paddle into the axle and attach remaining cables to the baskets/paddle. Tighten all cables by adjusting the turnbuckles and attach wire to the turnbuckles to keep them from loosening when the axle spins.
13. Because the live box is heavy and awkward it should be installed from a boat. Tie a safety line from the top of the box to the fish wheel. Tip the box on its side, bottom facing

the fish wheel, ease over the side of the boat while rotating the bottom down and between the two channel supports. Bolt in place.

14. Install fish slide and fish guard. Spin the axle to test for an optimum rotation speed of 3–5 rotations per minute.

15. Double check anchor ropes and boom re-bar.

16. Position weir frame or tripod between the fish wheel, slightly downstream of the axle, and shore. It is also acceptable to position the weir frame at the downstream end of the float and extend it past the float toward mid river by one meter. Insert 1" x 10' electrical conduit pipe into the weir frame to form a "fish tight" structure to divert fish toward fish wheel baskets.

17. Install walkways to shore if necessary.

18. Adjust the fishing depth of the baskets to compensate for change in water levels to maintain the baskets 2–4 inches off the river bottom. This will prevent fish from swimming under the baskets. Adjust fishing depth by removing the fish slide and attach stanchion winches on each of the axle plates by connecting the winch cable to the shackle hole on top of each plate. Unbolt the plates on both sides of the axle and raise or lower the appropriate height using winches. Re-insert bolts and test spin the baskets. A person's body weight may drop the fish wheel enough to push the basket into the bottom so it may be necessary to step off the fish wheel when testing the spin.

18. Accurately record fish wheel openings, closures and catches.

Sample size

1. Sampling strategies reflect different sample sizes necessary to achieve the ASL databases for each river.

2. Sampling goals are subject to change and should be confirmed before operations begin each year.

3. Kenai River goal:

   - 0.1% of the previous day's escapement; 500 total samples/500,000 fish.

4. Kasilof River goal:

   - 0.2% of the previous day's escapement; 500 total samples/250,000 fish.

ASL (Age, Sex and Length) sampling

1. Crews from the catch and escapement project will collect salmon samples and data from the Kenai and Kasilof fish wheels. Yentna sonar crews will perform ASL sampling.

2. Catch and escapement crews and sonar crews will accurately communicate fish wheel data daily. The sonar crews will enter catch data in the Fish Wheel Catch Summary (Figure B1-3).

3. Sockeye salmon ASL data will be collected for all three rivers. Additionally, ASL data from other species may be collected and when necessary, genetic samples.

4. The project leader for catch and escapement will analyze all ASL data providing management and research biologists with:

- Age composition of each stock
- Productivity of each system
- Growth analysis
- Escapement goals
- Forecasting run strengths and future returns

5. Information should be recorded in 'Rite in the Rain' (waterproof) data sheets.

6. Fish wheel sampling will begin as soon as the fish wheels are operational.

7. ASL data sheets from remote sonar sites (if in operation) will be flown into the ADF&G office on weekly supply flights to initiate stock analysis (age composition) in a timely manner.

8. After the required number of ASL samples is obtained, any remaining fish should be identified by species, counted and released with catch numbers recorded on the Fish Wheel Summary sheet.

Sampling procedures

1. Use the ASL data form when sampling fish from the fish wheel (Figure C1-1). The age column will remain blank and filled in later when the scales are aged.

2. Identify sex and species; count each sockeye salmon to be sampled.

    - Males usually have the beginnings of a hooked snout and slimmer stomach region than the female. When the female is squeezed or pressed, often an ovipositor will protrude from the anus.

3. Measure length (millimeters) from the middle of the eye to the fork of the tail (MEFT).

Upper Cook Inlet Adult Salmon Age-Length Form

LOCATION: CARD #:

DATE: SAMPLERS:

START TIME: END TIME:

No.	Sex	Length	Genetics #	Otolith	Age Scale
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					

COMMENTS:

Fishwheel Information	Totals
Reds Sampled:	________
Reds Not Sampled:	________
REDS GRAND TOTAL	________
Incidental Catch:	
Kings:	
Pinks:	
Dollies:	
Chums:	
Silvers:	
Other:	
Time fishwheel started:__________	
Time fishwheel stopped:__________	

Sex: 1-male 2-female
Length: mid eye to fork-of-tail in nearest mm.
Genetic # - vial number if sample is taken.
Otolith - Y=yes

filename: 12alform.xls

Figure C1-1.–Fish wheel ASL sampling form.

4. Pull the 'preferred scale' from the fish using forceps. The preferred scale is located on the left side of the fish, 2–3 rows above the lateral line on a diagonal line from the posterior of the dorsal fin to the anterior of the anal fin. Remove all slime, grit and skin from the scale by moistening and rubbing between fingers (Figure C1-2).

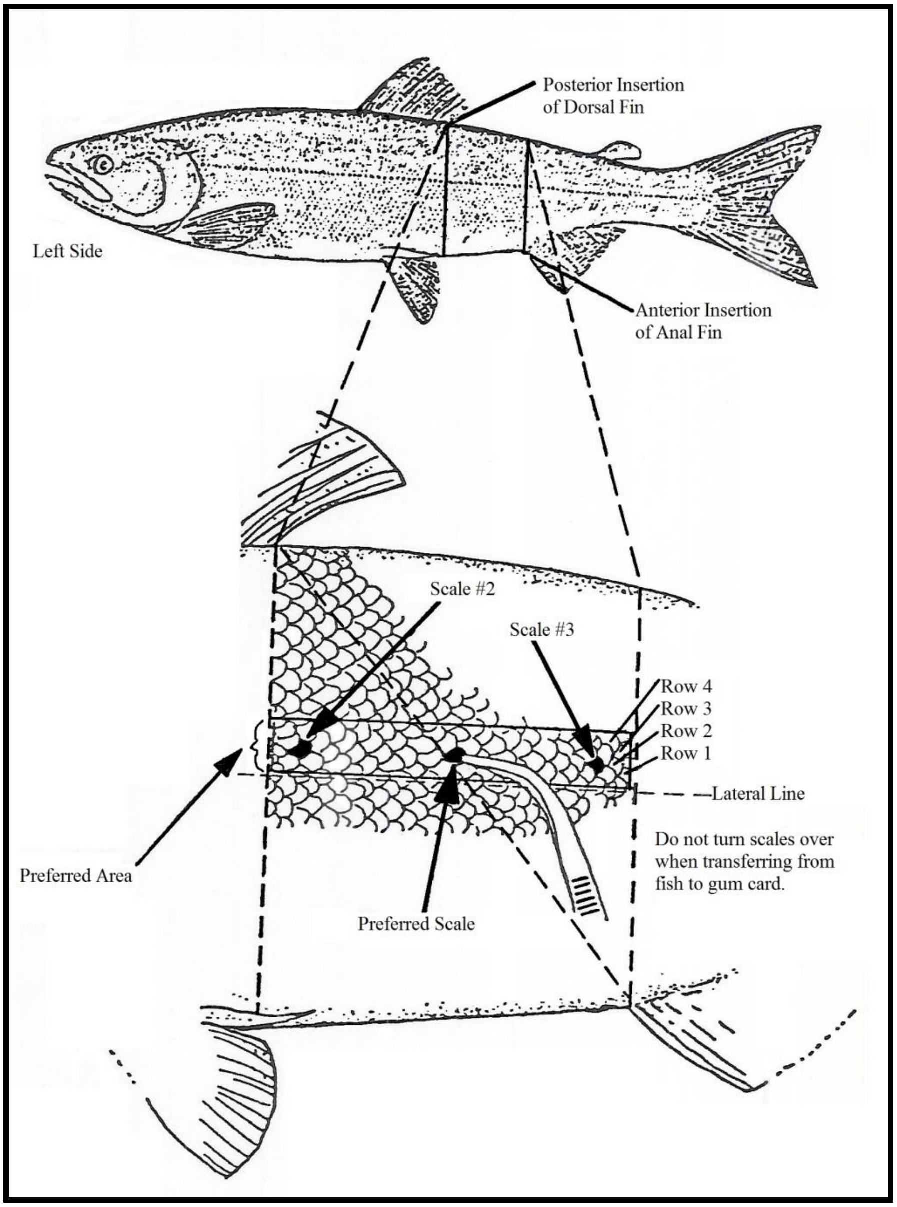


Figure C1-2.–Scale procedure showing the preferred area.

5. If the preferred area is scarred and scales are missing, select a scale within the preferred area on either the left side of the fish or pull a scale from an area 1–2” anterior of the preferred area.

6. If no scales are present in the preferred area on either side of the fish and sufficient numbers of fish are available for sampling, disregard fish.

7. Mount the cleaned and moistened scale on a gum card directly over the appropriate number (Figure C1-3). All scales should be oriented the same direction on the gum card.

- The side of the scale facing up on the gum card is the same as the side facing up when pulled from the fish. This outward facing side is referred to as the ‘sculptured’ side and is necessary to leave an impression on an acetate card when 'reading' (aging) the scale. Sculptured ridges may be felt with a fingernail or forceps.

Species: ______________________ Card No: ______________

Locality: ____

Stat. Code: ____

Sampling Date: Mo__________ Day______ Year___________

Gear: ____

Collector(s): ____

Remarks: ____

____

10	9	8	7	6	5	4	3	2	1
20	19	18	17	16	15	14	13	12	11
30	29	28	27	26	25	24	23	22	21
40	39	38	37	36	35	34	33	32	31

Figure C1-3.–Gum card, front (top) and back (bottom), used for scales samples.

Scale Cards

1. Each card is sequentially labeled from day to day. Each scale card has space for 40 scale samples that must match the No. on the ASL form.
    - If a card for sockeye salmon was No. 10 on July 12, start with card 11 on July 13, or, if card 10 is filled while sampling and sampling is to continue, label the next card 11, etc.
2. If scale samples are collected from other species, numbering sequence should be independent of the sockeye numbering sequence.
3. Headings of scale cards and ASL sheets should be filled out with #2 pencils with appropriate information prior to sampling.
    - Species: common name (sockeye) will suffice. Specie codes are; Chinook-41, sockeye-42, coho-43, pink-44 and chum-45.
    - Card No. as stated above, sequential by river.
    - Locality: name of river and bank.
    - Gear: fish wheel.

- Collector: Last name of persons collecting scales and data. Note the scale collector with SC, the wrestler with W and if a third person records data, initialize with an R.
- Notes: any information pertinent to sampling such as weather conditions or problems.

4. Keep the card dry so that scales remain affixed in the proper place.
5. Cover the completed, dry, gum card with wax paper, clip to the ASL form and keep dry.

Materials for sampling

- Clipboard
- Gum cards
- Wax paper
- Gloves for handling the fish
- ASL rite-in-rain data sheets
- Measuring board
- Pencils
- Forceps
- Dip net
- Rain gear

APPENDIX D: GENETIC SAMPLE COLLECTION PROCEDURES

Appendix D 1.–Salmon Genetic Sampling.

Salmon Genetics

Sampling Non-lethal Finfish Tissue for DNA Analysis

ADF&G Gene Conservation Lab, Anchorage

I. General Information

We use axillary process samples from individual fish to determine the genetic characteristics and profile of a particular run or stock of fish. This is a non-lethal method of collecting tissue samples from adult fish for genetic analysis. The most important thing to remember in collecting samples is that **only quality tissue samples give quality results**. If sampling from carcasses: tissues need to be as "fresh" and as cold as possible and recently moribund, do not sample from fungal fins.

Sample preservative: Ethanol (ETOH) preserves tissues for later DNA extraction without having to store frozen tissues. Avoid extended contact with skin.

II. Sample procedure:

1. Tissue type: Axillary process, clip axillary process from each fish (see attached print out).
2. Data to record: Record each vial number to paired data information.
3. Prior to sampling, fill the tubes half way with ETOH from the squirt bottle. Fill only the tubes that you will use for a particular sampling period.
4. To avoid any excess water or fish slime in the vial, wipe the axillary process dry prior to sampling. Using the dog toe nail clipper or scissors, clip off axillary process (**1/2 -1" max**) to fit into the cryovial.
5. Place axillary process into ETOH. The tissue/ethanol ratio should be **slightly less than 1:3** to thoroughly soak the tissue in the buffer.
6. Top up tubes with ETOH and screw cap on securely. Invert tube twice to mix ETOH and tissue. Periodically, wipe the dog toe nail clippers or scissor blade so not to cross contaminate samples.
7. Discard remaining ethanol from the 500ml bottle before returning samples. **Tissue samples must remain in 2ml ethanol** after sampling. HAZ-MAT paperwork will be required for return shipment. Store vials containing tissues at cool or room temperature, away from heat in the white sample boxes provided. In the field: keep samples out of direct sun, rain and store capped vials in a dry, cool location. Freezing not required.

III. Supplies included with sampling kit:

1. (1) – Dog toe nail clipper - used for cutting the axillary process
2. (1) – Scissors can be used to cut a portion axillary process – if clippers don't work for your crew
3. Cryovial- a small (2ml) plastic vial, pre-labeled.
4. Caps – with or without gasket to prevent evaporation of ETOH.
5. Cryovial rack- white plastic rack with holes for holding cryovials while sampling
6. Ethanol (ETOH) – in (2) 500 ml plus (1) – 125 ml Nalgen bottle
7. Squirt bottle – to fill or "top off" each cryovial with ETOH
8. Paper towels – use to blot any excess water or fish slime off axillary process

9. Printout of sampling instructions
10. (3) – three pair of lab gloves (size large)
11. Laminated "return address" label

IV. Shipping: HAZMAT paperwork is required for return shipment of these samples and is included in the kit.

Ship samples to:	ADF&G – Genetics	Lab staff: 1-907-267-2247
	333 Raspberry Road	Judy Berger: 1-907-267-2175

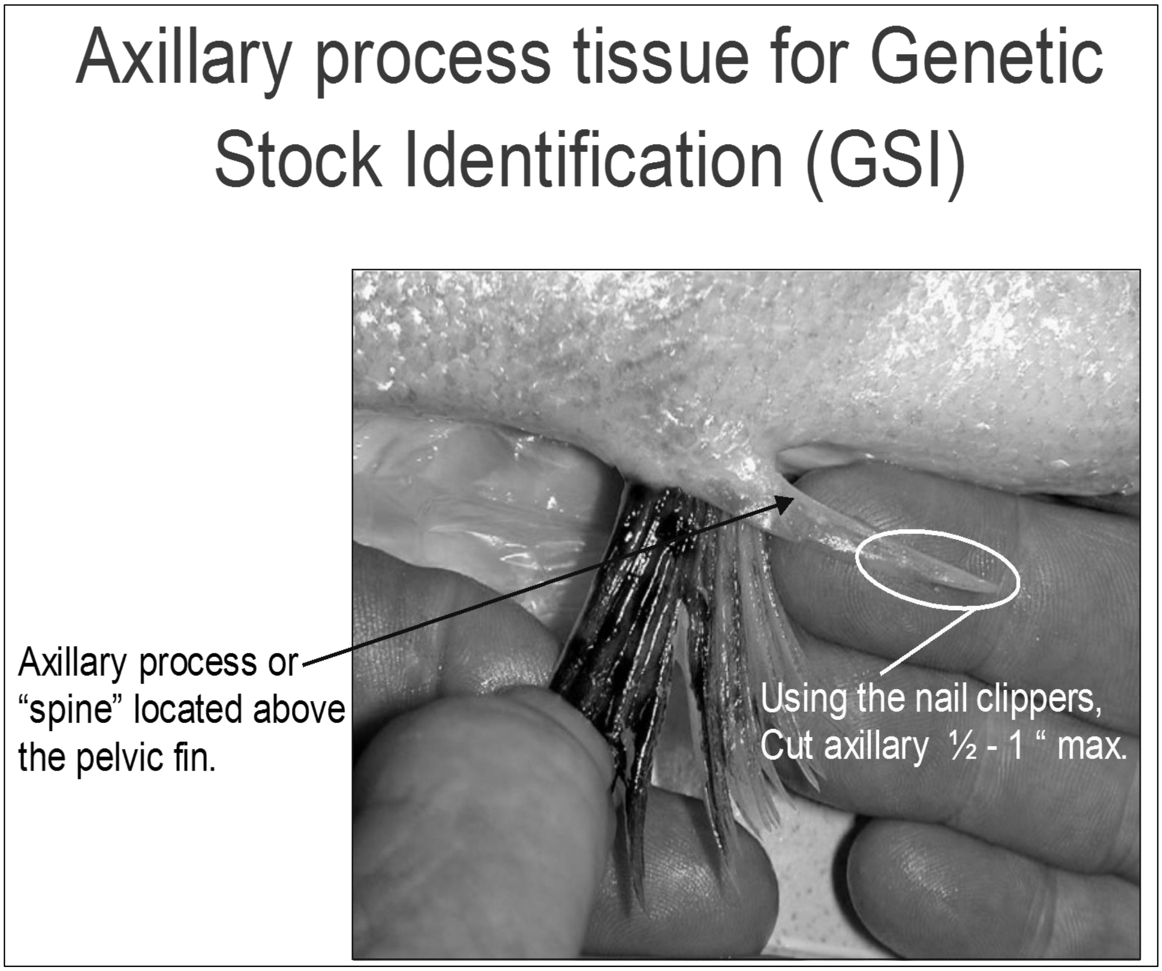


Figure D1-1.–Axillary process location above the pelvic fin.

APPENDIX E: CREW CONCERNS

Appendix E 1.–Crew scheduling, timesheet procedures and general crew concerns.

Timesheets and schedules

1. Standard field timesheets are kept and signed by each employee and submitted to the area office (Soldotna) by the 15th and 30th or 31st of each month (Figure E1-1).

2. Employees are responsible for working 37.5 hours each week and documenting the start and stop times.

ALASKA DEPARTMENT OF FISH AND GAME Time and Attendance Report

Pay period ending: 7/15/2003 SSN: 123-45-6789 Name: Stan Doe Division Commercial Fisheries

Record times in military format. Example: 6:00 p.m. = 18:00. If you work past midnight, stop at 23:59 and resume at 00:01 the next day.

Day	Date	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Leave Taken		Sea Duty	Standby	Hazard	Code 1	Code 2	Code 3	Code 4	Holiday / Leave	Work Hrs Total
Mon	7/1	8:00	12:00	13:00	16:30												7.50				0.00	7.50
Tues	7/2	8:00	12:00	13:00	16:30												7.50				0.00	7.50
Wed	7/3	8:00	12:00	13:00	16:30												7.50				0.00	7.50
Thurs	7/4											H	7.50				0.00				7.50	0.00
Fri	7/5											A	7.50				0.00				7.50	0.00
Sat	7/6	off																			0.00	0.00
Sun	7/7	off																			0.00	0.00
Mon.	7/8	8:00	12:00	13:00	15:30												6.50				0.00	6.50
Tues	7/9	8:00	12:00	13:00	15:30												6.50				0.00	6.50
Wed	7/10	13:00	17:00	18:00	21:30												7.50				0.00	7.50
Thurs	7/11	13:00	17:00	18:00	21:30												7.50				0.00	7.50
Fri	7/12	13:00	17:00	18:00	21:30												7.50				0.00	7.50
Sat	7/13	13:00	17:00	18:00	21:30												7.50				0.00	7.50
Sun	7/14	off																			0.00	0.00
Mon.	7/15	7:00	12:00	13:00	16:00												8.00				0.00	8.00
																	0.00				0.00	0.00
TOTALS															0.00	0.00	73.50	0.00	0.00	0.00	15.00	73.50

	Charge to:		
	Notation	CC/LC	%
1		11100821-11128351	100%
2			
3			
4			
		Total	100%

	Comments		Comments
7/1		7/9	
7/2		7/10	
7/3		7/11	
7/4	holiday	7/12	
7/5	annual lv	7/13	
7/6	regular day off	7/14	regular day off
7/7	regular day off	7/15	
7/8			

We certify that the information provided above is true and correct.

Employee's Signature ______ **Date:** 7/15/2003

Supervisor's Signature ______ **Date:** ______

Approving Officer Signature ______ **Date:** ______

Leave Use Codes

H=Holiday X=Comp
S=Sick Y=Comp
A=Annual C=Court
P=Personal L=LWOP

**** Premium Pay Codes (PPC)**

110 - Sea Duty 250 - Straight Time
206 - Hazard 251 - Overtime
211 - Standby

Holiday, Leave, Overtime and Premium Pay Overrides

**Codes	Hours	CC/LC
Leave & Holiday	15.00	No code needed for Leave & Holiday

Figure E1-1.–Standard Field Timesheet.

3. If access to online services is available, crews will enter their hours in the ADF&G Timesheet Entry and Reporting System (TEARS). An ID password will be needed to login to TEARS, see administrative staff for assistance.

- After accessing the program, click the appropriate time period to access the pay period screen.

- Enter the hours for each day of work by going to the Edit section and recording hours and proper code. However, if a routine work week was followed, click default, which will automatically enter 7.5 hour days for the pay period.
- Close the window, check the hours for each day then save the timesheet, submit, and print a copy for Admin. Once the timesheet is submitted all the entries are locked into place, changes cannot be made without calling Admin to unlock the sheet.

4. Regular Time: The workweek begins on Monday at 00:00 and concludes 23:59 the following Sunday, consisting of 37.5 hours.

5. A 5-day workweek will be scheduled for the Kenai and Kasilof crews with each shift consisting of 8.0–8.5 hours (7.5 hours plus a ½ or 1-hour lunch).

6. If in operation, Yentna River crews will be scheduled to work staggered 6 hour shifts, 7 days a week during standard sonar operations. Additional hours will be worked when river conditions necessitate the moving of sonar and fish wheel equipment or to respond to equipment breakdowns that need immediate attention.

7. Overtime: The need to work overtime (OT) will be evaluated by the project leader or crew leader if the project leader is absent.

    - Employees receive OT pay (1.5 times regular pay) for any hours worked in excess of 37.5 hours but no more than 15 hours can be worked in any 24-hour period.

8. Shift differential: Any employee whose work shift starts after 12:00 is eligible for shift differential pay. Shift differential eligibility is based on start time.

    - Swing shift starts at 12:00 and ends at 19:59.
    - Graveyard shift starts at 20:00 and goes until 07:59.

9. Hazard duty: For eligible employees, hazardous working conditions are described in the Manual of Administrative Procedures. Hazard duty must be properly documented on timesheets.

10. Holiday: Those employees who work on a State or Federal holiday are eligible for holiday pay.

11. During the sonar operational period, the crew leader at each site makes the schedule at least one week (more if desirable) in advance, reviews it with employees and ensures that most of the workday or period is covered. Every employee is required to be given two days off, back to back, but exceptions may be made where time off is impractical.

12. Routines may vary from site to site, however essential duties must be completed by certain times.

    - ASL sampling as required.
    - Daily escapement estimates must be completed and error checked by 09:00. These estimates are for the previous day's counts.
    - Daily escapement estimates must be phoned into the project leader by 09:00.
    - During the course of the season for Kenai and Kasilof rivers, Area Managers may want updates throughout the day. Cumulative estimates through 00:00–07:00; 00:00–12:00; and 00:00–15:00, rounded to the nearest 1,000th fish. Include passage rate information.

Field logistics

1. Remote sonar sites, if operating, are supplied once a week with groceries and necessary maintenance needs. The crew leader and the air charter determine a consistent weekly schedule.

2. Field crew leaders will relay supply needs to the designated logistics coordinator for Upper Cook Inlet field camps. The logistics coordinator and/or crew leader at the Kenai sonar site will ensure that weekly supplies are delivered to the specified air charter on schedule. In the absence of a logistics coordinator, a crew member from the Kenai sonar site will fulfill this role.

3. High Adventure Air or Litzen Air are suggested air charter services to use for weekly supply needs to remote sonar locations. DeHaviland Beavers on floats are used for larger supply needs, while super cubs are useful for small grocery runs.

Communications and phone use

1. Remote field camp communication devices:
    - The crew leader or designated staff is required to call in daily to relay sonar camp welfare, data, camp needs and/or personnel needs. A specific time will be arranged with the project leader.
    - In general, personal cell phones do not work at remote field camps. It is justifiable to use the State's communication devices for personal needs. Justifiable phone calls include but may not be limited to paying bills; inquiries about school issues; mail; laundry; safety checks with family; health; etc. Personal phone calls should be kept to a minimum of 5 minutes.
    - Lengthy "social" conversations (>5 minutes) are allowed but must be paid by the caller, limited to off hours and less than 20 minutes per day. A record must be kept of these calls.
2. Land line (Kenai sonar site):
    - Available for personal use during off hours and breaks only as long as the call is not long distance.
    - Extended personal calls must be made in the evening only, not during normal office hours.
    - This land line number may be given to businesses and personnel related activities.
3. Use of state cell phones at Kenai and Kasilof sonar sites:
    - The crew leader or designated staff is required to call in daily to relay sonar site welfare, data, camp needs and/or personnel needs. A specific time will be arranged with the project leader.
    - Periodic escapement updates may also be required by area management biologists. Times for these updates will arranged as needed.
    - Cell phone numbers may not be given out to the general public. These phones are only for ADF&G staff communication.
    - When reasonable, cell phones should be carried on person during working hours.
4. Personal cell phone use:
    - Should only be used during breaks.

- Should not be carried on person during working hours.

Crew courtesies and expectations

1. Show respect for coworkers.
2. Make an effort to help and train new employees. Be patient, so that everyone has a chance to improve their performance and become a team player.
3. Good work habits.
   - Be on time.
   - Take the initiative to get each task done.
   - Look for things to do-don't wait to be told.
   - Show an interest in your work. A positive outlook will increase your performance and a general appreciation of your job. There is an element of fun in each task to be done.
4. Pets remain at home.
   - Pets will not be tolerated inside the Kenai sonar site facilities.
   - The state is not responsible for the transportation or health of employee's pets.
5. Kenai sonar site.
   - ADF&G staff may request housing at the Kenai sonar site, if space is available.
   - Housing is available during regular seasonal projects only; long-term winter housing is not available.
   - House rules must be followed exactly; failure to do so may result in immediate expulsion.
   - Must clean up common areas after yourself; laundry, dishes, bathroom, refrigerator.
   - Must clean up your room when you check out.
   - No pets.
   - No smoking in the trailer

Common phone numbers

1.	Bill Glick (Project Leader)	260-2917	Cell 398-3002
2.	Mark Willette (UCI Research Project Leader)	260-2911	Cell 394-2217
3.	April Faulkner (DIDSON questions)	260-2907	Cell 953-1199
4.	Suzi Maxwell (DIDSON questions)	260-2914	
5.	Main Soldotna office	262-9368	
6.	Constance Nicks (Personnel questions)	260-2902	
7.	Kenai sonar site	262-4267	

8. Kasilof sonar site	394-0029	
9. Wendy Gist	260-2933	Cell 953-9474
(ASL sampling)		
10. Pat Shields		
(Area Management biologist)	260-2941	Cell 398-1254
11. Aaron Dupuis		
(Assistant Area Management biologist)	260-2916	Cell 347-3020
12. Kim Rudge-Karic		
(Logistic coordinator and supplies)	260-2924	Cell 420-7072

13. Additional staff and numbers of pertinent businesses will be available annually.

14. Emergencies

- 911
- State emergency; provide location; extent of injuries; access point.
- State Troopers in Soldotna 262-4453
- State Troopers in Anchorage 269-5511
- F&W Protection 262-4573