

ALASKA PENINSULA AND ALEUTIAN ISLANDS
SALMON OPERATIONAL PLANS, 2002

By

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Division of Commercial Fisheries
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Table of Contents

Alaska Peninsula salmon catch sampling procedures, 2002	Red Divider
Alaska Peninsula salmon evaluation and escapement sampling operating procedures, 2002	Red Divider

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TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES	i
LIST OF FIGURES	i
LIST OF APPENDICES	ii
ABSTRACT	1
INTRODUCTION	2
OBJECTIVES	2
SUPERVISION	3
PERSONNEL	3
METHODS	3
DATA ANALYSIS AND REPORTING	5
LITERATURE CITED	6
TABLES	7
FIGURES.....	15
APPENDICES	21

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Districts, sections, and statistical areas for the Alaska Peninsula Management Area, 2002	7
2. Sockeye salmon catch sampling schedule for the Alaska Peninsula Management Area, 2002	8
3. Chum salmon catch sampling schedule for the Alaska Peninsula Management Area, 2002	10
4. Coho salmon catch sampling schedule for the Alaska Peninsula Management Area, 2002	12
5. Chinook salmon catch sampling schedule for the Alaska Peninsula Management Area, 2002	14

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Map of the Alaska Peninsula Management Area, with the North and South Peninsula defined	15
2. Map of the Alaska Peninsula Management Area from Kupreanof Point to Scotch Cap with the salmon fishing districts defined	16
3. Map of the Alaska Peninsula Area from Kupreanof Point to McGinty Point (Southeastern District) with the statistical salmon fishing areas shown	17
4. Map of the Alaska Peninsula Area from McGinty Point to Arch Point (South Central District) with the statistical salmon fishing areas shown	18
5. Map of the Alaska Peninsula Area from Arch Point to Unimak Island (Southwestern District) with the statistical salmon fishing areas shown	19
6. Map of the Alaska Peninsula Area from Hague Rock to Unimak Pass (Unimak District) with the statistical salmon fishing areas shown	20

LIST OF APPENDICES

	<u>Page</u>
APPENDIX A: ALASKA PENINSULA SCALE SAMPLING TECHNIQUE	21
A.1. Measuring adult salmon fish length	26
A.2. Preferred scale sampling area on an adult salmon	27
APPENDIX B: COMPLETION OF MARK-SENSE AWL FORMS	28
B.1. Assigned port and weir location codes	32
B.2. Chinook salmon AWL form and gum card with three scales per fish	33
B.3. Sampling week (period) and corresponding calendar dates, 2002	34
B.4. Sockeye salmon AWL form and gum card with one scale per fish	35
B.5. Coho salmon AWL form and gum card with four scales per fish	36
APPENDIX C: CAMP POLICY	37
APPENDIX D: FIRST AID AND SAFETY	41

ABSTRACT

The Alaska Peninsula catch sampling program began in 1985 in Port Moller and has occurred each year since. Samples have been collected in Sand Point since 1998. The Port Moller sampling focuses on sockeye salmon *Oncorhynchus nerka* harvested in the commercial catch from Nelson Lagoon, Bear River, Three Hills, and Ilnik Sections. Chinook salmon *O. tshawytscha*, chum salmon *O. keta*, and coho salmon *O. kisutch* are also collected in Port Moller when time permits. In Sand Point, sockeye salmon are sampled from the commercial catch in the Shumagin Islands and Southeast District Mainland. Age data is used to build brood tables for forecasting and provides basic biological information with regard to the commercial salmon harvested. Length and sex data are also collected from the sockeye salmon catch in Nelson Lagoon and in the Harbor Point to Strogonof Point areas.

INTRODUCTION

The Alaska Peninsula and Aleutian Islands Management Areas for the management of commercial salmon fisheries encompass state waters of the Aleutian Islands, the North Alaska Peninsula west of Cape Menshikof, and the South Alaska Peninsula west of Kupreanof Point (Figures 1-6). There are 335 known salmon producing streams in the Aleutian Islands Area and 247 salmon producing streams on the Alaska Peninsula Area (Murphy, 1992).

Five species of salmon are commercially harvested in the Alaska Peninsula and Aleutian Islands Management Areas: 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 on the North Alaska Peninsula. Pink salmon have been of economic importance in the Aleutian Islands. 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 operation was initiated in the Alaska Peninsula Management Area to establish a database for separating stocks, evaluating escapement goals, forecasting, and assessing inseason run timing. The current catch sampling emphasis is on sockeye and chum salmon, with chinook and coho salmon also opportunistically sampled.

OBJECTIVES

The sampling program objective is to determine sockeye and chum salmon age composition of the commercial catch in the Alaska Peninsula fisheries within present budget constraints. Chinook and coho salmon are also sampled to obtain baseline age composition data.

Long Term: Improve management of salmon resources for the Alaska Peninsula and Aleutian Islands Management Areas by providing data with which to better forecast run strength, develop stock-recruitment relationships, assess escapement requirements, and estimate stock contribution levels for mixed stock fisheries.

Short Term: Update brood tables for sockeye salmon at Nelson and Bear Rivers. Determine the age composition of chinook, sockeye, chum, and coho salmon for all major fisheries.

SUPERVISION

Bob Murphy, Area Management Biologist (AMB) in Port Moller, will supervise the catch sampling crew and operations at Port Moller. Charlie Burkey, the AMB in Sand Point will supervise the catch sampler based in Sand Point.

PERSONNEL

During 2002, a two-person crew will be stationed in Port Moller and a one-person crew will be stationed at Sand Point. The Sand Point person will send scale gum cards and associated AWL forms to Port Moller for scale pressing and age determination. The Port Moller crew will be responsible for pressing all scales collected in any other location (including weir camps) unless instructed differently. Certified staff in Port Moller will age all scales collected.

The Port Moller sampling crew is expected to collect age composition data from 1 June to approximately 4 September. The Port Moller crew will be responsible for catch sampling the commercial fisheries on the North Peninsula and possibly the South Peninsula, if overflow fish are delivered to Port Moller from King Cove.

A catch sampler will be based in Sand Point from early July to 20 August. The Sand Point crew will be responsible for catch sampling the commercial fisheries on the South Peninsula. Sockeye salmon catches from the Shumagin Islands are the priority for the Sand Point catch sampler.

METHODS

To ensure that samples from designated areas are representative of the entire catch, 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 (and tender interviews) will be reviewed to ensure sampling of pure loads obtained from the separate areas. To ensure that sampling goals are met, the crews will begin sampling the first day the respective catches are delivered from the designated sampling areas for each week (Sunday to Saturday). Sampling will usually begin on Monday for catches from the previous day and end on Saturday. If there is a high probability of collecting samples from the same area on more than one occasion during a week, the crew should try to collect the sample 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 age (scales) are in Appendices A and B. The accuracy of the data is the responsibility of the crew leaders. All questions concerning collection procedures should be brought to the attention of the supervisor at the first available opportunity.

Sample sizes are statistically derived to ensure the accuracy and precision of age composition estimates. Catch sampling crews will be collecting 400 samples/week/area each for sockeye and chum salmon, and 300 samples/week/area each for chinook and coho salmon (Tables 2-5). Species other than sockeye salmon will be sampled only at Port Moller.

These sample sizes are the target maximum. The maximum sample sizes will not be achieved at all times, especially for small local runs and early and late in the season. Pure loads from multiple deliveries can be sampled and combined to reach the weekly sample goal. Do not sample an area unless at least 75 fish can be sampled for a given species during a given week. The exceptions to this rule would be for a run where knowledge is limited, such as the sockeye run at Thin Point. Some areas may never have a pure load. At these areas, try to sample the fish when deliveries are 90% or more from one area (mark the percent of each fishing area on the top of each AWL form). For areas that will never be greater than 90% pure, sample as time permits. Future analysis of the data will take the mixture into consideration. Proper identification of catch area will be the responsibility of the dockside catch sampling crew.

All scale samples from catch and escapement sampling will be aged in Port Moller. Samples collected in Sand Point will be sent with the appropriate paperwork to Port Moller periodically. The crew at Sand Point will maintain a logbook of all outgoing catch samples. To ensure safe delivery, notify Port Moller:

- 1) That the samples are being mailed (use a secure moisture proof container) priority mail vial USPS;
- 2) what samples are being sent;
- 3) when delivery is expected in Port Moller; and
- 4) who is transporting the samples (if one of the state pilots has them).

Sockeye salmon have top priority for sampling during all periods from the specified fishing areas. No other species other than sockeye salmon are to be sampled in Sand Point unless otherwise directed by Area Management staff. If other species are collected in Sand Point, they should be directed toward gathering biological age composition data of local runs. Chinook, chum and coho salmon will be sampled as time allows in Port Moller.

Sockeye salmon length and sex sampling will be conducted at Port Moller from Nelson Lagoon and the Harbort Point to Strogonof Point reach.

Crews should 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 to: CWT & Otolith Processing Lab, 10107 Bentwood Place, Juneau, AK 99802-5526. Catch location of the fin-clipped chinook, catch date, gear type, species, tag number or head of fish, type of tag, length, weight, and several scales from the preferred area should be included with the report.

The Sand Point staff should anticipate supply shortages (AWL, gum cards, etc.) in season and notify staff in Port Moller before the supplies are exhausted. Each crew leader will keep a daily log book of activities. A report from each crew leader outlining problems encountered and solutions, as

well as any suggestions for the project, will be sent to Port Moller at the end of the season along with an equipment list and place of storage.

Appendix C contains information on general equipment, cabin maintenance, and crew policy.

Appendix D contains information on first aid and safety.

DATA ANALYSIS AND REPORTING

Ken Bouwens, Bob Murphy, and Matt Foster will complete a Regional Information Report for the 2002 season by 1 May 2003.

Currently, funding is not available for scale pattern analysis studies on the Alaska Peninsula, nor catch sampling operations in King Cove. Also, funding is not available to sample sockeye salmon from the Southeastern District Mainland.

LITERATURE CITED

Murphy, R.L. 1992. Number of salmon systems and distribution of escapements in the Alaska Peninsula and Aleutian Islands Management Areas, 1986-91. Regional Information Report No. 4K92-15, Alaska Department of Fish and Game, Division of Commercial Fisheries, Region IV Report, Kodiak.

Table 1. Districts, sections, and statistical areas for the Alaska Peninsula Management Area, 2002.

Fishing Area Location	Statistical Areas
SOUTH PENINSULA	
Southeastern District Mainland	
Beaver Bay to Renshaw Pt.	281-70,80,90
Northwest Stepovak Section	281-40,50,55,62,65,67
East Stepovak Section	281-15,25,30
Shumagin Islands Section	282-10,11,20,25,30,32,35,40,42,45,50,55,60,65,70,75,80
South Central, Southwestern, and Unimak Districts	
McGinty Point-Cape Tolstoi	283-15,17,21
Inner Pavlof Bay & Canoe Bay	283-23,24,25
Outer Pavlof Bay-Pavlof Islands	283-20,26, 284-36,37,38
Belkofski Bay & Deer Island Sections	284-42,45,55
Cold Bay Section	284-62,65,67
Thin Point Section	284-75
Morzhovoi Bay Section	284-80
Ikatan Bay to Cape Lazaref	284-90; 285-20,30
Sanak Island	285-10
Cape Lutke	284-40
NORTH PENINSULA	
Northwestern District	
Urilia Bay	311-32
Swanson Lagoon	311-52
Bechevin Bay	311-60
Izembek-Moffet Bay Section	312-10,20,40
Northern District	
Black Hills Section	313-10
Nelson Lagoon Section	313-30
Herendeen Bay	314-20
Harbor Point to Cape Seniavin	314-12; 315-11,20
Cape Seniavin to Strogonof Point	316-10,20,22,25
Harbor Point to Strogonof Point	314-12; 315's; 316's
Outer Port Heiden Section	317-10
Inner Port Heiden Section	317-20
Cinder River Section	318-20

Table 2. Sockeye salmon catch sampling schedule for the Alaska Peninsula Management Area, 2002.

Crew	SAMPLING AREA			SAMPLE		
	District/Section	Geographic Area	Statistical Areas	Frequency	Size	Data
Port Moller						
	Northern District:					
	Nelson Lagoon Section	Nelson Lagoon	313-30	Weekly	400	Scales
	Bear River (prior to June 25)	Harbor Point to Cape Seniavin	314-12,315-11,20	Weekly	400	ALS ^a
	Bear River, Three Hills, and Ilnik Sections (post June 24)	Harbor Point to Strogonof Point	314-12,315-11,20 316-10,20,22,25	Weekly	800	ALS ^a
	Ilnik Section (Lagoon)	Ilnik Lagoon	316-22	Weekly	400	Scales
	Inner Port Heiden Section	Inner Port Heiden	317-20	Weekly	400	Scales
Sand Point						
	Northwestern District:					
		Urilia Bay	311-32	Weekly	400	Scales
	Southeastern District Mainland:					
		Beaver Bay to Renshaw Pt.	281-70,80,90	Weekly	400	Scales
		Northwest Stepovak Sect.	281-40; 281-50; 281-55; 281-62; 281-65; 281-67			
		East Stepovak Section	281-15,25,30			
		Shumagin Islands Section	282-10,11,20,25,30,32,35,40, 42,45,50,55,60,65,70,75,80	Weekly	400	Scales

-Continued-

Table 2. (page 2 of 2)

Crew	SAMPLING AREA			SAMPLE		
	District/Section	Geographic Area	Statistical Areas	Frequency	Size	Data
Sand Point (Cont.)						
South Central, Southwestern, and Unimak Districts:						
	McGinty Point-Cape Tolstoi		283-15,17,21	Weekly	400	Scales
	Inner Pavlof Bay & Canoe Bay		283-23,24,25	Weekly	400	Scales
	Outer Pavlof Bay-Pavlof Islands		283-20,26, 284-36, 28437, 284-38	Weekly	400	Scales
	Belkofski Bay & Deer Is. Sections		284-42,45,55	Weekly	400	Scales
	Cold Bay Section		284-62,65,67	Weekly	400	Scales
	Thin Point Section		284-75	Weekly	400	Scales
	Morzhovoi Bay Section		284-80	Weekly	400	Scales
	Ikatan Bay to Cape Lazaref		284-90; 285-20; 285-30	Weekly	400	Scales
	Sanak Island		285-10	Weekly	400	Scales
	Cape Lutke		284-40	Weekly	400	Scales
Unalaska District:						
	Unalaska Bay		302-31	Weekly	400	Scales
	Reese Bay		302-35	Weekly	400	Scales
	Makushin Bay		302-40	Weekly	400	Scales

^a ALS stands for age, length, and sex data.

Table 3. Chum salmon catch sampling schedule for the Alaska Peninsula Management Area, 2002.

Crew	SAMPLING AREA			SAMPLE		
	District/Section	Geographic Area	Statistical Areas	Frequency	Size	Data
Port Moller						
	Northern District:					
	Nelson Lagoon Section	Nelson Lagoon	313-30	Weekly	400	Scales
	Moller/Herendeen Bay Section	Herendeen Bay	314-20	Weekly	400	Scales
	Bear River, Three Hills, and Ilnik Sections (post June 24)	Harbor Point to Strogonof Point	314-12,315-11,20 316-10,20,22,25	Weekly	400	Scales
Sand Point						
	Northwestern District:					
		All Areas		Weekly	400	Scales
	Southeastern District Mainland:					
		Beaver Bay to Renshaw Pt	281-70,80,90	Weekly	400	Scales
		Northwest Stepovak Sec.	281-40; 281-50; 281-55; 281-62; 281-65; 281-67	Weekly	400	Scales
		East Stepovak Section	281-15,25,30	Weekly	400	Scales
	Shumagin Islands Section		282-10,11,20,25,30,32,35,40, 42,45,50,55,60,65,70,75,80	Weekly	400	Scales

-Continued-

Table 3. (page 2 of 2)

Crew	District/Section	SAMPLING AREA		SAMPLE		
		Geographic Area	Statistical Areas	Frequency	Size	Data
Sand Point (Cont.)						
South Central, Southwestern, and Unimak Districts:						
	McGinty Point-Cape Tolstoi		283-15,17,21	Weekly	400	Scales
	Inner Pavlof Bay & Canoe Bay		283-23,24,25	Weekly	400	Scales
	Outer Pavlof Bay-Pavlof Is.		283-20,26, 284-36, 28437, 284-38	Weekly	400	Scales
	Belkofski Bay & Deer Is. Sec.		284-42,45,55	Weekly	400	Scales
	Cold Bay Section		284-62,65,67	Weekly	400	Scales
	Thin Point Section		284-75	Weekly	400	Scales
	Morzhovoi Bay Section		284-80	Weekly	400	Scales
	Ikatan Bay to Cape Lazaref		284-90; 285-20; 285-30	Weekly	400	Scales
	Sanak Island		285-10	Weekly	400	Scales
	Cape Lutke		284-40	Weekly	400	Scales

Table 4. Coho salmon catch sampling schedule for the Alaska Peninsula Management Area, 2002.

Crew	SAMPLING AREA			SAMPLE		
	District/Section	Geographic Area	Statistical Areas	Frequency	Size	Data
Port Moller						
Northern District:						
	Nelson Lagoon Section	Nelson Lagoon	313-30	Weekly	300	Scales
	Bear River, Three Hills, and Ilnik Sections	Harbor Point to Strogonof Point	314-12,315-11,20 316-10,20,22,25	Weekly	300	Scales
Sand Point						
Northwestern District:						
	Izembek-Moffet Bay Section	Izembek-Moffet Bay	312-10,20,40	Weekly	300	Scales
		Swanson Lagoon	311-52	Weekly	300	Scales
Southeastern District Mainland:						
	Beaver Bay to Renshaw Pt.		281-70,80,90	Weekly	300	Scales
	Northwest Stepovak Section		281-40; 281-50; 281-55; 281-62; 281-65; 281-67	Weekly	300	Scales
	East Stepovak Section		281-15,25,30	Weekly	300	Scales
	Shumagin Islands Section		282-10,11,20,25,30,32,35,40, 42,45,50,55,60,65,70,75,80	Weekly	300	Scales

-Continued-

Table 4. (page 2 of 2)

Crew	SAMPLING AREA		SAMPLE			
	District/Section	Geographic Area	Statistical Areas	Frequency	Size	Data
Sand Point (Cont.)						
South Central, Southwestern, and Unimak Districts:						
	McGinty Point-Cape Tolstoi	283-15,17,21		Weekly	300	Scales
	Inner Pavlof Bay & Canoe Bay	283-23,24,25		Weekly	300	Scales
	Outer Pavlof Bay-Pavlof Islands	283-20,26, 284-36, 28437, 284-38		Weekly	300	Scales
	Belkofski Bay & Deer Island Sections	284-42,45,55		Weekly	300	Scales
	Cold Bay Section	284-62,65,67		Weekly	300	Scales
	Thin Point Section	284-75		Weekly	300	Scales
	Morzhovoi Bay Section	284-80		Weekly	300	Scales
	Ikatan Bay to Cape Lazaref	284-90; 285-20; 285-30		Weekly	300	Scales
	Sanak Island	285-10		Weekly	300	Scales
	Cape Lutke	284-40		Weekly	300	Scales

Table 5. Chinook salmon catch sampling schedule for the Alaska Peninsula Management Area, 2002.

Crew	SAMPLING AREA			SAMPLE		
	District/Section	Geographic Area	Statistical Areas	Frequency	Size	Data
Port Moller						
Northern District:						
	Nelson Lagoon Section	Nelson Lagoon	313-30	Weekly	300	Scales
	Bear River Section (prior to July 25)	Harbor Point to Cape Seniavin	314-12,315-11,20	Weekly	300	Scales
	Bear River, Three Hills, Ilnik Section (post June 24)	Harbor Point to Strogonof Point	314-12,315-11,20 316-10,20,22,25	Weekly	300	Scales

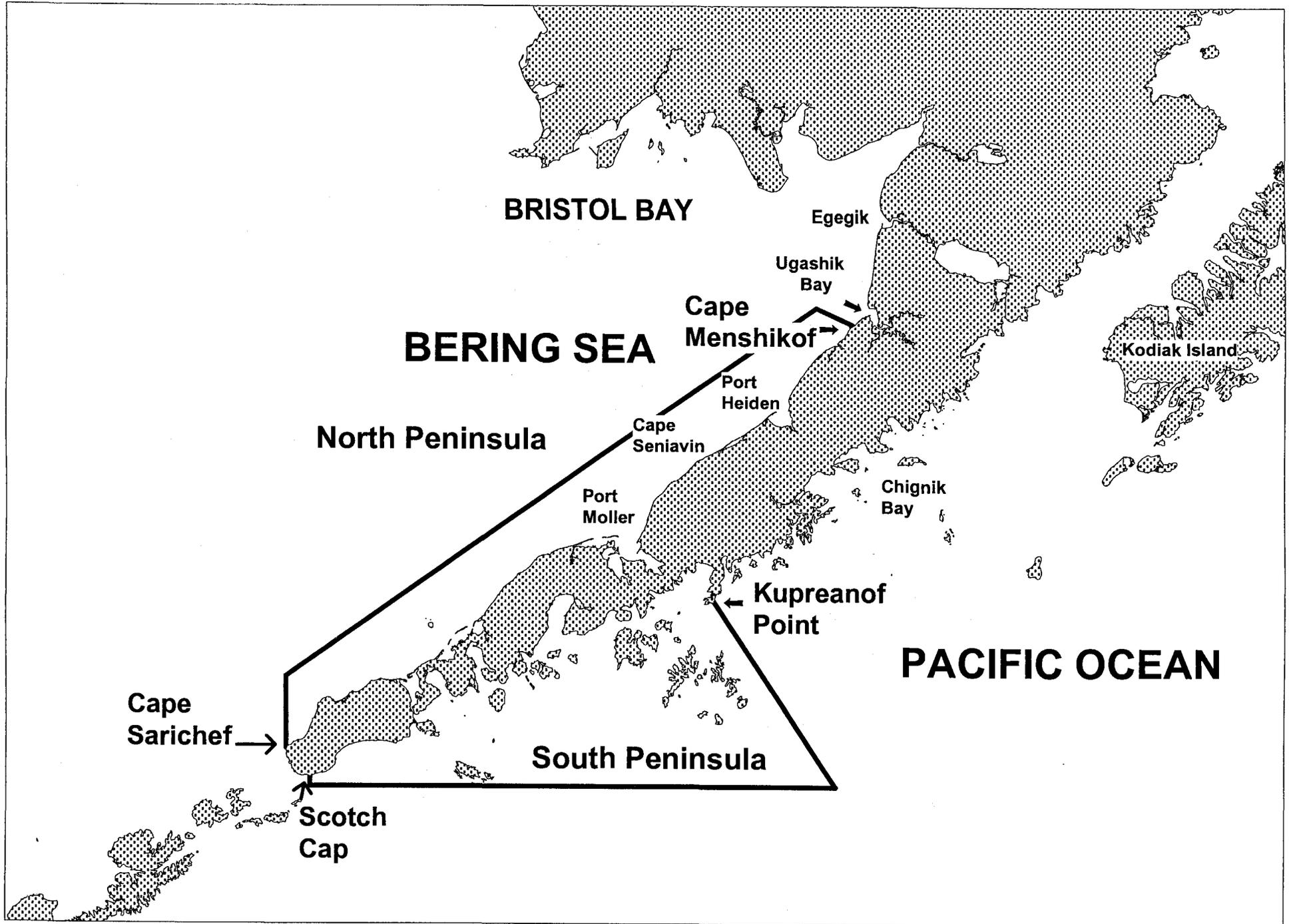


Figure 1. Map of the Alaska Peninsula Management Area, with the North and South Peninsulas defined.

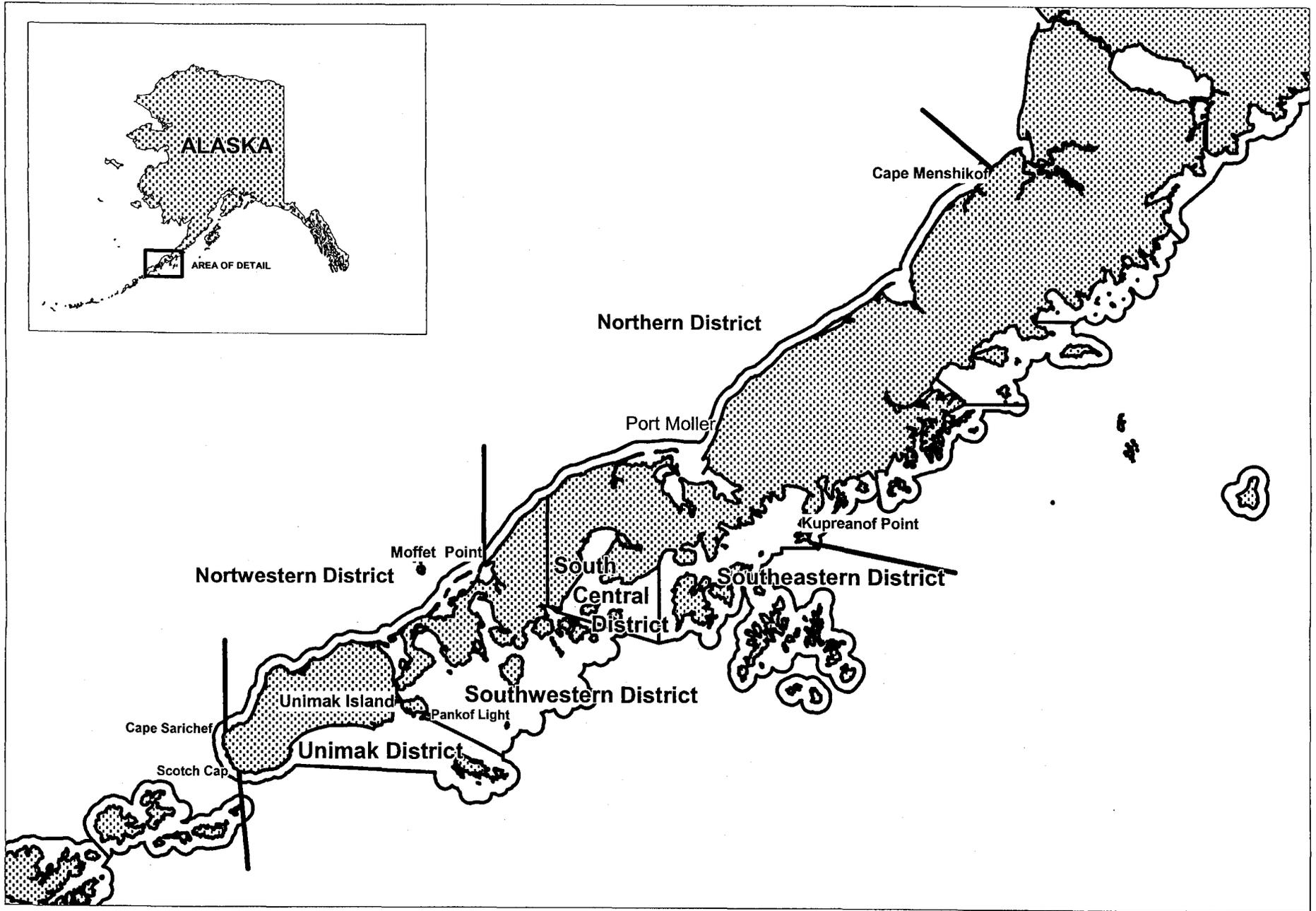


Figure 2. Map of the Alaska Peninsula Management Area from Kupreanof Point to Scotch Cap with the North and South Peninsula salmon fishing districts defined.

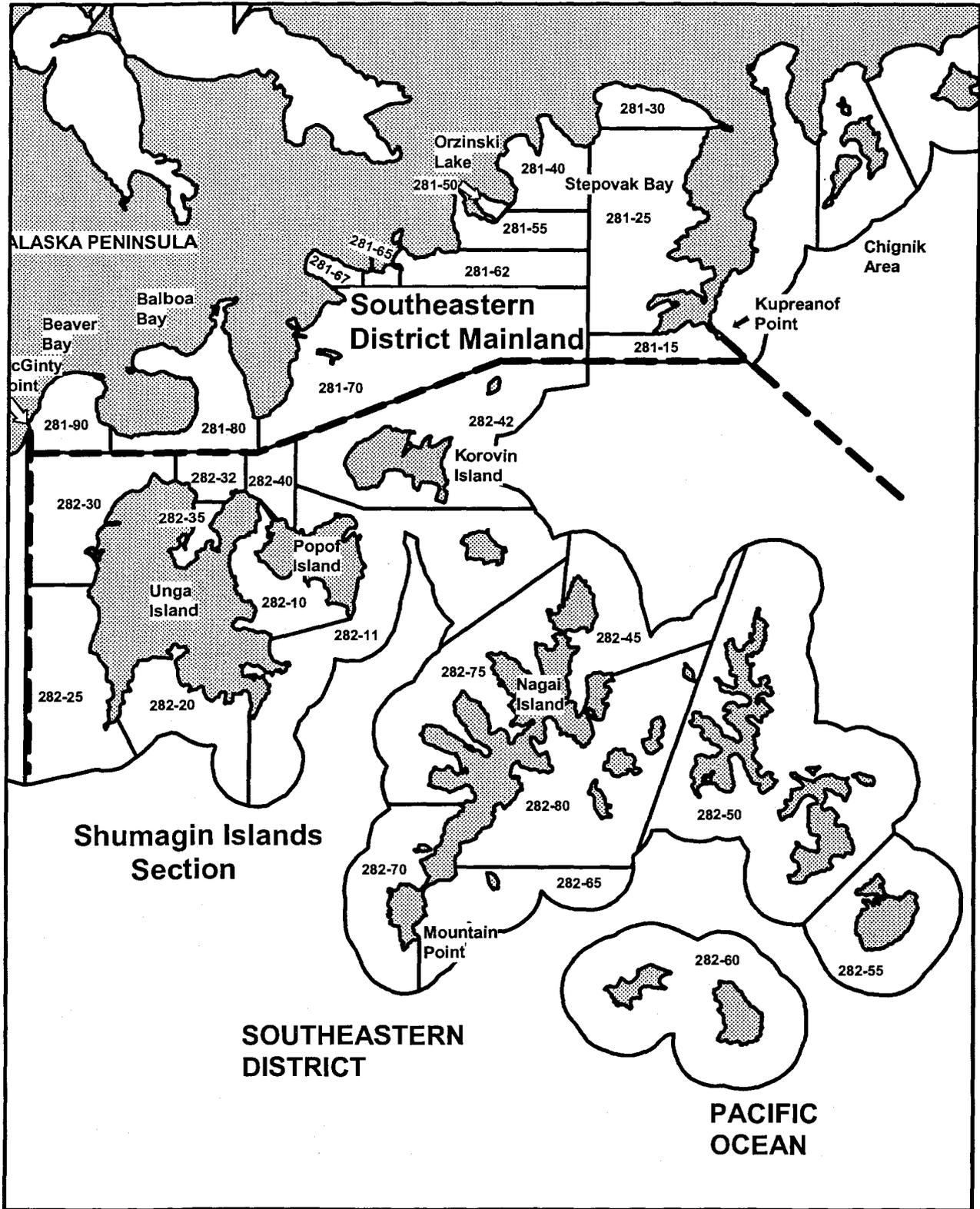


Figure 3. Map of the Alaska Peninsula Area from Kupreanof Point to McGinty Point (Southeastern District) with the statistical salmon fishing areas shown.

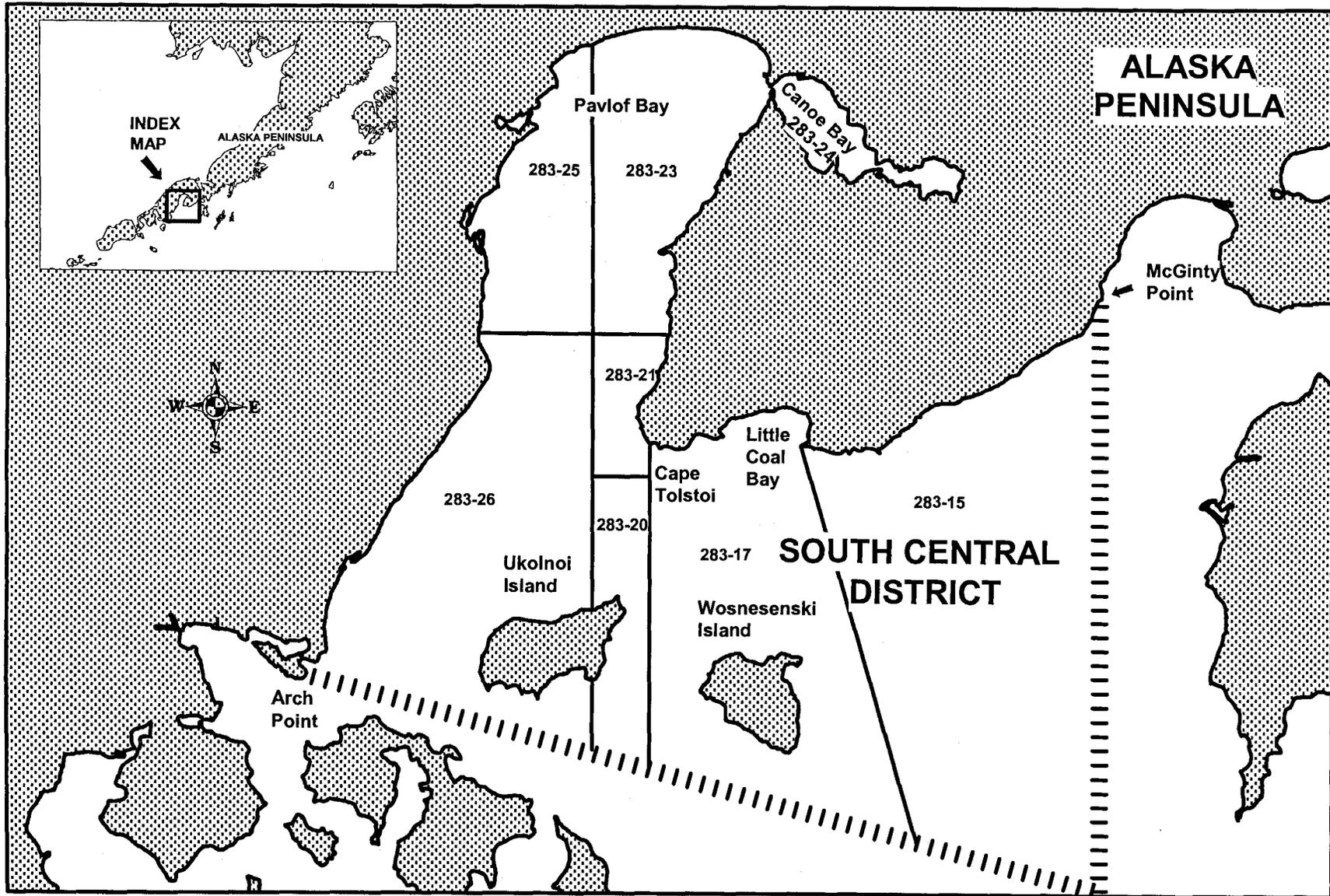


Figure 4. Map of the Alaska Peninsula Area from McGinty Point to Arch Point (South Central District) with the statistical salmon fishing areas shown.

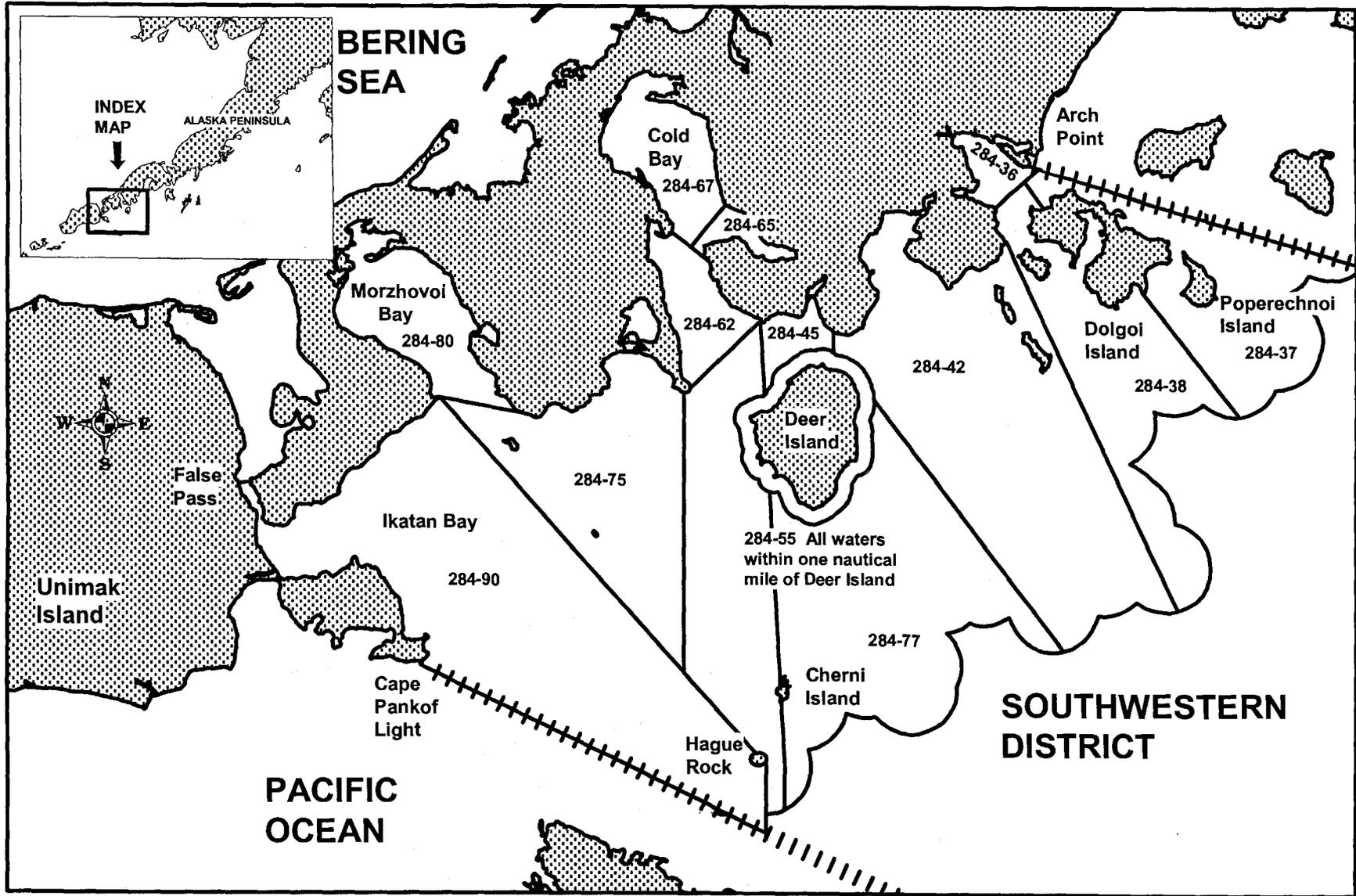


Figure 5. Map of the Alaska Peninsula Area from Arch Point to Unimak Island (Southwestern District) with the statistical salmon fishing areas shown.

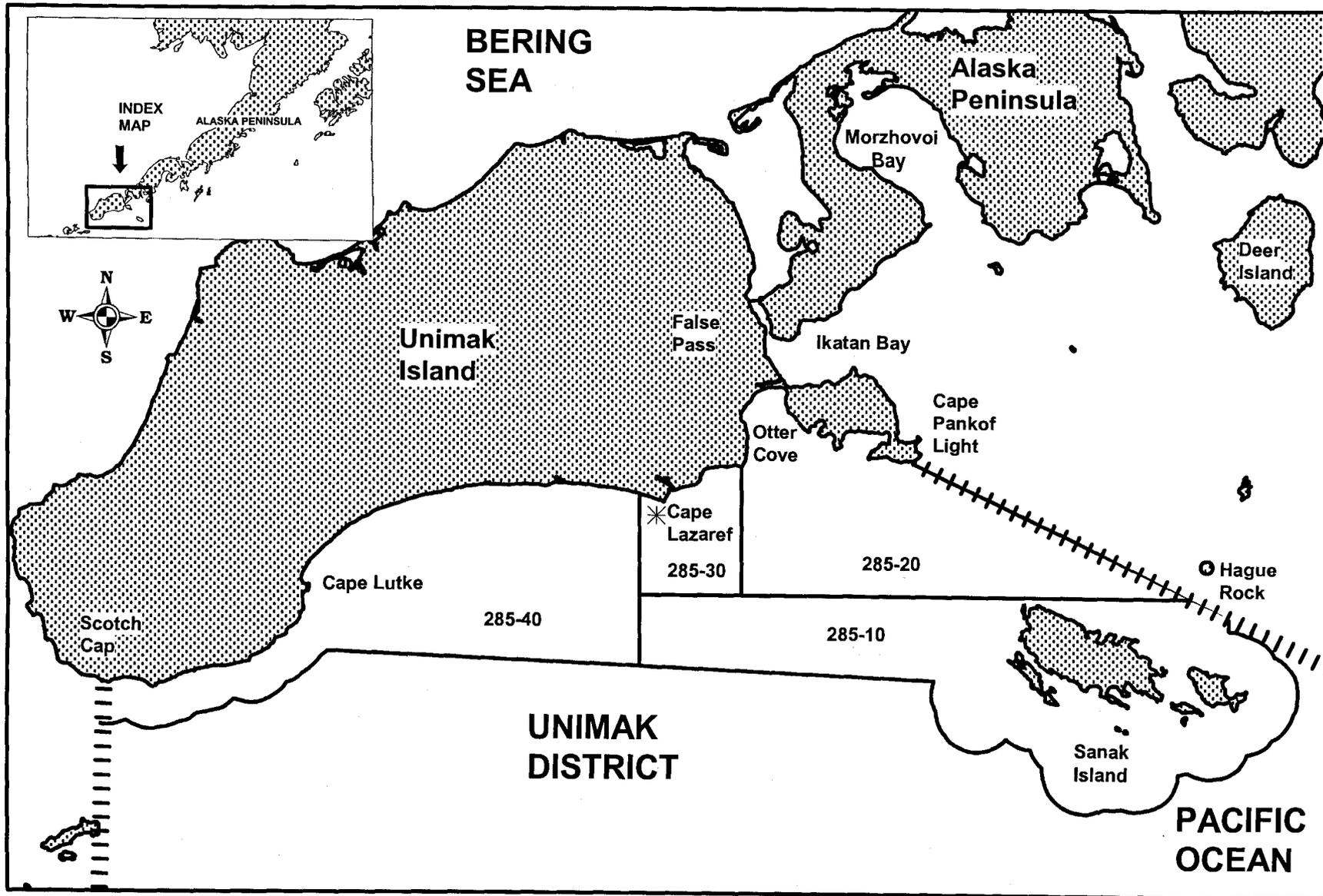


Figure 6. Map of the Alaska Peninsula Area from Hague Rock to Unimak Pass (Unimak District) with the statistical salmon fishing areas shown.

APPENDIX A

Alaska Peninsula Scale Sampling Technique

ALASKA PENINSULA SCALE SAMPLING TECHNIQUE

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, numbered 1 through 40 (refer to Appendix A.2). 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.

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 between sheets of wax paper 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 AWL sheet.

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

Species:

Write out completely (e.g. sockeye).

Locality:

Write out the 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 AWL form, starting with the 3 digit district, then the 2 digit subdistrict, leave the 3 digit stream number blank, and finally use your 3 digit port code. Refer to Appendix B.1 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 set gillnet, drift gillnet, purse seine, hand purse seine.

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 AWL.

COLLECTING SCALES:

Observe the following procedures when collecting scale samples:

1. One scale will be taken from each sockeye or chum salmon, three scales from chinook salmon, and four scales from each chum salmon.
2. Pluck the "preferred scale" from the fish using forceps (Appendix A.2). 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, select another fish.
3. 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 remain on the scale.
4. 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.
5. 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 A.2.
6. Scales should be neat, clean, orderly, and properly oriented on the card. This is essential for the scales to remain adhering 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).
7. 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:

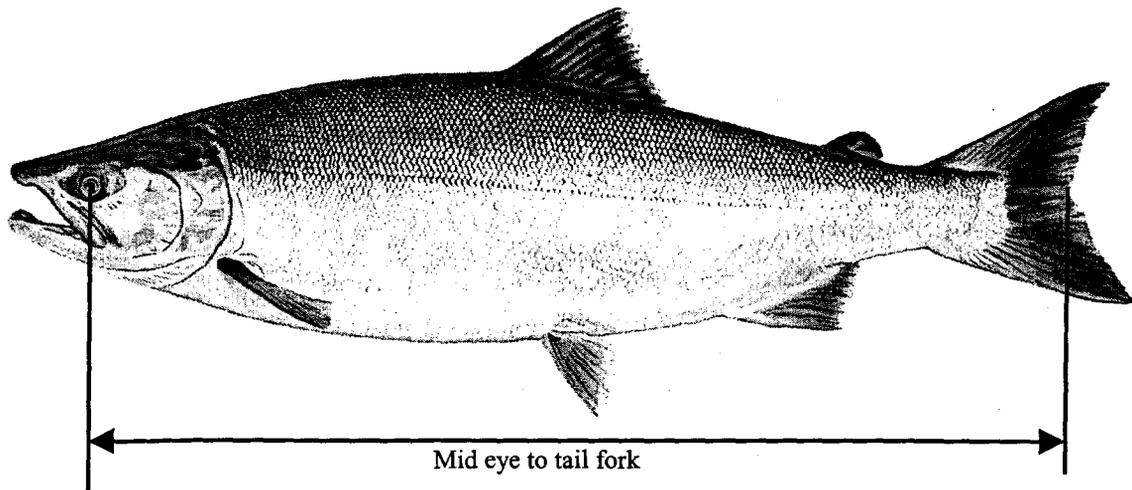
1. When sex is collected from Nelson Lagoon and the Harbor Point to Strogonof Point reach, record the sex in the appropriate column of the AWL form. If any difficulty was encountered in this procedure, write "I had trouble sexing these fish" on the top margin of the AWL and ask your supervisor for help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

2. When lengths are taken, measure all fish in millimeters from the middle of the eye to the fork of the tail. Refer to appendix A.1. Record the length by blackening with No. 2 pencil only the appropriate column circles on the AWL form. Column 3 (next to the sex) on the AWL form is used for fish over 999 millimeters long. Measure all species of salmon to the nearest mm. Check the calipers daily before use to ensure the accuracy of the measurements.
3. Pluck the "preferred scale" from the fish using forceps. Remove all slime, grit, and skin from the scale by moistening and rubbing between 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 A.2. 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, sample a scale as close to the preferred area as possible and darken the 8 under "age error code" on the AWL form.
4. Clean, moisten, and mount scale on gum card directly over the appropriate number as shown in Appendix A.2. 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.
5. When sampling sockeye and chum salmon repeat steps 1 through 4 for up to 40 fish on each AWL form. Refer to Appendix B.4.
6. When taking three scales per fish as with chinook, sample the "preferred scale," scale #2 and scale #3. Scale #2 is one inch to the left of the preferred scale, and scale #3 is located one inch to the right. All are two rows above the lateral line. Mount the three scales from fish #1 over gum card positions 1, 11, and 21 as shown in Appendix B.2. Continuing, mount the 3 scales from fish #2 over 2, 12, and 22, etc. You will be putting 30 scales total, three each from 10 different fish, on one gum card. You will repeat this sequence four times, numbering the cards 1A, 1B, 1C, and 1D to collect samples from all 40 fish needed per AWL.
7. When taking four scales per fish as with coho, sample the "preferred scale," scale #2, scale #3, and scale #4. Scale #2 is one inch to the left of the preferred scale, scale #3 is located one inch to the right, and scale #4 is located between any of the other three preferred scales. All are two rows above the lateral line. Mount the four scales from fish #1 over 1, 11, 21, and 31 on the gum card as shown in Appendix B.5. Continuing, mount the four scales from fish #2 over 2, 12, 22, and 32, etc. You will be putting 40 scales total, four each from 10 different fish, on one gum card. You will repeat this sequence four times, numbering the cards 1A, 1B, 1C, and 1D to collect samples from all 40 fish needed per AWL.
8. During sampling, use plastic scale card holders to hold individual gum cards and cover the completed gum card with wax paper for storage.

SCALE SAMPLING CHECKLIST

Clipboard	Pencils (No. 2)	Gloves
Gum Cards	Forceps	Measuring board or calipers
AWL Forms	Wax paper inserts	Sampling Manual
Plastic gum card holders		

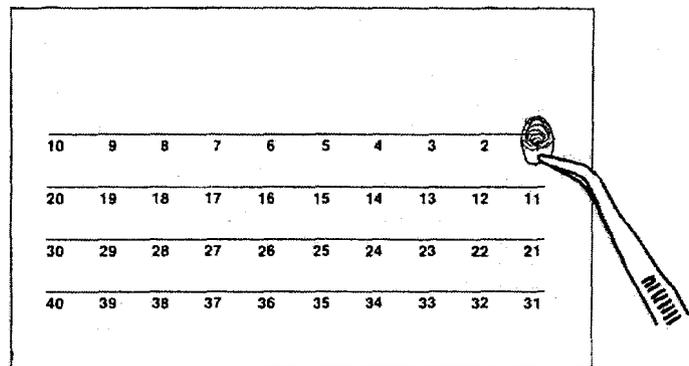
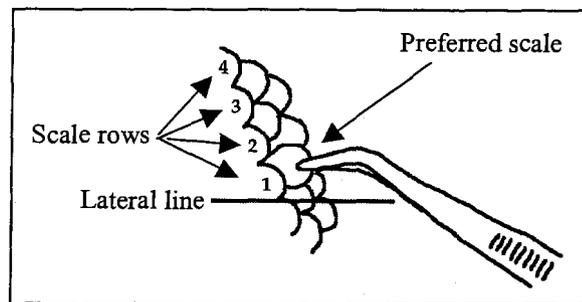
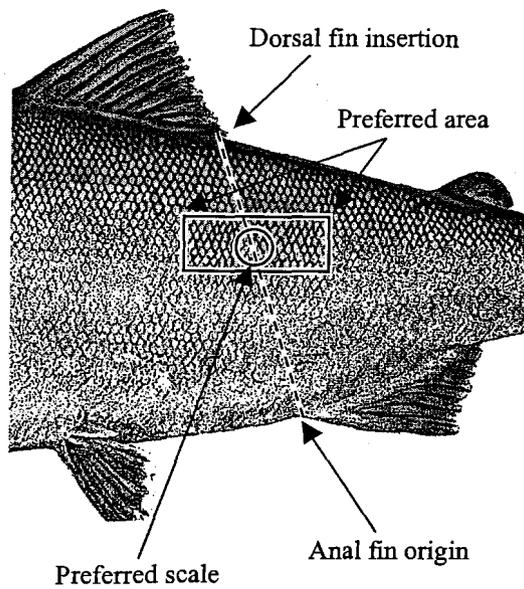
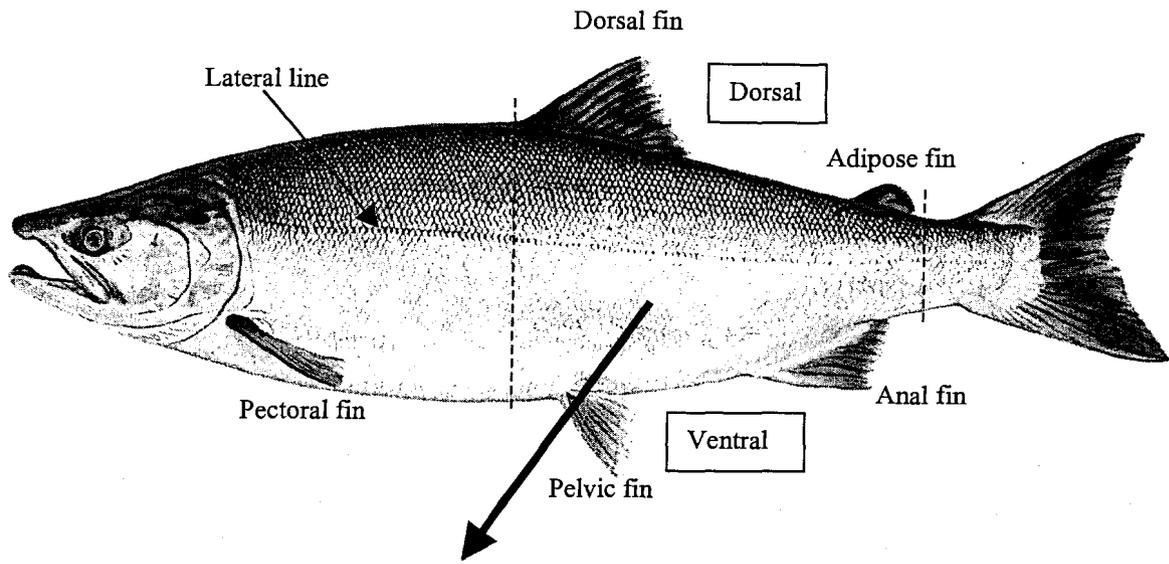
Appendix A.1. Measuring adult salmon length.



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 on a board that has a ruler mounted on it. 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 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 A.2. Preferred scale sampling area on an adult salmon.



Do not turn scale over. 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 B

Completion of Mark-Sense AWL Forms

Length, Sex, and Scale Sampling Procedure: Using AWL 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 Age-Weight-Length forms (hereafter called AWL forms) neatly and accurately. The following procedures are to be adhered to when sampling for length, sex, and scales using AWL forms.

COMPLETING THE FORMS:

Complete each section of the left side of the AWL 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 AWL 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 is filled in and appropriately marked.

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

Description:

Write out the name of the system 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 AWL form being filled out. The AWL 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 AWL form for sockeye and chum salmon will have only one corresponding gum card. The scale collected should correspond to the same fish if length or sex data is taken.

Species:

Refer to the reverse side of the AWL 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).

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 B.1 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 B.3.

Project:

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

Gear:

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

Mesh:

Leave blank.

Type of length measurement:

Mark 2 when sampling adults: mid-eye to fork of tail (Appendix A.1).

Number of scales/fish:

Mark 1 when sampling sockeye or chum salmon, 3 when sampling chinook, and 4 when sampling coho.

Number of cards:

Always mark 1 (refers to the number of AWL's, not the number of scale cards associated with the AWL).

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

Additional data columns are available on the reverse of the AWL 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

1. Record length by blackening the appropriate column circles on the AWL form. Column 3 on the AWL form is used for fish over 999 millimeters long. Measure all species of salmon to the nearest mm.

2. AWL forms should be carefully edited before submitting to Port Moller. **This is extremely important, and cannot be emphasized enough.** Re-check header information on AWL 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 sloppily marked the optical scanner records the information incorrectly or misses it entirely. Keep marks within each circle and fill them completely. Do not go outside the circle. After the AWL's are edited, place editor's initial next to page number, but not in the left margin.
3. Transfer important comments from gum cards to the AWL 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 AWL. If no room is available on the AWL to completely explain the remarks, use a separate piece of paper.
4. Never put data from different dates on one AWL or one gum card. Even if only one scale is collected that day, begin a new card and AWL for the next day.
5. The data processing program uses the "litho code" on the AWL. (It is located in the lower left margin of the AWL.) It helps if the AWL 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.
6. If AWLs get wrinkled or blotched they should be copied over before submitting to Port Moller. The optical scanning machine is extremely sensitive to wrinkles and blotches and will misread or reject the sheets.
7. 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 419mm fish in the 10's column with nothing in the 1's column.

Appendix B.1. 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, ADF&G Weir
313-30-003-056 Nelson River, ADF&G Weir
315-11-002-055 Bear River, ADF&G Weir
315-12-000-060 Sandy River, ADF&G Weir
316-20-001-058 Ilnik River, ADF&G Weir

Appendix B.2. Chinook salmon gum card and AWL.

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

Species: Chinook Card No: 3A

Locality: Harbor - Stroganof

Stat. Code: 316- - - - 051

Sampling Date: Mo. 6 Day 26 Year 01

Gear: _____

Collector(s): TM JV

Remarks: Tender - Zone 5

DESCRIPTION: Chinook Harbor - Stroganof Sampled: 6/27 ADF&G ADULT SALMON AGE-LENGTH FORM VERSION 2.1

<p>CARD: <u>3</u></p> <p>SPECIES: <u>1</u></p> <p>DAY: <u>26</u></p> <p>MONTH: <u>6</u></p> <p>YEAR: <u>01</u></p> <p>DISTRICT: <u>316</u></p> <p>SUBDISTRICT: _____</p> <p>STREAM: _____</p> <p>LOCATION: <u>091</u></p> <p>PERIOD: <u>26</u></p> <p>PROJECT: <u>1</u></p> <p>GEAR: <u>3</u></p> <p>MESH: _____</p> <p>TYPE OF LENGTH MEASUREMENT: _____</p> <p>NUMBER SCALES/FISH: <u>3</u></p> <p># OF CARDS: <u>1</u></p>	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>#</th> <th>SEX</th> <th>100's</th> <th>LENGTH</th> <th>1"</th> <th>AGE GROUP</th> <th>AGE ERROR CODE</th> </tr> </thead> <tbody> <tr><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>12</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>13</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>14</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>15</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>16</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>17</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>18</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>19</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>20</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>21</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>22</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>23</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>24</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>25</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>26</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>27</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>28</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>29</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>30</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>31</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>32</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>33</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>34</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>35</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>36</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>37</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>38</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>39</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>40</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	#	SEX	100's	LENGTH	1"	AGE GROUP	AGE ERROR CODE	1							2							3							4							5							6							7							8							9							10							11							12							13							14							15							16							17							18							19							20							21							22							23							24							25							26							27							28							29							30							31							32							33							34							35							36							37							38							39							40						
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A
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29681

Marked Performed by NCS 58030823-2 844331 PE231 PRINTED IN U.S.A.

Chinook scale mounting instructions. Collect 3 scales per fish. Prepare 4 gum cards, labeled A, B, and C for each AWL. Place the scales from fish # 1 over gum card positions 1, 11, and 21 on card A. Scales from fish #2 go over positions 2, 12, and 22 on card A. When you mount scales from fish # 11, place them on card B in positions 1, 11, and 21.

Appendix B.3. Sampling week (period) and corresponding calendar dates, 2002.

Sampling Week	Calendar Dates	Sampling Week	Calendar Dates
1	01-Jan to 03-Jan	28	05-Jul to 11-Jul
2	04-Jan to 10-Jan	29	12-Jul to 18-Jul
3	11-Jan to 17-Jan	30	19-Jul to 25-Jul
4	18-Jan to 24-Jan	31	26-Jul to 01-Aug
5	25-Jan to 31-Jan	32	02-Aug to 08-Aug
6	01-Feb to 07-Feb	33	09-Aug to 15-Aug
7	08-Feb to 14-Feb	34	16-Aug to 22-Aug
8	15-Feb to 21-Feb	35	23-Aug to 29-Sep
9	22-Feb to 29-Feb	36	30-Aug to 05-Sep
10	01-Mar to 07-Mar	37	06-Sep to 12-Sep
11	08-Mar to 14-Mar	38	13-Sep to 19-Sep
12	15-Mar to 21-Mar	39	20-Sep to 26-Sep
13	22-Mar to 28-Mar	40	27-Sep to 03-Oct
14	29-Mar to 04-Apr	41	04-Oct to 10-Oct
15	05-Apr to 11-Apr	42	11-Oct to 17-Oct
16	12-Apr to 18-Apr	43	18-Oct to 24-Oct
17	19-Apr to 25-Apr	44	25-Oct to 31-Oct
18	26-Apr to 02-May	45	01-Nov to 07-Nov
19	03-May to 09-May	46	08-Nov to 14-Nov
20	10-May to 16-May	47	15-Nov to 21-Nov
21	17-May to 23-May	48	22-Nov to 28-Nov
22	24-May to 30-May	49	29-Nov to 05-Dec
23	31-May to 06-Jun	50	06-Dec to 12-Dec
24	07-Jun to 13-Jun	51	13-Dec to 19-Dec
25	14-Jun to 20-Jun	52	20-Dec to 26-Dec
26	21-Jun to 27-Jun	53	27-Dec to 31-Dec
27	28-Jun to 04-Jul		

Appendix B.4. Sockeye salmon gum card and AWL.

<p>Species: <u>Sockeye</u> Card No: <u>002</u> Locality: <u>Harbor - Stroganof</u> Stat. Code: <u>316</u> - - - - - <u>051</u> Sampling Date: Mo. <u>6</u> Day <u>25</u> Year <u>01</u> Gear: _____ Collector(s): <u>TM JV</u> Remarks: _____</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr> <tr><td>20</td><td>19</td><td>18</td><td>17</td><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td></tr> <tr><td>30</td><td>29</td><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td></tr> <tr><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td><td>32</td><td>31</td></tr> </table>	10	9	8	7	6	5	4	3	2	1	20	19	18	17	16	15	14	13	12	11	30	29	28	27	26	25	24	23	22	21	40	39	38	37	36	35	34	33	32	31
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DESCRIPTION: <u>Sockeye Harbor - Stroganof</u> Sampled: <u>6/26</u>		ADF&G ADULT SALMON AGE-LENGTH FORM VERSION 2.1 <i>PT</i>																																																																																																																																																																																																																																																																																																																																																																				
<p>CARD: <u>002</u></p> <p>SPECIES: <u>2</u></p> <p>DAY: <u>25</u></p> <p>MONTH: <u>6</u></p> <p>YEAR: <u>01</u></p> <p>DISTRICT: <u>316</u></p> <p>SUBDISTRICT: <u>20</u></p> <p>STREAM: _____</p> <p>LOCATION: <u>051</u></p> <p>PERIOD: <u>26</u></p> <p>PROJECT: _____</p> <p>GEAR: <u>03</u></p> <p>MESH: _____</p> <p>TYPE OF LENGTH MEASUREMENT: _____</p> <p>NUMBER SCALES/FISH: <u>1</u></p> <p># OF CARDS: <u>1</u></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>#</th> <th>SEX</th> <th>100's</th> <th>LENGTH</th> <th>1's</th> <th>AGE GROUP</th> <th>AGE ERROR CODE</th> </tr> </thead> <tbody> <tr><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>12</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>13</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>14</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>15</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>16</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>17</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>18</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>19</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>20</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>21</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>22</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>23</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>24</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>25</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>26</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>27</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>28</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>29</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>30</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>31</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>32</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>33</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>34</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>35</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>36</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>37</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>38</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>39</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>40</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>41</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>42</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>43</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>44</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>45</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>46</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>47</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>48</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>49</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>50</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE	1							2							3							4							5							6							7							8							9							10							11							12							13							14							15							16							17							18							19							20							21							22							23							24							25							26							27							28							29							30							31							32							33							34							35							36							37							38							39							40							41							42							43							44							45							46							47							48							49							50						
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Pluck one sockeye scale per fish. Place each scale directly over its corresponding number on the gum card.

Appendix B.5. Coho salmon gum card and AWL.

Species: <u>Coho</u> Card No: <u>1A</u> Locality: <u>Harbor - Stroganof</u> Stat. Code: <u>316</u> - - - - <u>051</u> Sampling Date: Mo. <u>8</u> Day <u>10</u> Year <u>01</u> Gear: <u>Drift Gill Net</u> Collector(s): <u>TM</u> Remarks: _____ _____	<table border="1" style="width: 100%; border-collapse: collapse; font-size: small;"> <tr><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr> <tr><td>20</td><td>19</td><td>18</td><td>17</td><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td></tr> <tr><td>30</td><td>29</td><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td></tr> <tr><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td><td>32</td><td>31</td></tr> </table>	10	9	8	7	6	5	4	3	2	1	20	19	18	17	16	15	14	13	12	11	30	29	28	27	26	25	24	23	22	21	40	39	38	37	36	35	34	33	32	31
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DESCRIPTION: Coho Harbor - Stroganof Sample #: 8110
 Reader: _____

ADF&G ADULT SALMON AGE-LENGTH
FORM VERSION 2.1

CARD: <u>001</u> SPECIES: <u>3</u> DAY: <u>9</u> MONTH: <u>8</u> YEAR: <u>01</u> DISTRICT: <u>316</u> SUBDISTRICT: _____ STREAM: _____ LOCATION: <u>051</u> PERIOD: <u>33</u> PROJECT: <u>1</u> GEAR: <u>3</u> MESH: _____ TYPE OF LENGTH MEASUREMENT: _____ NUMBER SCALES/FISH: <u>4</u> # OF CARDS: <u>1</u>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>#</th> <th>SEX</th> <th>100's</th> <th>LENGTH</th> <th>1's</th> <th>AGE GROUP</th> <th>AGE ERROR CODE</th> </tr> </thead> <tbody> <tr><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>12</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>13</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>14</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>15</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>16</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>17</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>18</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>19</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>20</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>21</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>22</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>23</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>24</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>25</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>26</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>27</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>28</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>29</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>30</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>31</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>32</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>33</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>34</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>35</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>36</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>37</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>38</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>39</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>40</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE	1							2							3							4							5							6							7							8							9							10							11							12							13							14							15							16							17							18							19							20							21							22							23							24							25							26							27							28							29							30							31							32							33							34							35							36							37							38							39							40						
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DO NOT WRITE IN THIS MARGIN

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Mark Ready by PCS 9/20/99/02 94021 P220 Printed in U.S.A.

Coho scale mounting instructions. Collect 4 scales per fish. Prepare 4 gum cards, labeled A, B, C, and D, for each AWL. Place the scales from fish # 1 over gum card positions 1, 11, 21, and 31 on card A. Scales from fish #2 go over positions 2, 12, 22, and 32 on card A. When you mount scales from fish # 11, place them on card B in positions 1, 11, 21, and 31.

APPENDIX C

Camp Policy

CAMP POLICY

1. All employees will act in a professional manner at all times and shall be especially courteous to the public.
2. The crew leader of each sampling station shall establish a policy on living standards and personnel behavior in accordance with normal guidelines.
3. All sampling stations will operate as directed. No crew leader shall be off location for more than 24 hours unless specifically authorized by immediate supervisor. Time-off for individual crew members shall be scheduled by the crew leader and shall have the option as to whether sampling duties allow time-off from the location.
4. It will be the responsibility of the crew leader to prevent any abuse to State equipment which includes ATV's, boats, equipment, and facilities.
5. The crew leader must report within 24 hours any damaged or lost equipment.

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 a catch sampling site 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, destroy animal then immediately follow proper first aid techniques and notify 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, burn and bury the carcass as instructed.

FISH AND WILDLIFE VIOLATIONS

CONTACT A FISH & WILDLIFE PROTECTION OFFICER IMMEDIATELY IF 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 Fish & Wildlife Protection (FWP) officers in obtaining sufficient evidence for a case.

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 FWP 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 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 violation. Be aware that you do not have the power to arrest somebody and never attempt this.

FIREARMS

A State weapon will be available at each location and staff should be familiar with firearm safety and proper use. Personal firearms are not recommended in these areas, unless the immediate supervisor approves. 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.

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. Use your best judgment on whether to shoot a bear if property is at stake. When, and if, 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.

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 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.

APPENDIX D

First Aid and Safety

FIRE AND FIRST AID

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.

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 me. 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 welcome to call me in Port Moller at any time.

MEMORANDUM STATE OF ALASKA

To: Catch Sampling Crews

2002 FIELD CAMPS

From: Bob Murphy
Area Management Biologist
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 and Port Moller 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.

A State rifle or shotgun 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.

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 OPERATING PROCEDURES, 2002



By:

Robert L. Murphy
and
Philip Tschersich

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

April 2002

TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES	i
LIST OF APPENDICES	i
ABSTRACT	1
INTRODUCTION	2
OBJECTIVES	2
SUPERVISION	2
PERSONNEL	2
PROCEDURES	3
Escapement Enumeration	3
Bear River	3
Nelson River Weir	3
Nelson River Tower	4
Sandy River	5
Ilnik River	5
Orzinski (Orzenoi) Lake.....	6
Escapement sampling for age, length, and sex composition	7
Smolt Sampling	7
General Camp Maintenance and Procedures	8
DATA REPORTING	8
TABLES	9
APPENDICES	10

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Bear River, Nelson River, Sandy River, Ilnik River, or Orzinski Lake daily and cumulative escapement reporting form	9

LIST OF APPENDICES

	<u>Page</u>
APPENDIX A: SCALE SAMPLING TECHNIQUES	10
A.1. Example of an AWL form and gum card from Bear River	17
A.2. Assigned port and weir location codes.	18
A.3. Measuring adult salmon length.....	19
A.4. Preferred scale sampling area on an adult salmon	20
A.5. Sampling periods and corresponding calendar dates, 2002	21
APPENDIX B: PROCEDURE FOR SAMPLING SALMON SMOLT	22
B.1. Smolt AWL form from Sandy River	24
B.2. Preferred scale sampling area on a smolt salmon.....	25
B.3. Smolt glass slide example.....	25
B.4. Measuring smolt length.....	26
APPENDIX C: GENERAL EQUIPMENT, CAMP MAINTENANCE, AND CAMP POLICY	27
APPENDIX D: BEAR, NELSON, SANDY, ILNIK, AND ORZINSKI LAKE WEIRS INSTALLATION PROCEEDURES	36
D.1. Installation of the Bear River Weir.....	37
D.2. Installation of the Nelson River weir	40
D.3. Installation of the Sandy River weir	49
D.4. Installation of the Ilnik River weir.....	53
D.5. Installation of the Orzinski Lake weir	56
APPENDIX E: KEY TO FIELD IDENTIFICATION OF ANADROMOUS JEVENILE SALMONIDS IN THE PACIFIC NORTH- WEST	58

ABSTRACT

The Alaska Department of Fish and Game monitors the salmon escapement on hundreds of systems in the Alaska Peninsula. Most of the monitoring occurs using aircraft while performing aerial surveys. Five river systems have salmon counting weirs: Nelson, Bear, Sandy, Ilnik, and Orzinski Rivers. These weirs are important to the management of sockeye salmon *Oncorhynchus nerka* fisheries. All the systems, except Orzinski River, are located on the north Alaska Peninsula. Other salmon, such as: chinook *O. tshawytscha*, coho *O. kisutch*, pink *O. gorbuscha*, and chum *O. keta* also are counted if they pass through the weir. These weirs provide accurate data necessary for management of the commercial salmon fisheries.

INTRODUCTION

The basic function of fisheries management is to assure sufficient spawning escapement while allowing harvest of available surpluses.

In 2002, the Alaska Department of Fish and Game (ADF&G) crews at Bear River, Nelson River, Sandy River, Ilnik River, and Orzinski Lake will enumerate and sample fish from the escapement.

OBJECTIVES

Long Term: To improve management of the salmon resources for the Alaska Peninsula Management Area through improved forecasting, development of stock-recruitment relationships to assess escapement requirements, and accurate assessment of stock composition.

Short Term:

1. Enumerate salmon escapement by species.
2. Determine the sockeye salmon *Oncorhynchus nerka* age, length, and sex composition for Bear River, Sandy River, Ilnik River, Nelson River, and Orzinski Lake.
3. Determine the age, length, and weight composition of sockeye smolt for Bear River and Sandy River.

SUPERVISION

The Area Management Biologist (AMB) in Cold Bay, Arnie Shaul, will supervise the Nelson River project. The AMB in Sand Point, Charlie Burkey, will supervise the Orzinski Lake project. The AMB in Port Moller, Bob Murphy, will supervise the Bear, Sandy, and Ilnik Rivers projects.

PERSONNEL

ADF&G will staff the Bear River weir from about 29 May through 25 August, the Nelson River weir from 22 May through 31 July, the Sandy River weir from 5 June to 25 July, the Ilnik River weir from 25 May through 25 July, and the Orzinski Lake weir from 7 June through 5 August. Personnel assigned to these projects are responsible for enumerating and sampling the adult salmon run. In addition, salmon smolt will be sampled at Bear River and Sandy River. Two people will be assigned to each project; additional assistance, if needed, will be provided during weir installation and removal.

PROCEDURES

Escapement Enumeration

Bear River

The main objective of the Bear River weir project is to record the number of salmon escaping into Bear Lake. Large numbers of fish (> 200) should not be allowed to stage behind the weir. If large numbers of fish start to accumulate behind the weir, the gate should be opened and the fish counted through.

A sockeye salmon less than 16 inches (400 mm) in length (mid eye to tail fork) will be considered a jack. Use the escapement form provided to record the escapement data (Table 1). On the daily counting forms, note the time period that the weir gate is opened and closed, and the appropriate period and cumulative counts for adults, jacks, percentage of net marked fish, percentage of males and females, and other salmon species. Remarks such as weather, water levels, holes in the weir, approximate numbers of Dolly Varden 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 log book (Rite-in-the-Rain) that has been provided with a more detailed description of the daily events. Total daily counts and cumulative seasonal counts for each species will be relayed to Port Moller during the normal morning radio schedule at 08:30. When the project is completed send all forms to Port Moller.

The crew should recover the temperature sensor under the main cabin where it was installed in 2001, and using the download device sent to the camp, retrieve the data. The download device should then be sent on to the other camps. Your AMB will direct you where it should be sent. The temperature sensor should be returned to its place under the cabin.

Weir maintenance is very important to prevent weir 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. For a detailed discussion of the installation of the Bear River weir, refer to Appendix D.1.

Nelson River Weir

The floating weir on Nelson River will be installed around 23 May and operated until 23 July when it will be removed. The location will be the same as previous years as indicated by the railroad track located in the river. For a detailed discussion of the installation of the Nelson River weir, refer to Appendix D.2. The main objective of the Nelson River weir is to record the number of salmon escaping into Hoodoo Lake and Sapsuk River. Large numbers of fish (> 200) should not be allowed to stay behind the weir. If fish start to accumulate behind the weir, open up a fish gate and count them through. Two to four tally wackers may be necessary for counting all species of salmon. Any sockeye or chinook salmon under 400 mm in length (mid eye to tail fork) will be considered a jack. Use the daily counting form provided to record all data.

On the escapement form, note the time period that the weir gates are opened and closed, and the appropriate period and cumulative counts for adults and jack sockeye and chinook, and all other species counted. Remarks such as weather, water levels, holes in the weir, 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 log book (Rite-in-the-Rain) that has been provided with a more detailed description of the daily events. Total daily counts and cumulative seasonal counts for each species will be relayed to Cold Bay during the normal morning radio schedule at 08:30. When the project is completed send all forms to the Cold Bay office. The crew should remove the two temperature sensors (one in the water and the other on land) that were installed in 2001 and use the download device sent to the camp to transfer the temperature data, then return the sensors to the same locations once the data is received.

Weir maintenance is important. Keep the weir clean of debris and check to insure the weir is fish tight on a regular basis. In deeper channels, a dry suit and diving mask will be needed to visually inspect the weir for holes. If the weir cannot be used, the tower and the procedures for the Nelson River Tower will be used.

Nelson River Tower

After the weir is fully installed, the counting tower should be made ready in case the weir fails. The counting panels should be repainted as needed. If the weir fails, the counting panels should be installed on the river bottom in the same location as in past years. Logbooks are provided for recording daily and cumulative count data.

Counting Procedures are as follows:

Hour One: Counts are made during the first 10 minutes and last 10 minutes of the hour. The counts are added together and multiplied by 3 to obtain the hour one estimate.

Hour Two: No actual counts are made. The count is estimated by adding the last count in hour one to the first count in hour three and multiplying by 3.

Hour Three: Counts are made during the first 10 minutes and last 10 minutes of the hour. The counts are added together and multiplied by 3 to obtain the hour three estimate. The same procedure as during hour one.

Hour Four: No actual counts are made. The count is estimated by adding the last count in hour three to the first count in hour five and multiplying by 3.

This procedure is repeated throughout the balance of the day until the last count. If you anticipate that counting will not be possible during the last 10 minutes of the last hour due to poor visibility, caused by darkness, two 10 minute counts (20 minutes continuous) are made at the beginning of the hour. To calculate the last hour's count, multiply the 20 minute count by 3.

The night count estimate is made by averaging the last hourly count of the first day with the first hourly count of the second day, and multiplying the average by the number of night hours.

Calculate daily and cumulative escapement, re-check for errors, and report these counts over the radio at 8:30 AM each morning.

Sandy River

The main objective of the weir project is to record the number of salmon escaping into Sandy Lake. Large numbers of fish (>200) should not be allowed to stage behind the weir. If fish start to accumulate behind the weir, open up the weir and count them through.

The Sandy River weir site will be moved this season to a location downstream from the existing site. The exact location will be determined on-site. The weir will be staffed from about 5 June through 25 July. The tripods should be loaded with sand bags. After the stringers, panels, and catwalk are in place, sand bags should be stacked on top of the tripod against the back legs. A small deadhead should be secured on at least one side of the river, with a line secured through each leg of the tripods to prevent the tripods from washing downstream in case of a flood. Weir maintenance is important at Sandy River to decrease the pressure on the weir. Keep the weir clean of debris and check it as often as needed to insure there are no holes for fish to escape. In the deeper channels, dry suits and diving masks 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 D.3.

A floating weir will be relocated from Chignik to Port Moller this spring. The weir will be retrofitted for use at Sandy River and eventually moved to the new Sandy River weir site. The new weir will be installed so the two types of weirs are "blended" and the tripod weir occupies the shallow parts of the river, while the floating weir the deeper parts of the river. Mesh will be used to tie the two weir styles together.

A sockeye salmon less than 16 inches (400 mm) in length (mid eye to tail fork) will be considered a jack. Use the escapement reporting form provided to record the data (Table 1). On the daily counting form note the time that the weir gates are opened and closed and the number of sockeye adults and jack and other species counted. Remarks such as weather, water levels, holes in the weir, 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 log book (Rite-in-the-Rain) with a more detailed description of the daily events. Total daily counts and cumulative seasonal counts for each species will be relayed to Port Moller during normal morning radio schedule at 08:30. When the project is completed send all forms to the Port Moller office.

Ilnik River

The main objective of the Ilnik Lagoon weir project is to record the number of salmon escaping into the Ilnik River system. Large numbers of fish (> 200) should not be allowed to stage behind the weir. If fish start to accumulate behind the weir, open the gate and count them through.

The Ilnik River weir will be staffed from about 25 May through 25 July. The floating weir will be installed in the same location as in 2001. For a detailed discussion of the installation of the Ilnik River weir, refer to Appendix D.4. Weir maintenance is extremely important at Ilnik to decrease the likelihood of the weir washing out. Due to the tidal influence, a large amount of debris tends to accumulate on the panels. Keep the weir clean of debris and check it often to insure 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.

If 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.

A sockeye salmon less than 16 inches (400 mm) in length (mid eye to tail fork) will be considered a jack. Use the escapement reporting form provided to record the data (Table 1), including the time period that the weir gates are opened and the number of sockeye adults, jacks, and other species counted. Remarks such as weather, water levels, holes in the weir, 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 log book (Rite-in-the-Rain) that has been provided with a more detailed description of the daily events. Total daily counts and cumulative seasonal counts for each species will be relayed to Port Moller during normal radio schedule at 08:30. When the project is completed send all forms to Port Moller.

Orzinski (Orzenoi) Lake

The Orzinski Lake weir project will be operated from about 7 June to 5 August. The Orzinski Lake project will be supervised by the Sand Point Area Management Biologist. On the escapement reporting form (Table 1), note the time period that the weir gates are opened and then closed, and the appropriate period and cumulative counts for adults, jacks, and other species. Remarks such as weather, water levels, holes in the weir, 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 log book (Rite-in-the-Rain) with a more detailed description of the daily events.

The main objective of the Orzinski Lake weir is to record the number of salmon escaping into Orzinski Lake. Large numbers of fish (> 200) should not be allowed to stage behind the weir. If fish start to accumulate behind the weir, open up a fish gate and count them through. Any sockeye salmon under 400 mm in length (mid eye to tail fork) will be considered a jack. Use the escapement reporting form provided to record all data.

Keep the weir clean of debris and check to insure the weir is fish tight on a regular basis. Cumulative and daily counts should be relayed to the Acting AMB in Sand Point. 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 and camp operation, refer to Appendix D.5.

Escapement sampling for age, length, and sex composition

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

The sample goal is 240 adult sockeye salmon per week for each system. In 2002, the standard week is Thursday to Wednesday. Sampling should begin on Thursday, with the goal of obtaining 80 fish per day over a staggered, three day period. As a starting sampling schedule, 80 fish should be collected on Thursday, another 80 fish sampled on Saturday, and another 80 fish sampled on Tuesday. 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 allow a more representative age composition sampling comparison over the entire week. This schedule may be amended by the AMB 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 correctly mounted on a gum card with the corresponding fish number on the AWL form (refer to Appendix A.1). Length will be measured from mid eye to the fork-in-the-tail (Appendix A.3). Sex data will be determined by kype (nose) development or visual determination of eggs or milt. It is imperative that all scales collected match the length and sex data for that fish. Experienced personnel will perform training for new employees in these procedures.

Smolt Sampling

Outmigrating sockeye smolt will be collected at Bear River and Sandy River. At Bear River, the weir crew will sample smolt only when the Bear River smolt crew is not engaged in sampling. After the weirs are operational, sampling will begin. A weekly sample size of 200 smolt will be collected during the duration of the smolt outmigration, which usually lasts four to six weeks. Smolt will be sampled for age, weight, and length composition. Appendix B illustrates sampling and recording procedures.

Sampling will begin on Friday, the day after beginning the adult sampling. The net will be fished as long as it is necessary to capture 200 smolt. If 200 smolt are not captured on Friday, sampling will continue until the goal is met or until the following Wednesday. A fyke net should be located in swift moving current so the water velocity is just below the washout threshold of the net. A good procedure is to attach the net behind the weir using the tripods as an anchor for the net. Check the net frequently to avoid unnecessary mortality. Shortly before or after dusk is when outmigration usually peaks.

It is important to fill out the backs of the AWL 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 must be recorded to 0.1 of a gram (Appendix B.1.).

General Camp Maintenance and Procedures

During the season, the duties outlined above may take longer than 37.5 hours/week to accomplish. When this happens at Bear River, Sandy River, or Ilnik River, notify Bob Murphy; at Nelson River notify Arnie Shaul, and at Orzinski Lake notify Charlie Burkey in Sand Point. They will decide what projects take priority and whether to authorize overtime. No additional overtime may be worked or claimed unless it is first authorized.

Cabin and facilities maintenance is an important aspect of being able to accomplish objectives 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 for these jobs to the AMB. Try to anticipate problems before they occur. Ordering replacement parts, before a deteriorating piece of equipment actually breaks, will prevent long delays in repair because of the logistics involved.

Appendix C provides general information including radio schedules, ordering food and supplies, compliance with ADF&G regulations, equipment/maintenance, procedures regarding 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

Ken Bouwens, Matt Foster and Bob Murphy will author a Regional Information Report by May 2003 which covers the results of the 2002 escapement sampling season.

APPENDIX A

Scale Sampling Techniques

ALASKA PENINSULA SCALE SAMPLING TECHNIQUE

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 positions for mounting individual scales, numbered 1 through 40 (refer to Appendix A.1). 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.

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 be 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 AWL form.

Record the following information on each gum card:

Species:

Write out completely (e.g. sockeye).

Locality:

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

Statistical code:

Transfer the appropriate digits from the AWL form, starting with the 3 digit district, then the 2 digit subdistrict, then a 3 digit stream number, and finally the 3 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 the fish were sampled.

Gear:

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

Collector(s):

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

Remarks:

Record any pertinent information. Transfer this same information to the top margin of the AWL.

COLLECTING SCALES:

Observe the following procedures when collecting scale samples.

1. One scale will be taken from each sockeye or chum salmon, three scales from chinook salmon, and four scales from each chum salmon.
2. Pluck the "preferred scale" from the fish using forceps (Appendix A.2). 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, select another fish.
3. 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 remain on the scale.
4. 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.
5. 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 A.2.
- 6 Scales should be neat, clean, orderly, and properly oriented on the card. This is essential for the scales to remain adhering 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:

1. 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 AWL and ask your supervisor for help as soon as possible before sexing additional fish.
2. Measure all adult sockeye salmon lengths in millimeters from the middle of the eye to the fork of the tail. (Refer to Appendix A.3.)

3. When sampling at a weir, you may use a field notebook to record the data. Keep the AWL forms in the cabin where they will be clean, dry, and flat. After sampling is done, transfer the data to the AWL 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.
4. As soon as possible after completion (or at the end of the season) send the gum cards and AWL forms to Port Moller. During scheduled radio 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.
5. 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 AWL.

SCALE SAMPLING CHECKLIST

Clipboard	Pencils (No. 2)	Gloves
Gum Cards	Forceps	Measuring board or calipers
AWL Forms	Wax paper inserts	Sampling Manual
Plastic scale card holders		

Length, Sex, and Scale Sampling Procedure: Using AWL 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 Age-Weight-Length forms (hereafter called AWL forms) neatly and accurately. The following procedures are to be adhered to when sampling for length, sex, and scales using AWL forms (Appendix A.1-A.5).

COMPLETING THE FORMS:

Complete each section of the left side of the AWL 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 AWL 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 is filled in and appropriately marked.

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

Description:

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

Card:

Record the gum card number corresponding to the AWL being filled out. The AWL 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 AWL form will have only one corresponding gum card. The scale collected should correspond to the same fish if length or sex data is taken.

Species:

Refer to the reverse side of the AWL 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.

District:

Refer to Appendix A.2 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 A.2 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 A.2 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 A.2 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 A.5.

Project: 7

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

Gear:

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

Mesh:

Leave blank.

Type of length measurement:

Mark 2 when sampling adults: mid-eye to fork of tail (Appendix A.3).

Number of scales/fish:

Mark 1 when sampling sockeye salmon (Appendix A.1).

Number of cards:

Mark 1 when sampling sockeye salmon (Appendix A.1).

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

Additional data columns are available on the reverse of the AWL 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

1. Record length by blackening the appropriate column circles on the AWL form. Column 3 on the AWL form is used for fish over 999 millimeters long. Measure all salmon to the nearest mm.
2. AWL's should be carefully edited before submitting to Port Moller. **This is extremely important, and cannot be emphasized enough.** Re-check header information on AWL; 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 regularly is 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 AWL's are edited, place editor's initial next to page number, but not in left margin.
3. Transfer important comments from scale cards to AWL 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 AWL. If no room is available on the AWL to completely explain the remarks, use a separate piece of paper.
4. Never put data from different dates on one AWL or one scale card. Even if only one scale is collected that day, begin a new card and AWL for the next day.

5. The data processing program uses the "litho code" on the AWL. (It is located in the lower left margin of the AWL.) It helps if the AWL's 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.
6. If the AWL forms get wrinkled or blotched they should be copied over before submitting to Port Moller. The optical scanning machine is extremely sensitive to wrinkles and blotches and will misread or reject the sheets.
7. 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 419mm fish in the 10's column with nothing in the 1's column.

Appendix A.1. Example of an AWL (Age Weight Length) 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 be used in the field at the time of sampling.

W - AH
P1 - PT
R - PT

ADF&G ADULT SALMON AGE-LENGTH
FORM VERSION 2.1

DESCRIPTION: Bear River Adult Sockeye

CARD: 002

SPECIES: 2

DAY: 15

MONTH: 6

YEAR: 01

DISTRICT: 315

SUBDISTRICT: 11

STREAM: 002

LOCATION: 055

PERIOD: 25

PROJECT: 3

GEAR: 00

MESH:

TYPE OF LENGTH MEASUREMENT: 2

NUMBER SCALES/FISH: 1

OF CARDS: 1

DO NOT WRITE IN THIS MARGIN

30094

Mark Restored by NCS 10/20/09 054321 PE03 Printed in U.S.A.

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

Species: Sockeye Card No: 002

Locality: Bear River

Stat. Code: 315-11-002-055

Sampling Date: Mo. 6 Day 15 Year 01

Gear: Weir Trap

Collector(s): Plucker - PT Wrestler - AH

Remarks: _____

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 A.2. Assigned port and weir location codes.

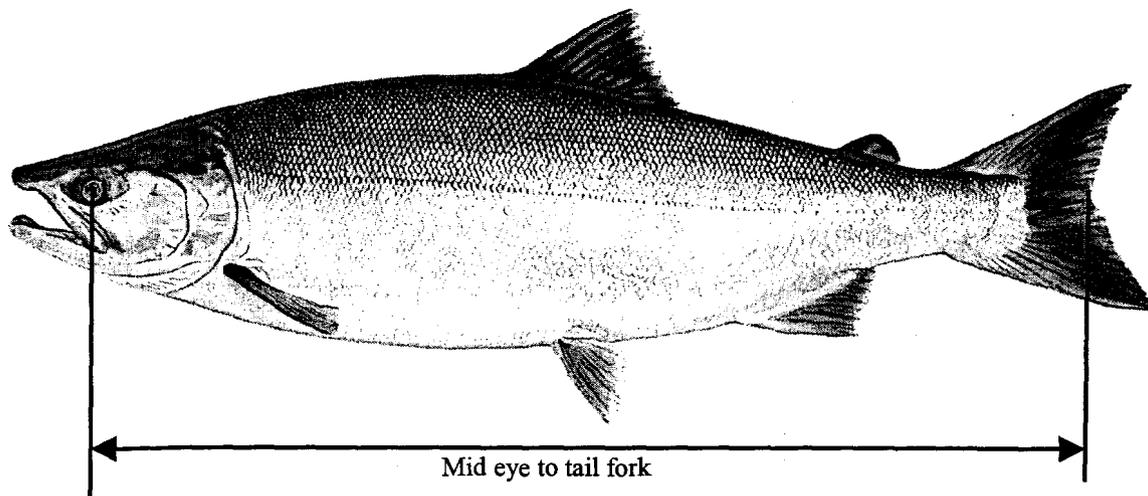
Port Codes

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, ADF&G Weir
313-30-003-056 Nelson River, ADF&G Weir
315-11-002-055 Bear River, ADF&G Weir
315-12-000-060 Sandy River, ADF&G Weir
316-20-001-058 Ilnik River, ADF&G Weir

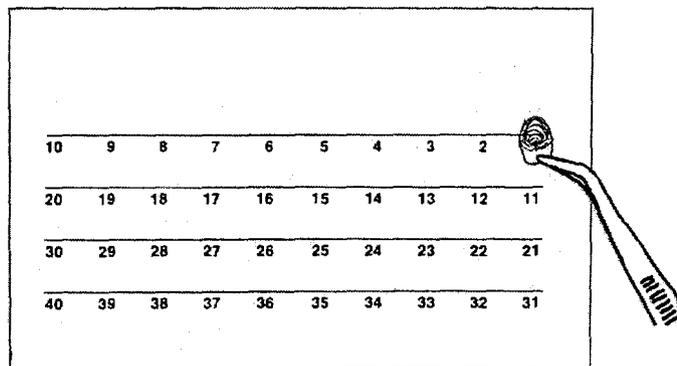
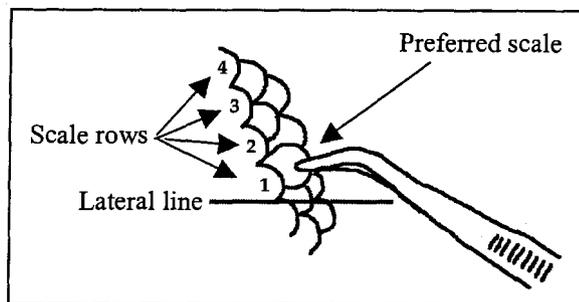
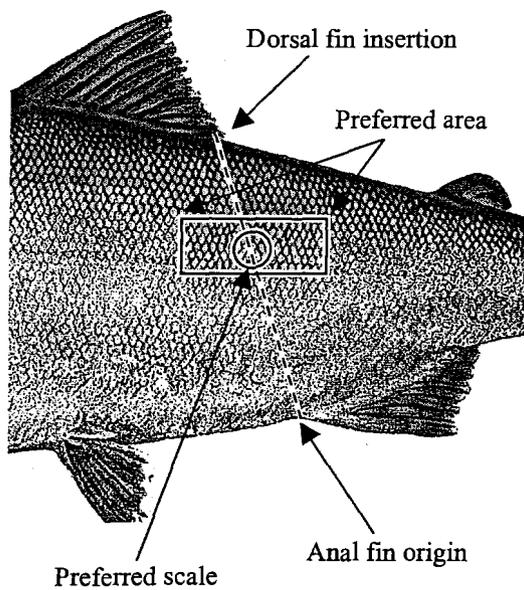
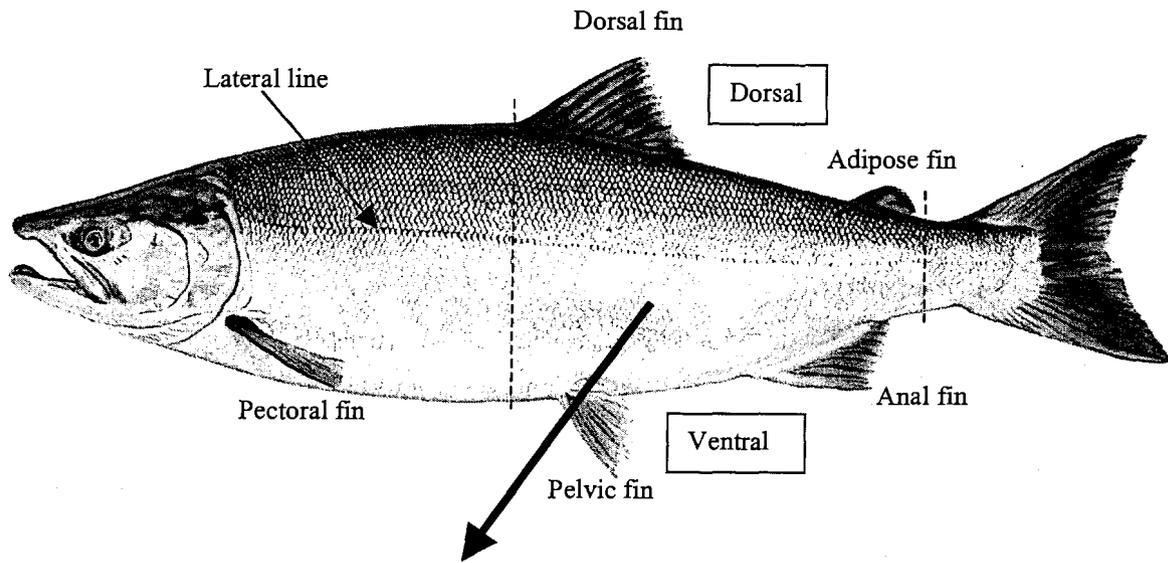
Appendix A.3. Measuring adult salmon length.



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 on a board that has a ruler mounted on it. 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 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 A.4. Preferred scale sampling area on an adult salmon.



Do not turn scale over. 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 A.5. Sampling weeks (period) and corresponding calendar dates, 2002.

Sampling week	Calendar Dates	Sampling week	Calendar Dates
1	01-Jan to 03-Jan	28	05-Jul to 11-Jul
2	04-Jan to 10-Jan	29	12-Jul to 18-Jul
3	11-Jan to 17-Jan	30	19-Jul to 25-Jul
4	18-Jan to 24-Jan	31	26-Jul to 01-Aug
5	25-Jan to 31-Jan	32	02-Aug to 08-Aug
6	01-Feb to 07-Feb	33	09-Aug to 15-Aug
7	08-Feb to 14-Feb	34	16-Aug to 22-Aug
8	15-Feb to 21-Feb	35	23-Aug to 29-Sep
9	22-Feb to 29-Feb	36	30-Aug to 05-Sep
10	01-Mar to 07-Mar	37	06-Sep to 12-Sep
11	08-Mar to 14-Mar	38	13-Sep to 19-Sep
12	15-Mar to 21-Mar	39	20-Sep to 26-Sep
13	22-Mar to 28-Mar	40	27-Sep to 03-Oct
14	29-Mar to 04-Apr	41	04-Oct to 10-Oct
15	05-Apr to 11-Apr	42	11-Oct to 17-Oct
16	12-Apr to 18-Apr	43	18-Oct to 24-Oct
17	19-Apr to 25-Apr	44	25-Oct to 31-Oct
18	26-Apr to 02-May	45	01-Nov to 07-Nov
19	03-May to 09-May	46	08-Nov to 14-Nov
20	10-May to 16-May	47	15-Nov to 21-Nov
21	17-May to 23-May	48	22-Nov to 28-Nov
22	24-May to 30-May	49	29-Nov to 05-Dec
23	31-May to 06-Jun	50	06-Dec to 12-Dec
24	07-Jun to 13-Jun	51	13-Dec to 19-Dec
25	14-Jun to 20-Jun	52	20-Dec to 26-Dec
26	21-Jun to 27-Jun	53	27-Dec to 31-Dec
27	28-Jun to 04-Jul		

APPENDIX B

Procedure for Sampling Salmon Smolt

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

Two hundred smolt will be sampled per week. When more than 200 smolt are captured in the fyke net, place the smolt in a large container and gently stir the water to roil the smolt. Randomly remove a portion of the catch and sample. Stop this procedure when 200 smolt are sampled. Return the remaining smolt to the river.

Smolt will be sampled the same day of capture. A smolt sampling day encompasses the 24 hours 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 AWL forms (Appendix B.1). Refer to Appendix B.1 of the standard procedures for recording data on AWL 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.

Use a scalpel to remove 5-10 scales from the preferred area (Appendix B.2). Mount the scales on a glass slide (Appendix B.3). Label the left portion of the slide with: location, date, specimen number, and collectors.

Measure smolt length from the tip of the snout to the fork of the tail, in the nearest millimeter (Appendix B.4).

Smolt should be kept lightly wet at all times during sampling. **Weights will be recorded to the nearest 1/10 of a gram.** Weights are recorded on the back of the AWL form in the three columns from the right as found in Appendix B.1.

Appendix B.1. Smolt AWL form from Sandy River.

DESCRIPTION: *SANDY RIVER SOCKEYE SMOLT* 002A-0923

ADFG ADULT SALMON AGE-LENGTH FORM

DO NOT WRITE IN THIS MARGIN

42658

FRONT

CARD	AGE	LENGTH	%	AGE GROUP	AGE ERROR CODE
002					

SPECIES: 2
 DAY: 20
 MONTH: 6
 YEAR: 01
 DISTRICT: 315
 SUBDISTRICT: 12
 STREAM: 000
 LOCATION: 000
 PERIOD: 05
 PROJECT: 8
 GEAR: 14
 MESH:
 TYPE OF LENGTH MEASUREMENT: 1
 NUMBER SCALES: 11
 # OF CARDS: 4

DO NOT MARK IN THIS MARGIN

42658

BACK

TRANSFER SCALES TO THIS COLUMN AS QUICKLY AS POSSIBLE TO THIS CARD

SPECIES
 1 - Chinook (Salmon)
 2 - Sockeye (Salmon)
 3 - Dolly (Salmon)
 4 - Pink (Salmon)
 5 - Coho (Salmon)
 6 - Steelhead
 7 - Steelhead
 8 - Steelhead

PROJECT
 1 - Commercial catch
 2 - Subsistence catch
 3 - Escapement (river, weir, weir, etc.)
 4 - Escapement - spawning grounds
 5 - Test fishing
 6 - Sport catch (harvest)
 7 - Sport catch (harvest)
 8 - Sport
 9 - Pre-Salmon

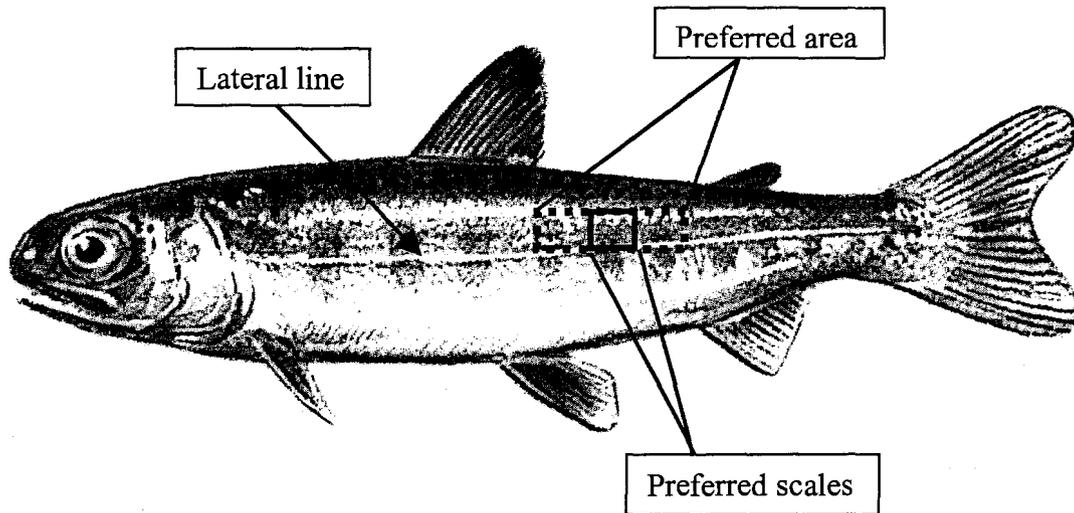
GEAR TYPE
 1 - Dip net
 2 - Purse seine
 3 - Beach seine
 4 - Otter gillnet
 5 - Gill net
 6 - Trap
 7 - Long line
 8 - Gill net
 9 - Fishhook
 10 - Pot
 11 - Hoop net
 12 - Handheld net
 13 - Dip net
 14 - Fish hook
 15 - Hoop net
 16 - Hoop net
 17 - Hoop net
 18 - Hoop net
 19 - Hoop net
 20 - Hoop net

LENGTH TYPE
 1 - Tip of snout to fork of tail
 2 - Midway to fork of tail
 3 - Fin to fork of tail
 4 - Midway to dorsal plate
 5 - Post orbit to dorsal plate
 6 - Unmeasured

AGE ERROR CODES
 1 - Error
 2 - Inverted
 3 - Reversed
 4 - Missing
 5 - Missing
 6 - Reversed
 7 - Wrong position
 8 - Not preferred

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. The "litho code" from the far-left column of the front of the AWL has been transferred to the corresponding column on the back of the AWL.

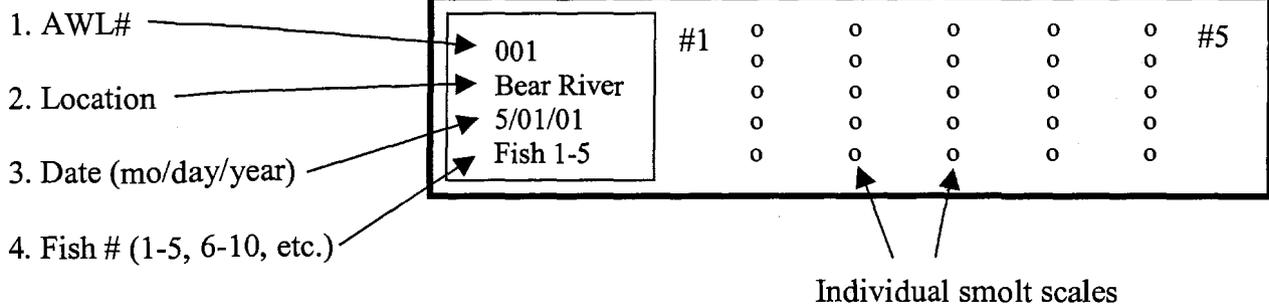
Appendix B.2. Preferred scale sampling area on a smolt salmon.



Appendix B.3. Smolt glass slide example.

Information for label:

Glass microscope slide

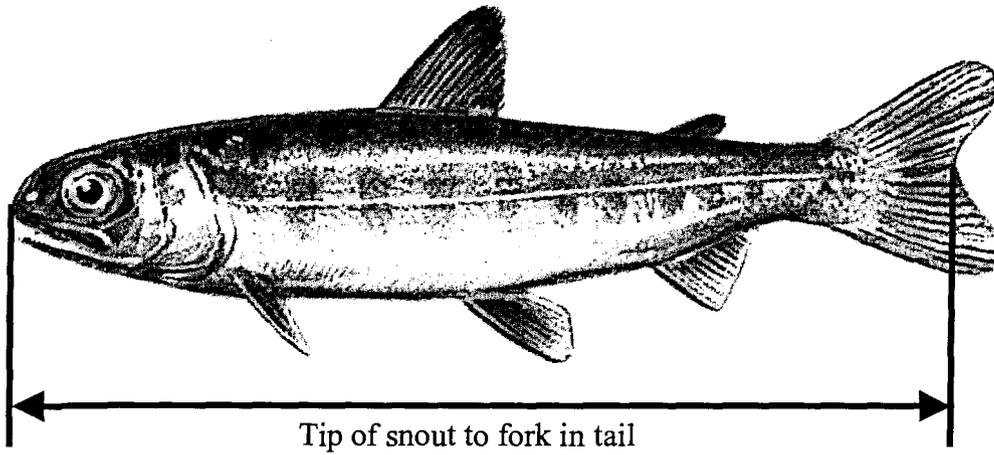


When the slides are completed, return them to the box in order by AWL number, date, and fish number. Label the slide box on top with the following information:

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

Appendix B.4. Measuring smolt length.

Measure the smolt from the tip of the snout to the fork in the tail. 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.



APPENDIX C

General Equipment, Camp Maintenance
and Camp Policy

Equipment Maintenance

Equipment maintenance is perhaps 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.

Motor Care and Outboard Operation

Motors will perform longer and better if these suggestions are followed:

1. 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.
2. 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 be accidentally used in generators or outboards.
3. When mixing gasoline or filling the tanks of the generator, stove or lantern, keep the following in mind:
 - a. Always mix fuel tanks or equipment under cover to prevent water contamination and always use a funnel and filter.
 - b. Fill camp stoves and lanterns outside as the danger of fire is very real.
 - c. A little extra effort toward cleanliness will pay in hours of trouble free operation.
4. Always place outboard motors in neutral when starting and always make sure a safety line is attached between the boat and motor.
5. 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.
6. Never start or run an outboard in the tilted position.
7. In the normal operation of a outboard, a "tell-tale" 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.

8. 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.
9. If the skeg or jet unit hits bottom, check the screws for tightness and housing damage.
10. If your outboard will not start, check the following:
 - a. 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.
 - b. Check to see if there is water in the gasoline.
 - c. If the engine is flooded, wait 5 minutes for the plugs to dry before attempting to start again.
 - d. Check the spark plugs as they may be fouled or defective (replace if needed)
 - e. Check to make sure the kill switch is clipped to the engine properly.
11. 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.

Boats

1. 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.
2. 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.
3. Boats must be bailed regularly of rainwater to keep it from sinking.

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 camp site is required. A few of the things to check are:

1. Maintenance of living accommodations and other installations will be performed as necessary. All materials necessary will be provided.
2. 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.
3. Upon completion of the summer season, all camp equipment will be cleaned prior to winter storage.
4. All sampling nets, tarps and cloth items must be dry before being stored.
5. 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.
6. All skiffs and ATVs will be chained and locked to a stationary object.

Camp Policy

1. 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.
2. The crew leader of each camp shall establish a policy on living standards and personnel behavior in accordance with normal guidelines.
3. All sampling stations will operate as directed. Time off for individual crew members shall be scheduled by the crew leader and shall have the option as to whether sampling duties allow time off from the location.
4. All employees will be required to act in a professional manner at all times and shall be especially courteous to the public.

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

Food Orders

Grocery orders for Bear, Sandy, and Ilnik Rivers should be placed with Port Moller, for Nelson River with Cold Bay, and for Orzinski Lake with Sand Point during the evening radio schedule beginning ant 1930.

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. Although not recommended, pets are allowed only on approval from the appropriate supervisor and other crew members. Past experience indicates, that one or more of the following problems may occur:

1. Problem of transportation in small planes for larger pets.
2. It is the owners repsonbility to arange for food to be shipped out on a regular basis. Limitations with shipping large quantities of pet food in small aircraft that are already full with freight.
3. Dangerous encounters with bears are a possibility.
4. Your pet may not be compatible with the other members of your camp and may interfere with work, if this occurs the pet must be sent home.
5. A pet that gets sick or injured can cause you considerable expense if it must be flown to medical assistance located in Anchorage.
6. Rabies is common on the Alaska Peninsula, so be careful of all mammals including ground squirrels, fox, wolf, otters, and your pet. If you are 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 and your supervisor will send you to Anchorage if tests for rabies prove positive. 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, burn and bury the carcass as instructed.

Radio Schedules

Radio schedules will be made twice daily. Radio 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, 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 so 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 schedule, notify beforehand either Cold Bay, Sand Point, or Port Moller. 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.

Nelson River ADF&G cabin	Lat. 55°48'73" N, Long. 160°59'29"W
Bear River ADF&G cabin	Lat. 56°03.690"N, Long. 160°26.821"W
Sandy River ADF&G cabin	Lat. 56°12'02" N, Long. 160°01'55"W
Ilnik River ADF&G cabin	Lat. 56°60.684" N, Long. 159°59.507" W
Port Moller Airstrip	Lat. 56°00'44" N, Long. 160°33'43"W

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 they are expected to return. Also, in each camp is a handheld VHF radio (with spare batteries), backpack with basic survival gear, 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 backpack 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.

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.

1. What is the violation?
2. When did the violation occur (e.g. date, time, tide condition, etc.)
3. Where did the violation occur?
4. 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 and needs it. 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, and if, trying to frighten a bear away by shooting - do not fire toward it. By chance, you may wound it by pulling the shot, ricochets, etc. If you are having problems with a particular bear around camp, call the office and notify them of the situation.

The Division of Wildlife Conservation personnel will take care of the problem, if it is feasible.

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.

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 life jacket when out on any water. Use your head - 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 employees 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

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.

Make an effort to avoid intestinal parasites such as Giardia. When in doubt, boil your drinking water for 15 minutes.

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 of visitors 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, Ilnik, and Orzinski River weirs installation Procedures

Appendix D.1. Installation of the Bear River Weir.

Materials

All weir installation materials are stacked on the bank of 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:

1. claw (framing) hammer
2. 2-3lb hand sledge
3. hand saw
4. wire cutters
5. vise-grips
6. 16 penny nails (for attaching sandbag platform boards and catwalk boards)
7. 20 penny nails (for stringer supports)
8. dock spikes (for reinforcing main tripod timbers)
9. a number of 2x4's (for tripod sandbag platform)
10. bailing wire

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 which could cause problems with alignment or installation might exist. 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.

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 travelling 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 4 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 3 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.

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, 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 also 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.

Trap Assembly

To assemble the fish trap, you will need three full-sized weir panels, the two panels which have been cut off at an angle on one end, the three half-panels (cut lengthwise), four fence posts, a mallet, bailing wire, wire cutters, and 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. 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.

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 gets carried out with the ice. 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.

By Steve Krueger and Joe Dinnocenzo

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 Cold Bay ADF&G office at the next radio schedule.

- the rail
- the south bank stabilization structures
- the winch station 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 a 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 station and north bank deck is intact. The deck surface should be level. The station should be upright and straight. The base of the station should line up with the end of the rail and a pulley should be mounted where the station 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 preserve 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 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 down stream 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 a 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 station 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 carrying the awkward, heavy winch. Insert each “J” hook through a different pair of boltholes 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 station 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 station with its handle pointing downstream. Insert the bolts through the winch and attach the washers and nuts on the south (offshore) side of the station.

Loosen the winch cable from the spool and pull the cable down the station between the station 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 2 unique panels stored on the south bank with gasket material 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 clamp 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.

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 downstream 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 station. After the first three panels are installed, a gap is left between the third and fourth panels to allow space for the funnel and 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 persons 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 persons will have to walk back and forth between the weir panel installation site and the winch station 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, 2 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. 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 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. When in the correct position, the ears at the upstream corner of proximate panels should line up and be in close enough proximity so that a connector pipe (16 foot length of 1" conduit with no end caps) will slip over both ears after being slid through the connector fittings on the end of each cross member of proximate panels. 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 3 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.) 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 proximate 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 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 4 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 2 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. 2 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.

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 have been preferred over wire in recent years due the reduced possibility fish getting hurt 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. (I can’t remember quite how we do this and avoid 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 10 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 4 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 2 by 4s 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. 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 placed 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 could 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, 4 people are necessary to accomplish some of the tasks associated with installation. Typical water temperatures during the normal installation time run about 2 to 4 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.

Appendix D.3. Installation of the Sandy River Weir.

Materials

All weir installation materials are stacked on either bank of the river at the installation location, a few hundred yards upstream of the cabin. 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:

11. claw (framing) hammer
12. 2-3lb hand sledge
13. hand saw
14. wire cutters
15. vice-grips
16. 16 penny nails (for attaching sandbag platform boards and catwalk boards)
17. 20 penny nails (for stringer supports)
18. dock spikes (for reinforcing main tripod timbers)
19. a number of 2x4's (for tripod sandbag platform)
20. bailing wire

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 area as the previous year. The riverbed should be walked across in transects a number of times to determine where any holes, gravel bars, or channels may exist which could cause problems with the weir alignment or installation. Choose a transect which offers the smoothest, best consolidated, and most continuously regular substrate possible. 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 loosely consolidated gravel. If the weir is installed over these areas, the loosely filled gravel 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. If necessary, move up or down stream to avoid such artifacts from previous installations.

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 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 and/or high winds off the lake, 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. Allowing the tripods to roll unchecked down the bank under the force of gravity will lead to breakage.

Place the tripods so that the back legs have about 4 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 travelling 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 will 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 2 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 10 feet upstream of the desired placement, then stand it up. Slowly walk it back into position and have someone stand on 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 2-3 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 10 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 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 10 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.

As you go, do not forget to install the 3 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. Generally, the fish travel most actively near the far (southwest bank) and this is where the fish pass gates and the trap will be installed.

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 wire can be 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.

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 gets carried out with the ice. 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 D.4. 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:

1. post hole driver
2. crisco grease for setting PVC pipe through rubber strap
3. 300 hundred heavy duty zip ties
4. dry suits,gloves,hood
5. 2-3 lb hand sledge hammer
6. large mallet
7. metal fid to guide pipe through rubber strap
8. barge and hand winch
9. metal fence posts

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 10 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 10 foot panels. 5 foot panel are adequate for the entire sand bar which dominates the middle of the

river, then a number of 10 foot panels are needed as the river deepens. Finally, 15 foot panels are necessary to block the deep channel by the far (south) bank.

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, side by side, 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 grave 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 without 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 taut 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 downstream 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 3 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.

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. Installing 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).

Staging in Sand Point

Things to do:

1. 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.
2. Buy fuel. Approximately 25 gallons of unleaded and five gallons of diesel.
3. Take propane. Three 100-lb. bottles should be plenty for the project.
4. Buy food. Plan on going without additional supplies until July. There is a refrigerator (a little smaller than standard size) which has a freezer approximately .4 m³. There is a standard size propane oven in the cabin.

Things to bring:

1. Firearms and ammunition
2. Radios: SSB (M700 base station and Spilsbury mobile) VHF base station, hand-held VHF. Test all of these in Sand Point prior to departure.
3. Tools
4. Float Coats
5. Chain Saw
6. 12 volt batteries (3)
7. Spotting Scope
8. First Aid Kits
9. Each person will need chest waders and rain gear.
10. AWL forms, scale cards, daily weir count forms, logbook.
11. Satellite Telephone

Setting up Camp

The Orzinski 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:

1. Make 150-180 sand bags from the gravel bar just in front of the weir site.
2. Install the tripods in a straight line perpendicular to the water current.
3. Initially, place at least 15 sandbags on each tripod.
4. Install the stringers
5. 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.
6. Line the bottom of the weir with sandbags. Place the sandbags at the base of the panels on the downstream side of the weir.
7. Install the catwalk.
8. A flash panel should be placed in front of the counting gate.
9. 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

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

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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 fish¹ 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 alter-

native 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.

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

¹ Especially adult smelt, family Osmeridae.

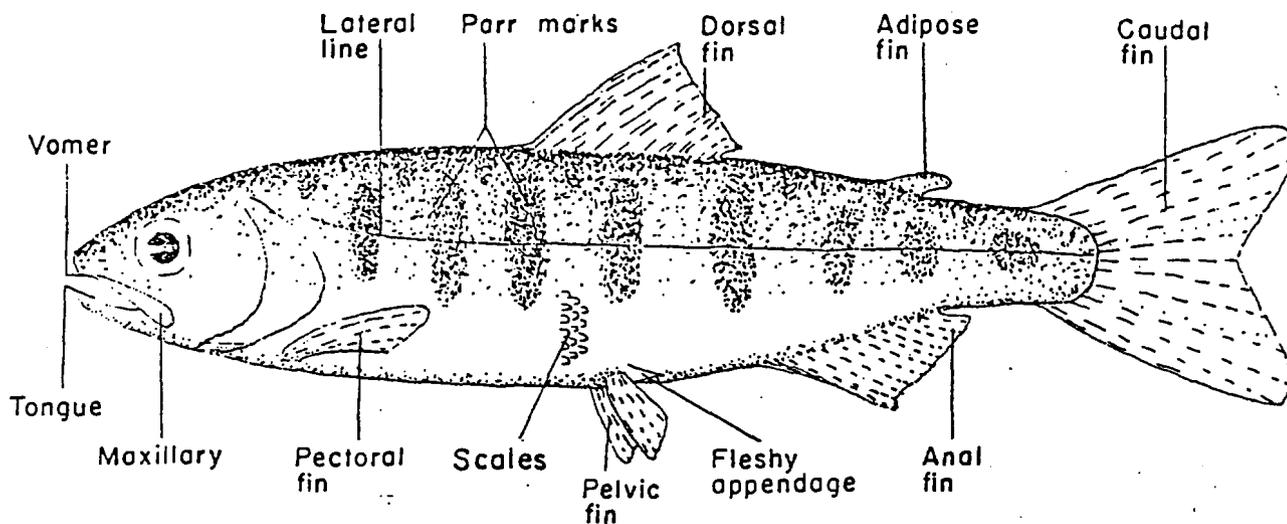


Figure 1.—A hypothetical salmonid showing external characteristics.

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)

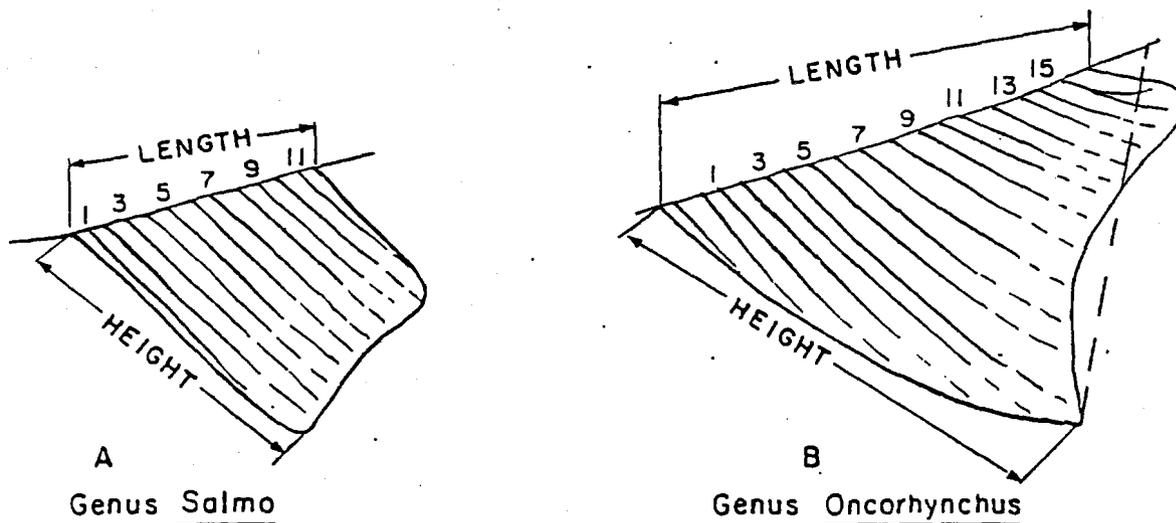


Figure 2.—Anal fins: (A) Trout, genus *Salmo*; (B) Pacific salmon, genus *Oncorhynchus*. The two drawings show differences in structure and fin ray count. (Note that the length of the anal fin is its overall basal length, and its height is that distance from the origin of the fin to the tip of the anterior 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.)

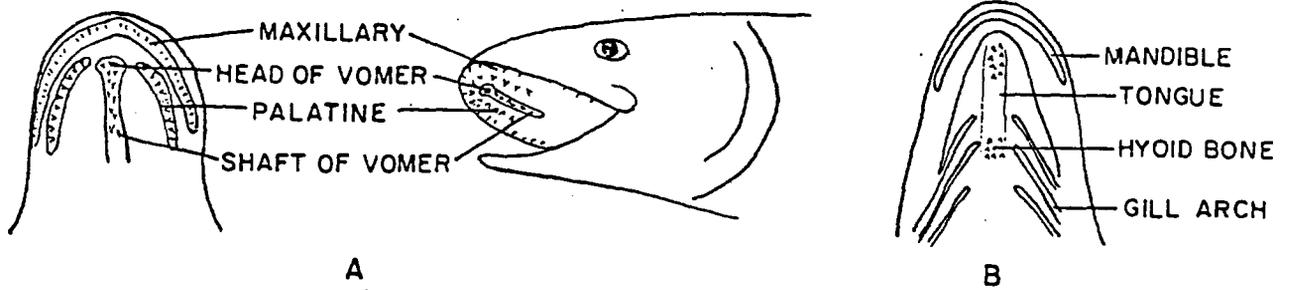
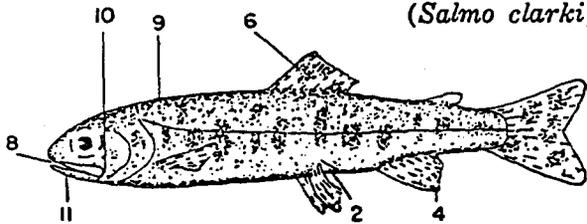


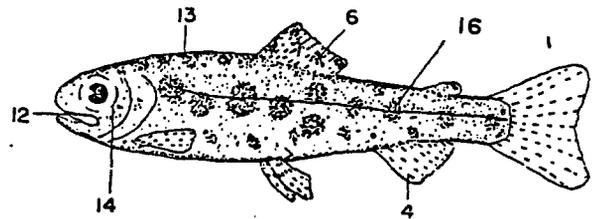
Figure 3.—Location of dentition in (A) the roof and (B) the floor of the mouth of salmonid fishes. (Presence or absence of teeth on the vomer or tongue may be determined by use of the little finger or a blunt instrument. The small hyoid teeth at the base of the tongue are located between the gill arches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

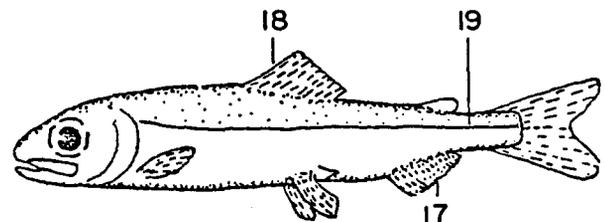


16. (20) Parr marks almost round.
Rainbow or steelhead trout
(*Salmo gairdneri*)



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*

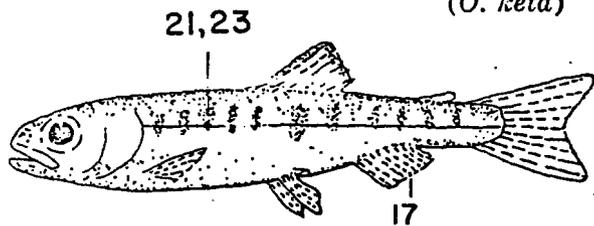
19. (20) No parr marks. Fry leave fresh water while small—approximately 1.75 inches (45 mm) long.
Pink salmon
(*O. gorbuscha*)



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.

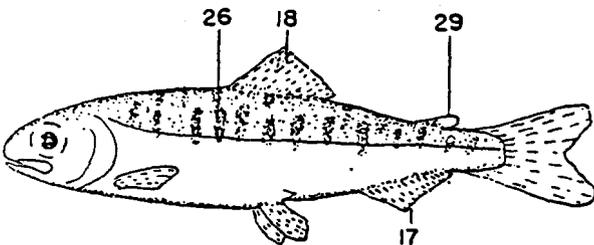
- 20. (16) Parr marks present as vertical bars or oval spots.
- 21. (30) Parr marks short, extending little, if any, below lateral line.
- 22. (25) Gill rakers on first arch, 19 to 26.
** Pyloric caeca, 140 to 186.
- 23. (26) Parr marks faint. Sides below lateral line iridescent green.
- 24. (27) Small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

Chum salmon
(*O. keta*)



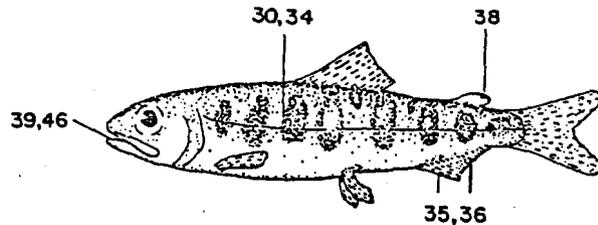
- 25. (22) Gill rakers on first arch, 30 to 40.
**Pyloric caeca 60 to 115.
- 26. (23) Parr marks usually sharply defined. Sides below lateral line silvery, not iridescent green.
- 27. (24) Relatively large when migrating from fresh water, approximately 3 to 5 inches (80 to 126 mm) long.
- 28. (31) Gill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

Sockeye salmon
(*O. nerka*)



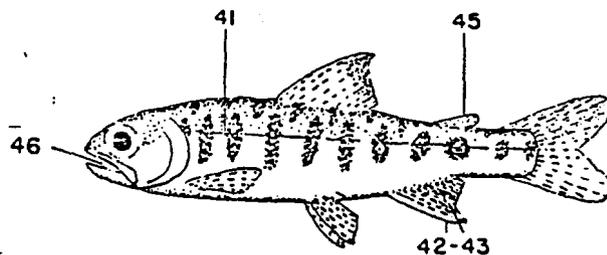
- 30. (21) Parr marks large, vertical bars centered by lateral line.
- 31. (28) **Gill rakers short and thick, fewer than 29 on first arch.
- 32. (29) Adipose fin at least partially pigmented.
- 33. (40) **Pyloric caeca more than 90.
- 34. (41) Parr marks broader than interspaces.
- 35. (42) Anterior 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) **Pyloric 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*)



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*)

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