Regional Information Report No. 4K08-02

Alaska Peninsula Salmon Operational Plans, 2008

by

Robert L. Murphy,

Philip Tschersich,

and

Aaron D. Poetter

April 2008

Alaska Department of Fish and Game **Division of 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)

Measures (fisheries)

fork length	FL
mideye to fork	MEF
mideye to tail fork	METF
standard length	SL
total length	TL

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

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This document should be cited as:
Murphy, R., L. T. G. Hartill, A. D. Poetter,, and N. L. Zeiser. 2008. Alaska Peninsula salmon operational plans, 2008. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K08-02, Kodiak.

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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	™
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This document should be cited as:
Murphy, R. L., P. Tschersich. 2008. Alaska Peninsula salmon catch sampling procedures, 2008. In Alaska Peninsula salmon operational plans, 2008. Alaska Department of Fish and Game, Regional Information Report No. 4K08-2, Kodiak.

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INTRODUCTION

The Alaska Peninsula Management Area (Area M) can be divided into two sub-areas: the North Alaska Peninsula west of Cape Menshikof to Cape Sarichef, and the South Alaska Peninsula west of Kupreanof Point to Scotch Cap (Figure 1). There are 307 salmon producing streams in the Alaska Peninsula Management Area (McCullough 2001).

Five species of salmon are commercially harvested in Area M: Chinook salmon *Oncorhynchus tshawytscha*, sockeye salmon *O. nerka*, pink salmon *O. gorbuscha*, chum salmon *O. keta*, and coho salmon *O. kisutch*. Economically, sockeye and pink salmon are the primary species harvested on the South Alaska Peninsula, while sockeye salmon, followed by coho salmon are the primary species harvested on the North Alaska Peninsula. In some North Peninsula fisheries, Chinook and chum salmon may be more economically important than coho salmon.

In 1985, an expanded Chinook, sockeye, chum, and coho salmon commercial catch sampling project was initiated in Area M to establish a database for separating stocks, evaluating escapement goals, forecasting, and assessing inseason run timing. Due to budget reductions over the years, the catch-sampling program in King Cove was eliminated in 2002. Likewise, the catch-sampling program in Sand Point was eliminated in 2003. In 2004, the South Unimak June fishery was once again sampled in King Cove to help asses the strength of the Bristol Bay sockeye salmon run, and collect age composition data to assess the accuracy of the preseason forecast. In 2005, North Peninsula commercial harvests were sampled solely out of Port Moller. The emphasis of catch sampling has been on sockeye and chum salmon, with Chinook and coho salmon being sampled opportunistically. In 2008, significant changes to the catch sampling program are necessary to adapt to changes that have occurred over the past several years. The department has moved away from scale pattern analysis in the Alaska Peninsula Management Area to determine stock of origin by genetic analysis. The Port Moller catch sampling project will consists of one sampler who will sample the Nelson Lagoon commercial sockeye salmon fishery and the late (post July 31) Bear River sockeye salmon run. This data is currently being used to build brood tables, reconstruct runs, forecast runs, and is used inseason for fishery management decisions. Prior to August 1, 2008, the Port Moller to Outer Port Heiden Section fishery will no longer be sampled as it has been determined that the archive of scales (believed to be over 500,000 scales) will not, in the future, be used for the management of the state's resources.

OBJECTIVES

The objective of this project is to provide age and sex data from the Nelson Lagoon and late Bear River sockeye salmon commercial salmon harvests to assist with the long-term management of the Alaska Peninsula sockeye salmon runs. The means of achieving this objective is through the acquisition of specific data derived from sampling of the commercial salmon catch. These data will:

- Facilitate the construction of accurate brood tables of the Nelson River and late Bear River sockeye salmon runs
- Allow the development of accurate run forecasts.
- Aid in the evaluation of escapement goals and run timing.

SUPERVISION

Bob Murphy, the Area Management Biologist (AMB) in Port Moller, will act as overall project leader. Philip Tschersich, the Assistant Area Management Biologist (AAMB) in Port Moller, will supervise inseason progress of the port sampling crew. The sampling crew in Port Moller will consist of one Fish and Wildlife Technician II in Port Moller whose duties will also include providing logistics support to the four remote field camps, editing fish tickets, oversight and support of the Port Moller field office operations.

PERSONNEL

The Port Moller sampler will be responsible for sampling the North Peninsula commercial salmon harvest from Nelson Lagoon and the late Bear River sockeye salmon runs. The Port Moller crew will be responsible for pressing all scales collected, transferring appropriate harvest data for samples collected to optical scan mark-sense forms, and keeping logbooks tracking weekly samples.

Scale samples collected will be pressed onto acetate cards and aged by certified staff in Port Moller. Only those personnel passing the 2008 Westward Region scale-aging test will age the samples. The original scale "gum" cards and optical scan forms will be sent to the Kodiak office at the end of the season.

METHODS

To ensure that samples represent the entire catch from a designated area, mixed loads from multiple areas will not be sampled nor will there be any pre-selection of fish for length, sex, or condition. The tender schedules and locations (tender interviews and fish tickets) will be reviewed to ensure that samples of pure loads are obtained from the separate areas (Table 1). To ensure that sampling goals are met, the crews will begin sampling the first day catches are delivered from the designated sampling areas for each statistical week. In 2008, the statistical week runs from Saturday to the following Friday. Sampling will usually begin on Sunday for catches from the previous day (the first day of the statistical week), and end on the following Saturday. Collection of samples will occur that maximizes the sampling opportunity when the commercial fishery begins which is usually on a Monday. If there is the opportunity of collecting a sample from the same area on more than one occasion during a week, the crew will attempt to collect the samples over the entire week. If it is uncertain whether another sample can be collected later in the week, the crew should collect the entire sample when they are first available. Specific procedures for collecting and recording salmon scales for aging, and measuring adult salmon length, can be found in Appendices A and B.

When collecting scales, the sample size for most catch samples is 400 fish per statistical area, per sampling week. Sample sizes are statistically derived to ensure the accuracy and precision of age composition estimates. The sample size was constructed to permit each age class proportion estimates to be within at least 0.075 of the true proportion with a 90% confidence interval, regardless of number of age classes or population proportions (Thompson 1987, Bromaghin 1993). Samples sizes assume at least 80% of the scale samples will be readable. Obtaining scale samples of the highest quality will increase the percentage of readable scales and hence increase the precision of the estimates.

North Peninsula catch sampling crew will be collecting 400 scale samples per week, per area, for sockeye salmon (Tables 1 and 2). Pure loads from multiple deliveries can be sampled and combined to reach the weekly sample goal. An area will not be sampled unless at least 75 fish can be sampled for a given species during a given week. The exception to this rule would be for a run where knowledge is limited. Some areas may never have a pure load. From these areas, the crew will attempt to sample the fish when deliveries are 90% or more from one area: the percentage of the catch from each fishing area will be noted on the top of each optical scan form. For areas that will never be greater than 90% pure, sample as time permits. Future analysis of the data will account for the mixed catch and subsequent sample. Proper identification of catch area will be the responsibility of the dockside catch sampling crew.

All scale samples from the commercial catch and escapement sampling will be aged in Port Moller.

Crew will document and report all fin-clipped and tagged fish to their supervisor. For Chinook salmon with a clipped adipose fin, the head will be removed and sealed in plastic, frozen, and sent via air freight Pen-Pak® to: CWT & Otolith Processing Lab, 10107 Bentwoood Place, Juneau, AK 99802-5526. Catch location of the fin-clipped Chinook salmon, catch date, gear type, tag number or head of fish, type of tag, length, weight, and several scales from the preferred area (Appendix A) will be included with the report and any shipped samples.

DATA ANALYSIS AND REPORTING

Philip Tschersich, Bob Murphy, and Matt Foster will complete a Regional Information Report from this data by May 2009.

REFERENCE CITED

Bromaghin, J.F. 1993. Sample size determination for interval estimation of multinomial probabilities. The American Statistician. 47: 203-206.

McCullough, J.N. 2001. Alaska Peninsula Management Area salmon systems: managers manual, Regional Information Report No. 4K01-1, Alaska Department of Fish and Game, Division of Commercial Fisheries, Region IV Report, Kodiak.

Thompson, S. K. 1987. Sample size for estimating multinomial proportions. The American Statistician. 41: 42-46.

TABLES AND FIGURES

Table 1.–List of districts, sections, and statistical areas for the Alaska Peninsula Management Area to be sampled in 2008.

Fishing Area Location	Statistical Areas
NORTH PENINSULA	
Northern District	
Nelson Lagoon Section	313-30
Harbor Point to Strogonof Point	314-12; 315's; 316's
Outer Port Heiden Section	317-10

Table 2.–Sockeye salmon catch sampling schedule for the Alaska Peninsula Management Area, 2008.

Sampling Area			Sample		
Section	Geographic Area	Statistical Areas	Frequency	Size	Data
Nelson Lagoon Section	Nelson Lagoon	313-30	Weekly	400	Scale, sex, length
Bear River, Three Hills, Ilnik, and Outer Port Heiden Sections (post July 31)	Harbor Point to Outer Port Heiden	314-12, 315-11, 20 316-10, 20, 22, 25 317-10	Weekly	400	Scale, sex, length

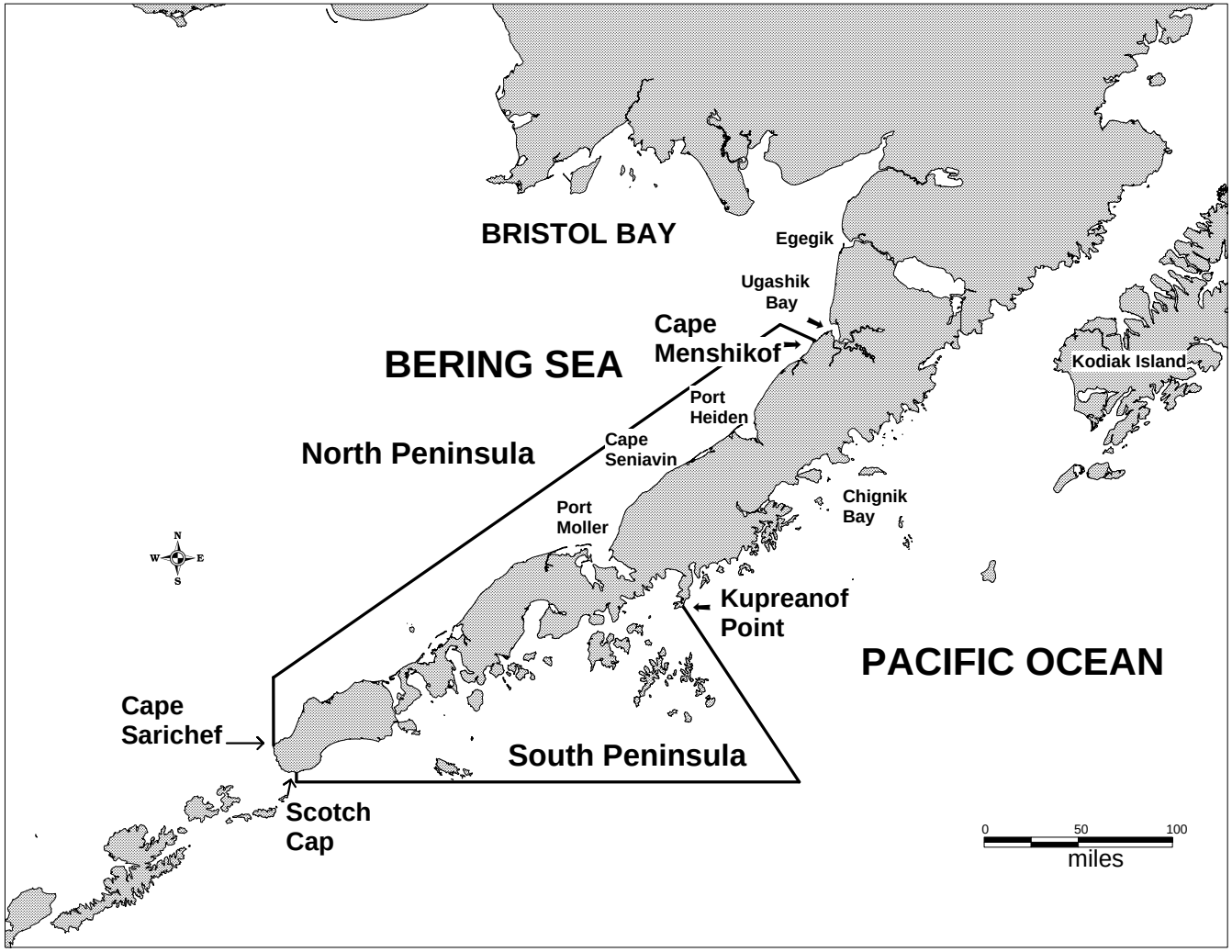


Figure 1.–Map of the Alaska Peninsula Management Area, with the North and South Peninsula defined.

APPENDIX A. PROCEDURES FOR SAMPLING ADULT SALMON

SCALE SAMPLING

The following is an explanation of how salmon scale samples are taken. If you have not taken scales before, or if you have any questions, ask somebody who has had experience with scale sampling. Scales must be readable to be useful, so follow proper technique when sampling.

SCALE GUM CARDS

A scale card is a gum-backed sheet with 40 spaces for mounting individual scales (refer to Appendix A2). It is important to keep the gum card dry at all times. If weather does not allow you to do this, it is best to suspend sampling until dryer conditions exist. A wet gum card is useless as the scales will fall off and prevent a readable impression from being taken. If the gum card does get wet, the scales should be remounted onto a new gum card with care taken to keep each scale in its original position.

During sampling, a gum card should be held using a plastic scale card holder. A clear acetate cover helps protect the card from water and the holder provides a rigid backing for the card. The completed gum card should be allowed to dry fully before long-term storage. All gum cards should be kept in a dry location with sheets of wax paper placed between them, to keep them from sticking to each other.

A new scale card is started each day, even if the previous card is not filled. It is important that scale cards and numbers match the information entered on the corresponding optical scan sheet.

Record the following information on each gum card in the appropriate field:

Species:

Write out completely (e.g., sockeye).

Locality:

Write out the full name of the area in which the fish were caught, followed by the word “catch” (e.g., Nelson Lagoon Catch).

Statistical code:

Transfer the appropriate digits from the optical scan form, starting with the three digit district, then the two digit subdistrict, leave the three digit stream number blank, and finally use your three digit port code. Refer to Appendix A3. for your location’s port code.

Sampling date:

Record the date the fish were caught (not the day they were delivered and processed).

Gear:

If known, write out completely (e.g., set gillnet, drift gillnet, purse seine, hand purse seine).

-continued-

Collector(s):

Record the last name or initials of the person(s) sampling.

Remarks:

Record any pertinent information such as tender or vessel name. Transfer this same information to the top margin of the optical scan form.

COLLECTING SCALES

One scale is taken from each sockeye salmon.

Pluck the "preferred" scale from the fish using forceps (Appendix A2). The preferred scale is located on the left side of the fish, one or two rows above the lateral line, along a diagonal line from the posterior insertion of the dorsal fin to the anterior origin of the anal fin. If the preferred scales are missing, reabsorbed, or obviously deformed, try sampling the right side of the fish. If the preferred scales are missing from both sides, collect a scale from an area as close to the preferred area as possible.

After removing the scale from the salmon, clean the scale by wiping the under-surface (the side adhering to the fish) on the back of your hand to remove all the skin (silver color). Make sure no dirt, slime, or skin remains on the scale. Moisten the under-side of the scale (the side you cleaned the silver skin from and the side that was adhering to the fish) and mount the scale on the gum card with the moistened side facing the card. The side of the scale that is exposed on the salmon has small ridges that will be used to generate an impression of the scale when pressed against acetate under heat and pressure. The ridged side of the scale must face out when attached to the gum card for an impression to be made.

Mount the scale so the anterior end (the end of the scale closest to the salmon's head when plucked) is oriented toward the top of the gum card. Refer to Appendix A2. Scales should be neat, clean, orderly, and properly oriented on the card. This is essential for the scales to adhere to the gum card and to make determination of the salmon's age possible by a scale reader (the purpose of the entire sampling process).

Once you become proficient at plucking scales, a time saving strategy is to pluck a scale from numerous (e.g. up to 10) fish at a time and line the scales up on a row on the back of your hand, then transfer them in sequence to the gum card. This naturally only works well when you are not taking lengths or weights concurrently.

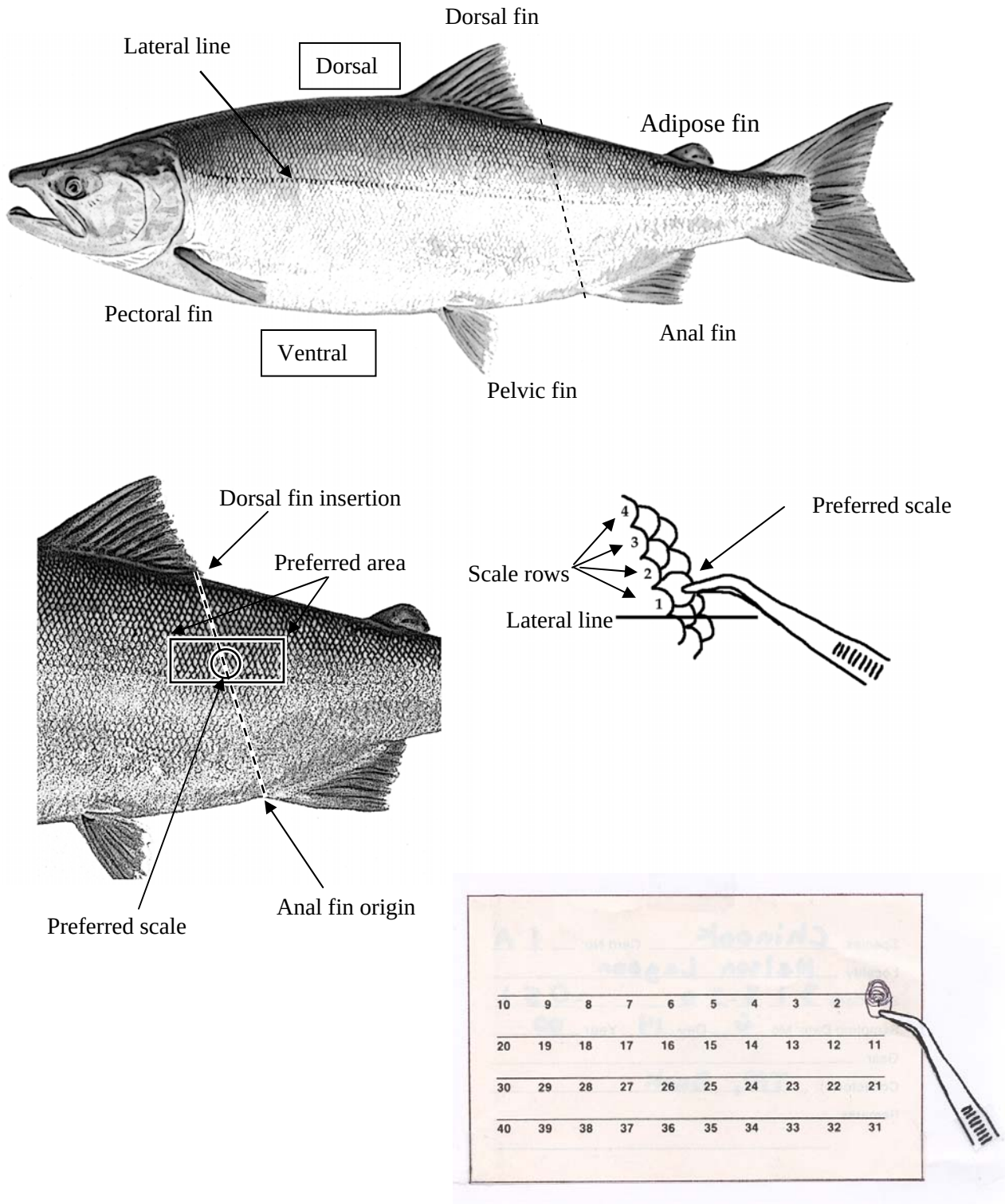
GENERAL SAMPLING GUIDELINES

- When sex data is collected from Nelson Lagoon record the sex in the appropriate column of the optical scan form. If any difficulty was encountered in this procedure, write "I had trouble sexing these fish" on the top margin of the optical scan and ask your supervisor for help as soon as possible before sexing additional fish.

-continued-

- When lengths are taken, measure all fish in millimeters from the middle of the eye to the fork of the tail. Refer to Appendix A4. Record the length by blackening with No. 2 pencil only the appropriate column circles on the optical scan form. Column 3 (next to the sex) on the optical scan form is only used for fish over 999 millimeters long. Measure all salmon to the nearest millimeter.
- Remove a scale from the preferred area from the fish using forceps. Remove all slime, grit, and skin from the scale by rubbing it between two fingers. The preferred scale is located on the left side of the fish, two rows above the lateral line on the diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin. Refer to Appendix A2. If the preferred scale is missing, select a scale within the preferred area on either the left or right side of the fish. If no scales are present in the "preferred area" on both sides of the fish, select another fish.
- Clean, moisten, and mount scale on gum card directly over the appropriate number as shown in Appendix A2. The side of the scale facing up on the gum card is the same as the side facing up when it was adhered to the fish. The exposed facing side is referred to as the "sculptured" side of the scale. The ridges on this sculpture side can be felt with a fingernail or forceps. Mount the scale with anterior end oriented toward top of the gum card.
- When sampling sockeye repeat steps 1 through 4 for up to 40 fish on each optical scan form (Appendix A5).
- During sampling, use plastic scale card holders to hold individual gum cards and cover the completed gum card with wax paper for storage.

Appendix A2.–Preferred scale sampling area on an adult salmon.



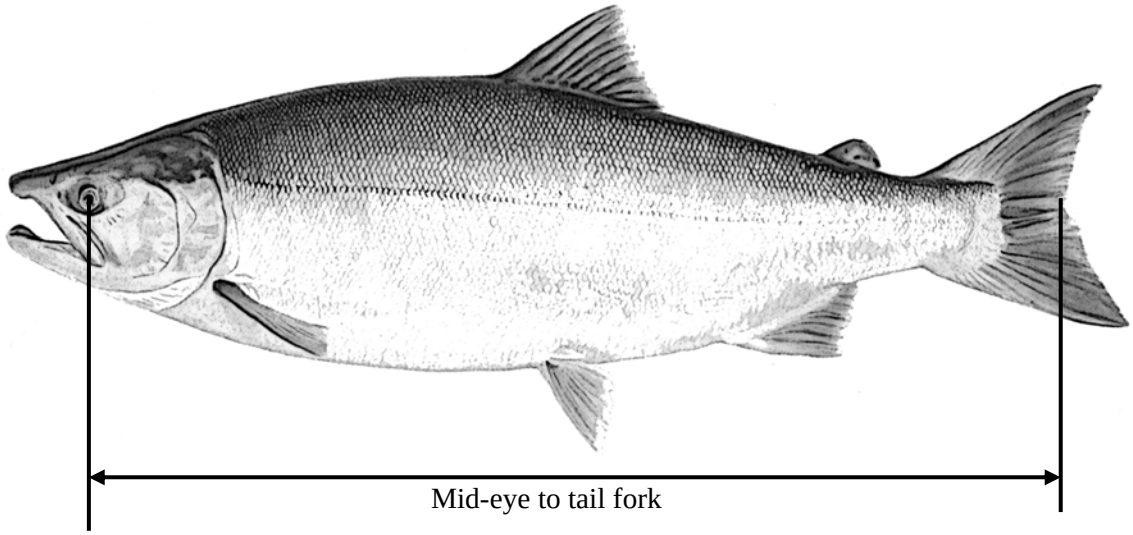
Do not turn scale over. The ridged side of the scale (the side facing out when on the fish) must face out on the gum card. Place scales directly over the number on the gum card. Mount scale with anterior portion of scale oriented toward the top of the card.

Appendix A3.–Assigned port and weir location codes.

Port Codes	
050	King Cove
051	Port Moller
052	Dutch Harbor
053	Akutan
054	Sand Point
057	Canoe Bay

Weir Location Codes	
281-50-001-059	Orzinski Lake
313-30-003-056	Nelson River
315-11-002-055	Bear River
315-12-000-060	Sandy River
316-20-001-058	Ilnik River

Appendix A4.–Measuring adult salmon length.



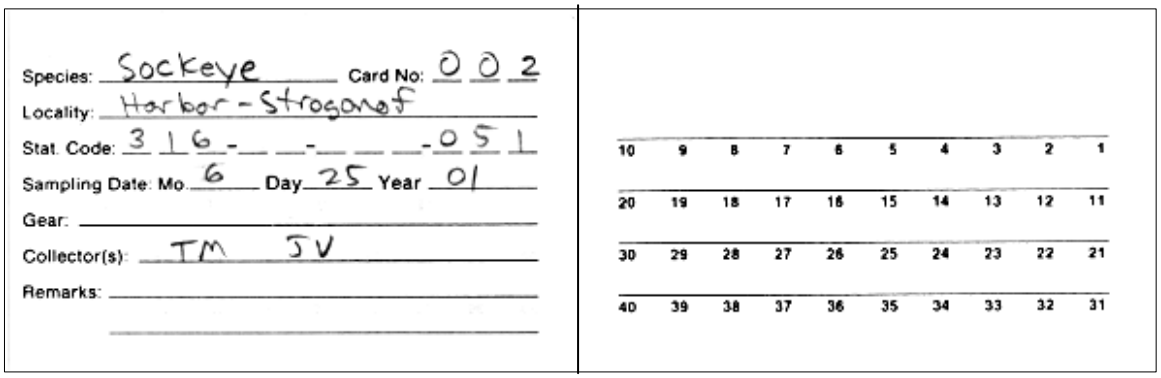
Because the length and shape of the snout of salmon changes as the fish approaches sexual maturity, length measurements are made from the middle of the eye to the fork of the tail. The length is always recorded to the nearest millimeter. The procedure for measuring mid-eye to fork of tail is as follows:

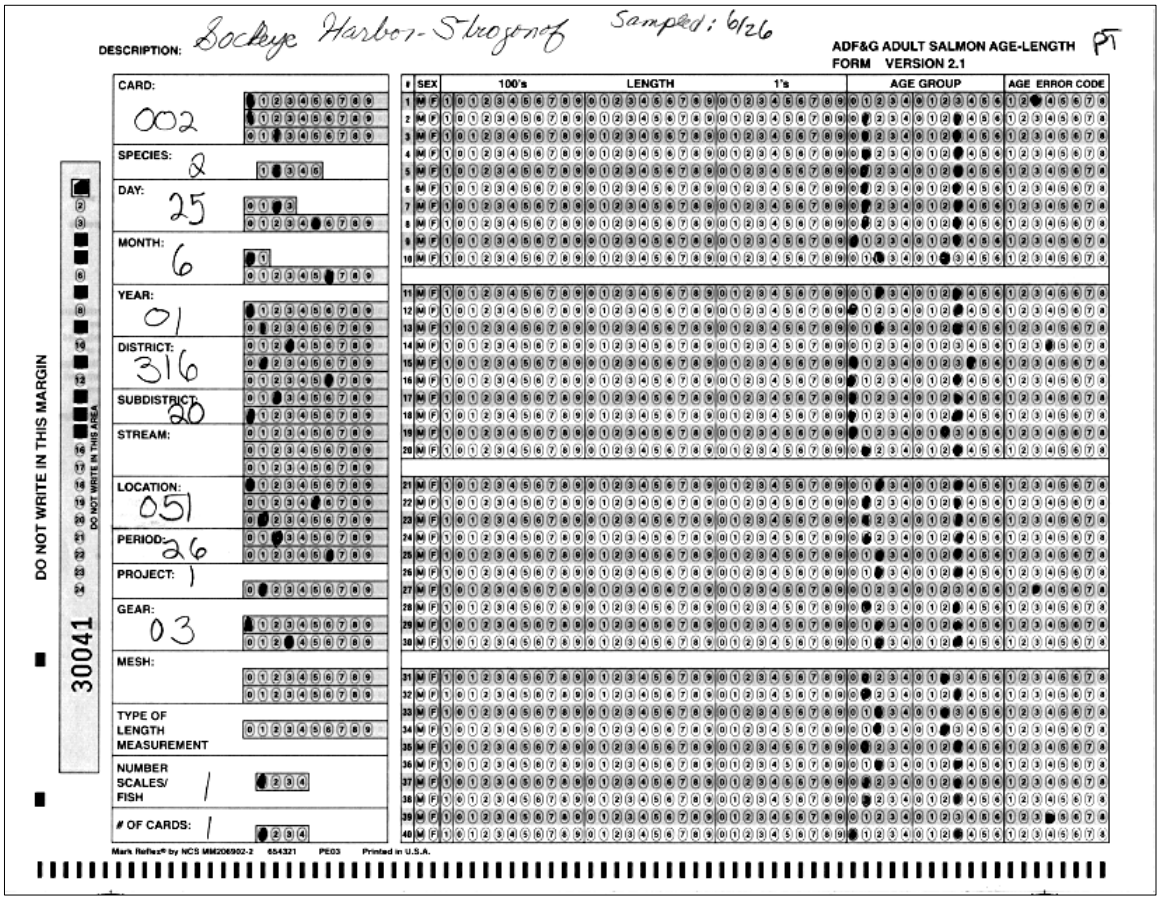
1. Place the salmon flat with the right side down. Orient the salmon with its head on your right, the tail in your left hand, and the salmon's dorsal surface (back) towards you. This puts the salmon in the correct orientation for a plucker to remove the preferred scale if they are standing on the other side of the measuring board.

2. Line the eye of the salmon up with the end of the ruler, then hold the salmon's head with your right hand. Gently sliding your thumb into the salmon's mouth and grasping the lower jaw works well for larger fish.

3. Flatten and spread the tail against the board with your left hand. Read the mid-eye to tail fork length to the nearest millimeter.

Appendix A5.–Sockeye salmon gum card and optical scan form.





APPENDIX B. COMPLETION OF OPTICAL SCAN FORMS

Appendix B1.–Completion of optical scan forms.

COMPLETING THE FORMS

Salmon from many systems throughout the state are sampled for length, sex, and age annually by field crews. This database is essential for sound management of the State's salmon resources. To be useful, data must be recorded on the optical scan mark-sense forms neatly and accurately. The following procedures are to be adhered to when sampling for length, sex, and scales using optical scan forms.

Complete each section of the left side of the optical scan form using a No. 2 pencil and darken the corresponding circles as shown in the figures. It is imperative that you darken the circle completely and neatly. Make every effort to darken the entire circle because the optical scanner that reads and records the data from the optical scan forms often misses partially filled or lightly filled circles. Label only one form at a time to avoid "the carbon paper effect" and resulting stray marks. It is necessary to review the forms after each day and ensure that all the data are filled in and appropriately marked.

When the optical scan forms are read by the optical scanning machine, the data processing program refers to the "litho code" on the optical scan form (located in the lower left margin of the form). It is extremely helpful if the optical scan forms are used in the numerical order of this code. It should not be difficult to keep them in order if they are arranged that way before page numbering. Those who sample different areas throughout the season can arrange the litho codes in order before each sample is taken.

Fill out the entries along the left side of the optical scan form as described below:

Description:

Write out the name of the harvest area and the type of sampling being done (e.g., Nelson Lagoon Commercial Sockeye Catch). Also record who the samplers are and their respective jobs (e.g., Plucker – Smith, Wrestler – Jones, Recorder – Smith).

Card:

Record the gum card number corresponding to the optical scan form being filled out. The optical scan forms and corresponding gum cards are numbered sequentially by date throughout the season starting with 001. Consult your crew leader for the current card number. Each optical scan form for sockeye and chum salmon will have only one corresponding gum card. Each scale collected should correspond to the same fish on the optical scan form.

Species:

Refer to the reverse side of the optical scan form for the correct digit (e.g., mark 2 for sockeye).

Date:

Day, Month, and Year: use appropriate digits for the date the fish were caught (not the day they were delivered or sampled).

-continued-

District:

Refer to Table 1 for your district code. It will be the first three-digit number

(e.g., **313**-30-XXX-051 in the case of Nelson Lagoon).

Subdistrict:

Refer to Table 1 for your subdistrict code. It will be the first two-digit number
(e.g., 313-**30**-XXX-051 in the case of Nelson Lagoon).

Stream:

Leave blank.

Location:

Refer to Appendix B5 for your location code. It will be the Port Code number where the sampling is being conducted. (e.g., 313-30-XXX-**051** in the case of Nelson Lagoon commercial catch fish sampled in Port Moller).

Period:

List the appropriate number from the calendar date in Appendix B6.

Project:

Refer to the reverse side of the optical scan form for the correct code (e.g., mark 1 for catch sampling).

Gear:

Refer to the reverse side of the optical scan form (e.g., mark 03 for drift gillnet).

Mesh:

Leave blank.

Type of length measurement:

Mark 2 when sampling adults: mid-eye to tail fork.

Number of scales/fish:

Mark 1 when sampling sockeye salmon.

Number of cards:

Mark the number of scale cards associated with the optical scan. For sockeye salmon mark 1.

It is extremely important to keep the optical scan forms flat, dry, and clean. Fish slime and water curling will cause data to be misinterpreted by the optical scanning machine. If unnecessary pencil marks, dark spots, etc. are visible, they need to be erased, or the machine will misinterpret the mark. It is necessary to fill in all information and darken the circles completely.

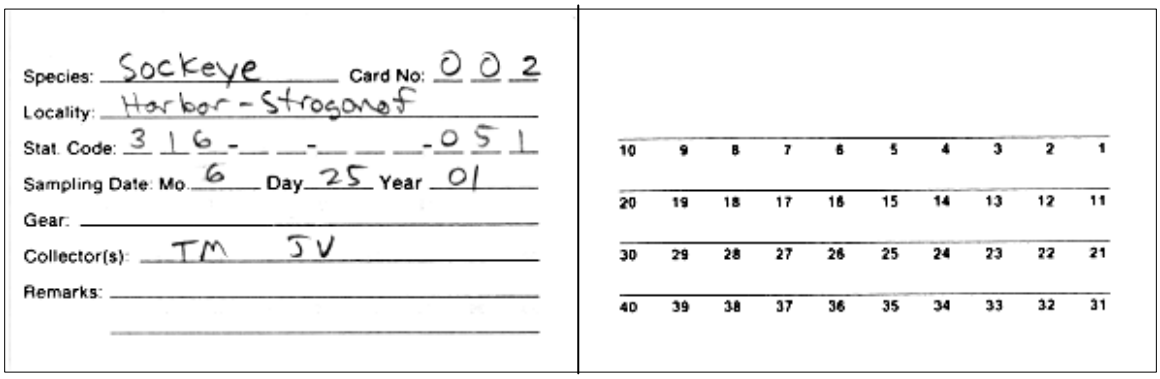
-continued-

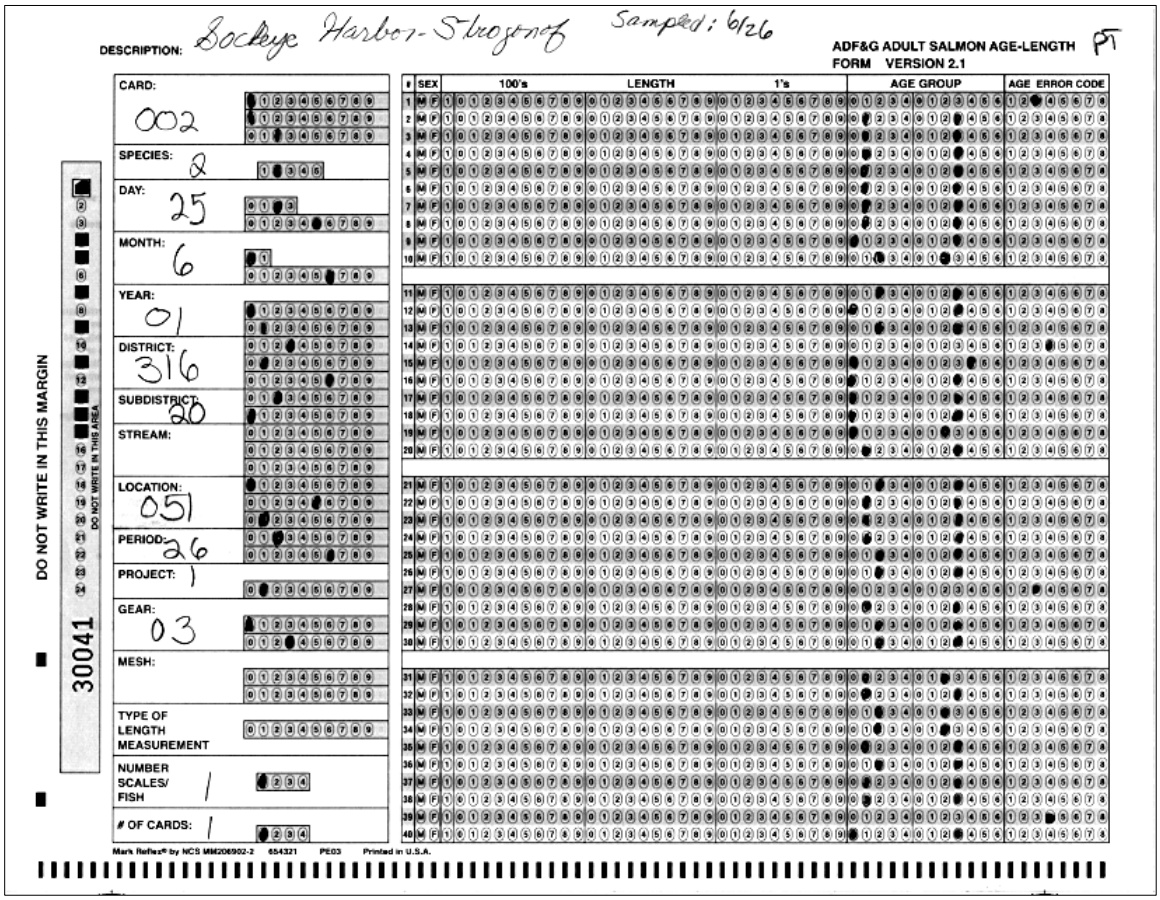
Additional data columns are available on the reverse of the optical scan form for individual project use. If you take weights (as in the case of smolt sampling), you need to transfer the dark boxes (litho code) on the front left margin of the form to the left margin on the back. This code needs to be entered on the back exactly as it appears on the front.

SOME REMINDERS

- Record length by blackening the appropriate column circles on the optical scan form.
- Optical scan forms should be carefully edited before submitting. **This is extremely important, and cannot be emphasized enough**. Re-check header information on optical scan forms; make sure all available information is filled in. Page numbers should not be repeated; a frequent error is to begin a week's sample with the last page number used the week before. This is particularly important if the data are sent to town regularly; it is easy to forget which numbers were used. Crew leaders should take time to ensure that the circles are being blackened correctly; if the circles are not darkened properly or are being sloppily marked the optical scanner records the information incorrectly or misses it entirely. Keep marks within each circle and fill them completely. After the optical scan forms are edited, place editor's initial next to page number, but not in the left margin.
- Transfer important comments from gum cards to the optical scan form. After pressing scales, the cards are seldom referred to again, and important remarks can be lost. Write comments in the top margin (not on the left side) or on the reverse of the optical scan form. If no room is available on the optical scan form to completely explain the remarks, use a separate piece of paper.
- Never put data from different dates on one optical scan form or one gum card. Even if only one scale is collected that day, begin a new card and optical scan form for the next day.
- The data processing program requires the "litho code" on the optical scan form (located in the lower left margin of the form). It helps if the optical scan forms are used in the order of this code. It should not be difficult to keep them in order if they are arranged that way before page numbering. Those who sample different areas throughout the season can arrange the litho codes in order before each sample is taken.
- If optical scan forms get wrinkled or blotched they should be copied to a new form before submitting to management staff in Port Moller. The optical scanning machine is extremely sensitive to wrinkles and blotches and will misread or reject the sheets.
- Edit the data after it has been recorded to pick up any mistakes. A common error, for instance, is placing both the 1 and 9 of a 419 mm fish in the 10’s column with nothing in the 1’s column.

Appendix B2.–Sockeye salmon gum card and optical scan form.





Pluck one sockeye scale per fish. Place each scale directly over its corresponding number on the gum card.

Appendix B3.–Assigned port and weir location codes.

Port Codes	
050	King Cove
051	Port Moller
052	Dutch Harbor
053	Akutan
054	Sand Point
057	Canoe Bay

Weir Location Codes	
281-50-001-059	Orzinski Lake
313-30-003-056	Nelson River
315-11-002-055	Bear River
315-12-000-060	Sandy River
316-20-001-058	Ilnik River

Appendix B4.–Sampling week (period) and corresponding calendar dates, 2006.

Sampling week	Calendar Dates
20	10-May to 16-May
21	17-May to 23-May
22	24-May to 30-May
23	31-May to 06-Jun
24	07-Jun to 13-Jun
25	14-Jun to 20-Jun
26	21-Jun to 27-Jun
27	28-Jun to 04-Jul
28	05-Jul to 11-Jul
29	12-Jul to 18-Jul
30	19-Jul to 25-Jul
31	26-Jul to 01-Aug
32	02-Aug to 08-Aug
33	09-Aug to 15-Aug
34	16-Aug to 22-Aug
35	23-Aug to 29-Sep
36	30-Aug to 05-Sep
37	06-Sep to 12-Sep
38	13-Sep to 19-Sep
39	20-Sep to 26-Sep
40	27-Sep to 03-Oct

APPENDIX C. CAMP POLICY, FIRST AID, AND SAFETY

EMPLOYEE CONDUCT

All employees will act in a professional manner at all times and shall be especially courteous to the public. The crew leader of each sampling station shall establish a policy on living standards and personnel behavior in accordance with State guidelines.

All sampling stations will operate as directed. Time-off for individual crew members shall be scheduled by the supervisor. Overtime will be approved by the supervisor prior to any overtime worked.

It will be the responsibility of the crew leader to prevent any abuse to State equipment which includes ATV's, boats, equipment, and facilities. The crew leader must report within 24 hours any damaged or lost equipment. All injuries to employees will be reported immediately to the supervisor.

The crew leader must report any accidents immediately to the Area Management Biologist who will then report the accident to the Regional Finfish Management Supervisor.

PERSONAL GEAR AND PETS

Generally 100 lbs. is a maximum for personal gear. If you anticipate bringing more than that amount, check with your supervisor first. Pets shall not be brought to Port Moller unless approved by the supervisor beforehand.

Rabies is common on the Alaska Peninsula, be careful of all mammals including ground squirrels, fox, wolf, otters, and your pet. If bitten, administering proper first aid techniques to the person and then kill the animal immediately and notify the supervisor. Remove the head of the animal if possible, wrap the head in several layers of plastic, put in a good box and freeze if possible. Burn and bury remaining parts of the carcass away from water sources and cabins, take precautions such as wearing plastic gloves to dispose of the carcass. Do not send suspected rabid animals out of your area unless you are bitten, instead burn and bury the entire carcass.

FISH AND WILDLIFE VIOLATIONS

In the event that you observe a violation of a fish or wildlife regulation, contact an Alaska Bureau of Wildlife Enforcement (ABWE) officer as soon as possible**.** This is not intended as an inclusive procedure for handling violations, it is not your job. Use this as a guideline for obtaining the necessary information and/or evidence to show and prove that a violation has been committed. It is important to be familiar with the commercial fishing, subsistence fishing, sport fishing, and hunting regulations in your area. Violation reporting procedures are printed on the back cover of the commercial fishing regulation book. Request the regulation book if your camp does not have one.

The use of the "4 W's" can greatly aid the ABWE officers in obtaining sufficient evidence for a case.

-continued-

1. What is the violation?
2. When did the violation occur (date, time, tide condition, etc.)
3. Where did the violation occur?
4. Who is in violation and who are witnesses?

It is important that all witnesses to a violation are interviewed (preferably by ABWE staff) and all statements pertaining to a violation are recorded along with their names and addresses. If you have a camera available, pictures are extremely valuable in prosecuting offenders. Collect as much information as possible and contact your supervisor or a State Trooper from the ABWE Division immediately. If you do not feel comfortable, or your personal safety may be in danger, do not pursue the violation. Contact your supervisor and they will handle the violation. Be aware that you do not have the power to arrest somebody and never attempt this.

FIREARMS

A State firearm will be available at each location and staff should be familiar with firearm safety and proper use. Personal firearms are not necessary in Port Moller unless being used for recreational purposes, and must be approved by the immediate supervisor. Loaded guns are prohibited inside any facility. Anyone handling a firearm should always treat it as if it were loaded. Guns should be kept clean and oiled and be completely unloaded while being cleaned. Any horseplay with or misuse of firearms while working for the Department of Fish and Game will not be tolerated and will be grounds for immediate dismissal. Completely unload a firearm of all rounds before entering a vessel, airplane, or four-wheeler.

BEARS

Do not antagonize bears - each bear must be considered dangerous. Do not encourage bears to come around camp by leaving food or unburned garbage around. Do not shoot at a bear unless, in your best judgment, he is endangering someone's life or damaging valuable personal or state property. If shooting cracker shells at bears, be careful especially at close ranges (<30’) since the shell could penetrate the bear and be lethal. Use your best judgment on whether to shoot a bear if property is at stake. When trying to frighten a bear away by shooting, do not fire toward it. By chance, you may accidentally wound the animal. If you are having problems with a particular bear around camp, notify your immediate supervisor of the situation. When possible, staff from the Division of Wildlife Conservation will take care of the problem.

-continued-

TRANSPORTATION

Do not endanger life or property by going out in a boat on dangerously rough water. If you are unfamiliar with marine safety, ask for information or advice from your immediate supervisor. All personnel must wear a Coast Guard approved life jacket when out on any water. If you think it is dangerous situation, don't go out on the water.

Extra shear pins or propellers (impellers and sleeves) and a tool kit which includes pliers, spark plugs, spark plug wrench, wrenches of various sizes, various screwdrivers, and other tools should be in the boat at all times. In case travel at night (which should be avoided when possible) becomes necessary, carry a flashlight.

Some camps have 4-wheel all terrain vehicles (ATV). The following safety precautions shall be observed at all times regarding department ATV. Only employees of the State may use the vehicles. Non-Fish and Game employees are not allowed on these vehicles at any time. Safety helmets are provided for all riders.

Review the Marine Safety and Light Aircraft Safety Manuals located at all camps before boating or flying. Do not get in a boat or plane if you feel uncomfortable with the situation. Consult the crew leader, pilot, or immediate supervisor if you are uncomfortable.

APPEARANCE

Keep the facilities, surrounding area, and yourself clean and neat. Appearance is important even in remote camps. Visitor impressions are often based on your personal appearances. Do your best to look respectable and keep the grounds clean.

COMPATIBILITY OF FIELD PERSONNEL

If you find yourself unable to get along with other members at your camp, notify the appropriate supervisor and an attempt will be made to amicably solve the problem. Usually, the person with the most experience in camp will be the crew leader. If it is not clear who has been designated crew leader in your camp, ask the Area Management Biologist. Where satellite phones are provided, all employees must understand how to operate the phone. If you are unsure, please ask someone that does. All emergency contact phone numbers will be posted near or on the phone. These phones could be the difference between life and death. Also, if there are any personnel difficulties within the camp, all employees are encouraged to call the Area Management Biologist in Port Moller at any time.

FIRST AID AND SAFETY

Check the facilities fire extinguisher and emergency exits. Know where they are and how to use them! Inventory your camp first aid kit, replace items as needed and become familiar with basic first aid treatment. Review the first aid booklet. Make sure the smoke and carbon monoxide detector are functioning properly with new batteries. All field personnel will have current Red Cross cardio-pulmonary resuscitation (CPR) and First Aid training and file copies of the associated certificates with the Department.

-continued-

MEMORANDUM STATE OF ALASKA

To: Catch Sampling Crews 2008 FIELD CAMPS

From: Bob Murphy and Philip Tschersich
Area Management Biologists
Division of Commercial Fisheries
Department of Fish & Game - Kodiak, Port Moller

SUBJECT: Health and Welfare of Crew Members

All employees must read the Safety Standard Operational Plans and included safety materials and must be fully aware of all health and safety practices (e.g. basic first aid, location of fire extinguishers, etc.). With camps, as remote as they are, do not neglect proper health and safety practices. There can be serious ramifications if an employee were to become ill.

Sand Point, Port Moller, and King Cove have medical clinics. Insurance forms will be available at all locations. Inform your supervisor immediately of any illness or injury that will require medical assistance or lost work time. Report all injuries to your supervisor immediately.

A State firearm may be available at each location. Loaded guns are prohibited inside any facility. Anyone handling a firearm should always treat it as if it were loaded. Guns should be kept clean and oiled and be completely unloaded while being cleaned. Any horseplay with or misuse of firearms while working for the Department of Fish and Game will not be tolerated and will be grounds for immediate dismissal. Completely unload a firearm of all rounds before entering a vessel or airplane. Keep an empty chamber under the firing pin of each pistol to prevent accidental discharge by accidentally dropping the weapon. If you are unfamiliar with firearms, please notify me immediately and proper safety and handling instructions will be given.

Do not antagonize bears - each one is a potential danger. Do not encourage bears to come around camp by leaving food or unburned garbage around. Do not shoot at a bear unless, in your best judgment, he is endangering someone's life or damaging valuable personal or state property. Use your best judgment on whether to shoot a bear if property is at stake. Be careful when, and if, trying to frighten a bear away by shooting near it. By chance, you may wound the animal accidentally. If you are having repeated problems with a particular bear around camp, call the AMB and notify them of the situation. If feasible, Wildlife Conservation Division personnel will take care of the problem.

-continued-

Port Moller, Sand Point, and Ilnik and Sandy Rivers have 4-wheel all terrain vehicles (ATV). The following safety precautions shall be observed at all times regarding department ATV use. Only employees of the State may use the vehicles. Non-Fish and Game employees are not allowed on these vehicles at any time. A safety helmet will be provided during operation of an ATV. An ATV will provide transport of State materials, supplies, and equipment between camp sites and supply planes or vessels. In addition, they may be used for transportation to and from assigned duties in the field such as monitoring a fishery or collecting harvest information, etc. Recreational activities within reason are permitted but safety of the rider and vehicle must be observed.

Check your camp's fire extinguisher. Know where it is and how to use it! Check carbon monoxide and smoke detectors to make sure they are in working conditions with a new installed battery. Inventory your camp first aid kit, replace items as needed and become familiar with basic first aid treatment. Review the first aid booklet.

Keep the cabin, surrounding area, and yourself clean and neat. Appearance is important. You will not always be notified of the intended arrival of visitors, officials, etc. Impressions of visitors are often based on appearance.

Rabies is common on the Alaska Peninsula, so be careful of all mammals including ground squirrels, fox, wolf, otters, and your pet. If bitten save the head of the animal if possible, wrap the head in several layers of plastic, put in a good box and freeze if possible. Notify your supervisor of the accident immediately. Burn and bury remaining parts of the carcass away from water sources and cabins, take precautions such as wearing plastic gloves to dispose of the carcass. Do not send suspected rabies animals out of your area unless you are bitten.

Alaska Peninsula Salmon Enumeration and Escapement Sampling Procedures, 2008

by

Robert L. Murphy

and

Philip Tschersich

April 2008

Alaska Department of Fish and Game **Division of 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)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

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

ALASKA PENINSULA SALMON ENUMERATION AND ESCAPEMENT SAMPLING PROCEDURES, 2008

by

Robert L. Murphy
and
Philip Tschersich

Alaska Department of Fish and Game
211 Mission Road
Kodiak, Alaska 99615

April 2008

The Regional Information Report Series was established in 1987 and was redefined in 2006 to meet the Division of Commercial Fisheries regional need for publishing and archiving information such as project operational plans, area management plans, budgetary information, staff comments and opinions to Board of Fisheries proposals, interim or preliminary data and grant agency reports, special meeting or minor workshop results and other regional information not generally reported elsewhere. Reports in this series may contain raw data and preliminary results. Reports in this series receive varying degrees of regional, biometric, and editorial review; information in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author or the Division of Commercial Fisheries if in doubt of the level of review or preliminary nature of the data reported. Regional Information Reports are available through the Alaska State Library and on the Internet at: http://www.sf.adfg.ak.us/statewide/divreports/html/intersearch.cfm.

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and
Philip Tschersich,
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This document should be cited as:
Murphy, R. L. and P. Tschersich. 2008. Alaska Peninsula salmon enumeration and escapement sampling procedures, 2008. ***In*** *Alaska Peninsula salmon operational plans, 2008. Alaska Department of Fish and Game, Regional Information Report No. 4K08-2, Kodiak.*

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U.S. Fish and Wildlife Service, 4040 N. Fairfax Drive, Suite 300 Webb, Arlington VA 22203

Office of Equal Opportunity, U.S. Department of the Interior, Washington DC 20240

The department's ADA Coordinator can be reached via phone at the following numbers:

(VOICE) 907-465-6077, (Statewide Telecommunication Device for the Deaf) 1-800-478-3648, (Juneau TDD) 907-465-3646, or (FAX) 907-465-6078

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ADF&G, Sport Fish Division, Research and Technical Services, 333 Raspberry Road, Anchorage AK 99518 (907)267-2375.

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ABSTRACT

In the Alaska Peninsula Management Area (Area M), weirs provide the primary mode of enumeration for a majority of the sockeye salmon escapements into area streams. Annually, the Alaska Department of Fish and Game (ADF&G) samples adult sockeye salmon *Oncorhynchus nerka* escapements from the Nelson, Bear River, Sandy, and Ilnik rivers, and Orzinski Lake weirs for biological characteristics (age, length, and sex). Outmigrating juvenile sockeye salmon (smolt) are also sampled for age, length, and weight at the Bear River weir.

In 1985, an expanded commercial salmon catch sampling operation was initiated in Area M. Commercial harvest samples, in combination with the escapement sampling, provide the foundation for preseason run forecasts, escapement goal evaluation, and accurate assignment of the run to stock of origin (run reconstruction) to some North Peninsula systems. Sockeye salmon escapement from systems with weirs will be sampled throughout the 2008 season along with commercial catch from individual districts and sections in Area M. The overall goal of the project is to provide data to assist with the long-term management of the Area M sockeye salmon runs.

Operation guidelines for the five Alaska Peninsula ADF&G weir camps is presented including weir installation instructions, salmon enumeration and sampling procedures, and general camp policies.

Key words: Alaska Peninsula, Area M, commercial salmon harvest, escapement, sampling, weir, operational plan, Chinook salmon, *Oncorhynchus tshawytscha*, sockeye salmon, *Oncorhynchus nerka*, coho salmon, *Oncorhynchus kisutch*, pink salmon, *Oncorhynchus gorbuscha*, chum salmon, *Oncorhynchus keta*.

INTRODUCTION

The basic function of fisheries management is to ensure sufficient spawning escapement while allowing the harvest of available surpluses, consistent with the maximum sustainable yield principle and subject to allocations established through public regulatory processes. In 2008 the Alaska Department of Fish and Game (ADF&G) crews will enumerate and sample escapements at Bear, Nelson, Sandy, and Ilnik rivers, and Orzinski Lake. Sockeye salmon smolt samples are also collected weekly at Bear and Sandy rivers when possible, to serve as indices of outmigration age composition and smolt condition.

The age composition of salmon stocks is determined through sampling of portions of the escapement and commercial catch. This in turn allows current runs to be evaluated in a historical context by identifying sibling relationships and the parent year escapement. Correlating such factors as escapement size and management strategies employed at the time of the parent year escapement, with subsequent returns produced from that parent year escapement, allows for better understanding of individual fisheries and leads to higher quality management. In runs where specific sockeye salmon *Oncorhynchus nerka* escapement and catch data can be combined to estimate the age structure of the run, brood tables can be generated for more accurate run reconstruction and forecasting.

BACKGROUND

BEAR RIVER WEIR

The Bear River weir (56° 02.24’ N lat., 160° 16.10’ W long.) is located about 180 m downstream of the outlet of Bear Lake, on the north side of the Alaska Peninsula (Figure 1). Bear River is home to the largest sockeye salmon run on the North Alaska Peninsula. The weir is about 53 m in length and the water depth varies from 0.6 m to 1.6 m. A weir was first constructed in 1929 and operated annually by the federal government through 1932 at a site approximately 12 km downstream of Bear Lake near the confluence of the Bear and Mad Sow rivers, but that site proved logistically difficult to supply as there was no air strip nearby. From 1953 through 1960 a

weir was installed near the current location, just downstream of the Bear Lake outlet. From 1961 through 1985, ADF&G employees enumerated salmon using a partial tripod weir and a counting tower. Since 1986, a full river-wide conventional tripod weir has been operated annually from late May through late August.

NELSON RIVER WEIR

The Nelson River weir (55° 48.99’ N lat., 161° 14.05’ W long.) is located about midway between the head of Nelson Lagoon and Sapsuk Lake (Figure 1). The weir is about 40 m in length and the water depth varies from about 0.6 m to 0.9 m. From 1962 to 1988, salmon were counted from a tower downstream of the present weir site. In 1989, ADF&G replaced the counting tower with a floating weir anchored to the stream substrate with railroad rails. Since 1989 the weir has been operated annually from late May through late July. The Nelson River tower used to be operated until late August for a total estimate of Chinook *O. tshawytscha*, sockeye, and chum *O. keta* salmon. Recently, the weir has been removed in late July because of budget constraints.

SANDY RIVER WEIR

The Sandy River weir (56° 11.94’ N lat., 160° 01.53’ W long.) is located about 5 km below Sandy Lake (Figure 1). The weir is about 61 m in length and the water depth varies from about 0.6 m to 1.5 m. From 1962 through 1964, ADF&G employees counted salmon from a tower. The project was abandoned between 1965 and 1994 for budgetary reasons and because the river was often too turbid for accurate salmon counts using tower methods. A large conventional tripod weir was constructed in 1994 in the same location as the tower counting project. In 2002 the weir was moved about 2 km downstream from the 1994-2001 location in order to find a location less prone to washout. Since 1994, the weir has been operated annually from early June through late July.

ILNIK RIVER WEIR

The Ilnik River weir (56° 36.73’ N lat., 159° 34.28’ W long.) is located about 3 km below the Ilnik Village site (Figure 1). The weir is the longest in the state at about 150 m in length and the water depth varies from about 0.2 m to 2.0 m. The Ilnik River salmon escapement has been counted through a weir since 1990. Between 1990 and 1994, large conventional tripods were used. The weir’s proximity to the Bering Sea and Ilnik Lagoon makes it subject to tidal influence and subsequent reversal of the current in the river. This combined with unstable, sandy river substrate led to erosion and caused the weir to frequently lose its integrity. Various strategies were employed to remedy the situation but with limited success. In 1996 a full river-wide floating weir was installed with success. The weir is operated annually from late May through late July.

ORZINSKI (ORZENOI) LAKE WEIR

The Orzinski Lake weir (55° 43.78’ N lat., 160° 05.70’ W long.) is located near the outlet of Orzinski Lake, about 1 km upstream of the river’s terminus in Orzinski Bay (Figure 1). The weir is about 26 m in length and the water depth varies from about 0.3 m to 0.6 m. Salmon were first counted through a weir constructed in 1929 and operated annually by the federal government through 1941 (except 1933 when the weir was not operated). Since its reinstatement in 1990, the weir has been operated annually from early June through late July.

OBJECTIVES

LONG TERM

- Management of the salmon resources in the Alaska Peninsula Management Area by achieving annual escapement objectives, improved forecasting, development of stock-recruitment relationships to assess escapement requirements, and accurate assessment of stock composition.
- Develop a history of biological attributes and samples that may be used for genetic and long-term age studies.

SHORT TERM

- Enumerate salmon escapement by species and ensure interim escapement objectives are met throughout the season.
- Determine the sockeye salmon age, length, and sex composition for Bear, Sandy, Ilnik, and Nelson rivers, and Orzinski Lake.
- Determine the age, length, and weight composition of sockeye smolt from Bear and Sandy rivers.

SUPERVISION

The Assistant Area Management Biologist (AAMB), Philip Tschersich and Area Management Biologist (AMB), Robert Murphy both based in Port Moller, will supervise the Nelson, Bear, Sandy, and Ilnik river weir crews. The AAMB in Sand Point, James Jackson, will supervise the Orzinski Lake weir crew. Day to day operations, task scheduling, and ensuring the quality of the work will be the responsibility of the crew leader designated for individual camps.

During the operation of the weir, the assigned duties may take longer than 37.5 hours/week to accomplish. When this is expected at Bear, Sandy, Nelson, or Ilnik River, notify the AAMB in Port Moller, or if this is expected at Orzinski Lake notify the AMB in Sand Point prior to actually doing work in excess of 37.5 hours/week. They will decide what projects take priority and authorize overtime if necessary. No additional overtime may be worked or claimed unless it is first authorized.

METHODS

GENERAL WEIR PROTOCOLS

The main responsibility of a weir crew is to install and maintain a salmon weir for the purpose of escapement enumeration and sampling. Two ADF&G people will be assigned to each project and additional assistance, if needed, will be provided during weir installation and removal.

Weir maintenance is very important to keep the weir fish-tight and prevent washout. The weir will be kept clean of debris and the river substrate should be checked as often as possible to make sure that holes do not develop through which fish might escape. In deeper channels, a dry suit and diving mask will be needed to visually inspect the weir for holes.

Large numbers of fish (> 200) should not be allowed to stage behind the weir. If fish accumulate behind the weir, they should be counted through the gate. A trap installed in the weir will allow

salmon to be live-captured for sampling and the collection of biological data on fish transiting the weir.

A sockeye salmon less than 16 inches (<400 mm) in length (mid-eye to tail fork) will be considered a "jack:" a fish which has spent only one year in salt water before returning to spawn (age-.1). The number of jack and "net-marked" salmon (those salmon wounded in encounters with gillnets), as well as the ratio of males to females, are important factors when evaluating escapement quality. Typically, the number of jack salmon is less than 10%. If the number of jack salmon, on a daily basis or for the season, is above 10%, the escapement objective may be increased to compensate for the reduction in reproductive potential. If the number of net-marked fish becomes excessive, or if the ratio of males to females becomes skewed, the escapement objectives may be increased to preserve escapement quality.

The daily and cumulative escapement form will be used to record the daily escapement counts (Figure 2). On the daily counting form, note the time period that the weir gate is opened, and the appropriate period and cumulative counts for adults, jacks, and other salmon species. Remarks such as weather, percentage of net marked fish, water levels, holes in the weir, approximate numbers of Dolly Varden *Salvelinus malma Walbaum* passed, and other comments should be included in the remarks column to the right of the page. Additional comments can be included at the bottom of the page.

It is important to keep a daily logbook (Rite in the Rain®) to document a more detailed description of the daily events such as weather information, water levels, maintenance performed, number of fish sampled, bear activity, personnel changes in camp, and so on. The weir crews at Nelson, Bear, Sandy, and Ilnik rivers will relay total daily counts and cumulative seasonal counts for each species to Port Moller during the normal radio or phone schedule at 8:30 AM and 7:30 PM. The weir crew at Orzinski Lake will provide this information to Sand Point during the same schedule. When the project is completed, all forms will be forwarded to Port Moller including daily counting forms, camp log books, and sampling log books containing raw data.

Procedures for sampling adult sockeye salmon can be found in Appendices A1 through A6. Procedures for sampling sockeye salmon smolt can be found in Appendices B1 through B5. General camp policies and equipment use can be found in Appendix C1.

BEAR RIVER WEIR

The weir on Bear River will be installed on approximately May 31 and will be removed around August 25. The Bear River weir will be located approximately 100 meters downstream of the lake in roughly the same location as in recent years. Care should be taken not to interfere with the approach of airplanes landing at the Bear Lake Lodge landing strip upstream of the weir, and also offer mooring opportunities on the riverbank for lodge skiffs behind the weir. Detailed weir installation instructions for Bear River can be found in Appendix D1.

Two distinct runs of fish, an early run and a late run, characterize the Bear River escapement (Table 1). The escapement goal for the early run, June 1 through July 31, is 176,000 to 293,000 sockeye salmon. The late-run escapement objective from August 1 through August 25 is a minimum of 87,000 sockeye salmon. The late-run total goal, including the post-weir estimate of 30,000 fish, is 117,000 to 195,000 sockeye salmon. The goal for the entire season including the

post-weir estimate is 293,000 to 488,000 sockeye salmon. Escapements may be increased if escapement quality is poor because of a high percentage of jack salmon.

Table 1.-Bear River weir sockeye salmon escapement management objectives.

Date	Escapement for period	Cumulative escapement
Early-run component:		
15-Jun	4,000 - 8,000	4,000 - 8,000
20-Jun	11,000 - 22,000	15,000 - 30,000
25-Jun	15,000 - 25,000	30,000 - 55,000
30-Jun	30,000 - 60,000	60,000 - 115,000
5-Jul	30,000 - 50,000	90,000 - 165,000
10-Jul	25,000 - 35,000	115,000 - 200,000
15-Jul	15,000 - 30,000	130,000 - 230,000
20-Jul	10,000 - 20,000	140,000 - 250,000
25-Jul	20,000 - 20,000	160,000 - 270,000
31-Jul	16,000 - 23,000	176,000 - 293,000
Total early-run goal	176,000 - 293,000	
Late-run component:		
5-Aug	15,000 - 30,000	191,000 - 323,000
10-Aug	20,000 - 35,000	211,000 - 358,000
15-Aug	17,000 - 35,000	228,000 - 393,000
20-Aug	15,000 - 30,000	243,000 - 423,000
25-Aug	20,000 - 35,000	263,000 - 458,000
Total late-run objective	87,000 - 165,000	
Post-weir objective	30,000	
Total late-run goal	117,000 - 195,000	
Season total escapement goal	293,000 - 488,000	

[a] Escapement occurring during the July 26-31 period over and above the 23,000 fish escapement objective will be applied to the late-run escapement objective. No more than 15,000 fish shall be applied to the late-run escapement objective. This will aid the ADF&G in managing the late Bear River sockeye salmon run more effectively when the run is earlier than expected.

NELSON RIVER WEIR

The floating weir on Nelson River will be installed around June 1 and will operate until July 25. The location will be the same as previous years as indicated by the railroad rails located in the river about 100 meters upstream of the department cabin. Detailed weir installation instructions for Nelson River can be found in Appendix D2.

The sockeye salmon escapement goal range for the Nelson River system is 97,000 to 219,000 fish (Table 2). Escapements may be increased if escapement quality is poor because of a high percentage of net-marked fish, high percentage of jack salmon, or a low female to male sex ratio. The estimated number of female sockeye salmon in the escapement should range from 50,000 to 110,000 fish by July 25. Management staff in Port Moller will direct the crew at the Nelson River weir to sample the escapement as needed to determine the male to female sex ratio of fish

transiting the weir. A daily dip-net sample of 100 fish is typical. The escapement goal range for Chinook salmon in the Nelson River system is 2,400 to 4,400 fish, though the actual number of Chinook salmon is generally determined through aerial surveys.

Table 2.-Nelson River weir sockeye salmon escapement management objectives.

Date	Escapement for period	Cumulative Escapement
30-Jun	30,000 - 60,000	30,000 - 60,000
5-Jul	20,000 - 45,000	50,000 - 105,000
10-Jul	20,000 - 50,000	70,000 - 155,000
15-Jul	15,000 - 30,000	85,000 - 185,000
20-Jul	10,000 - 25,000	95,000 - 210,000
25-Jul	2,000 - 9,000	97,000 - 219,000
Total escapement goal	97,000 - 219,000	

SANDY RIVER WEIR

The weir will be installed around June 5 and will operate until July 25. In 2002, the Sandy River weir was moved approximately 2 km downriver from the original site used since 1994. The move was initiated in order to find a location less susceptible to washout during high wind and water events. The weir should be reinstalled in roughly the same location as it was in 2005, after assessing the quality of the site in terms of river depth, channel development, and substrate stability.

Due to the notable fluctuations in water level and debris load that Sandy River experiences, extra precautions will be taken to secure the tripods during installation. After the stringers and catwalk are in place, sufficient sandbags should be stacked on the tripod platforms and against the back legs to hold the tripods securely in place when the panels are installed. Weir maintenance is especially important at Sandy River to minimize the force of the river on the weir. The weir will be kept clean of debris and checked as often as needed to ensure there are no holes for fish to escape. Dry suits and diving masks will be needed to visually inspect the weir to make certain that it is fish tight. Detailed weir installation instructions for Sandy River can be found in Appendix D3.

The Sandy River sockeye salmon annual escapement goal is 34,000 to 74,000 fish (Table 3). If weir counts are unavailable due to difficulties with the weir such as a high water event, aerial survey data will be used to estimate the escapement and manage the fisheries.

Table 3.-Sandy River weir sockeye salmon escapement management objectives.

Date	Escapement for period	Cumulative escapement
20-Jun	2,000 - 3,000	2,000 - 3,000
25-Jun	4,000 - 8,000	6,000 - 11,000
30-Jun	7,000 - 17,000	13,000 - 28,000
5-Jul	8,000 - 19,000	21,000 - 47,000
10-Jul	5,000 - 13,000	26,000 - 60,000
15-Jul	3,000 - 7,000	29,000 - 67,000
20-Jul	3,000 - 4,000	32,000 - 71,000
25-Jul	2,000 - 3,000	34,000 - 74,000
Total escapement goal	34,000 - 74,000	

ILNIK RIVER WEIR

The Ilnik River weir will be installed on approximately May 27 and will operate until July 20. The floating weir will be installed in the same location as in 2005. Weir maintenance is extremely important at Ilnik to decrease the likelihood of the weir washing out or being submerged due to debris loading. The large amount of algae washing down from Ilnik Lake tends to accumulate on the panels and can force the weir to sink, allowing fish to escape over the top of the panels. The weir will be kept clean of debris and checked often to ensure there are no holes for fish to escape. In the deeper channels, a dry suit and diving mask will be needed to visually inspect the weir to make certain that it is fish tight. For a detailed discussion of the installation of the Ilnik River weir, refer to Appendix D4.

If weekly escapement sampling is not possible due to inclement weather or other circumstances, upon approval from Port Moller, age (scales), sex, and length data will be collected from the set gillnet fishery (if present) in Ilnik Lagoon.

The Ilnik River sockeye salmon annual escapement goal is normally 40,000 to 60,000 fish (Table 4). In 1972-1975, 1986-1987, and 2005-2006, a tributary to the Ilnik River system, Ocean River, flowed directly into the Bering Sea rather than into Ilnik Lake. When this occurs, many of the fish bound for Ocean River do not pass through the Ilnik River system, and therefore do not pass the weir. For the years noted above, an average of 20% of the Ilnik River system escapement spawned in Ocean River. If the Ocean River were to flow directly into the Bering Sea during 2008, the Ocean River escapement objective of 8,000-12,000 sockeye salmon will be subtracted from the total Ilnik River escapement goal (Table 5).

Table 4.-Ilnik River sockeye salmon escapement interim management objectives if Ocean River flows into Ilnik Lake.

Date	Escapement for period	Cumulative escapement
20-Jun	5,000 - 8,000	5,000 - 8,000
25-Jun	5,000 - 7,000	10,000 - 15,000
30-Jun	5,000 - 10,000	15,000 - 25,000
5-Jul	5,000 - 10,000	20,000 - 35,000
10-Jul	10,000	30,000 - 45,000
15-Jul	5,000	35,000 - 50,000
20-Jul	3,000 - 7,000	38,000 - 57,000
25-Jul	2,000 - 3,000	40,000 - 60,000
Total escapement goal	40,000 - 60,000	

Table 5.-Ilnik River sockeye salmon escapement interim management objectives if Ocean River flows directly into the Bering Sea.

Date	Escapement for period	Cumulative escapement
20-Jun	4,000 - 6,400	4,000 - 6,400
25-Jun	4,000 - 5,600	8,000 - 12,000
30-Jun	4,000 - 8,000	12,000 - 20,000
5-Jul	4,000 - 8,000	16,000 - 28,000
10-Jul	8,000	24,000 - 36,000
15-Jul	4,000	28,000 - 40,000
20-Jul	3,000 - 5,600	30,400 - 45,600
25-Jul	2,000 - 3,000	32,000 - 48,000
Total escapement objective	32,000 - 48,000	

ORZINSKI (ORZENOI) LAKE WEIR

The Orzinski Lake weir project will be operated in the same location as in recent years, about 50 meters below the lake outlet, from about June 7 to August 5. All forms should be sent to Sand Point and then forwarded to Port Moller. For a detailed discussion of the installation of the Orzinski Lake weir, refer to Appendix D5.

Sockeye salmon usually begin entering Orzinski Lake in mid-June and normally 50% of the annual escapement has been achieved by the second week of July. The Orzinski Lake sockeye salmon annual escapement goal is 15,000 to 20,000 fish (Table 6).

Table 6.-Orzinski Lake sockeye salmon escapement interim management objectives.

Date	Escapement for period	Cumulative escapement
1-Jul	1,500 - 2,000	1,500 - 2,000
9-Jul	2,250 - 3,000	3,750 - 5,000
16-Jul	3,750 - 5,000	7,500 - 10,000
23-Jul	3,750 - 5,000	11,250 - 15,000
7-Aug	3,750 5,000	15,000 - 20,000
Season total goal	15,000 - 20,000	

ESCAPEMENT SAMPLING FOR AGE, LENGTH, AND SEX

The crews stationed at Bear, Nelson, Sandy, and Ilnik rivers, and Orzinski Lake will conduct sockeye salmon escapement sampling for age, length, and sex. Sockeye salmon will be the only species sampled. If the weir washes out, samples will be collected by seine if possible. Appendix A1 describes sampling and recording procedures.

The sample goal is 240 adult sockeye salmon per week for each system. In 2008, the standard statistical week starts on Saturday and ends on the following Friday. The goal of the sampling schedule is to obtain 80 fish per day, over three non-consecutive days. As a guideline, 80 fish should be sampled for age, length, and sex on Saturday, another 80 fish sampled on Monday, and another 80 fish sampled on Wednesday. Weather, fish counting, and other duties will likely influence the exact sampling schedule, but attempt to spread out the sampling over three non-consecutive days. This will yield a more representative sample for the week. This schedule may be amended by the supervisor due to various factors, including mitigating the effects of weekly fishing periods on the sampled population.

Samples will consist of scales, length, and sex data. Scales will be mounted on a gum card with the corresponding data (sex and length) recorded on an optical scan form (Appendix A2). Length will be measured from mid-eye to tail-fork (Appendix A3). Sex data will be determined by kype (nose) development or visual determination of the presence or absence of an ovipositor, eggs, or milt. It is imperative that all scales collected correspond to the length and sex data for that fish. Experienced personnel will provide training on these procedures for new employees.

SMOLT SAMPLING FOR AGE, LENGTH, AND WEIGHT

Outmigrating sockeye salmon smolt will be sampled at Bear River after the weir is operational. Smolt sampling at Sandy River will be attempted as time permits. A weekly sample size of 200 smolt will be collected throughout the duration of the smolt outmigration. Smolt will be sampled for age, weight, and length composition. Appendix B illustrates sampling and recording procedures.

A smolt trap (fyke net) will be deployed on Saturday evening for sampling on Sunday. The fyke net will be located in swift-moving current, generally near the main channel of the river. A good procedure is to attach the net behind the weir using the tripods as an anchor for the net. To avoid unnecessary mortality, check the net frequently shortly before or after dusk, when outmigration usually peaks. The net will be fished as long as it is necessary to capture 200 smolt. If 200 smolt

are not captured on Saturday night, sampling will continue until the goal is met or until the following Saturday, after which a new sampling week will begin.

It is important to fill out the backs of the optical scan forms when weights are recorded. The numbers (litho code) on the front left-hand margin need to be copied to the back left-hand margin when weights are recorded on the back of the form. Weight will be recorded to the nearest 0.1g (Appendix B1) and length to the nearest 1mm.

GENERAL CAMP MAINTENANCE AND PROCEDURES

Cabin and facilities maintenance is an important aspect of being able to accomplish projects comfortably. Maintenance can usually be accomplished during slow periods of the season. As soon as the camp is established, look the facilities over and make a list of projects that need to be accomplished. Send a list of materials needed to the supervisor. Try to anticipate your needs before they become a problem. Ordering replacement parts before a deteriorating piece of equipment actually breaks will prevent long repair delays because of the logistics involved.

Appendix C1 provides general information including radio schedules, ordering food and supplies, compliance with ADF&G regulations, equipment/maintenance, procedures regarding fish and wildlife violation reporting, emergencies, firearms, bears, garbage, boating, fire and first aid safety, drinking water, personal gear, compatibility of field personnel, and cleanliness of cabin.

DATA REPORTING

Philip Tschersich, Matt Foster, and Nicole Zeiser will complete a Fishery Management Report by March 2009 which includes the age, length, and sex composition results of the 2008 escapement sampling season. Further escapement information and commercial fishery catch data will be described in the Alaska Peninsula Annual Salmon Management Reports authored by Bob Murphy, Aaron Poetter, Philip Tschersich, James Jackson, and Elisa Russ and will be completed by April 2009.

The Port Moller Assistant, Philip Tschersich, will provide daily weir counts, by species and weir, to Joanne Shaker for entry into the regional escapement database. Regional AMBs are responsible for editing escapement counts by weir by species for accuracy.

FIGURES

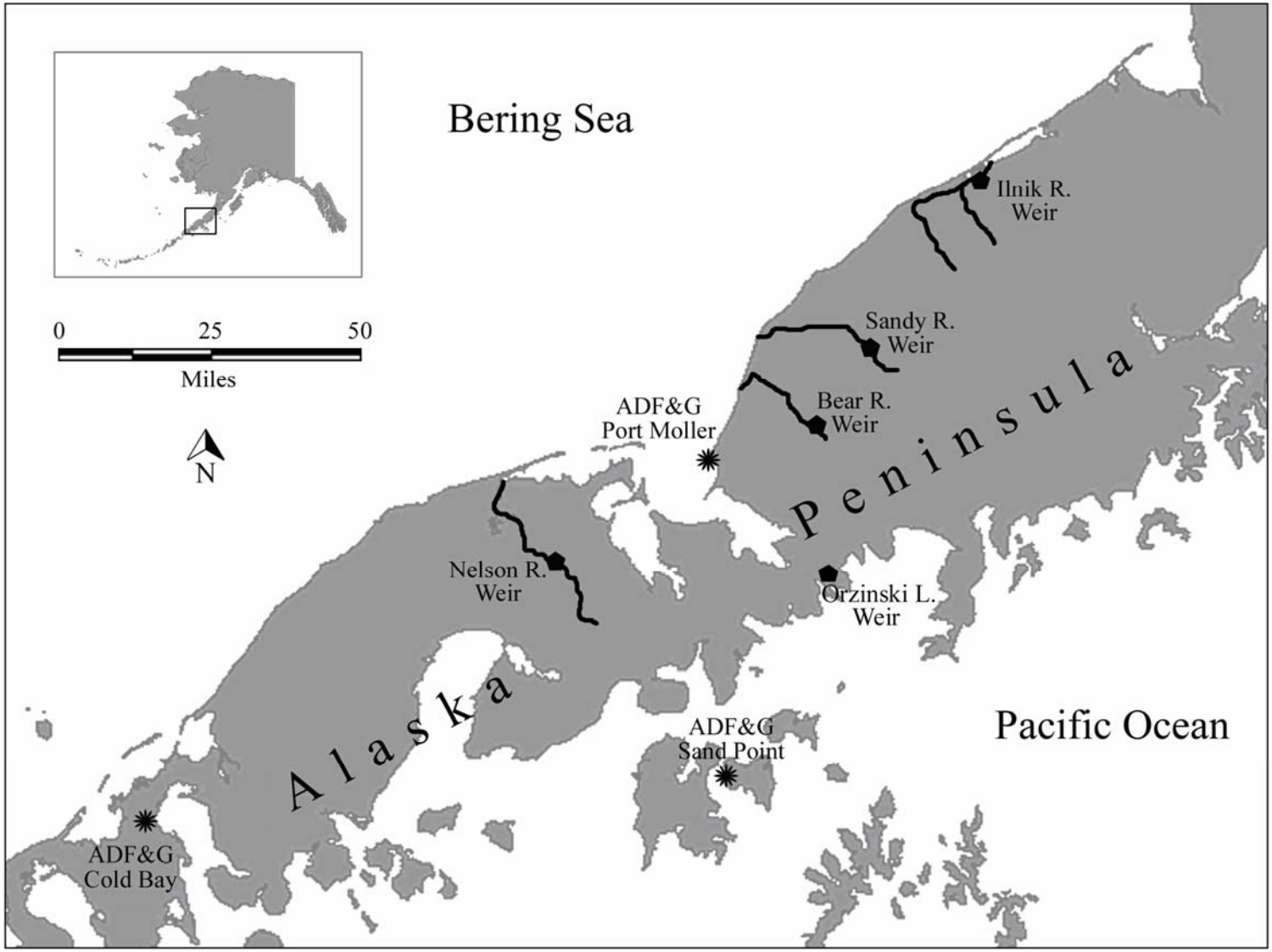


Figure 1.–Map of the Alaska Peninsula ADF&G regional offices and weir locations.

Date: July 4, 2000

Time Period	Adults: Daily Counts	Adults: Cumulative Daily Adults	Jacks: Daily Counts	Jacks: Cumulative Daily Jacks	Total Daily Cumulative	Daily Other Species: Chum	Pinks	Kings	Coho	Comments: Weather, number of sampled fish, water level, holes in the weir, other species of fish, etc.
10:20 - 10:35	22	22	0	0	22					6 net marked
13:30 - 13:40	4	26	0	0	26					
16:00 - 16:10	13	39	1	1	40					2 net marked / smaller fish
17:15 - 17:25	57	96	1	2	98					12 net marked / smaller
21:45 - 21:55	15	111	4	6	117					1 net marked
23:00 - 23:10	18	129	2	8	137					3 net marked / smaller!
23:30 - 23:40	23	152	1	9	161					6 net marked
Daily Total		152		9	161					18.6 % net marked
Previous Day's Cum		10,431		110	10,541					
Total Cumulative		10,583		119	10,702					

Figure 2.–Bear, Nelson, Sandy, and Ilnik rivers, and Orzinski Lake daily and cumulative escapement reporting form.

Follow this procedure when filling out a daily escapement form:

- Begin a new reporting form every day.
- Each day, copy the season cumulative totals for adults, jacks, sockeye total, and other species over from the previous day's sheet and enter them into the appropriate fields marked "Previous Day's Cum" at the page bottom.
- After each count, record the time interval when the fish pass gate was opened under the "Time Period".
- After each count, add the count from that period (under "Daily Counts") to the running daily cumulative columns (under "Cumulative Daily…") for both sockeye adults and jacks, then total the daily cumulative and record them under "Total Daily Cumulative."
- Record other species counts in the appropriate columns.
- Enter any notes such as water level, net marks, holes in the weir, etc., into the "comments" field on the right.
- Double-check all computations before reporting numbers to the Area Management Biologist during radio schedules.

APPENDIX A. PROCEDURES FOR SAMPLING ADULT SALMON FOR AGE, LENGTH, AND SEX

Appendix A1.–Procedures for sampling adult salmon for age, length, and sex.

SCALE SAMPLING

The following is an explanation of how salmon scale samples are taken. If you have not taken scales before, or if you have any questions, ask somebody who has had experience with scale sampling. Scales must be readable and properly organized to be useful, so follow proper technique when sampling.

SCALE GUM CARDS

A scale card (gum card) is a gum-backed sheet with 40 positions for mounting individual scales, numbered 1 through 40 (refer to Appendix A2). Scale samples are placed on the cards with no attempt to separate the fish by their sex or length.

It is important to keep the gum card dry at all times. If weather does not allow you to do this, it is best to suspend sampling until dryer conditions exist. A wet gum card is useless as the scales will fall off and prevent a readable impression from being taken. If the gum card does get wet, the scales should be remounted onto a new gum card with care taken to keep each scale in its original position.

During sampling, a gum card should be held in a plastic scale card holder. A clear acetate cover helps protect the card from water and the holder provides a rigid backing for the card. The completed gum card should be allowed to dry fully before storing long-term. All gum cards should be stored with a sheet of wax paper placed between them, to keep the cards from sticking to each other, and kept in a moisture-proof container.

A new scale card is started for each day, even if the previous card is not filled. It is important that scale cards and numbers match the information entered on the corresponding optical scan form.

Record the following information on each gum card:

Species:

Write out completely (e.g., sockeye).

Card Number:

Gum cards are numbered sequentially beginning with “001” and continue through the entire season. Do not repeat or omit gum card numbers.

Locality:

Write out the name of the system being sampled (e.g., Bear River).

Statistical code:

Transfer the appropriate digits from the optical scan form, starting with the 3-digit district, then the 2-digit subdistrict, then a three digit stream number, and finally the 3-digit location code (e.g., 315-11-002-055 for Bear River). Refer to Appendix A.2 for your location’s statistical code.

Sampling date:

Record the date when fish were sampled.

Gear:

Write out completely (e.g., weir trap).

Collector(s):

Record the last name of the person(s) sampling.

-continued-

Remarks:

Record any pertinent information. Transfer this same information to the top margin of the optical scan form.

COLLECTING SCALES

For sampling you will need:

- Clipboard with waterproof recording paper (Rite in the Rain®)
- Pencils (No. 2)
- Gum Cards
- Wax paper inserts
- Plastic scale card holders
- Forceps
- Measuring board or calipers

During the sampling of sockeye salmon, you will take one scale from each fish. Pluck the "preferred scale" from the fish using forceps (Appendix A2). The preferred scale is located on the left side of the fish, two rows above the lateral line on the diagonal from the posterior insertion of the dorsal fin to the anterior origin of the anal fin. If the preferred scales are missing, reabsorbed, or obviously deformed, try the right side of the fish. If preferred scales are missing from both sides, collect a scale from an area as close to the preferred area as possible.

After removing the scale from the salmon, clean the scale by wiping the under-surface (the side adhering to the fish) on the back of your hand or between two fingers to remove all the skin (silver color). Make sure no dirt, slime, or skin remains on the scale. Moisten the scale and mount the scale on the gum card with the ridged side up. The ridged side is the same side that is exposed on the salmon. Finally, mount the scale so the anterior end (the end of the scale closest to the salmon's head when plucked) is oriented toward the top of the gum card (Appendix A2).

Scales should be neat, clean, orderly, and properly oriented on the card. This is essential for the scales to adhere to the gum card and to make determination of the salmon's age possible by a scale reader (the purpose of the entire sampling process). If all the silver-colored skin is not removed and the scale is not totally clean, it will not adhere to the gum card or it will not be legible when it is viewed for aging or other evaluation.

GENERAL SAMPLING GUIDELINES

If any difficulty is encountered in determining the sex of the fish being sampled, write, "I had trouble sexing these fish" on the top margin of the optical scan and ask your supervisor for help as soon as possible before sexing additional fish.

Measure all adult sockeye salmon lengths in millimeters from the middle of the eye to the fork of the tail. (Appendix A3)

-continued-

When sampling at a weir, you may use a field notebook to record the data. Keep the optical scan forms in the cabin where they will be clean, dry, and flat. After sampling is done, transfer the data to the optical scan forms on a daily basis. It is the responsibility of the data collector to transcribe the data before turning it over to the immediate supervisor.

As soon as possible after completion of sampling (or at the end of the season) send the gum cards and optical scan forms to Port Moller. During scheduled radio or satellite phone calls before and following the sending of samples, the crew leader will notify Port Moller: (1) that the samples are being sent (use a moisture-proof container); (2) what samples are being sent; (3) when delivery is expected in Port Moller; and (4) who is transporting the samples. It is important that these steps are followed to ensure delivery.

If you encounter an adipose fin-clipped fish, record the head tag number on the corresponding row in the first five columns on the reverse side of the optical scan form.

COMPLETING THE FORMS

Salmon from many systems throughout the state are sampled for length, sex, and age annually by field crews. This database is essential for sound management of the State's salmon resources. To be useful, data must be recorded on the optical scan forms neatly and accurately. The following procedures are to be adhered to when sampling for length, sex, and scales using optical scan forms (Appendices A1-A5).

Complete each section of the left side of the optical scan form using a No. 2 pencil and darken the corresponding ovals as shown in the figures. It is imperative that you darken the oval completely and neatly. Make every effort to darken the entire oval because the optical scanner that reads and records the data from the optical scan forms often misses partially filled, or lightly filled ovals, but avoid pressing so hard as to indent the paper. Do not stack forms when filling them out and label only one form at a time to avoid "the carbon paper effect" and resulting stray marks. It is necessary to review the forms after each day and ensure that all the data is filled in and appropriately marked.

Fill out the entries along the left side of the optical scan form (Appendix A2) as described below:

Description:

Write out the name of the system and the type of sampling being done (e.g. Bear River Adult Sockeye Escapement). Also record who the samplers are and their respective jobs (e.g., Plucker – Smith, Wrestler – Robinson, Recorder – Smith).

Card:

Record the gum card number corresponding to the optical scan being filled out. The optical scan forms and corresponding gum cards are numbered sequentially throughout the season starting with 001. Consult your crew leader for the current card number. Each optical scan form will have only one corresponding gum card. Each scale collected must correspond to the same fish on the optical scan form.

Species:

Refer to the reverse side of the optical scan form for the correct digit (e.g., mark 2 for sockeye).

Date:

Day, Month, and Year: use appropriate digits for the date the fish are sampled.

-continued-

District:

Refer to Appendix A2 for your district code. It will be the first three digit number

(e.g., **315**-11-002-055 in the case of Bear River).

Subdistrict:

Refer to Appendix A2 for your subdistrict code. It will be the first two digit number (e.g., 315-**11**-002-055 in the case of Bear River).

Stream:

Refer to Appendix A2 for your stream number. It will be the second three digit number

(e.g., 315-11-**002**-055 in the case of Bear River).

Location:

Refer to Appendix A2 for your location code. It will be the last three digit number

(e.g., 315-11-002-**055** in the case of Bear River).

Period:

List the appropriate number from the calendar date in Appendix A5 (e.g., mark 27 for sampling in the week between June 28 and July 4).

Project:

Refer to the reverse side of the optical scan form for the correct code (e.g., mark 3 for escapement sampling).

Gear:

Refer to the reverse side of the optical scan form (e.g., mark 00 for weir trap).

Mesh:

Leave blank.

Type of length measurement:

Mark 2 when sampling adults: mid-eye to tail fork (Appendix A3).

Number of scales/fish:

Mark 1 when sampling sockeye salmon (Appendix A1).

Number of cards:

Mark 1 when sampling sockeye salmon (Appendix A1).

It is extremely important to keep the optical scan forms flat, dry, and clean. Fish slime and water curling will cause the optical scanning reader machine to reject the entire optical scan form. If unnecessary pencil marks, dark spots, etc. are visible, they need to be erased or the machine will misinterpret the mark. It is necessary to fill in all information and darken the circles completely.

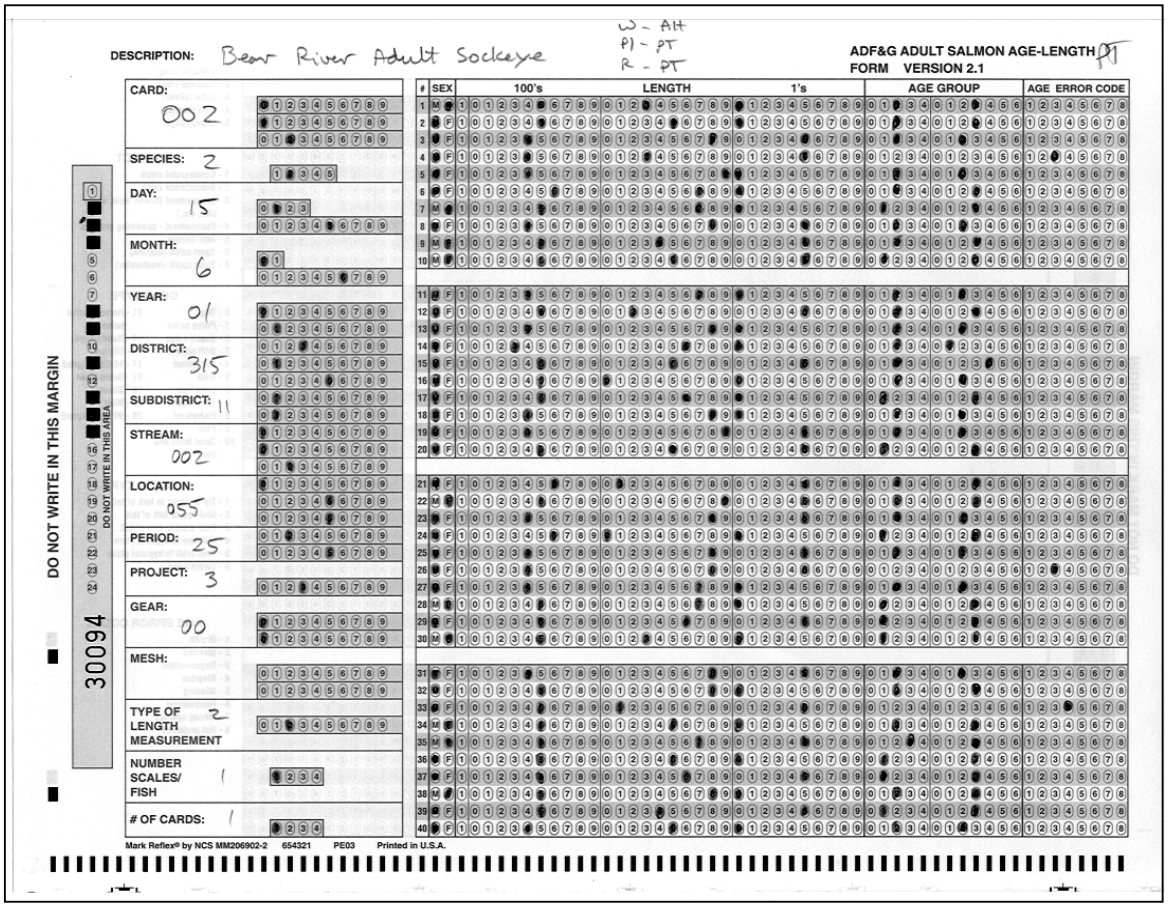
-continued-

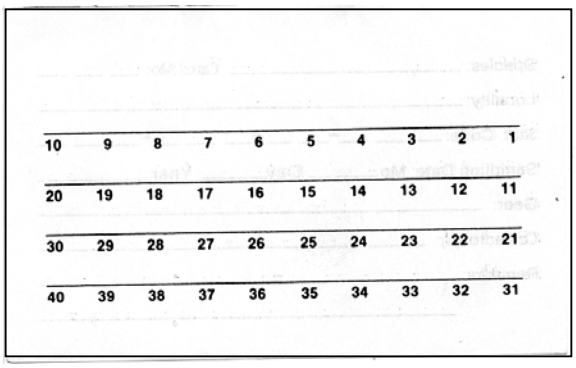
Additional data columns are available on the reverse of the optical scan for individual project use. If you take weights (as in the case of smolt sampling), you need to transfer the dark boxes (litho code) on the front left margin of the form to the left margin on the back. This code needs to be entered on the back exactly as it appears on the front.

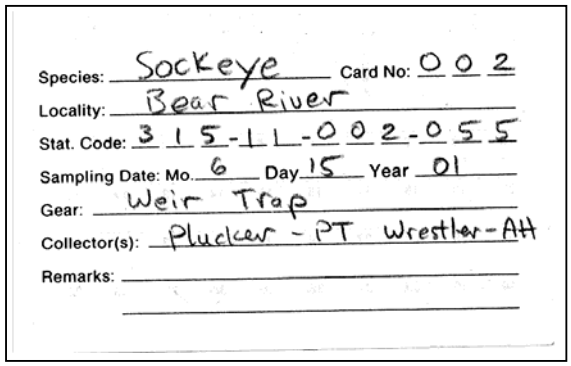
SOME REMINDERS

- Record length by blackening the appropriate column circles on the optical scan form. Column 3 on the optical scan form is used for fish over 999 millimeters long. Measure all salmon to the nearest millimeter.
- Optical scan forms should be carefully edited before submitting to Port Moller. **This is extremely important, and cannot be emphasized enough**. Re-check header information on optical scan forms: make sure all available information is filled in. Page numbers should not be repeated: a frequent error is to begin a week's sample with the last page number used the week before. This is particularly important if the data are regularly sent to town: it is easy to forget which numbers were used. Crew leaders should take time to ensure that the circles are being blackened correctly, if the circles are not darkened properly or sloppily marked the optical scanner records the information incorrectly or misses it entirely. Keep marks within each circle and completely fill them. Do not go outside the circle. After the optical scan forms are edited, place editor's initial next to page number, but not in left margin.
- Transfer important comments from scale cards to optical scan forms. After pressing scales, the cards are seldom referred to again, and important remarks can be lost. Write comments in the top margin (not on the left side) or on the reverse of the optical scan form. If no room is available on the optical scan form to completely explain the remarks, use a separate piece of paper.
- Never put data from different dates on one optical scan form or one scale card. Even if only one scale is collected that day, begin a new card and optical scan form for the next day.
- The data processing program requires the "litho code" on the optical scan form (it is located in the lower left margin of the optical scan form). It helps if the optical scan forms are used in the order of this code. It should not be difficult to keep them in order if they are arranged that way before page numbering. Those who sample different areas throughout the season can arrange the litho codes in order before each sample is taken.
- If the optical scan forms get wrinkled or blotched they should be copied to a new form before submitting to Port Moller. The optical scanning machine is extremely sensitive to wrinkles and blotches and will misread or reject the sheets.
- When sending optical scan forms and gum cards to an area office, let the office know that the data is enroute and follow-up in a timely manner to make sure that it arrives.
- Look down the form from two angles after the data has been recorded to pick up any glaring mistakes. A common error, for instance, is placing both the 1 and 9 of a 419 mm fish in the 10’s column with nothing in the 1’s column.
- It is important for post-season editing that all information be provided on every AWL form and gum card. Include such information as who wrestled the fish, plucked the scale, and filled out the forms. It is the responsibility of the crew leader to make sure all information is entered correctly.

Appendix A2.–Example of an optical scan form and gum card from Bear River.







Note that ages have been entered on the form. The "Age Group" and "Age Error Code" columns will not filled in until the scale is read to determine the fish's age. It is important for post-season editing that all information be provided on every AWL form and gum card. Include such information as who wrestled the fish, plucked the scale, and filled out the forms. It is the responsibility of the crew leader to make sure all information is entered correctly

Appendix A3.–Assigned port and weir location codes.

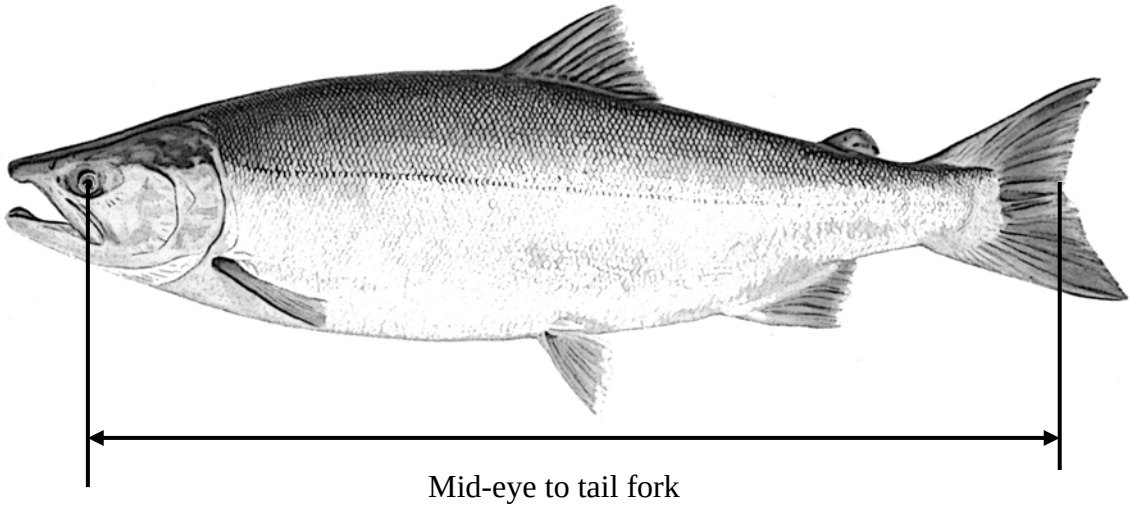
Port Codes

050	King Cove
051	Port Moller
052	Dutch Harbor
053	Akutan
054	Sand Point
057	Canoe Bay

Weir Location Codes

281-50-001-059	Orzinski Lake
313-30-003-056	Nelson River
315-11-002-055	Bear River
315-12-001-060	Sandy River
316-20-001-058	Ilnik River

Appendix A4.–Measuring adult salmon length.



Mid-eye to tail fork

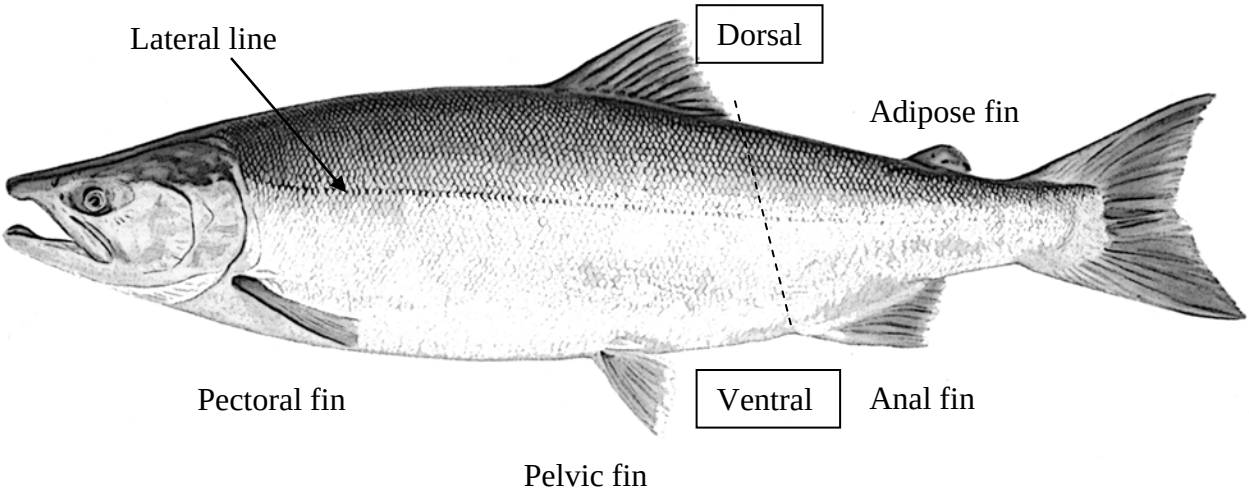
Because the length and shape of the snout of salmon changes as the fish approaches sexual maturity, length measurements are made from the middle of the eye to the fork of the tail. The length is always recorded to the nearest millimeter. The procedure for measuring mid-eye to fork of tail is as follows:

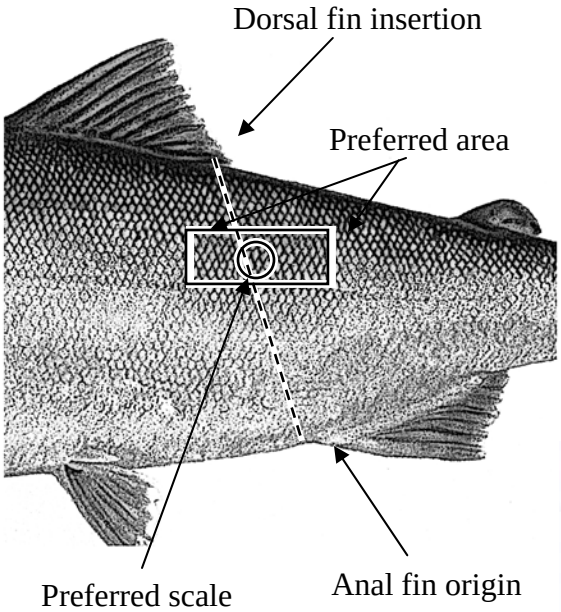
1. Place the salmon flat, right side down, on a board that has a ruler mounted on it with a metric scale. Orient the salmon with its head on your right, the tail in your left hand, and the salmon's dorsal surface (back) towards you. This puts the salmon in the correct orientation for the plucker to remove the preferred scale from the fish's left side if the plucker is standing on the other side of the measuring board.

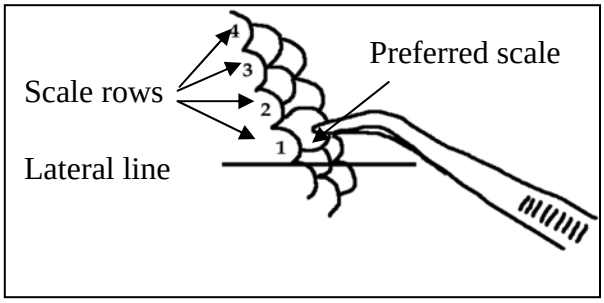
2. Line the eye of the salmon up with the end of the ruler, then hold the salmon's head with your right hand. Gently sliding your thumb into the salmon's mouth and grasping the lower jaw works well for larger fish.

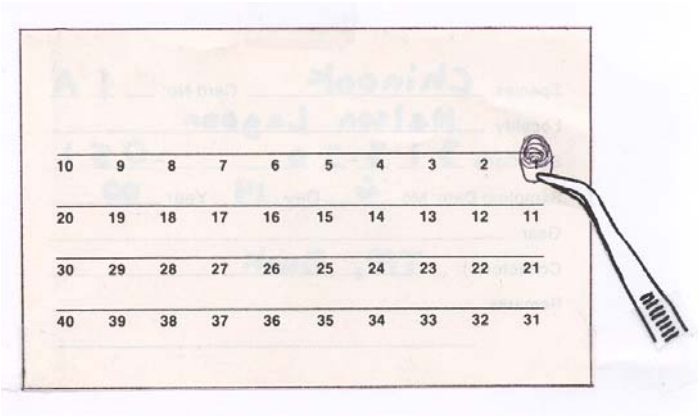
3. Flatten and spread the tail against the board with your left hand. Read the mid-eye to tail fork length to the nearest millimeter.

Appendix A5.–Preferred scale sampling area on an adult salmon.









Do not turn scale over (ridged side should face up, as on fish). Place scales directly over the number on the gum card. Mount scale with anterior portion of scale oriented toward the top of the card.

Appendix A6.–Sampling weeks (period) and corresponding calendar dates, 2008.

Sampling week	Calendar Dates
20	10-May to 16-May
21	17-May to 23-May
22	24-May to 30-May
23	31-May to 06-Jun
24	07-Jun to 13-Jun
25	14-Jun to 20-Jun
26	21-Jun to 27-Jun
27	28-Jun to 04-Jul
28	05-Jul to 11-Jul
29	12-Jul to 18-Jul
30	19-Jul to 25-Jul
31	26-Jul to 01-Aug
32	02-Aug to 08-Aug
33	09-Aug to 15-Aug
34	16-Aug to 22-Aug
35	23-Aug to 29-Sep
36	30-Aug to 05-Sep
37	06-Sep to 12-Sep
38	13-Sep to 19-Sep
39	20-Sep to 26-Sep
40	27-Sep to 03-Oct

APPENDIX B. PROCEDURE FOR SAMPLING SALMON SMOLT

Appendix B1.–Procedure for sampling salmon smolt.

SMOLT SAMPLING

Once the field camp is established, 200 sockeye smolt will be sampled for scales, length, and weight data on a weekly basis during the peak outmigration at Bear River and Sandy River. Smolt sampling will terminate when fewer than 10 smolt are captured over a 24-hour period, and after consulting with your supervisor.

At Bear River, the fyke trap will be fished so sampling can be spread throughout the course of the week to obtain a representative sample. Forty fish taken on five days spread throughout the week will be the goal. The sample can be obtained in a shorter period if it is anticipated that spreading the sampling out over the course of the week may not be possible due to time constraints or physical factors

At Sandy River, the goal of sampling 200 smolt per week can be completed as the required number of smolt are collected. No effort needs to be made to spread the collection of the smolt out over the course of a week. If more than 200 smolt are captured, place the smolt in a large container and gently stir the water to mix the smolt. Randomly remove a portion of the catch and sample. Stop this procedure when 200 smolt are sampled.

Smolt will be sampled the same day of capture. A smolt sampling day encompasses the 24-hour period between noon of one day to noon of the following day, and is identified by the calendar date corresponding to the first 12-hour period. Age, weight, and length data will be recorded on adult optical scan forms. Refer to Appendix B2 of the standard procedures for recording data on optical scan forms. Record at the top of each form: personnel collecting the data, length of time the gear was fished (in hours), the hours from/to the gear was fished, approximate numbers of sockeye smolt and other species captured.

Smolt will be sampled as soon as possible after they are captured. The smolt will be transported in clean, 5-gallon buckets to the sampling area. An additional bucket of water will be used as a recovery bucket. Buckets containing smolt will be filled with fresh, clean water and aerated. The buckets will be covered when possible to reduce stress on the fish.

Tricane Methanesulfate (MS-222) will be used to anesthetize the smolt; latex gloves will be worn to prevent direct exposure to the anesthetic. Experienced personnel will demonstrate the use of this chemical. A small amount (approximately 1g) of MS-222 and a small amount of baking soda will be dissolved in approximately 2L of **cold** water. The amount of anesthetic used will vary depending on the water temperature, freshness of the chemical, and the size of the smolt. Smolt are extremely sensitive to changes in water temperature so extra care should be taken to prevent the anesthetizing solution from becoming too warm. A digital thermometer and ice cubes added to moderate the water temperature and not allow it to exceed 10°C. A few smolt will be placed in the anesthetic solution until subdued to a point where they can no longer flex their axial musculature but can still ventilate their gills. The concentration of the solution should be such that it immobilizes the fish in 2-3 minutes. After the fish are anesthetized, it is important to sample them quickly and place them in a recover container to prevent mortality. No more than 80 smolt will be anesthetized with one batch of solution.

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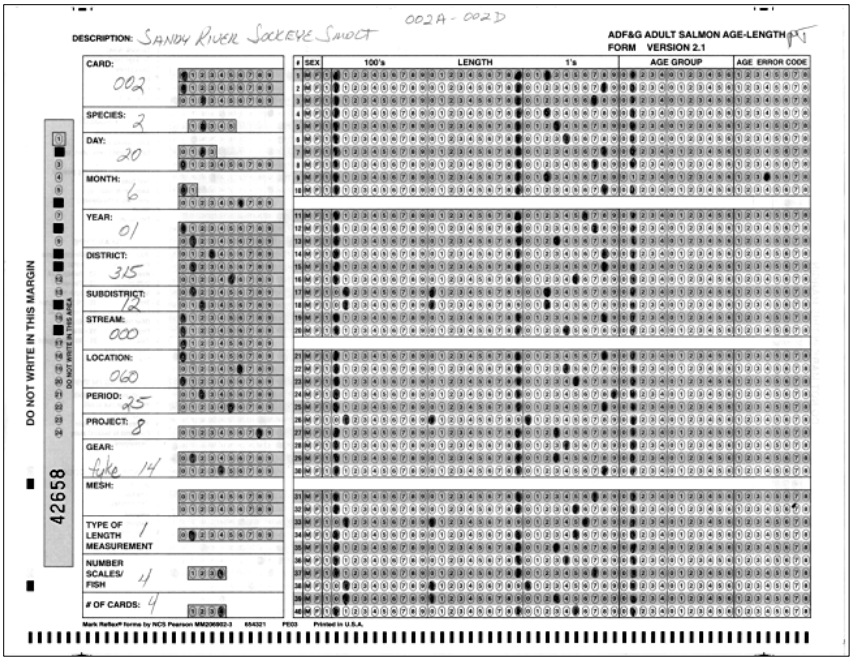
After the smolt have been immobilized, excess water will be gently removed from the fish using a paper towel or a wet sponge as a blotter. Place the fish on its right side to sample the left side. Measure smolt length, to the nearest mm, from tip-of-snout to tail fork (Appendix B3). Record length by blackening the appropriate column circles on the front side of the optical scan form. When collecting length data, take care to ensure that each length corresponds to the appropriate scale smear mounted on the slide, as length-at-age is evaluated for each sample. Use a scalpel to remove 5-10 scales from the preferred area (Appendix B4). Mount the scales on a glass slide (Appendix B5). Label the left portion of the slide with location, date, specimen number, and collectors. Weigh each smolt to the nearest 0.1g, and record the weight by blackening the appropriate column circles on the backside of the optical scan form. When measuring weight, care should be taken to avoid excess water clinging to the smolt, which would give an inaccurate value.

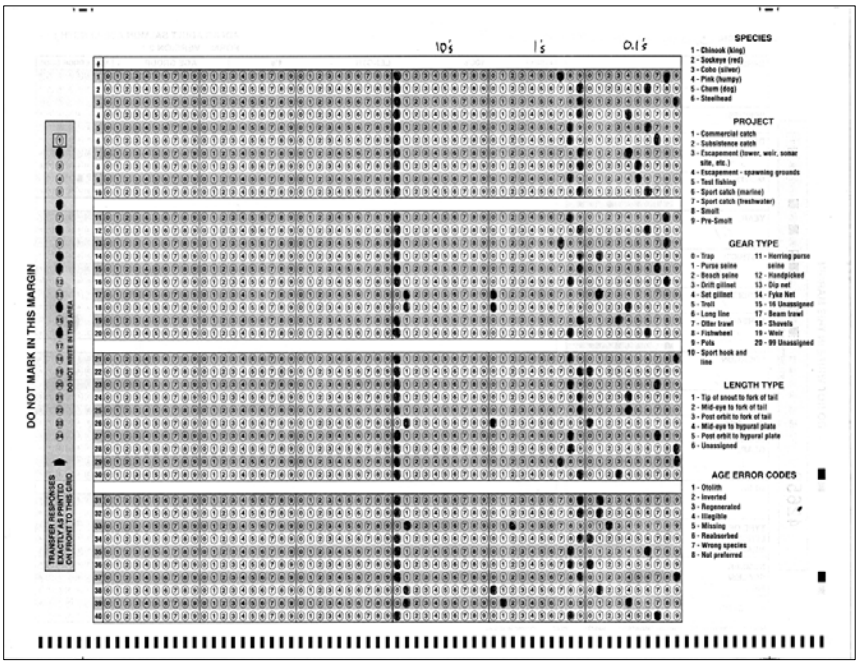
Smolt should be kept lightly wet at all times during sampling. Weights will be recorded to the nearest 0.1 gram. Weights are recorded on the back of the optical scan form in the three columns from the right as found in Appendix B2.

Appendix B2.–Smolt optical scan form from Sandy River.

Front

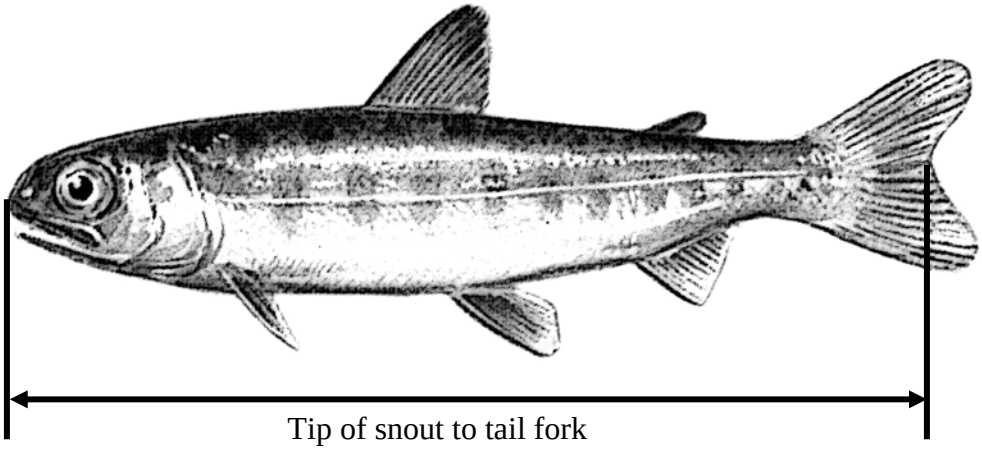


Back



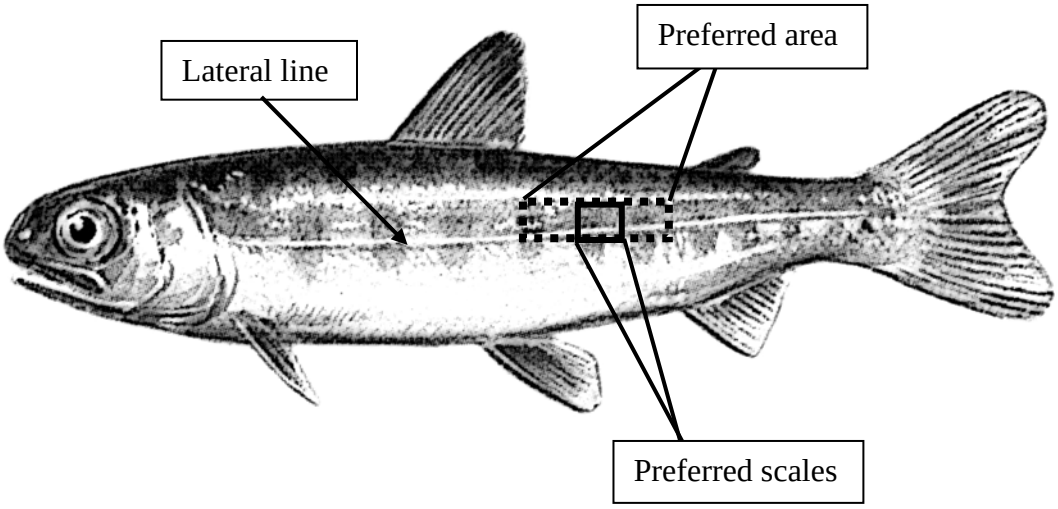
It is very important that the “litho code” from the far-left column of the front of the AWL be transferred to the corresponding column on the back of the AWL. Note that the “Age Group” and “Age Error Code” columns on the front of the AWL have been filled out. These columns are used by a person aging the collected scales, and are not used in-field by sampling personnel.

Appendix B3.–Measuring smolt length.



Measure the smolt from the tip of the snout to the tail fork. Lay the smolt on the measuring tape with the snout at the zero mark. Carefully spread the tail with your fingers and note the length inside the fork to the nearest millimeter. It is important to spread the tail, as collapsed caudal rays will give an inaccurately long measurement.

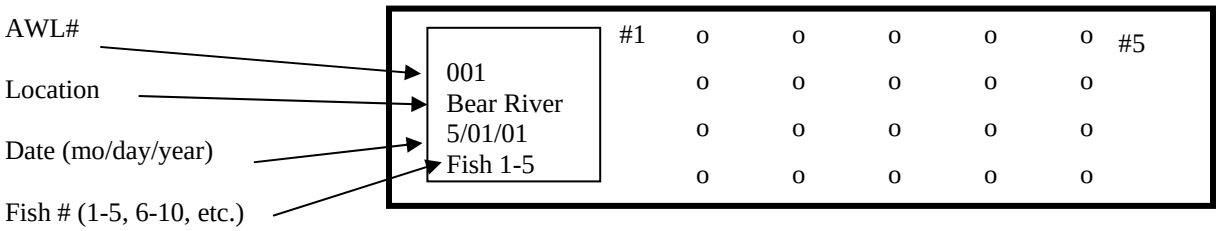
Appendix B4.–Preferred scale sampling area on a smolt salmon.



Appendix B5.-Smolt glass slide example.

Information for label:

GLASS MICROSCOPE SLIDE



When the slides are completed, return them to the box in order by optical scan form number, date, and fish number. Label the slide box on top with the following information:

Location (e.g. Bear River)
Optical scan form numbers (e.g. #001 - 020)
Beginning and ending dates (e.g. 5/01/01 - 5/15/01)

APPENDIX C. GENERAL EQUIPMENT, CAMP MAINTENANCE, AND CAMP POLICY

EQUIPMENT MAINTENANCE

Equipment maintenance is one of the most important operations you will perform during the field season. The outboard motors, generators, and other equipment must be kept in good operating condition.

It will be the crew leader's responsibility to assign the most knowledgeable member of the crew to the job of maintaining and servicing the equipment. It will be this person's responsibility to see that all equipment is kept in operating condition.

ENGINE CARE AND OUTBOARD OPERATION

If outboard uses mixed fuel, the correct outboard motor fuel mixture is 50:1. The newer Precision Blend outboards mix the two-cycle oil and gas automatically, but older engines will need to have their fuels pre-mixed. Always pour the oil into the tank first, then add 2 or 3 gallons of gas and mix thoroughly, then fill tank to capacity always using a large funnel and chamois filter. Some outboards may be four-stroke engines, which need to have oil level checked routinely. Always mix fuel tanks or equipment under cover to prevent water contamination and always use a funnel and filter. Note that Chain saws have a fuel mixture of 25:1. Chain saw gas should be mixed in a separate can and clearly marked that it is chain saw fuel to avoid accidentally being used in outboards.

Always place outboard motors in neutral when starting and always make sure a safety line is attached between the boat and motor. Perform a check daily of the clamp screws that hold the outboard to the transom. Also routinely check the motor for loose screws and bolts, cracks, and breaks, especially in the area of the lower unit. Never start or run an outboard in the tilted position.

In the normal operation of a outboard, a stream of water is discharged from a hole in the bottom edge of the cowling or from the back of the shaft. If this stream of water stops, the water pump may not be working and the motor should be shut off. On propeller outboards, the side plate over the water intake can be removed for cleaning as it may be plugged. If the pump continues not to function, the outboard should not be run, and a report to base camp should be made. On jet units, a cover on the side of the cylinder head through which water circulates can be removed and cleaned, and the cover over the temperature sensor (thermostat) can also be cleaned to restore flow. Take along a piece of bailing wire to dislodge sand from the small water discharge tube under the cowling.

Check the gear oil in the lower unit of the outboard once a week and drain and replace the gear oil at the end of the season and every 50 hours of operation. Jet units must be greased daily. This is crucial. Grease guns will be provided.

If the skeg or jet unit hits bottom, check the screws to make sure they are still secure and there is no damage to the lower unit. Also, remove any rocks stuck between the grates on the jet unit.

All outboards are to be tilted in the up position when moored to preclude silt accumulation in the jet unit or water pump and skeg or housing damage.

If your outboard will not start, check the following:

- Check to make sure the kill switch is clipped to the engine properly.
- Check to see if the fuel line is connected properly to the motor and the tank and not pinched or kinked, and that the air vent on the tank is open.
- Check to see if there is water in the gasoline.
- If the engine is flooded, wait 5 minutes for the plugs to dry before attempting to start again.
- Check the spark plugs and spark plug wires as they may be fouled or defective (replace if needed).

-continued-

BOATS

Boats are to be kept clean and free of loose tools and debris, and moored at locations where they are not subject to damage by wave action or through contact with the river bottom in rock laden areas. Boats must be bailed regularly of rainwater to keep them from sinking.

Each crew leader will be responsible for maintaining mooring stakes on the river bank sufficient for the boats assigned to his project plus one transient craft. Further responsibility includes maintaining a bow line on each assigned craft and ensuring that each boat is properly moored at the end of each work day to preclude possible loss or damage.

GENERATORS

Portable generators may be supplied to field camps. Their maintenance is important. Since most of the generators have 4-cycle engines, mixed gas must not be used. The crankcase oil reservoir should be checked daily and maintained at the full level. At the end of the season, and after 25 hours of operation, the oil should be changed. Spark plugs should be checked at every oil change for fouling and gap.

CAMP MAINTENANCE

Maintaining a clean and efficient field camp is required. Maintenance of living accommodations and other installations will be performed as necessary. All materials necessary will be provided.

Grounds will be kept free of litter. All garbage will be bagged up and disposed of at the nearest sanitary landfill at least once a week. Special precautions should be observed to ensure that garbage does not attract bears and other scavenger species.

Upon completion of the summer season, all camp equipment will be cleaned prior to winter storage. All sampling nets, tarps and cloth items must be dry before being stored. All skiffs and ATVs will be chained and locked to a stationary object at the end of the season.

The crew leader at the close of the field season will take a complete equipment inventory. A report detailing the equipment and storage locations will be submitted at the end of the season to the supervisor. A list of equipment needing replacement or repair will also be submitted, along with a equipment need list for next season.

CAMP POLICY

No alcoholic beverages are to be stored in areas open to public view. If alcohol is consumed at a camp an employee must be off-duty and under no circumstances shall he or she engage in the operation of any State equipment or firearms. Employees will not return to duty status under the influence of alcohol.

The crew leader of each camp shall establish a policy on living standards and personnel behavior in accordance with State guidelines. Time off for individual crew members must be scheduled by the supervisor. All employees will be required to act in a professional manner at all times and shall be especially courteous to the public.

It will be the responsibility of the crew leader to prevent any abuse of State equipment. The crew leader will report within 24 hours to the supervisor any damaged or lost equipment.

FOOD ORDERS

Grocery orders should be placed during the evening radio schedule beginning at 7:30 PM. For Nelson, Bear, Sandy, and Ilnik Rivers, the order should be placed with Port Moller, and for Orzinski Lake the order is placed with Sand Point.

-continued-

PERSONAL GEAR AND PETS

Generally 100 lbs. is a maximum limit for personal gear. If you anticipate bringing more than that amount to your field camp, check with your supervisor first. Pets are not permitted in remote field camps.

RADIO OR SATELLITE PHONE SCHEDULES

Radio or satellite phone schedules will be made twice daily. Schedules are normally at 8:30 AM and 7:30 PM on 3.230 megahertz unless otherwise specified. The morning schedule is used for passing along the current weather (visibility, ceiling, wind speed and direction, precipitation, etc.) and the previous day's escapement counts. The evening schedule is used for updated escapement counts, grocery, and supply orders, and the latest pertinent fishery announcements. All camps must complete the schedule within 15 minutes in the morning and 30 minutes in the evening, so we do not invade another areas time allotment. So, keep the conversation short. Personal conversation between camps should be arranged at times as not to interfere with any ADF&G schedules. Where satellite phones are being used, a schedule will be worked out with the appropriate supervisory office. Personal use of satellite phones will be limited to a specific time that will not interfere with any radio schedules, and only be allowed if there is no cost to the state. Emergency contact phone numbers should be clearly displayed on/near the phone.

If a camp does not respond to two consecutive radio/phone schedules, the worst will be assumed and a plane will be dispatched. If for some reason you know that you will not be able to make a radio schedule, notify beforehand either Cold Bay, Sand Point, or Port Moller. If you miss a morning radio schedule without prior arrangement from your supervisor, you must immediately contact your supervisor to pass on pertinent escapement numbers since these numbers are used for management of the fishery as well as passed on to other locations. In an emergency, the Coast Guard can also be summoned using frequency 4.125 MHz by saying "Mayday, Mayday, Mayday" and give your name, say who you work for, your location (field camp name on the Alaska Peninsula and approximate distance from a town, i.e. 10 miles east of Port Moller for Bear Lake or lat./longs. if known), and the nature of the injury or emergency. Always broadcast even if you think nobody hears you. Somebody may be listening to the radio somewhere and can pass on your emergency to the appropriate people. All personnel need to be familiar with the single sideband/phone and the operation to contact the appropriate emergency personnel. A list of sideband frequencies and phone numbers should be readily available (taped to the radio/phone) if an emergency exists. If 4.125 MHz on the single side band radio is not marked on the radio and you need assistance finding which dial number it is located on, please ask the appropriate supervisor. Listed below is the latitude and longitude of some field camps. These lat./longs. should be written on the radio or be readily accessible in an emergency.

Orzinski Lake, ADF&G cabin	55°43.783' N. lat., 160°05.700' W. long.
Nelson River ADF&G cabin	55°48.990' N. lat., 161°14.047' W. long.
Bear River ADF&G cabin	56°02.242' N. lat., 160°16.098' W. long.
Sandy River ADF&G cabin	56°11.941' N. lat., 160°01.529' W. long.
Ilnik River ADF&G cabin	56°36.729' N. lat., 159°34.282' W. long.
Port Moller Airstrip	56°00.331' N. lat., 160°33.665' W. long.

Any employees performing job duties away from the cabins (such as boating trips up/downriver) or hiking/fishing/etc. on their own time are required to let others know their plans such as where they are going and when the are expected to return. Also, in each camp is a handheld VHF radio (with spare batteries), backpack with basic survival gear, EPIRB, and firearm and ammunition which the employee is encouraged to carry for their own safety. All field camps will standby on channel 72 for North Peninsula locations and channel 6 for Orzinski Lake, as do local pilots and commercial fishermen. All employees should be aware of the gear in the back pack and should request additional safety/survival items if needed or missing. Employees with any questions or concerns are asked to pass them on to their supervisor.

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FISH AND WILDLIFE VIOLATIONS

This is not intended as an inclusive procedure for handling violations. Below are guidelines for obtaining the necessary information and/or evidence to document a violation. It is important to be familiar with the commercial fishing, subsistence fishing, sport fishing, and hunting regulations in your area. Violation reporting procedures are printed on the back cover of the commercial fishing regulation book. Request the regulation book if your camp does not have one.

The use of the "4 W's" can greatly aid the Fish & Wildlife Protection officer in obtaining sufficient evidence for a case.

- What is the violation?
- When did the violation occur (e.g. date, time, tide condition, etc.)
- Where did the violation occur?
- Who is in violation and who are witnesses?

It is important that specifics about the event be documented so the appropriate officer can follow-up and contact those involved. If you have a camera available, pictures are extremely valuable in prosecuting offenders. Collect as much information as possible and contact your supervisor or a State Trooper from the Fish and Wildlife Protection Division immediately. If you do not feel comfortable, or your personal safety may be in danger, do not pursue the violation. Contact your supervisor and they will handle the situation. Be aware that you do not have the power to arrest somebody or seize equipment. Just limit yourself to documenting the event as safely as possible.

FIREARMS

A State weapon will be provided at each camp. If you are unfamiliar with the operation and use of a firearm, please let your supervisor know. Training will be provided for anyone who requests it or is unfamiliar with firearms. Loaded guns are prohibited inside the camp facilities. Anyone handling a firearm should always treat it as if it were loaded. Guns should be kept clean and oiled and be completely unloaded while being cleaned. Any horseplay with or misuse of firearms while working for the Department of Fish and Game will not be tolerated and may be grounds for immediate dismissal. Completely unload a firearm of all rounds before entering a vessel, airplane, or four wheeler.

BEARS

Do not encourage bears to come around camp by leaving food or unburned garbage around. Do not shoot at a bear unless, in your best judgment, it is endangering someone's life or damaging personal or state property. Use your best judgment on whether to shoot a bear if property is at stake. When trying to frighten a bear away by shooting, do not fire toward it. You may wound it by pulling the shot, ricochets, etc. Do not use cracker shells at close distance (<30'). If a cracker shell hits a bear at close range, it may penetrate the body cavity and explode inside the bear, killing it. If you are having problems with a particular bear around camp, call the appropriate supervisory office and notify them of the situation. The Division of Wildlife Conservation personnel may take care of the problem.

GARBAGE

Burn garbage as needed to prevent bear problems (e.g. food products). Flatten metal cans and box them for empty return flights. Be sure all burn barrels have proper grates or covers to prevent grass fires from sparks. Never leave a fire unattended and always have adequate fire extinguishing materials handy.

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TRANSPORTATION

Do not endanger life or property by going out in a boat on dangerously rough water. If you are unfamiliar with marine safety, ask one of the field offices for information or advice. All personnel must wear a Coast Guard approved life jacket when out on any water. Be conservative and use good judgment: if you think it is dangerous, don't go out on the water.

Extra shear pins or propellers, and a tool kit which includes pliers, spark plugs, and a spark plug wrench, should be in the boat at all times. Also, handheld VHF and flares should also be carried. In case travel at night becomes necessary, carry a flashlight.

Some camps may be furnished with 4-wheel all terrain vehicles (ATV). The following safety precautions shall be observed at all times regarding Department ATV operation. Only employees of the State may use the vehicles. Non-Fish and Game personnel are not allowed on these vehicles at any time. Follow all safety rules listed on the vehicle and in the safety manual provided by the manufacturer. If the manual is unavailable, contact your supervisor, as they will have a copy that could be sent to you. A safety helmet is provided. An ATV may provide transport of State materials, supplies, and equipment between camp sites and supply planes or vessels. In addition, they may be used for transportation to and from assigned duties in the field such as monitoring a fishery or collecting harvest information, etc.

Review the Marine Safety and Light Aircraft Safety Manuals located at all camps before boating or flying. Do not get in a boat or plane if you feel uncomfortable with the situation. Consult the crew leader or pilot beforehand.

FIRE AND FIRST AID

All remote employees are required to have up to date 1st Aid and CPR certificates. Make an effort to avoid intestinal parasites such as *Giardia*. When in doubt, boil your drinking water for 15 minutes.

Check your camp's fire extinguisher. Know where it is and how to use it! Inventory your camp first aid kit, replace items as needed and become familiar with basic first aid treatment. Review the first aid booklet.

Keep the cabin, surrounding area, and yourself clean and neat. Appearance is important. You will not always be notified of the intended arrival of visitors, officials, etc. Visitor impressions are often based on your appearance.

COMPATIBILITY OF FIELD PERSONNEL

If you find yourself unable to get along with other members at your camp, notify your supervisor and an attempt will be made to resolve the situation.

APPENDIX D. BEAR, NELSON, SANDY, AND ILNIK RIVERS, AND ORZINSKI LAKE WEIR INSTALLATION PROCEDURES

Materials

All weir installation materials are stacked on the bank of the river at the installation location. The materials are divided roughly in half on either bank. You will need the following items to install the weir and do repairs on the tripods:

- Claw (framing) hammer
- 2-3lb hand sledge
- Hand saw
- Wire cutters
- Vise-grips
- 16 penny nails (for attaching sandbag platform boards and catwalk boards)
- 20 penny nails (for stringer supports)
- Dock spikes (for reinforcing main tripod timbers)
- A number of 2x4's (for tripod sandbag platform)
- Bailing wire or long, strong zip-ties

LOCATION SELECTION

Weir location selection is critical to subsequent ease of weir maintenance, access, and safety. The weir should be installed roughly in the same location as the previous year. The riverbed should be thoroughly profiled by walking across the river a number of times to determine where any holes, gravel bars, or channels exist which could cause problems with alignment or installation. Choose a transect which offers the smoothest, best consolidated, and most continuously regular substrate possible. Keep in mind that the weir should run roughly perpendicular to the river's current in the deepest, fastest channel, which is generally located closer to the far (southwest) bank. Place a stake or sandbag on each bank at either end of the chosen transect so that you have a target to work towards and a fixed reference point to sight-off of to check tripod alignment. The weir should be far enough upstream that the lodge can park a number of skiffs behind the near (northeast) end and be able to drive their tractor to the skiffs, even at high water levels. The weir must also be far enough downstream that the tripods near the far (southwest) bank do not protrude into the flight path of aircraft approaching or taking off from the airstrip. Taking all these limitations into account, there is actually very little latitude in installation location.

Bear River water levels are generally low in spring when the weir is installed, but can be expected to rise significantly (two feet and more) over the course of the summer. In some years, two distinct peaks in water level can be observed which correspond roughly with the peaks in the salmon runs. The water can rise as much as two feet in 24 hours, usually as a result of heavy rains, warm weather melting snow and glaciers, and high winds off the lake, so be prepared for the worst early in the season.

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TRIPOD PLACEMENT

The weir generally uses 21 to 23 tripods, so you may end up with one or two spare. Begin on the near (northeast) bank with the older, weaker tripods where the current is slack. Check the 20 penny nails in the front leg of the tripod where the stringers will rest before placing them in the water as it is hard to drive new ones in place when the leg is underwater. When rolling the tripods to the river, make every attempt to be gentle so that the timbers do not split or part, and that the nails on the front leg are not bent. Place the tripods so that the back legs have about 4 inches of gap between them (the width of your foot) and mount stringers on the front leg as you work. Make sure there is 4-8 inches of overlap on either end of the stringer where it meets the tripods. Adjust the spacing of the tripods to maintain adequate stringer overlap. Allow more overlap where the current is stronger and the water is deeper. This will allow some tripod settling and traveling without the stringers being pulled off the front leg.

As you work, check the alignment by sighting down the stringers towards the target stake or sandbag on the far bank. The tripods placed in deeper water may require some sandbags to keep them from moving in the current. Once you have found the correct position for the tripod, push it back and forth forcefully to work the legs down into the gravel and set them in place. This will help minimize movement later. Recheck alignment periodically. Proper alignment of the tripods is critical to having the panels lay flat on the stringers and prevent gaps between panels later. A little extra care and effort at this stage can save countless hours of weir maintenance later in the season when the water level rises.

Once the tripods are set and the stringers are on, spend some time loading the platforms with sandbags as the resistance will increase dramatically once the weir panels are put on. The tripods in the shallow, slow moving water near the banks may need as few as 6 sandbags each, while the deeper tripods may require 40 or more. If you begin installing the weir late in the afternoon, this is a good place to stop for the day to allow the tripods to settle down into the substrate overnight before adding the resistance of the panels. This additional resistance can cause the tripods to settle back as well as down, negating much of the effort devoted to alignment.

Keep in mind that the weir generally fails due to sandbags being washed off the tripod platforms, so sandbag placement is critical to surviving episodes of high water. The sandbags should be wedged between the tripod legs as tightly as possible. Eventually, additional sandbags can be stacked on the wings behind the back legs, and a small platform can be added to the crown of the tripod for additional bags. Nail one or two planks across the back of the rear legs above the wing support to keep sandbags from washing off the back of the platform once it is loaded.

PANEL INSTALLATION

Place the panels on the weir starting on one end making sure that the panels are perfectly perpendicular to the water surface. You will likely have to dig into the substrate to allow the entire bottom of the panel to rest in the gravel as you descend the banks or move past irregularities in the gravel. Hop up and down on the t-angle crosspiece of the panels to push the panel down into the gravel. As you go, do not forget to install the three gates at intervals that cover different water depths. Two gates will be used as fish passes, and one will lead into the sampling trap. As the water level and turbidity rise, you may need to switch to a fish pass gate in shallower water, so install the gates leaving yourself some future options (such as one in the deepest channel, and another closer to the bank). Think about where you want the trap and install a gate for this purpose as well.

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Finally, put the catwalk boards on and use them for shuttling more sandbags onto the weir. All boards should overlap on a tripod wing. If necessary, blocks can be nailed to the tripod wings if the catwalk board does not meet the wing properly.

Line the entire front of the weir with sandbags to prevent scouring below the panels. Later, in August, pinks will accumulate in front of the weir to spawn. While digging their redds (nests), they throw prodigious quantities of gravel up on the front of the weir, which becomes the single greatest maintenance concern on the weir. Bears will swim back and forth in front of the weir, also throwing gravel up on the panels. Laying weir panels flat on the river bottom in front of the weir helps keep the rocks from being kicked up. Lay the panels parallel to the weir and hold them down with a few sandbags.

Zip-ties can be used to attach the panels to the stringers and join panels where they meet in order to keep the panels from shifting and make it more difficult for bears to knock the panels free. Another method of keeping bears from opening holes in the ends of the weir is to stack numerous panels against the weir. The bears typically will pull one or two free, but then lose interest.

TRAP ASSEMBLY

To assemble the fish trap, you will need:

- 3 full-sized weir panels
- 2 panels which have been cut off at an angle on one end
- 3 half-panels (cut lengthwise)
- 6 fence posts
- 2-3 lb hand maul or post-pounder
- Bailing wire or long, strong zip-ties
- Wire cutters
- Vice-grips

The trap is most effective if it is installed offset to one side of the fish gate so that you can run the net up a weir panel and not leave any gap through which the fish can escape past the net. Begin by laying a full sized panel on its side pointing upstream, letting the downstream end rest against the base of the weir next to one side of the fish gate. Pound two fence post in at both ends and wire the panel to the posts to hold it. Measure the distance between the top and bottom t-angle cross pieces of a panel. Measure out this distance across the face of the weir and put another full sized panel parallel to the first in, again held up by two fence posts. Next, stand well upstream of the open end of the trap with the last full sized panel. Holding the panel vertically on its side and parallel to the weir, in one movement sink the panel down into the water and walk forward with it as the current moves it downstream until it rest against the two existing panels jutting out from the face of the weir. You should now have a mostly enclosed box sitting in front of the gate. The gaps at the downstream ends of the side panels of the trap can be closed using the diagonally cut panels. Put the cut panels on the inside of the side panels with the cut ends resting on the river bottom and the short side resting against the face of the weir. Bailing wire everything in place. Add more fence posts to reinforce the structure as needed. The three lengthwise half panels are available to make the sides of the trap taller if the water should rise, and to generally put the measuring table at a comfortable working height.

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When removing the weir, take care to stack all materials well back from the river bank as these have been eroding for some time and anything which falls in the river will be carried away by fall floods or out with the ice in the spring. Stack the tripods closely together and tie a line through all the legs above the platform to keep the tripods from blowing away and to keep the bears from being able to separate and break them.

PREINSTALLATION INSPECTION

Upon arriving at the Sapsuk River field camp inspect the over-wintering condition of the following weir components and relay the condition of them to the Port Moller ADF&G office at the next radio schedule.

- The rail
- The south bank stabilization structures
- The winch stanchion and north bank deck
- The weir trap and funnel (located on the south bank)
- The weir panel piles (There should be 3 on the north bank and one on the south bank)
- The Beebe winch

The rail should be embedded, straight, and roughly perpendicular to the stream banks. Some or all of it may be covered with gravel deposited during the winter. Before installation begins, check to ensure that an erosion hole has not developed under the rail.

The south bank should be reinforced with a two-gabion length complex just downstream of an angled gabion as well as the plywood bulkhead.

Check to see if the winch stanchion and north bank deck is intact. The deck surface should be level. The stanchion should be upright and straight. The base of the stanchion should line up with the end of the rail and a pulley should be mounted where the stanchion and the rail meet.

The weir trap and funnel should be secured to fence posts on the south bank. They are oriented parallel to the bank and the trap is upstream of the funnel.

The four weir panel piles should be secured to fence posts and covered with plywood and aluminum panels to help protect the plastic from UV light.

The Beebe winch should be wrapped in a tarp and is located on the forward seat of the Grumman skiff under the cabin.

PREPARATION

The rails entire surface, including all of its eyes, needs to be cleared of all silt and gravel. A dry suit, hood, snorkel, mask, and sturdy garden rake are needed for this task. Rake substrate off and downstream of the rail surface. Ream out each rail eye with an individual rake tooth. This action is necessary to clean each eye, facilitating cable stringing and preventing the cable from jamming during installation. If the rail has been undermined, sandbags will need to be placed both upstream and downstream of the rail to fill the void. After the sand bags have been positioned, a piece of chain link fencing should be securely staked down over the sand bags by driving metal “J” hooks around the edges of the new piece with a heavy hammer.

The next task is to clear sediment from the area near each rail end near each bank. This is necessary not only to clear the eyes on the rail, but also to preserve visibility in the water when installing the first and last panels. This makes installing these panels much easier.

The next task is to install the Beebe winch on the stanchion and string the cable through the rail eyes. Unlock the combination lock (combo is 0127) and detach the cable from the winch. Carefully lift the winch out of the skiff onto the ground. Two steel “J” hooks located in the cabin are a handy tool for

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carrying the awkward, heavy winch. Insert each “J” hook through a different pair of bolt holes on the mounting flange of the winch. By holding the hook ends, two strong people can carry the winch down to the winch deck.

The winch is mounted to the stanchion with four bolts, washers, and nuts located in a ziplock bag in the gray plastic toolbox. The winch is bolted to the north side of the stanchion with its handle pointing downstream. Insert the bolts through the winch and attach the washers and nuts on the south (offshore) side of the stanchion.

Loosen the winch cable from the spool and pull the cable down the stanchion between the stanchion and the pulley, then under the pulley and through each rail eye. One person operates the winch providing cable slack while another person, in a dry suit, pulls out about 10 to 15 feet of cable at a time and then threads the cable end through each eye in the rail. If more slack is pulled out at any one time, the cable tends to get snagged on itself. This process is repeated until the cable is threaded through all the eyes across the river. Extreme care must be taken to thread the cable through all the eyes in the rail. If any of the eyes are missed, any work toward installation of the weir will have to be undone and done over.

Upon reaching the south stream margin, the winch cable must be looped through the south bank deadman anchor cable and cable clamped back on itself. (The deadman loop should be protruding through the plywood of the bulkhead right over the end of the rail.) Before clamping the cable on, measure the distance of the first weir panel’s cable hook from the edge of the panel. (The first panel is one of two unique panels stored on the south bank with “gasket” material (herring web) attached to the left side of the panel, when looking at the panel right side up from the upstream end.) The loop formed when the winch cable is clamped on itself must be shorter (including all the clamps attaching the cable) than this distance to prevent interfering with installing the first panel snugly against the bulkhead. Three cable clamps are sufficient to attach the cable. Cable clamps must be tight so the cable will not slip under the strain that will be on when the weir is installed. The clamps should be attached with the cable end to the clamp loop side. Ideally, the cable clamps will also be installed on the shoreward side of the closest eye on the rail.

The next task is preparing the panels. Unwire panel stacks from over-wintering piles. Consolidate lengths of wire by draping them over bushes or placing them on the winch deck. Leaving wire in the grass can lead to hazards resulting in punctured drysuits, stumbling crewmembers, etc. Pull the fence posts out of the ground and store them away from the panels to prevent tripping. The panels need to be removed from the piles, carried individually towards the river upstream of the weir and laid out (resistance board up) perpendicular to the river with ample space between them for walking. Three people are needed to carry

panels, one on the lower end of the panel and one on each side. When carrying panels from the side, hold on to cross members and ring eyes and **not** on the outside pickets. Picking panels up by the outside pickets will cause pipe clamps screws on these pickets to loosen or even pull out of cross members.

It takes 39 panels to complete the weir. One unique panel is a bit narrower than the rest and may be needed for the last panel to fit between the banks. To be sure you have everything prepared that you need this panel plus 39 others should be prepared prior to installing the weir. Examine each panel for loose pipe clamps, broken end caps, or broken pickets, especially jointed ones. Flag repair sites with surveyor tape and remove tape after repairs are made.

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Swing each resistance board to check board orientation when cables are taught. Resistance boards should be at about a 110° angle from the pickets. Resistance board angle can be adjusted by changing the spacing between the cross member the resistance board is mounted on with that of the other cross member the cables are attached to. This can be done by gently tapping on either on the cross members with a hammer. If neither of the cross members will slide on the pickets, it may be necessary to loosen all the pipe clamps on one cross member to facilitate sliding the cross member to make the adjustment. In this case, the pipe clamp mounting screws should be retightened after the adjustment is made. Also inspect resistance boards for broken hardware. Replace any cables, hooks, hinges, or eyebolts as needed to maintain the function of the board.

Including the uniquely narrower panel, there should be a total of 5 panels with gasket material attached to them in preparation for interfacing with either a stream margin or funnel opening. Ensure that these gaskets have no holes and the web is not rotten or in need of repair. The web should be wide enough to allow the floating panel attached to it to move freely in response to extreme changes in water levels while still not allowing fish to escape upstream. The gasket should extend along the entire length of the floating panel to which it is attached. The gasket on the panel interfacing with the north bank will need especially deep web material since the shoreward attachment point is up over the bulkhead wall on the edge of the winch deck. The gaskets for panels proximate to the south bank and the funnel (located on the south bank) should have an uncapped 13-foot length of PVC pipe ("connector pipe") laced to the edge of the gasket opposite the side attached to the panel. Make sure the lacing is snug and in good repair.

Care must be taken in handling weir panels. When turning them over, picking them up or setting them down, panels can be damaged if they are dropped or otherwise handled roughly.

Before each panel is transported into the water to be installed, the resistance board should be tied tight to the underside of the panel. To do this, tilt the panel on its side. Insert a piece of cord or small line (about 10-12 feet long) from the topside between the third and fourth pickets in from the edge of the panel just upstream of the resistance board. The other end of the line is passed between the third and fourth pickets in from the other side (again through the top, upstream of the board). Pull both ends across the resistance board and then push the back up through the panel (between the third and fourth pickets) so both ends are now on top of the panel just down stream of the resistance board. Draw the line up tight so it holds the resistance board snugly against the panel and tie the ends together with a bow knot.

Also before each panel is put in the water, two temporary rope "handles" need to be tied on the upstream corner of each panel to facilitate orienting the panel in the current while attaching it to the cable. Two white nylon 3/8" lines have been used for this in the past, each about 16-20' long. Tie each line around the bottom cross member and end plate with a slip overhand knot, with about a foot of line on the slip release so that it can be quickly released underwater. With rope handles tied and the resistance board tied up, each panel is ready to be put in the water and installed.

INSTALLING PANELS

The weir is 39 panels wide. Panels are installed one at a time starting from the south bank stream margin and progressing across the river toward the north bank and the winch stanchion. After the first three panels are installed, a gap is left between the third and fourth panels to allow space for the funnel and

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trap. The gap should be a couple inches wider than the outside width of the funnel with panels in place. This gap should be secured while installing the weir with at least four vice grips, a pair on each panel proximate to the gap. For the panel south of the gap, put each of the two vice grips on the cable immediately north of each of the two hook eyes. For the panel north of the gap, put each of the two vice grips immediately south of each of the two hook eyes. Make sure that each vice grip is clamped as tight as possible on the cable, to prevent slipping.

The first, third, fourth and 39th panels have gasket material on the appropriate edge necessary to interface with either of the banks or the sides of the funnel.

To install each panel requires (at least in the swifter/deeper sections) 3 people to handle transporting panels into and maneuvering in the water. These folks will all need to be in dry suits with snorkels and masks and (in deeper sections) weight belts. A fourth person (if available) will operate the winch. If a fourth person is not available, one of the other three people will have to walk back and forth between the weir panel installation site and the winch stanchion when necessary to operate the winch.

First, one person unlocks the winch and lets out slack (usually about 15 rotations of the handle when the winch is in the slower gear) while a second person pulls the excess cable upstream in a slight loop in the area where the panel is intended to be installed. The cable should have enough slack so the cable can be lifted 8 to 12 inches off the rail.

Then after the resistance board is secured and rope “handles” are tied in place as detailed earlier, each panel is carefully picked up off the bank. This is best done by one person lifting on each side above the resistance board (don’t lift using the outside picket!) while a third person lifts from the bottom of the panel. Care should be used while carrying the panel over the bank into the stream. Footing can be tricky and slow, deliberate movements will result in a lower chance of accidents. Once the panel is floating in the water, two people will immediately grab and hold the rope handles. It is useful to pay out some of the rope and stay upstream of the panel so when the panel is in position you are out of the way of the third person who hooks the cable to the hooks. It is also useful (especially in deep water/high current to wrap some of the remaining rope handle around your back and shoulders so you can be more effective if pulling the panel into position becomes necessary. By staging the majority of the panels upstream of the rail, the panels can be more easily maneuvered into position as they are floated across and downstream and pulling against the current will be minimized.

The panel is floated into a position slightly upstream of the rail where it will be installed and held there by the two people holding onto the rope “handles”. A third person (the “hooker”) pushes down on the upstream end of the panel while reaching down and hooking the loose cable onto the pair of hook eyes in the foot of the panel. This person then unties the rope handles (tied with slip knots so they are easy to untie under water) and removes the line holding the resistance board from unfolding. One of the other two people takes the lines back to the bank to rig the next panel for installation.

Meanwhile the “hooker” and the other person in the water tie the panel into the other previously installed ones by putting sideways pressure on it sliding it toward the south bank. When it is in the correct position, a signal will be given to the winch operator to take up the slack previously paid out. As the slack is being slowly taken up the panel should be continually checked for correct placement and adjustments should be

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made to the location of the panel as necessary. At this point the winch operator should ensure that all slack is taken back out of the cable. The foot-plate of each panel has short metal pegs or "ears" which stick up on either end. The PVC connector rods that join neighboring panels will slip down over these ears to rest against the foot of the weir. When in the correct position, the ears of neighboring panels should line up and be in close enough proximity so that the end of a connector pipe (16-foot length of 1" conduit with no end caps) will slip over both ears. It is sometimes necessary to make slight adjustments in panel location once the cable is already tightened. This may be accomplished by judicious use of a short crow bar or three pound hammer to move a panel slightly. (All tools used in water should be spray painted orange prior to weir installation to assist in finding them if dropped.) Care should be taken not to pry or hammer on the edge pipe or pipe clamp as they may be easily pulled loose.

Once each panel is in correct position and the slack is taken from the cable, a connector pipe must be installed to connect it with previously installed panel. This takes teamwork and finesse of the two people left in the water. (Panels #1 and #4 are exceptions as they are connected, on their southern edge, to a gasket.) If connector rings between the panels line up and do not overlap, the cross member on the panel being connected must be moved up or down slightly by tapping on it with a hammer so the rings can be lined up. One person threads a connector pipe through the rings starting with the most extreme downstream ring between the two panels being connected. Most connector pipes will have small holes drilled into them closer (about one third of their length) from one end than the other. When threading these connector pipes, position the pipe so the end furthest away from these small holes is upstream (and threaded first through the connector rings). The other person straddles the adjoining panels and threads the up stream end of the pipe through the rings and over the ears on the upstream end of the panels as the first person (at the direction of the "straddler") gently pushes the connector pipe upstream. When installed, the connector pipe should fit snugly over both ears of the adjoining panels. (The person pushing generally gently pushes while simultaneously twisting the pipe to help it more easily thread through the rings.)

After the connector pipe is installed, and the panel is inspected to make sure it is installed correctly, a pair of vice grips should be clamped tightly on the cable immediately north of each of the hook eyes on the recently installed panel. As panels are installed across the river, the two most recently installed panels should be clamped with vice grips to prevent the partially installed weir from slipping on the cable when slack is paid out for subsequent panel installation. In addition, vice grips should be left holding both panels next to the funnel until the entire weir is in and the funnel is installed. As weir panels are installed sequentially across the river, vice grips can be leapfrogged to newly installed panels from ones further back that no longer need to be held in place.

Once the vice grips are in place, the panel installation process is repeated, first by loosening the cable, and then installing the next panel. It may be necessary to use the narrower panel in the final (39th) location on the rail proximate to the north bank if there is not room for the full width one with gasket material on the right side (looking at it from the bottom, right side up).

TRAP AND FUNNEL INSTALLATION

After all the panels are installed, the trap and funnel complex are installed. First it is necessary to remove sand bags and gravel from the trap site just upstream of the gap in the panels that may have washed in there during the winter. The rough outline of last year's trap location should be apparent from the general

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sandbag pattern of distribution and can be used as a guide when preparing the site. This is necessary to insure the trap floor (made of white sandbags) will be low enough, even at low waters levels, to be conducive to fish trapping and passage. The site should be level and slightly deeper than the surrounding riverbed.

Once the site is prepared, the trap frame, stored on the south bank, is carefully carried into the river (this is a strain with less than four people although it can be done with three if everyone is healthy and strong) and placed in the slightly depressed hole prepared for it. It may be necessary to remove the frame and remove additional gravel to make it level and low enough. When in place, the downstream end of the trap should fit snugly up over the rail. The trap should be oriented roughly perpendicular to the rail.

Next, the aluminum panels (also stored on the south bank) are zip tied or wired to the outside of the frame on each side. Each aluminum weir panel (already numbered) is placed straight up and down in the spot corresponding with the same number marked on the frame. The bottom of each panel should fit snugly in the angle of the frame so no gaps exist where fish could get through. There should be four panels for each side. Next, six fence posts should be driven into the bottom (about 12 to 18 inches) near the upright members of the trap frame outside the trap with a post driver. They should be wired or zip tied tightly to the trap frame to help hold it in place.

Next, the bottom of the trap is lined with a layer of white sandbags. This layer extends upstream of the trap several feet to serve as a flash panel for counting fish. The bags help to hold the trap in place, make fish in the trap more visible and seal any minor holes where fish might escape. Finally the sliding door panels are installed in both ends of the trap. Make sure that the doors open and close easily. It may be necessary to realign a frame or trim a door panel to make it slide easier. Also make sure each door fits snugly to the sandbags comprising the flash panel so that fish will not pass undetected when it is closed.

After the trap is in place, the funnel is installed just downstream of the trap. First, the stream bottom where the funnel will be located must be cleared of any stray sandbags or bigger rocks. The bottom does not need to be as smooth or flat as it is under the trap because the funnel (with the exception of the extreme upstream end) will be suspended off the bottom on fence post “legs” to allow the fish (moving back and forth behind the weir) to line up in the funnel and pass into the trap. Next the trap frame is transported from the south bank into the water in position just downstream of the trap. The upstream end of the frame is marked and should be placed so the bottom corner of the upstream end is resting on top of the rail.

The next step is to ensure that there is enough space to hang aluminum weir panels on the outside of the frame (the preferred method). The weir panels are about two inches thick and the floating weir panels on each side of the funnel must have room to move up and down in response to changing water levels. There should be almost no friction between the panels and the sides of the funnel. If it seems likely that friction will occur, weir panels will have to be hung on the inside of the funnel frame.

Assuming weir panels can be hung on the outside of the frame, fence post “legs” are driven into the bottom (approximately 12 to 18 inches deep) just inside the frame near the upright members. Two posts should be driven in each corner on the extreme downstream end and, two on the next (upstream) set of upright members of the frame. The fence posts should be driven as close as possible to the frame.

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Next, the frame is lifted on the downstream end and held high enough off the bottom so that the frame is approximately level. While one (strong) person holds the frame in this position, the frame is lashed tightly to the fence post legs with bailing wire and/or zip ties. (Large zip ties are preferred over wire in recent years due to the reduced possibility of fish getting injured by them.) The upstream upright members of the funnel should be in close contact with the downstream end of the trap at this point. These should also be lashed together in a way that avoids interfering with the operation of the downstream gate.

After the frame is securely in position, a total of four panels (two on each side) are hung (hopefully on the outside) of the frame. The panels used for the funnel are positioned horizontally (parallel to the waterline). The upstream panel on each side should be low enough (on the upstream end) to touch the bottom, but (on the down stream end) still allow fish to pass under as they move back and forth behind the weir. The downstream panel on each side should be staggered slightly higher but still horizontal so that the aluminum panel will be in contact with the adjoining floating weir panel throughout it's entire length at all probable water levels. Staggering it about ten inches higher than the upstream panel works fine. Panels should be wired or zip tied to the frame securely.

If it becomes necessary to hang the panels inside the frame, due to the gap reserved for the funnel not being wide enough, then the fence post "legs" are driven outside the frame (and out of the way of the panels).

GASKET INSTALLATION

After the funnel and trap are in place, the four herring web gaskets need to be attached either to a bank or a side of the funnel. On the south bank, a connector pipe (13 foot long piece of 1" PVC pipe with uncapped ends), already laced to the edge of the gasket material, is attached to the plywood bulkhead wall with nails and pipe hanger. On the north bank, the shoreward edge of the gasket is affixed to the edge of the winch deck by nailing 2x4s down over it. On each side of the funnel a connector pipe, already laced to the edge of the gasket material, is zip tied or wired (snugly) to the outside of the funnel. Care must be taken to ensure the gaskets are attached so as to allow the proximate floating weir panels to move freely in response to varying water levels and not let fish escape upstream undetected.

SECURING CONNECTOR PIPES AND MINOR LEAK PLUGGING

After the gaskets are installed the next step is to secure the connector pipes between floating weir panels so the water does not cause them to back off the connecting ears on the upstream corners of adjoining panels. Most connector pipes, if already used, will have small holes drilled about one third of the way upstream from the downstream end of the connector pipe (if installed properly) and just upstream of the most downstream set of connector rings. A six-inch piece of wire is threaded through these holes and twisted back over itself two or three times. If a hole is not in the right spot, a cordless drill can be used to put one where it is needed. All 37 connector pipes should be secured in this fashion. (Do not drill hole while standing in the water! Any holes in connector pipes should be drilled from the bow of a skiff.)

The last task before declaring the weir fish tight is to look for and plug any leaks in the weir. A dry suit and snorkel will be necessary to closely inspect the entire weir underwater for any holes that could potentially leak fish. Holes are not always apparent when looking through the surface of the water.

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Generally, a hole in the weir wider than 1.25 inches or so could potentially leak fish and should be plugged. Look for irregularities in the weir or the bottom, which could be potential leaks. Holes close to the bottom can usually be plugged with a couple of carefully place sandbags. Holes higher in the water column might be plugged by using a zip tie or wire to secure a picket near the center of an existing void. Pay special attention to the upstream end of gaskets near the rail. Also inspect the trap to ensure fish will not escape under the sides of the trap. Usually, several sandbags are placed around the outside of the trap to ensure fish will not escape. The usual trouble spots near the trap are on the downstream end, near the rail. Scouring could develop into a problem especially just after the weir is installed so also look for developing holes under the rail.

A CAUTIONARY NOTE

Once any leaks are plugged it's time to have that little celebration that comes with the knowledge the weir has once again been successfully installed. During the installation process (and all other phases of weir operation) it is important to remember to be cognizant of safety issues. Weir installation can involve difficult tasks done in near impossible conditions. If someone is not sure of the exact steps necessary to complete a task or if current conditions do not allow them to be done safely, it is best to ask someone with more experience before attempting to accomplish a goal. The weir installation process is progressively more difficult as water levels get higher. At some point (around 2.8 feet on the water level gauge as it is currently set at the weir site) weir installation becomes impossible due to high stream velocities. Even at lower stream levels, visibility can sometimes prevent weir installation. At low water levels, three strong and physically fit people can install the weir. If moderate or higher water levels are present, four people are necessary to accomplish some of the tasks associated with installation. Typical water temperatures during the normal installation time run about two to four degrees Celsius. Avoid working long hours in the water as fatigue and low body temperatures can contribute to bad decision making and higher accident risks. The application of common sense is necessary to make safe operational decisions.

MATERIALS

All weir installation materials are stacked on the bank of the river at the installation location, about 1½ miles downstream of the cabin. You will need the following items to install the weir and do repairs on the tripods:

- claw (framing) hammer
- 2-3lb hand sledge
- hand saw
- wire cutters
- vice-grips
- 16 penny nails (for attaching sandbag platform boards and catwalk boards)
- 20 penny nails (for stringer supports)
- dock spikes (for reinforcing main tripod timbers)
- a number of 2x4's (for tripod sandbag platform)
- bailing wire

LOCATION SELECTION

In 2002, the Sandy River weir was relocated approximately 1 ½ miles downriver from the previous location. The old site was prone to washout during high water and wind events due to the long, straight stretch of river above the weir. The old site also had a very deep channel mid-river which concentrated the force of the river on the weir in that location. The main criteria for selection of the new site were: 1) to find a location below a bend in the river or behind an island which would provide a very short fetch to preempt wave formation and, 2) to find a location with a uniform depth across the river's cross section to mitigate flow concentrations from deep channels. The new site location in 2002 proved successful with little substrate erosion.

The presence of a weir can significantly affect the deposition of river substrate. A trough often forms just upstream of the panels over the course of a summer, and deep channels will form where sections of the weir may have washed out in the past. Over the course of the winter, some of these voids will partially fill with loose and poorly consolidated gravel. If the weir is installed over these areas, the loose fill will once again erode easily and put the integrity of the weir in jeopardy. It is important to recognize these features, as they will have a large impact on how well the installation proceeds and how the weir weathers high, fast water. When preparing to install the weir, it is important to begin by walking transects across the river in the intended location to determine where the most uniform and level substrate is to be found. Moving ten feet up- or down-stream can make a large difference in terms of encountering depressions, gravel bars, or poorly consolidated substrate. Taking a little extra time when selecting the exact location can obviate serious problems later.

Sandy River water levels are generally low in spring when the weir is installed, but can be expected to rise significantly (two feet and more) over the course of the summer. In some years, two distinct

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peaks in water level can be observed which correspond roughly with the peaks in the salmon runs (especially at Bear River). The water can rise as much as two feet in a few hours, usually as a result of heavy rains and/or high winds off the lake and melting glaciers located on volcanoes, so be prepared for the worst early in the season.

TRIPOD PLACEMENT

Place a stake or sandbag on each bank at either end of the chosen transect so that you have a target to work towards and a fixed reference point to sight-off of to check tripod alignment. Begin on the near (northeast) bank with the older, weaker tripods where the current is weaker. Check the 20-penny nails in the front leg of the tripod where the stringers will rest before placing them in the water, as it is hard to drive new ones in place when the leg is underwater. When rolling the tripods down the bank to the river, make every attempt to be gentle so that the timbers do not split or part, and that the nails on the front leg are not bent.

Place the tripods so that the back legs have about four inches of gap between them (the width of your foot) for the shorter tripods and no gap (bottom of the rear legs touch that of the next tripod) for the larger ones. It can aid in tripod alignment if stringers are mounted on the front leg as you work. Make sure there is 6-8 inches of overlap on either end of the stringer where it meets the tripods. Adjust the spacing of the tripods to maintain adequate stringer overlap. Allow more overlap where the current is stronger and the water is deeper. This will allow some tripod settling and traveling without the stringers being pulled off the front leg.

As you work, check the alignment by sighting down the stringers towards the target stake or sandbag on the far bank. The tripods placed in deeper water may require some sandbags to keep them from moving in the current. Because the tripods will float when placed on their side in as little as two feet of water, it helps to roll the tripods upstream some distance and then roll them into the river and float them across the river until you are upstream of the spot where you want to place it. Allow it to float down in the current until it is about ten feet upstream of the desired placement, then stand it up. Slowly walk it back into position and have someone hold it while others go back to the bank for sandbags to secure it.

Another way to move tripods to the deeper parts of the river is to use the skiff. Place the tripod in the river, facing upstream, near the bank in about two to three feet of water. Walk the skiff under the back wing support (the crosspiece below the wings) until the bow of the skiff is under the tripod's sandbag platform. Roll the tripod back on its back legs until the crown of the tripod is resting on the bottom of the skiff and the main bulk of the tripod is resting on the bow. The wings of the tripod will hang down into the water on either side of the skiff. This is a very effective but precarious way to move tripods as it is easy to swamp the skiff with such a large, unwieldy load. Be sure to load at least ten sandbags in the skiff to secure the tripod once it is unloaded into position. Drive the skiff slowly up behind the position you wish the tripod to occupy, and then further, slightly upstream of the other tripods, before unloading the tripod. You have to drive slowly because the tripod wings are hanging down into the water and any speed will cause these to drag enough to make the tripod slide back in the skiff. As the tripod is tipped upright the front leg will sink down into the water and will contact the river bottom. Slide the wing support

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off the bow of the skiff and have someone immediately step onto the sandbag platform to keep the tripod from shifting until the sandbags are loaded. It is important that the tripod be unloaded upstream of the intended final position because moving the tripod against the current is nearly impossible without loading it back into the skiff and driving it.

Once you have found the correct position for the tripod, push it back and forth forcefully to work the legs down into the gravel and set them in place. This will help minimize movement later. Recheck alignment periodically. Proper alignment of the tripods is critical to having the panels lay flat on the stringers and prevent gaps between panels later. A little extra care and effort at this stage can save countless hours of weir maintenance later in the season when the water level rises.

Once the tripods are set and the stringers are on, spend some time loading the platforms with sandbags as the resistance will increase dramatically once the weir panels are put on. The tripods in the shallow, slow moving water near the banks may need as few as ten sandbags each, while the deeper tripods will require 40 or more. If you begin installing the weir late in the afternoon, this is a good place to stop for the day to allow the tripods to settle down into the substrate overnight before adding the resistance of the panels. This additional resistance can cause the tripods to settle back as well as down, negating much of the effort devoted to alignment.

Keep in mind that the weir generally fails due to sandbags being washed off the tripod platforms, so sandbag placement is critical to surviving episodes of high water. The sandbags should be wedged between the tripod legs as tightly as possible. Eventually, additional sandbags can be stacked on the wings behind the back legs, and a small platform can be added to the crown of the tripod for additional bags. Nail one or two planks across the back of the rear legs above the wing support to keep sandbags from washing off the back of the platform once it is loaded. Sandbags that are underwater are only fractionally as useful as those above the surface of the water as they “lose” much of their weight when submerged, and increase resistance to the water flow. As most of the tripods in the deeper section of the river will have their sandbag platforms well under water during flooding events, stacking as many sandbags as possible on accessory platforms added to the crown of the tripod can mean the difference between washout and surviving the high water event. Use the skiff to shuttle sandbags.

PANEL INSTALLATION

Place the panels on the weir starting on one end making sure that the panels are perfectly perpendicular to the water surface. You will likely have to dig into the substrate to allow the entire bottom of the panel to rest in the gravel as you descend the banks or move past irregularities in the gravel. Hop up and down on the t-angle crosspiece of the panels to push the panel down into the gravel. In the past, longer panels were installed in the deeper, center sections of the river, but a more recent strategy has been to use shorter panels all the way across and allow the river to flow over the tops of the panels during high water events to reduce the resistance. Fish have not been observed escaping over the top of the panels in these instances.

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As you go, do not forget to install the three gates at intervals that cover different water depths. Two gates will be used as fish passes, and one will lead into the sampling trap. As the water level and turbidity rise, you may need to switch to a fish pass gate in shallower water, so install the gates leaving yourself some future options (such as one in a moderately deep water, and another closer to the bank). Think about where you want the trap and install a gate for this purpose as well.

Finally, put the catwalk boards on and use them for shuttling more sandbags onto the weir. All boards should overlap on a tripod wing. If necessary, blocks can be nailed to the tripod wings if the catwalk board does not meet the wing properly. During high water events, the catwalk will likely be underwater. The boards wash off easily and so should be removed if their loss seems imminent.

Line the entire front of the weir with sandbags to prevent scouring below the panels. Some have found it more effective to line the backs of the panels with sandbags instead. It may be prudent to experiment with either placement or use both in areas more susceptible to erosion.

Zip ties or bailing wire are used to attach the panels to the stringers and join panels where they meet in order to keep the panels from shifting. While this preempts some minor holes from forming, it also makes it more difficult to push panels down or move them relative to each other when gaps do form. Wiring the panels in the shallow water only could be a safe compromise. Bear activity can also knock panels loose. Zip tying panels to stringers or stacking numerous layers of panels on the weir both help reduce the likelihood of a bear creating a hole.

When removing the weir, take care to stack all materials well back from the river bank as these are quite low and are flooded periodically. Stack the tripods closely together and tie a line through all the legs above the platform to keep the tripods from blowing away and to keep the bears from being able to separate and break them.

Appendix D4.–Installation of the Ilnik River Weir.

MATERIALS

All materials for the weir are stacked on either side of the river bank. The materials are divided roughly in half on either bank. You will need the following items to install the weir:

- Post hole driver
- Crisco shortening (non-petroleum based grease) for pushing PVC pipe through rubber straps
- 300 hundred heavy duty zip ties
- Dry suits, gloves, hood
- 2-3lb hand sledge hammer
- Large rubber mallet
- Metal fid to guide pipe through rubber strap
- Barge and hand winch
- 50 Metal fence posts
- Chainsaw winch or hydraulic block

INSTALLATION LOCATION

The weir should be installed roughly in the same location as the previous year. The river should be walked in transects a number of times to determine where any holes, sand bars, or channels which could cause problems with scouring or installation might exist. Choose a transect which offers the smoothest, best consolidated, and most continuously regular substrate possible. Place a stake or sandbag on each bank at either end of the chosen transect so that you have a "target" to work towards and a fixed reference point to "sight" off of to check panel alignment. Keep in mind that the weir should run perpendicular to the river's current in the deepest, fastest channel, which is generally, located closer to the far (south) bank.

It is easiest to begin on the near (north) bank. You will begin by dragging the panels into general position. When dragging panels, fold the foot chain and herring web over onto the panel so that it rests on the PVC, and pull the panel by the second PVC tube from the end, near a hypalon strap. Do not pull on the outermost tube as the tube is weakened by the glue holding the white stopper-rings in place, and may break. Laying the chain on the panel when dragging keeps the chain from being pulled loose from the webbing and keeps the web from separating from the eyelets at the bottom of the panel (the zip-ties break easily). It makes sense to be careful with the panels, as repairing them is extremely laborious and time consuming. If damaged panels are encountered, set them aside and flag the problem spot with surveyor's tape and make the necessary repairs as soon as possible.

There are three different lengths of panels: 5, 10, and 15 feet long measured from the herring web to the top caps. All sections are ten feet wide. The longer panels belong in the deeper water and the shorter in the shallower. Some budgeting of panels will be necessary to have enough long ones, but care must be taken not to put too short a panel in water that may become much deeper on a high tide. As a general rule, the small channel near the near (north) bank requires ten foot panels. Five foot panels are adequate for the entire sand bar which dominates the middle of the river, then a number of ten foot panels are needed as the river deepens. Finally, 15 foot panels are necessary to block the deep channel by the far (south) bank.

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The first panel should be laid on the bank so that fish cannot escape around the end of the weir on extremely high tides. Drag a few subsequent panels into their general positions. The weight of the chain may cause it to sink down into the soft sand, making it difficult to move panels when this happens. Either leave the chain lying on the PVC tubes until the panels are in their final positions, or do not leave them unattended for long periods of time in the river; only bring panels out as you need them.

Lay the panels to be joined side by side and line them up so the white, lower end caps of the panels are in line. Pay attention to how the hypalon straps line up as well. The straps from the adjoining panels should not bind or interfere with each other. If they do not lay flat, one next to the other, it will be extremely difficult to drive the connector pipe through them. If necessary, move the panels to be joined relative to each other to see if there is a better orientation for the straps not to interfere with each other, or try to slide the strap up or down its panel slightly. Place a fid in the end of a connector pipe and lubricate the pipe with a thin layer of vegetable shortening. Make sure the connector pipe has a hole drilled through the end with the fid; a zip-tie will later be threaded through this hole to secure the herring web to the bottom of the joint. Carefully push the connector pipe through the available slots in the hypalon straps at either end of the panels to join them. It may become necessary to hammer the connector pipe in with a rubber mallet at the end. The fid fits loosely and it is easy to drop and lose it. It will be necessary to have the person guiding the fid through the hypalon straps float on top of one of the panels as the gap between the panels is too small to stand in as the panels are joined. The fid is sharp and care must be taken so that the person pushing the connector pipe does not accidentally drive the fid against the person guiding it. Good communication is essential here to keep the fid from being lost at the least, and to avoid injury at the worst.

After the PVC sections are joined, the herring web must be sewn together with twine and a mending needle or with zip-ties. Join the sutured web to the piece of connector pipe via the hole in the bottom of the pipe using a zip-tie. Join the ends of the chain with a 6-8 foot length of light line looped twice through the chains and tied off in an overhand knot. Some sections of chain are considerably longer than the herring web or panels themselves and it may be necessary to “choke up” on the chain, or move back a few links so everything lays flat and with out undue gaps, strain, or excess material. Make sure there are no holes in the web where the two sections are joined, or where the web joins the panels or chain through which a small fish could wriggle.

Once two panels are joined, pull the chain as taught as possible along the river bottom and pass a fence post through one loop of the doubled line joining the ends of the chain. Drive the fence post into the river bottom so that the toothed surface faces upstream and the fluke is perpendicular to the current. The entire post should lean upstream at about 30 degrees to resist the current’s tendency to pull the panels down river. Drive the post at least three feet down into the sand with a post-pounder.

As the river deepens on the south side of the sand bar, it will become necessary to use the barge to join panels. The barge’s main role is to hold the foot-chain up off the bottom so that subsequent panels can be added more easily. Working at or above the water surface is necessary to ensure that no holes are missed while sections are joined. The other critical function the barge serves is to store materials such as zip-ties, connector pipes, lengths of line, and a base of operations for people working in the water. The barge will be staged upstream of the weir, secured with one or two large anchors placed well upstream. The barge should be positioned so that the winch and davit are approximately three feet upstream and slightly

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beyond the end of the last panel in the river. This allows the barge to lift the end of the last panel off the river bottom and keep tension on it so that the panels remain straight and do not migrate downstream when lowered to the river bottom.

Load the next panel to be joined into the skiff with the chain end in the bow and one end of the panel laying on top and hanging slightly over the starboard rail. Drive the skiff to the downstream side of the barge and tie off to the barge so that the end of the panel in the skiff is roughly in line with the last panel in the water. Without unloading the new panel, join it to the last one installed with connector pipe and stitch the web together at the bottom. Tie the double line loop through the ends in the chain and pass a fence post through one of the loops before allowing the chain to settle to the bottom by unloading the new panel from the skiff and lowering the newly connected joint with the cable winch. Before dropping the end of the new panel out of the skiff, hook it to the cable winch so that it is above the water's surface and ready for the next panel to be joined.

As you work into the deeper channel where the current velocity increases, maintaining panel alignment towards the far bank becomes more difficult. It helps to secure the barge in the current with a large anchor placed well upstream and another line running to a deadman upstream on the south bank. In this way you can keep tension across the panels (via the deadman) and keep them from drifting downstream in the current (via the anchor). You will periodically have to move the barge across the river and maintain tension on the installed panels, and to be in an effective position to add subsequent panels. A well thought-out block and tackle system helps enormously to deal with the loads that the current places on the barge when trying to reposition it. Attaching the blocks to the line using prusiks or other "travelling" devices makes the system much more flexible. Having numerous cleats on the barge for a variety of tie-off options is a must.

Once all the panels are installed, crab floats (buoys) will have to be tied behind the panels, below the second hypalon strap down, to keep the top caps of the weir above water. One person can pass the buoy line under the panel while another person is on the panel ready to receive the line and tie it to a PVC pipe below the second hypalon strap with half-hitches (multiple clove-hitches). An alternate and faster way to attach the buoys is to use small plywood discs which the buoy line passes through. Make a 4-6 inch diameter disc and drill a hole in the center to pass the buoy line through. Tie a knot in the end of the line so the disc is not lost. In the river, turn the disc sideways so you can pass it through the panels, between the PVC pipes, from the downstream side, and then allow it to rest flat against the face of the panel. Pull the buoy line through the disc and snug the buoy against the back of the panel, holding it in place with a half-hitch with a bite (which you can untie easily).

STAGING IN SAND POINT

Things to do:

- Make sure the skiff outboard is running properly. It should be test run in Sand Point. Be familiar with jet unit maintenance and operations and take necessary maintenance and repair equipment.
- Buy fuel. Approximately 25 gallons of unleaded and five gallons of diesel.
- Take propane. Three 100-lb. bottles should be plenty for the project.
- Buy food. Plan on going without additional supplies until July. There is a propane refrigerator (a little smaller than standard size) which has a small freezer. There is a standard size propane oven in the cabin.

Things to bring:

- Firearms and ammunition
- Radios: SSB (M700 base station and Spilsbury mobile) VHF base station, hand-held VHF. Test all of these in Sand Point prior to departure.
- Tools
- Float Coats
- Chain Saw
- 12 volt batteries (3)
- Spotting Scope or binoculars
- First Aid Kits
- Each person will need chest waders and rain gear.
- Optical scan forms, scale cards, daily weir count forms, logbook.
- Satellite Telephone

SETTING UP CAMP

The Orzinski Lake weir camp is typically set up between June 3 and 7. Camp supplies and personnel will travel to Orzinski Bay in the department skiff or aircraft. If an aircraft is used, a low tide will be needed for the beach landing. If the skiff is used, arriving at a high tide is desirable for transporting supplies up the inter-tidal river. If the tide allows, store gear at a location inside the river mouth as it is much more protected and easier to access at low tides. Use the 16-foot flat-bottom Lowe skiff that is stored under the cabin to haul gear upriver to the cabin site. In recent year normal water conditions, navigating the river under power has been very difficult and damage to outboard jet units has occurred. Pull supplies upstream without power until a safe path for jet unit operation can be identified.

INSTALLING THE WEIR

The following procedure is an efficient way to install the Orzinski Lake weir:

- Make 150-180 sand bags from the gravel bar just in front of the weir site.
- Install the tripods in a straight line perpendicular to the water current.

-continued-

- Initially, place at least 15 sandbags on each tripod.
- Install the stringers
- Install the panels. Panels should be wired to both stringers because of the frequent bear activity on the weir. There are two wooden gates that should be placed in the deep water.
- Line the bottom of the weir with sandbags. Place the sandbags at the base of the panels on the downstream side of the weir.
- Install the catwalk.
- A flash panel should be placed in front of the counting gate.
- A trap for sampling fish should be installed.

LOGS

Any logs in the lake within 150 meters of the weir should be moved above high water influence. This is much easier than pulling them off the weir when the water rises and will reduce the risk of weir damage during high water events. There are two pee-vees that can be used for this.

BEARS

Many bears inhabit the Orzinski Lake area. Thirteen bears have been counted at the same time from the cabin porch. Bears eventually become accustomed to loud noises or techniques used to deter them from the weir and camp. After the salmon have arrived, personnel should always carry a firearm. Anything left unsecured is subject to destruction by bears. All gear should be safely stowed behind aluminum panels to deter bears from destroying it. Keep the cabin door closed to prevent bears from entering the cabin.

Stay alert when walking from the camp site to the bay. If you stay alert and look around every few minutes you will usually see a bear before it sees you. When returning to the cabin, particularly in the evenings, there will often be bears behind the weir and up against the bank where you cannot see. Make a lot of noise when approaching the weir so bears have time to get out of your way.

Bears will swim from the beach to Orzinski Bay set net sites and pick fish from the fisherman's nets. This can damage nets and has prompted fisherman to shoot the bears. Be prepared to encounter a wounded bear. Practice with the firearm until you feel comfortable with its operations.

APPENDIX E. KEY TO FIELD IDENTIFICATION OF ANADROMOUS JUVENILE SALMONIDS IN THE PACIFIC NORTHWEST

Appendix E1.–Key to field identification of anadromous juvenile salmonids in the Pacific Northwest.

Key to Field Identification of Anadromous Juvenile Salmonids in the Pacific Northwest

By

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ABSTRACT

A key is presented with descriptive illustrations to help in field identification of live, juvenile salmonids in fresh waters of the Pacific Northwest. Other juvenile fish that may be mistakenly identified as salmonids are included.

INTRODUCTION

Species identification of live, anadromous juvenile salmonids is frequently a problem to the field biologist. The purpose of this key is to list and illustrate the external characteristics which will expedite field identification of juvenile salmonids in the Pacific Northwest.

Five species of Pacific salmon (pink, chum, sockeye, chinook, and coho); four species of trout (cutthroat, brown, Dolly Varden, and rainbow or steelhead); and other juvenile and adult fish [1] that may be mistaken for salmon or trout in fresh water are described in this key.

USE OF KEY

The characteristics for identification are listed in a series of alternative statements, some of which are illustrated. To use the key, examine the first statement; if applicable, proceed to the next and continue to successive statements until the species is identified. If a statement is not applicable, pass to the alternative characteristics indicated by numbers in parentheses (numbers on the drawings correspond to numbers of statements in the key). Continue in this manner until the specimen is identified. Some external characteristics are positive separating features (marked with asterisk), whereas others are not. Therefore, two or more statements should be considered before final rejection. If a precise identification cannot be made using the external characteristics —and the fish can be sacrificed, a positive identification can usually be made from internal features (marked with double asterisks). A bibliography of keys that utilize more descriptive internal characteristics is included in this paper.

[1] Especially adult smelt, family Osmeridae.

KEY

1. (47) Adipose fin and scales present. (Fig. 1)
2. (48) Fleshy appendage at base of pelvic fins present.
3. (49) Mouth large, reaching at least to center of eye.

Family Salmonidae

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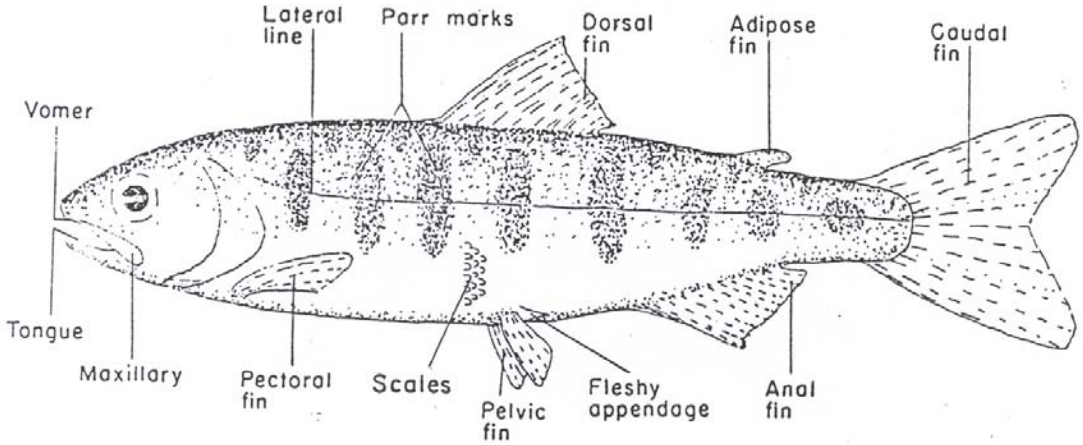

Figure 1.—A hypothetical salmonid showing external characteristics.

4. (17) Anal fin higher than long, with 8 to 12 developed rays (Fig. 2A)
5. (52) *Teeth on head and shaft of vomer. (Fig. 3A)

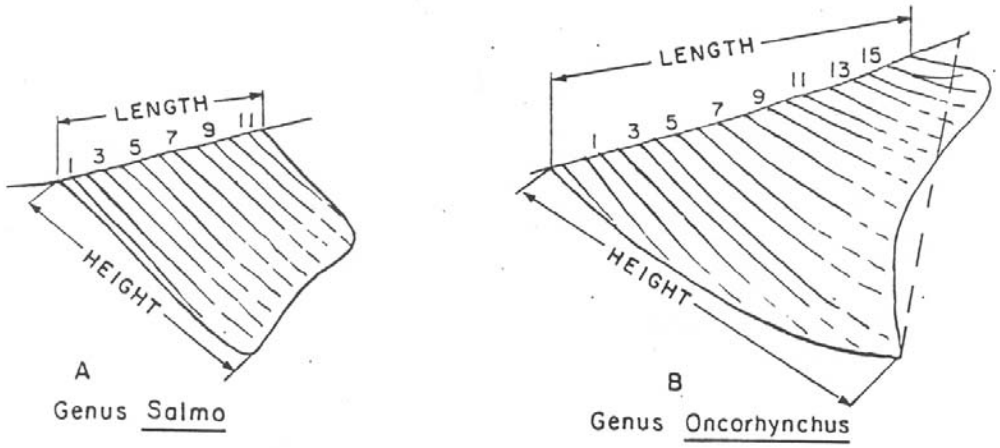

Figure 2.—Anal fins: (A) Trout, genus *Salmo;* (B) Pacific salmon, genus *Oncorhynchus.* The two drawings show differences in structure and fin ray count. (Note that the length of the anal fin is its overall basal length, and its height is that distance from the origin of the fin to the tip of the anterior lobe. In counting fin rays, include only those which originate from the base and terminate at the outer margin of the fin or are half as long as [or greater than] the longest ray.)

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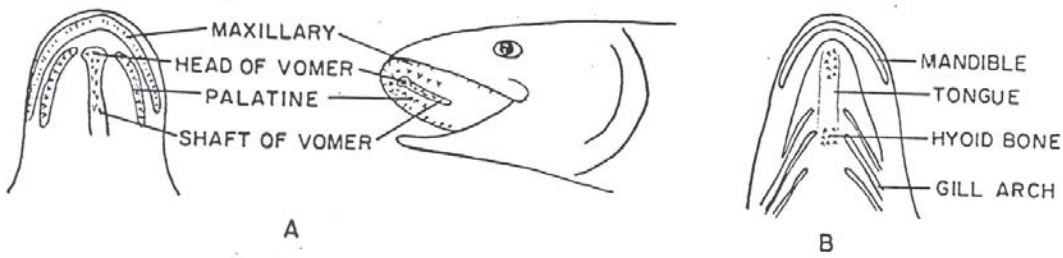
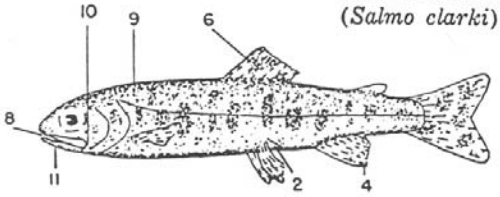


Figure 3.—Location of dentition in (A) the roof and (B) the floor of the mouth of salmonid fishes. (Presence or absence of teeth on the vomer or tongue may be determined by use of the little finger or a blunt instrument. The small hyoid teeth at the base of the tongue are located between the gill arches of the lower jaw and are difficult to find.)

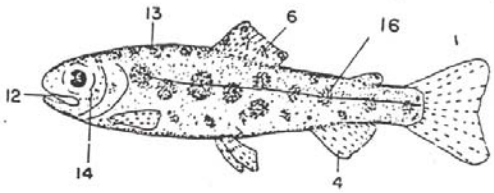
6. (18) Dorsal fin with large dark spots.
Trout
Genus *Salmo*

7. (53) Adipose fin not orange; no row of pale round spots along lateral line.
8. (12) *Small hyoid teeth at base of tongue. (Fig. 3B)
9. (13) Not more than five parr marks on mid-dorsal ahead of dorsal fin.
10. (14) Maxillary reaching past posterior margin of eye.
11. (15) Red or yellowish hyoid mark under lower jaw. Tail usually black spotted.
Cutthroat trout
(*Salmo clarki*)



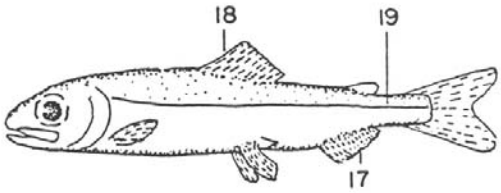
12. (8) *No teeth at base of tongue.
13. (9) Five to 10 parr marks along mid-dorsal ridge ahead of dorsal fin.
14. (10) Maxillary short, not reaching past posterior margin of eye.
15. (11) No hyoid mark under lower jaw. Few or no spots on tail.

16. (20) Parr marks almost round.
Rainbow or
steelhead trout
(*Salmo gairdneri*)



17. (4) Anal fin longer than high, with 13 or more developed rays. (Fig. 2B)
18. (6) Dorsal fin without large dark spots, may be black tipped.
Pacific salmon
Genus *Oncorhynchus*

19. (20) No parr marks. Fry leave fresh water while small—approximately 1.75 inches (45 mm) long.
Pink salmon
(*O. gorbuscha*)



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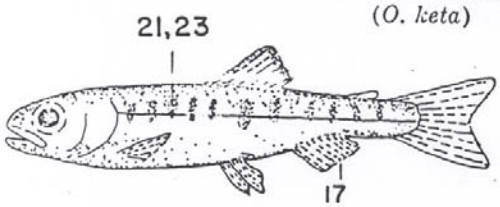
Appendix E1.–Page 4 of 5.

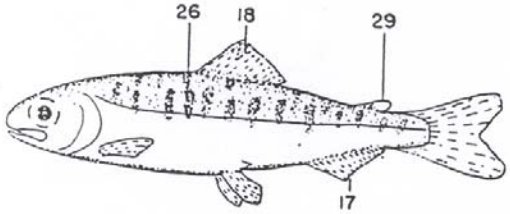
20. (16) Parr marks present as vertical bars or oval spots.
21. (30) Parr marks short, extending little, if any, below lateral line.
22. (25) Gill rakers on first arch, 19 to 26. ** Pyloric caeca, 140 to 186.
23. (26) Parr marks faint. Sides below lateral line iridescent green.
24. (27) Small when migrating from fresh water, approximately 1.5 inches (40 mm) long.

Chum salmon
(*O. keta*)



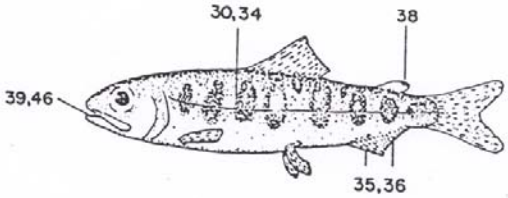
25. (22) Gill rakers on first arch, 30 to 40. **Pyloric caeca 60 to 115.
26. (23) Parr marks usually sharply defined. Sides below lateral line silvery, not iridescent green.
27. (24) Relatively large when migrating from fresh water, approximately 3 to 5 inches (80 to 126 mm) long.
28. (31) Gill rakers long and slender, more than 29 on first arch.
29. (32) Adipose fin clear, not pigmented.

Sockeye salmon
(*O. nerka*)



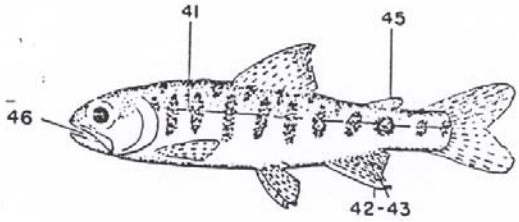
30. (21) Parr marks large, vertical bars centered by lateral line.
31. (28) **Gill rakers short and thick, fewer than 29 on first arch.
32. (29) Adipose fin at least partially pigmented.
33. (40) **Plyloric caeca more than 90.
34. (41) Parr marks broader than interspaces.
35. (42) Anterior rays of anal fin not distinctly longer than rest, not white edged.
36. (43) Anal fin not pigmented.
37. (44) Black spots, when present, on both lobes of caudal fin.
38. (45) Adipose fin not completely mottled, clear area at anterior base of fin.
39. (46) Black gums along base of lower teeth.

Chinook salmon
(*O. tshawytscha*)



40. (33) **Plyloric caeca less than 80.
41. (34) Parr marks narrower than interspaces.
42. (35) Anterior rays of anal fin elongated; when depressed they extend to base of last ray. (Fig. 2B)
43. (36) Anal fin pigmented between rays, resulting in black banding.
44. (37) Black spots, when present, on upper lobe of caudal.
45. (38) Adipose fin completely pigmented.
46. (36) Mouth gray to white.

Coho salmon
(*O. kisutch*)



-continued-

47. (1) Adipose fin not present; scales present or lacking.
Not Salmonidae

48. (2) No fleshy appendage at base of pelvic fins.
Smelts
Family Osmeridae

49. (3) Mouth small, not reaching center of eye; teeth weak or absent.

50. (51) Depressed dorsal fin, shorter than head.
Whitefishes
Genus *Coregonus*

51. (50) Depressed dorsal fin, longer than head.
Arctic grayling
(*Thymallus arcticus*)

52. (5) **Teeth on head of vomer only.
Chars
Genus *Salvelinus*
Dolly Varden (*S. malma*)

53. (7) Adipose fin orange; row of distinct pale round spots along lateral line.
Brown trout
(*Salmo trutta*)

ACKNOWLEDGMENTS

We especially thank Dr. Arthur D. Welander, Professor of Fisheries, and Dr. Bruce S. Miller, Research Biologist, College of Fisheries, University of Washington, Seattle, for their valuable suggestions. We also thank Galen H. Maxfield, Fishery Biologist, and Dr. Alan J. Beardsley, Fishery Biologist, both from the NMFS Northwest Fisheries Center, Seattle.

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North Alaska Peninsula Sockeye Salmon Test Fishery Operational Plan

by

Robert L. Murphy,

and

Phillip Tschersich

April 2008

Alaska Department of Fish and Game **Division 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)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

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 INFORMATION REPORT 4K08-02

NORTH ALASKA PENINSULA SOCKEYE SALMON TEST FISHERY OPERATIONAL PLAN, 2008

by

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and

Philip Tschersich

Alaska Department of Fish and Game
Division of Commercial Fisheries
211 Mission Road Kodiak, Alaska 99615

April 2008

The Regional Information Report Series was established in 1987 and was redefined in 2006 to meet the Division of Commercial Fisheries regional need for publishing and archiving information such as project operational plans, area management plans, budgetary information, staff comments and opinions to Board of Fisheries proposals, interim or preliminary data and grant agency reports, special meeting or minor workshop results and other regional information not generally reported elsewhere. Reports in this series may contain raw data and preliminary results. Reports in this series receive varying degrees of regional, biometric, and editorial review; information in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author or the Division of Commercial Fisheries if in doubt of the level of review or preliminary nature of the data reported. Regional Information Reports are available through the Alaska State Library and on the Internet at: http://www.sf.adfg.ak.us/statewide/divreports/html/intersearch.cfm.

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This document should be cited as:
Murphy, R.L. and P. Tschersich. 2008. North Alaska Peninsula sockeye salmon test fishery operational plan, 2008. ***In*** *Alaska Peninsula salmon operational plans, 2008. Alaska Department of Fish and Game, Regional Information Report No. 4K08-02, Kodiak.*

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ABSTRACT

This document provides commercial salmon fishermen and buyers on the North Alaska Peninsula information and guidelines that will be used for the Bear River test fishery during 2008. The Bear River, located 15 miles northeast of Port Moller, is the largest producer of sockeye salmon *Oncorhynchus nerka* in the Alaska Peninsula Management Area. In 2000, a test fishery program was started by the Alaska Department of Fish and Game to assess the marine abundance of sockeye salmon at Bear River following commercial salmon fishery closures. This program assists management staff with making commercial fishery management decisions regarding the sockeye salmon run to Bear River.

The 2008 Bear River test fishery will be operated when needed for management purposes using two vessels, one fishing north of Bear River and the other fishing south of Bear River. Each vessel will make at least four sets of standardized duration and location. The objectives of the test fishery is to assess the marine abundance of sockeye salmon in the vicinity of Bear River, collect age composition data from the sockeye salmon harvested in the test fishery, and secure revenues to cover test fishery expenses.

Key words: Bear River, Alaska Peninsula, sockeye salmon, test fishery, management

INTRODUCTION

This paper documents the purpose, goals, and methodology of a program designed to assess sockeye salmon *Oncorhynchus nerka* abundance in marine waters near Bear River. Commercial fishery openings in the Bear River Section of the Alaska Peninsula Management Area (Area M) are based on the achievement of the Bear and Sandy rivers' sockeye salmon interim escapement objectives. The Bear River sockeye salmon run is the largest in the Area M and has two temporally distinct sockeye salmon runs. An early run begins in June and ends in late July, and a late run begins in late July and ends in late September. The Bear River season-ending sockeye salmon escapement goal is 293,000-488,000 fish through September 15 (Honnold et al. 2007). The late-run escapement goal is 117,000-195,000 sockeye salmon. Currently, the sockeye salmon escapement is counted through a weir located at the outlet of Bear Lake, approximately 15 river miles upstream from the ocean terminus of the river and at least 1-2 days travel time for a swimming salmon. When weather permits, aerial surveys of Bear River are used to assess the number of fish moving upstream. However, test fishing is the only means available to assess marine abundance of sockeye salmon in waters surrounding the mouth of Bear River due to consistently poor clarity in marine waters.

The test fishery program allows the Alaska Department of Fish and Game (ADF&G) to assess the marine abundance of sockeye salmon and improve the management of Bear River. Sockeye salmon sometimes build up around the mouth of Bear River during commercial fishery closures and may not move into the river where they can be counted at the weir or by aerial surveys. These fish may unexpectedly enter the river in numbers surplus to the escapement needs, which can result in lost harvest opportunity.

The ADF&G test fish program began in 2000 to determine salmon abundance and collect biological samples during commercial fishery closures. In 2001, changes were made to the test fishery at the request of the North Peninsula fishermen (North Peninsula Fishermen's Working Group), who suggested that the test fishery be expanded from one vessel to two vessels to more effectively cover the area around the mouth of Bear River. The modification to the program was approved and it increased the test fishing area around Bear River to be simultaneously sampled with one boat fishing north of the Bear River stream terminus and one fishing south of the river. The expanded project provides a more accurate index of the number of salmon in the area.

OBJECTIVES

BIOLOGICAL OBJECTIVES

- Provide a timely index of the sockeye salmon abundance within the marine environment in the vicinity of the mouth of Bear River,
- Reduce the potential for large surplus escapements into Bear River, thus maximizing the harvest of surplus sockeye salmon and decreasing the likelihood of overescapement, and
- Collect biological data from test fishery-caught salmon.

FISCAL OBJECTIVES

- Secure revenue to meet the needs for the test fish project: the sale of fish caught during the test fishery is expected to cover the costs for the daily charter ($1,000/day/vessel), ADF&G personnel costs, and equipment necessary for the collection and processing of test fishery samples.

PROCEDURES

REQUIREMENTS FOR CHARTER CONTRACT

ADF&G test fishery charters will require a fully equipped drift gillnet vessel with a crew of at least two persons (skipper and deckhand). The skipper of each chartered vessel will be paid $1,000 per day to make at least four sets. Skippers will provide necessary personnel to operate the boat and gear, and will furnish food, fuel, lubricants, and other supplies needed for daily operation of the vessel. Vessel operators must have a current Area M salmon drift gillnet permit and legal drift gillnet gear (200 fathoms in length and up to 70 meshes deep) for the Bear River Section. Vessels must have a working refrigerated seawater system that will maintain the quality of fish delivered to the processor. Each vessel must be able to accommodate one ADF&G employee for the duration of the charter (day trips).

Vessels must comply with United States Coast Guard (USCG) regulations including having survival suits aboard for the entire crew (ADF&G will provide a survival suit for the observer), a first aid kit, and fire fighting equipment. Protection (hull) and Indemnity insurance including crew exposure in the amount of at least $300,000 is required. The skipper of the vessel must have at least five fishing seasons experience drift gillnet salmon fishing in the vicinity of Bear River.

ESTABLISHMENT OF CHARTER VESSEL SELECTION LIST

At the beginning of each season, ADF&G will establish and maintain a list of skippers wishing to participate in the program prior to the first charter. Enrollment will begin on May 15 and continue until the first test fishing date. Enrollment can be completed in person, by phone, or by radio with ADF&G staff in Port Moller (907-375-2716). Each skipper and vessel must meet the requirements listed in the previous section. ADF&G will conduct a random drawing to determine the sequence of the participants at the close of the initial enrollment period. This sequential list shall be maintained throughout the season and will be announced over VHF channel 72 prior to the first test fishery. Skippers drawn for the next day's test fishing will be notified over VHF channel 72 at least 10 hours in advance of a test fishery. If the vessel operator is unavailable to

participate in the test fishery or cannot be contacted prior to 8:00 p.m. the night before the test fishery, the vessel will be considered not available and the next skipper on the list will be chosen. If poor weather conditions exist, the ADF&G and the skipper will jointly make the decision of whether the test fishery will occur. When weather prevents the test fishery from occurring, the scheduled skipper will be given the opportunity to be the designated charter skipper when the next test fishery occurs.

Additional permit holders may enroll after the initial enrollment is completed. However, these permit holders will be placed at the end of the established list in the order in which they are received. If the established list is completed and more vessels are needed for subsequent test fisheries, then vessels will be randomly chosen again from the entire list.

DETERMINATION TO TEST FISH

ADF&G staff will determine when test fishing will occur based on management requirements. A test fishery may occur in the marine waters surrounding the mouth of Bear River if escapement counts at the Bear River weir are below the interim escapement objectives following a commercial fishing period closure.

DRIFT GILLNET PROCEDURES

ADF&G staff will meet with the permit holders of the scheduled chartered vessels prior to departure from Port Moller. The vessels will depart prior to 8:00 a.m. or at an agreed time that maximizes fishing around stages of the tide, and will return to Port Moller after the required sets are completed. At least one ADF&G observer will be onboard each vessel from the time it departs Port Moller until it returns. Drift gillnet gear 200 fathoms in length will be set perpendicular to the beach and fished as during commercial catch operations. Each skipper must make prescribed drift gillnet sets in specific locations in the Bear River Section (Figure 1). One skipper will test fish north of the stream terminus, and the other south of the stream terminus. ADF&G staff onboard the chartered vessels will record the number of fish caught by species at each gillnet location (Figure 2). GPS coordinates of the net location is first set, the time the first buoy is placed in the water, the last bouy placed in the water, and the time the net is first started to be pulled as well as the time the entire net is onboard will be recorded. Approximate distances will be reported in nautical miles (nm). Standard sets are 15 minutes in duration (the time the full net is in the water until picking the net begins) to avoid a large harvest of fish. The actual time that the net is in the water will vary depending on fishing conditions and how long it takes to bring the full net back on board.

Gillnet set locations are shown in Figure 1. The two skippers will try to coordinate the timing of the first sets. The sequence of sets should be conducted as follows:

	Skipper north of Bear River	Skipper south of Bear River
Set 1	½ nm north of the Bear River Church, ½ nm offshore and out	Southern part of the Whale Hole, ½ nm offshore and out
Set 2	At the Bear R. church, close to the beach	At the Whale Hole, close to the beach
Set 3	At the 1,000 yard northern regulatory marker, close to the beach	At the 1,000 yard southern regulatory marker, close to the beach
Set 4	Inside the 1,000 yard northern regulatory marker, close to the beach	Inside the 1,000 yard southern regulatory marker, close to the beach

Those sets close to the beach will be as close as possible to the shoreline considering sea and weather conditions. The skipper may recommend not fishing in a specific area based on weather conditions or other hindrances, such as known obstructions. Attempts will be made to reduce damage to fishing gear and equipment. Upon setting the gear, the net will be "run" to determine the approximate harvest of fish. Soak time will be 15 minutes in duration and commence after the entire net is in the water. If large numbers of sockeye salmon are observed being caught prior to the entire 15 minute soak time, then the gear will be pulled immediately to prevent excessive numbers of fish from being harvested. Additional sets beyond those scheduled or soak times longer than 15 minutes may be necessary to provide an indication of a potential build-up of sockeye salmon and recover the cost of the combined charters. Determination of the need for additional set times or locations will be made onsite by the ADF&G observers in consultation with the Area Management Biologist.

Upon completion of the final set, the skipper will transport the catch to a processor and will drop off ADF&G staff at the Port Moller dock. During delivery, sockeye salmon will be randomly selected for scale sampling per the guidelines in the Alaska Peninsula Catch Sampling Operational Procedures (Murphy and Tschersich *in press*a). All fish will be sold and revenue will be deposited into the ADF&G Test Fish Account.

MANAGEMENT IMPLICATIONS

ADF&G management staff in Port Moller will assess the results of each test fishery and will update fishermen via VHF radio during the next radio schedule. Management decisions will incorporate all available information, including daily catch rates prior to the fishery closure, aerial survey observations, daily escapement estimates, and the test fishery results. ADF&G will continue to incorporate other factors, as stated in the North Alaska Peninsula Management Plan (Murphy and Tschersich 2008.) to establish fishing times and areas. When a large salmon build-up is observed in the test fishery area, management actions may include opening the commercial fishery while still providing a closed water area to protect milling Bear River bound sockeye salmon. In the past, ADF&G has closed areas around Bear River to ensure escapement requirements were achieved while providing a harvest opportunity outside the protected areas. The test fishery program provides ADF&G with a marine abundance index and is intended to maximize fishing opportunities while minimizing surplus escapement.

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Murphy, R.L. and P. Tschersich. 2008. North Alaska Peninsula salmon management plan, 2008. Alaska Department of Fish and Game, Division of Commercial Fisheries, Fishery Management Report No. 08-19, Kodiak.

FIGURES

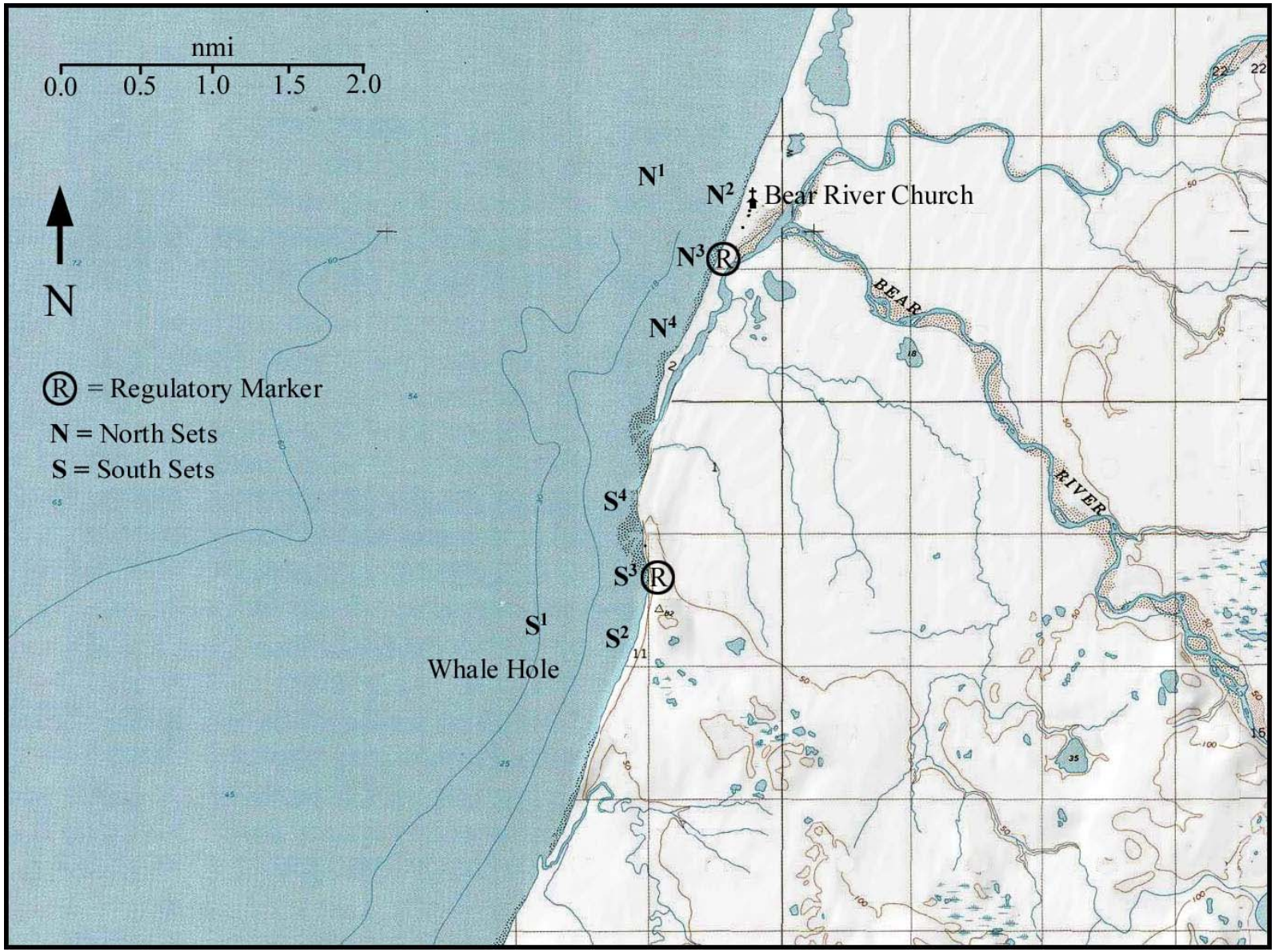

Figure 1.–Location of test fish drift gillnet sets in the vicinity of Bear River on the Alaska Peninsula.

BEAR RIVER TEST FISHERY

Date		Total Sockeye:
Port Moller High Tide Time		Total Sets:
Port Moller Low Tide Time		Total Soak Time:
Fishing Vessel Name & Skipper		
Mesh Size		
ADF&G Observer		

	SETS				
	1st	2nd	3rd	4th	
Location Description					
GPS Latitude					
GPS Longitude					
Amount Net Used					
Time Started Set (first buoy in water)					
Time Ended Set (last buoy in water)					
Time Started Picking Net					
Time Full Net Out of Water					**Total Soak**
Total Soak Time (Time Set through Time Net out of Water)		_____hrs _____mins	_____hrs _____mins	_____hrs _____mins	
CATCH AMOUNTS					**Totals**
Sockeye					
Chinook					
Pink					
Chum					
Coho					
Starry Flounder					
Other Species:					
Other Species:					
Other Species:					
Other Species:					

Comments: _____

_____

Figure 2.–Bear River test fishery data form.

APPENDIX A. U.S. COAST GUARD NOTIFICATION OF TEST FISHING

Appendix A1.–Notification of United States Coast Guard of test fishing activity.

In order to comply with Federal Department of Homeland Security requirements, a notification protocol has been implemented to inform the United States Coast Guard (USCG) of ADF&G test fishing operations on a chartered vessel. This is intended to reduce confusion over apparent fishing activity in closed waters or during closed seasons, and also in the possible proximity of sensitive areas such as around marine mammals.

The following information will be made available to the USCG Command Center prior to test fishing:

- The name of the vessel and registration numbers
- The call sign / captain's name
- The area of operations
- The date of operations.
- The type of work being done.

The information will be provided by Port Moller ADF&G personnel to a procurement specialist at the ADF&G headquarters in Juneau, who will coordinate and forward the information to the USCG Command Center prior to any test fishing activity. The intent to test fish information will be sent to:

Dave Mitchell
Procurement Specialist III
Alaska Department of Fish and Game Headquarters
1255 W 8th St
Juneau, AK 99801
(907) 465-4131 phone
(907) 465-6181 fax
dave_mitchell@fishgame.state.ak.us

The Shumagin Islands Immature Salmon Test Fishery Operational Plan, 2008

by

Aaron D. Poetter

April 2008

Alaska Department of Fish and Game **Division of 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)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

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

THE SHUMAGIN ISLANDS IMMATURE SALMON TEST FISHERY OPERATIONAL PLAN, 2008

by

Aaron D. Poetter

April 2008

Alaska Department of Fish and Game
Division of Commercial Fisheries
211 Mission Road Kodiak, Alaska 99615

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This document should be cited as:
Poetter, A.D. 2008. The Shumagin Islands immature salmon test fishery operational plan, 2008. In Alaska Peninsula salmon operational plans, 2008. Alaska Department of Fish and Game, Regional Information Report No. 4K08-02, Kodiak.

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ABSTRACT

This document provides commercial salmon fishermen and buyers on the South Alaska Peninsula information and guidelines that will be used to prosecute the Shumagin Islands immature salmon test fishery during 2008. The presence of immature salmon in South Peninsula waters has warranted restrictions to commercial fishing in some years. In 1990, a test-fishing program was instituted by the Alaska Department of Fish and Game in the Shumagin Islands to determine the presence and abundance of immature salmon in South Peninsula waters prior to the July commercial fishing periods. In 1998 the Alaska Board of Fisheries adopted regulations in the Post-June Management Plan (5AAC 09.366 (i)), mandating that the test fishery be conducted to assist management staff with making commercial fishery management decisions.

The 2008 Shumagin Islands test fishery will be operated beginning July 2 with one purse seine vessel making a minimum of six sets per day. The objectives of the test fishery are to assess the marine abundance of immature salmon in the vicinity of the Shumagin Islands. Test fishing will be conducted prior to the first commercial purse seine fishing period in the Shumagin Islands. Additional test fishing may be required if the abundance of immature salmon harvested during the commercial fishery is above the regulatory threshold.

Key words: Shumagin Islands, Alaska Peninsula, immature salmon, test fishery, commercial fishery management, Post June management plan, Area M, *Oncorhynchus*, purse seine, operational plan

INTRODUCTION

This paper documents the purpose, goals, and methods of a program designed to assess immature Chinook *Oncorhynchus tshawytcha*, sockeye *O. nerka*, coho *O. kitsuch*, and chum *O. keta* salmon abundance in the marine waters near the Shumagin Islands. For the purposes of the test fishery, immature salmon are defined as those Chinook, sockeye, coho, and chum salmon that are gilled in the seine web (5AAC 09.366 (i), 2004).

The Alaska Department of Fish and Game (ADF&G) first became aware of immature salmon catches in 1963 (McCullough 1995). The presence of excess numbers of immature salmon in South Peninsula commercial salmon catches has warranted restrictions to commercial fishing in some years. These restrictions were applied to all gear types in affected areas from late June into July in 1963, 1968, 1974, 1979, and for purse seine fishing only during the 1989-1992, 1999, 2001, and 2003 seasons (Burkey 2004; McCullough 1995).

High abundance of immature salmon has been most prevalent in the Shumagin Islands Section where the concern for harvesting immature salmon is limited to purse seine gear (Figure 1). Under current regulations, seine mesh size may not exceed 3-1/2 inches except for the first 25 meshes above the lead line, which may not exceed 7 inches (5 AAC 09.332 (a)). Set gillnet gear has larger mesh size (minimum of 5-1/4 inches; 5 AAC 09.331 (b)(3)) which allows immature salmon to pass through. Immature salmon usually migrate out of the area by the third week of July, although in 1992, closures were necessary until July 29.

Before 1998, the department conducted a test fishing program in mid-July to assess the presence of immature salmon in the Shumagin Islands (Table 1). In 1990, the department instituted a test-fishing program in the Shumagin Islands to determine the presence and abundance of immature salmon in South Peninsula waters prior to commercial salmon fishing in July. In the Shumagin Islands Section, most purse seine fishing effort occurs in the nearshore waters from Popof Head to Red Bluff, so test fishing sites were established in those areas (Figure 2). In 1991, the Alaska Board of Fisheries (BOF) restricted commercial salmon fishing to terminal areas within South Peninsula waters from July 6 - 19, due in part to concerns for immature Chinook, sockeye, and chum salmon that were inadvertently gilled during purse seine gear fishing operations

(McCullough and Shaul 1992). In 1998, the BOF amended the Post-June Management Plan (5AAC 09.366), which regulates the commercial salmon fishery after June 30 in South Alaska Peninsula waters. The regulation established the test fishery and clarified the definition of immature salmon. The BOF also changed the date of the general commercial opening in non-terminal areas from July 20 to July 6.

OBJECTIVES

BIOLOGICAL

- Provide a timely index of the immature salmon abundance within the marine waters in the vicinity of the Shumagin Islands;
- Reduce the potential for large catches of immature salmon, thus maximizing future escapement and harvest; and
- Collect biological data from test fishery-caught salmon.

FISCAL

- Secure revenue through the sale of fish caught during the test fishery to cover the costs for the daily charter.

PROCEDURES

REQUIREMENTS FOR CHARTER CONTRACT

In April of 2008, the ADF&G distributed a pre-season letter and request for quotation (RFQ) seeking individuals interested in working with the department in conducting test fishery operations. The letter asked interested parties to submit a bid based on a percentage of the adult salmon harvest that they would accept as payment for the charter. Selection of the test fish charter will go to the lowest bidder. In the case of multiple "low" bids, charter selection will be awarded to the low bid that was received first. The standard ADF&G short term vessel charter agreement between the State of Alaska and the vessel owner will be used (Appendix A1). Skippers will provide necessary crew to operate the boat and gear, fuel and lubricants, and other supplies needed for daily operation of the vessel. Vessel operators must have a current Area M salmon purse seine permit. Protection (hull) and Indemnity insurance including crew exposure in the amount of at least $300,000 is required. All vessels must contain a refrigerated sea water (RSW) system to chill the catch.

The purse seine vessel must make a minimum of six, 20-minute sets, and fully purse the gear. Sets will be made at Popof Head, Middle Set, and Red Bluff, all near Popof Island (Figure 2). At least one set will be made at each location. If large numbers of immature salmon (greater than 1,000) are observed being gilled during any set, additional sets will be shorter than 20-minutes in length.

Immature salmon are defined as any salmon (other than pink salmon) gilled in seine webbing and weighing less than three pounds per fish. Buyers will not purchase salmon that weigh less than three pounds. All salmon harvested are the property of the State of Alaska and will be sold to cover charter costs. During off-loading, the mature salmon will be separated by species, and

weighed. The number of mature salmon, by species, will be determined from the average weight of a sample of fish.

DETERMINATION TO TEST FISH

ADF&G staff will determine when test fishing will occur based on management requirements. Since 1998, the test fish program has been conducted in early July. However, prior to early July ADF&G staff will monitor the seine fishing fleet (via ADF&G vessel) for immature salmon harvests.

DEPARTMENT OF HOMELAND SECURITY REQUIREMENTS

In order to comply with Federal Department of Homeland Security requirements, a notification protocol has been implemented to inform the United States Coast Guard (USCG) of ADF&G test fishing operations on a chartered vessel (Appendix B1).

SEINE BOAT PROCEDURES AND DATA COLLECTION

ADF&G staff will meet with the skipper of the scheduled chartered vessel prior to departure from Sand Point. The vessel will depart at an agreed upon time with at least one ADF&G observer, and will return to Sand Point after the required sets are completed. Seine sets will be perpendicular to the beach for up to 20 minutes. ADF&G staff will record the number of immature salmon and bycatch caught by species and by set, seine set locations, start net out, net fully out, start net close, and end net close on the Sand Point Test Fishery Data Form (Appendix C1). Standard sets are 20 minutes in duration (time the entire net is in the water until vessel begins to close the net). Actual set time may vary depending on fishing conditions and the number of fish being caught. All gilled salmon will be removed from the net as they are brought aboard.

Sets made near to the beach will be as close to shore as possible. The skipper should use his/her sound judgment when fishing in a specific site based on weather conditions or other hindrances, such as known snags. Attempts should be made to reduce damage to fishing gear and equipment. If a high rate of catch of immature salmon is encountered before all six sets are made, fishing may cease to prevent excessive numbers of immature salmon from being harvested. Determination of the need for additional sets or locations will be made onsite by the ADF&G observers in consultation with the Area Management Biologist.

Upon completion of the final set, the skipper will transport the catch to a processor and will return ADF&G staff to the Sand Point dock. All fish will be sold and revenue will be deposited into the ADF&G Test Fish Account.

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TABLES AND FIGURES

Table 1.–Shumagin Islands, immature salmon test fish results, 1990–2007.

				Number of Adult Salmon						Number of Immature Salmon				
Year	Duration	Number of Sets		Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Chum	Total
1990	July 3 -	29		23	1,194	1,708	4,516	3,104	10,545	39	796	0	1,138	1,973
	August 13		Avg/Set	0.8	41.2	58.9	155.7	107.0	363.6	1.3	27.4	0.0	39.2	68.0
1991	July 1 - 19	51		148	3,791	1,422	7,077	4,092	16,530	331	13,167	0	7,410	20,908
			Avg/Set	2.9	74.3	27.9	138.8	80.2	324.1	6.5	258.2	0.0	145.3	410.0
1992	July 10 - 29	44		134	2,413	3,695	10,167	4,388	20,797	892	13,449	5	2,087	16,433
			Avg/Set	3.0	54.8	84.0	231.1	99.7	472.7	20.3	305.7	0.1	47.4	373.5
1993	July 12 - 18	24		259	1,804	4,892	2,944	827	10,726	393	2,188	0	139	2,720
			Avg/Set	10.8	75.2	203.8	122.7	34.5	446.9	16.4	91.2	0.0	5.8	113.3
1994	July 14 - 27	31		99	1,171	4,221	8,530	2,657	16,678	135	3,685	2	11	3,833
			Avg/Set	3.2	37.8	136.2	275.2	85.7	538.0	4.4	118.9	0.1	0.4	123.6
1995	July 12 - 17	30		122	4,000	3,671	8,456	2,592	18,841	215	221	0	390	826
			Avg/Set	4.1	133.3	122.4	281.9	86.4	628.0	7.2	7.4	0.0	13.0	27.5
1996	July 12 - 18	35		188	2,093	15,187	7,010	7,391	31,869	211	520	4	234	969
			Avg/Set	5.4	59.8	433.9	200.3	211.2	910.5	6.0	14.9	0.1	6.7	27.7
1997	July 12 - 19	39		373	2,716	3,536	4,925	4,075	15,625	3,361	674	32	182	4,249
			Avg/Set	9.6	69.6	90.7	126.3	104.5	400.6	86.2	17.3	0.8	4.7	108.9
1998	July 2 - 3	10		6	711	33	1,200	499	2,449	5	24	0	0	29
			Avg/Set	0.6	71.1	3.3	120.0	49.9	244.9	0.5	2.4	0.0	0.0	2.9
1999	July 1 - 7	26		26	12,284	18	12,340	4,680	29,348	13	2,132	0	42	2,187
			Avg/Set	1.0	472.5	0.7	474.6	180.0	1128.8	0.5	82.0	0.0	1.6	84.1
2000	July 3 - 5	13		9	1,597	101	2,946	1,919	6,572	13	77	0	126	216
			Avg/Set	0.7	122.8	7.8	226.6	147.6	505.5	1.0	5.9	0.0	9.7	16.6
2001	July 2 - 16	50		318	6,258	3,353	9,382	10,772	30,083	1,265	3,241	17	1,382	5,905
			Avg/Set	6.4	125.2	67.1	187.6	215.4	601.7	25.3	64.8	0.3	27.6	118.1
2002	July 2 - 4	15		29	1,020	11	443	1,227	2,730	325	911	1	280	1,517
			Avg/Set	1.9	68.0	0.7	29.5	81.8	182.0	21.7	60.7	0.1	18.7	101.1
2003	July 2 - 20	28		26	819	1,279	4,646	2,275	9,045	1,419	8,640	43	512	10,614
			Avg/Set	0.9	29.3	45.7	165.9	81.3	323.0	50.7	308.6	1.5	18.3	379.1
2004	July 7 - 8	10		81	507	542	1,131	1,827	4,088	42	111	0	279	432
			Avg/Set	8.1	50.7	54.2	113.1	182.7	408.8	4.2	11.1	0.0	27.9	43.2
2005	July 2 - 5	20		68	1,197	2,137	7,117	2,140	12,659	1,110	263	0	211	1,584
			Avg/Set	3.4	59.9	106.9	355.9	107.0	633.0	55.5	13.2	0.0	10.6	79.2
2006	July 2 - 5	15		21	1,211	440	2,254	7,855	11,781	69	356	0	66	491
			Avg/Set	1.4	80.7	29.3	150.3	523.7	785.4	4.6	23.7	0.0	3.1	1.1
2007	July 2 - 5	17		12	11,389	781	7,036	1,300	20,518	2	951	0	9	962
			Avg/Set	0.7	669.9	45.9	413.9	76.5	1,206.9	0.1	55.9	0.0	0.5	56.6
2003 - 2007		18		42	3025	1036	4437	3079	11618	528	2064	9	215	2817
5 Year Average			Avg/Set	2.9	178.1	56.4	239.8	194.2	671.4	23.0	82.5	0.3	12.1	111.8
1998 - 2007		20		60	3699	870	4850	3449	12927	426	1671	6	291	2394
10 Year Average			Avg/Set	2.5	175.0	36.2	223.7	164.6	602.0	16.4	62.8	0.2	11.8	88.2

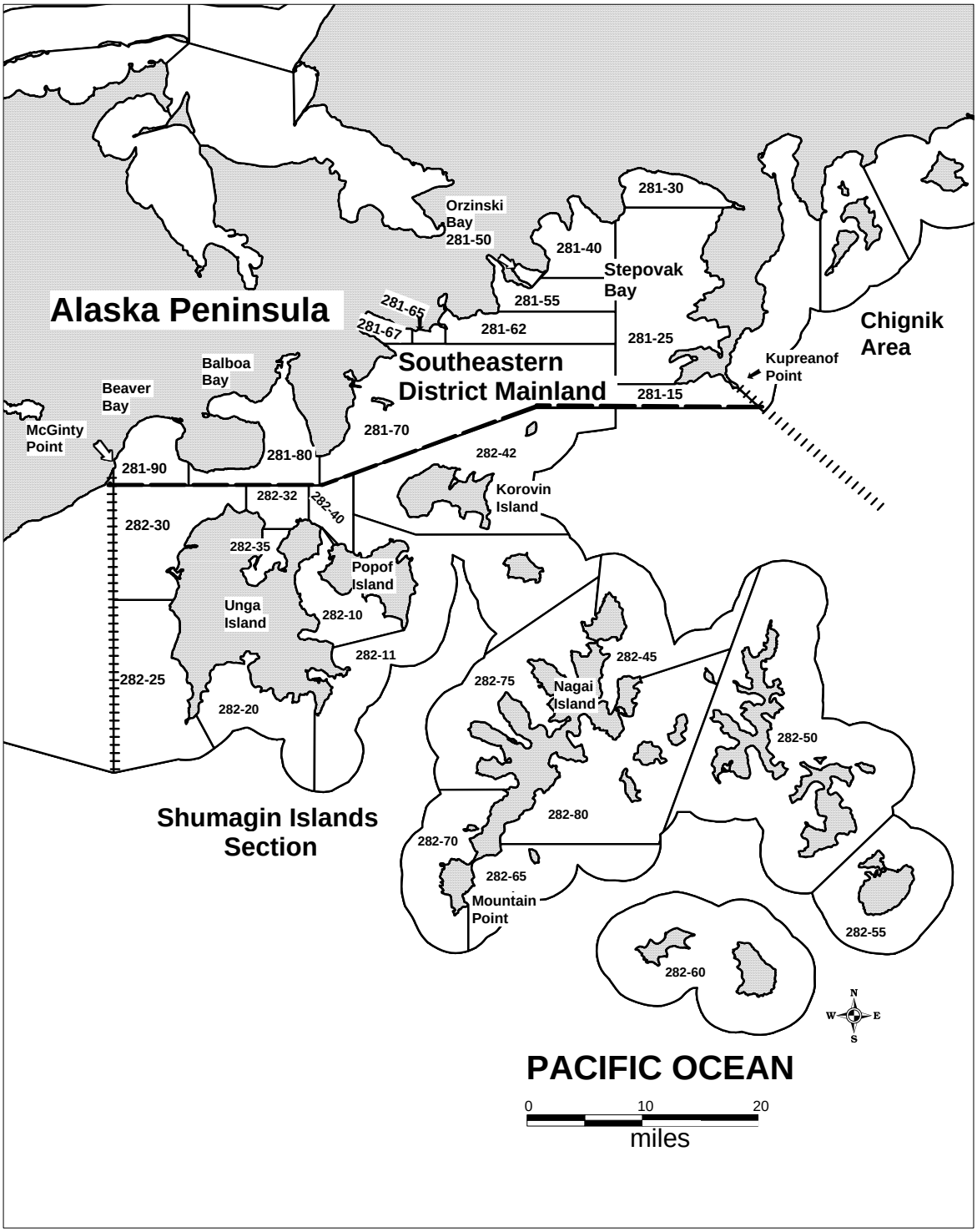

Figure 1.–Map of the Alaska Peninsula Area from Kupreanof Point to McGinty Point (Southeastern District) with the statistical salmon fishing areas shown.

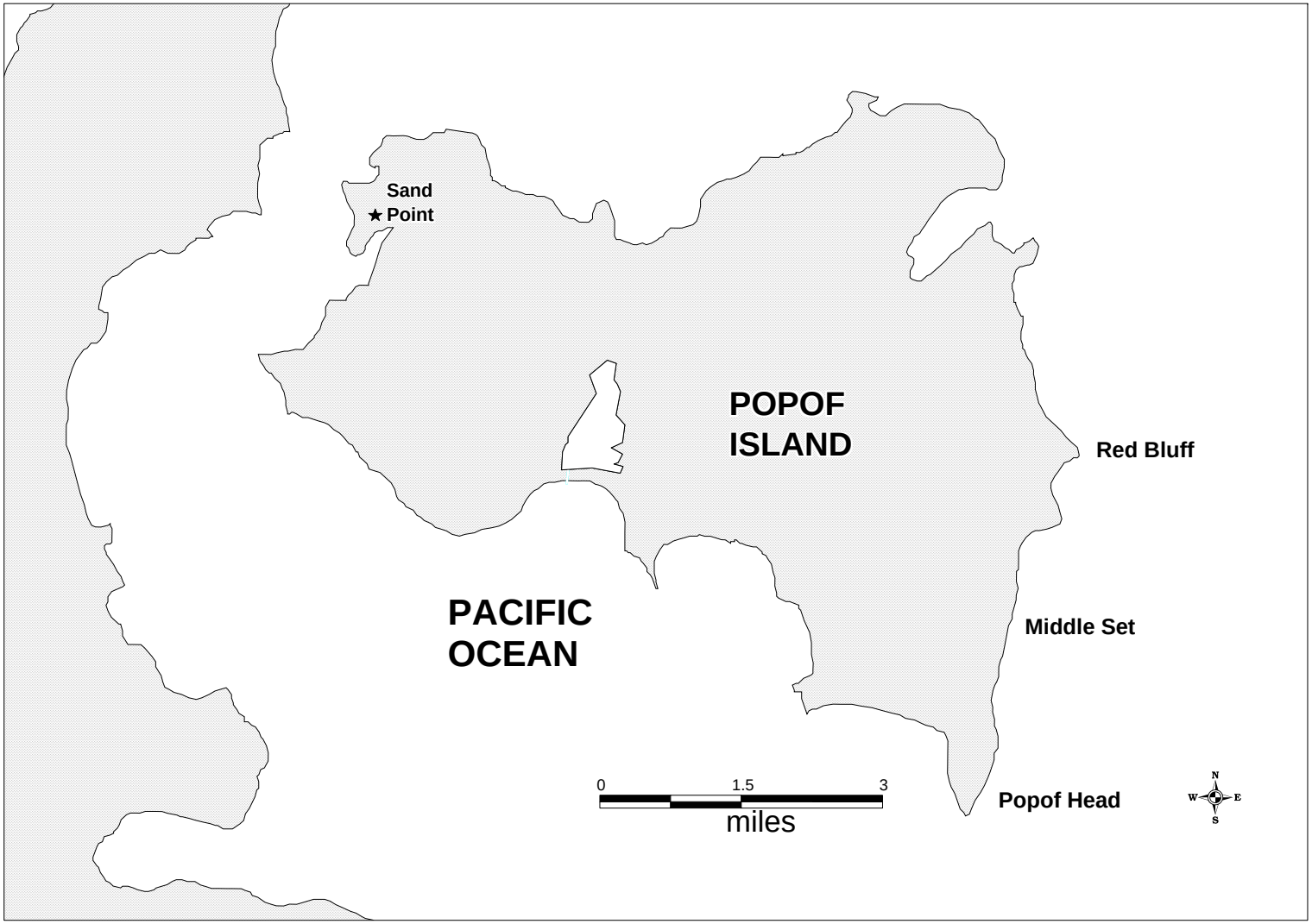

Figure 2.–Map of Popof Island with test fishing sites defined.

APPENDIX A. SHORT-TERM VESSEL CHARTER AGREEMENT

Appendix A1.–Short-term vessel charter agreement.

State of Alaska

Department of Fish and Game

SHORT TERM VESSEL CHARTER AGREEMENT

This agreement shall cover chartering of the vessel described and under the conditions set forth below between the State of Alaska, Department of Fish and Game and:

Name_____ Mailing address _____

Telephone_____ City/State/Zip_____

VESSEL S.S.# or Tax ID_____

Name and/or Number_____ Type & Keel length_____

Equipment & supplies needed provided by the contractor (food, bait, skiff, etc.)_____

_____

Fishing gear provided by contractor_____

Fuel _____will be _____ will not be provided by the State of Alaska.

PURPOSE OF CHARTER_____

_____

Charter will begin at _____ on _____ and end at _____ on _____.

(Location) (Date) (Location) (Date)

(Agreement cannot exceed fourteen (14) working days. No extension or sequential contract allowed.)

Cost of Charter: $_____ (cannot exceed $30,000)

TERMS AND CONDITIONS

1. The state will have general direction of activities of the vessel, but contractor (if aboard) will be responsible for safe operation of vessel.
2. The contractor will hold the State harmless from any liability caused by loss of vessel or damage caused to or by the vessel, and against any loss, damage, and/or liability occasioned by or arising from, any negligent act on the part of the contractor.
3. The State will provide insurance coverage for the state employees only.
4. The length of the charter shown above is estimated and can be terminated at anytime by the State but cannot exceed fourteen (14) days.
5. Vessel may be required to submit to an inspection by the U.S. Coast Guard (State's option).
6. Upon completion of the contract, Department of Fish and Game representatives will initiate payment processing. A warrant will be mailed to the above address after processing.
7. Special conditions _____

_____.

The terms and conditions are understood and agreed to.

/s/_____ /s/_____

Department of Fish and Game Representative Owner or Master of Vessel

INSURACE INFORMATION

1. Value of hull insurance $_____

2. Amount of protection and indemnity insurance $_____

3. Name of Insurance Carrier _____

4. Expiration date of policy _____

5. Number of Contractors _____

6. Name(s) of Department of Fish and Game personnel aboard: _____

APPENDIX B. NOTIFICATION TO THE UNITED STATES COAST GUARD OF TEST FISHING ACTIVITY

Appendix B1.–Notification to the United States Coast Guard of test fishing activities.

In order to comply with Federal Department of Homeland Security requirements, a notification protocol has been implemented to inform the United States Coast Guard (USCG) of ADF&G test fishing operations on a chartered vessel. This is intended to reduce confusion over apparent fishing activity in closed waters or during closed seasons, and also in the possible proximity of sensitive areas such as around marine mammals.

The following information will be made available to the USCG Command Center prior to test fishing:

- The name of the vessel and registration numbers
- The call sign / captain's name
- The area of operations
- The date of operations
- The type of work being done

The information will be provided by Sand Point ADF&G personnel to a procurement specialist at the ADF&G headquarters in Juneau, who will coordinate and forward the information to the USCG Command Center prior to any test fishing activity. The intent to test fish information will be sent to:

Dave Mitchell
Procurement Specialist III
Alaska Department of Fish and Game Headquarters
1255 W 8th St
Juneau, AK 99801
(907) 465-4131
(907) 465-6181 fax
dave.mitchell@alaska.gov

APPENDIX C. SAND POINT TEST FISH DATA FORM

Appendix C1.–Example of a Sand Point immature salmon test fish data form.

Page ___ of ____

Sand Point Test Fishery Data Form

Date_____ Vessel _____
Observer _____
Processor _____

SET NUMBER	Lat.	Long.
SET LOCATION	Start net out	Net fully out
	Start net closed	End net closed
	Time Out	Time Closed

Immature Salmon Caught

	Caught
Sockeye	
Chinook	
Pink	
Chum	
Coho	
Total	

Bycatch

Species	Caught
Total	

Comments:

Date_____ Vessel _____
Observer _____
Processor _____

SET NUMBER	Lat.	Long.
SET LOCATION	Start net out	Net fully out
	Start net closed	End net closed
	Time Out	Time Closed

Immature Salmon Caught

	Caught
Sockeye	
Chinook	
Pink	
Chum	
Total	

Bycatch

Species	Caught
Total	

Comments: