

Salmon Research Operational Plans
for the Kodiak Area, 2004



By

Westward Region Finfish Research Staff

Regional Information Report¹ 4K04-22

Alaska Department of Fish and Game
Division of Commercial Fisheries
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May 2004

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KODIAK MANAGEMENT AREA SALMON CATCH SAMPLING
OPERATIONAL PLAN, 2004



By

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INTRODUCTION

The Kodiak Management Area (KMA), located in the Gulf of Alaska, extends from Cape Douglas to Kilokak Rocks and includes Shelikof Strait and the waters of Kodiak, Afognak, and Shuyak Islands (Figure 1). The KMA is divided into seven commercial salmon fishing districts and 56 sections (Figures 2-8). The area includes over 800 known salmon streams (ADF&G 1993), 440 of which are known to have annual spawning salmon populations (Wadle 2004).

Of the five Pacific salmon species harvested in the KMA, sockeye salmon *Oncorhynchus nerka* are currently the most economically important followed by pink *O. gorbuscha*, chum *O. keta*, coho *O. kisutch*, and chinook salmon *O. tshawytscha*. The Alaska Department of Fish and Game (ADF&G) assumed the responsibility of managing Alaska's salmon resources in 1960. The emphasis of the salmon management program since that time has been to achieve biological escapement goals, maximize the quality and quantity of harvest in an orderly manner, and adhere to the Alaska Board of Fisheries adopted management plans (Brennan et al. 2003).

The 2003 KMA salmon harvest, totaling 19.6 million fish, was composed of approximately 4.1 sockeye, 14.1 million pink, 1.2 million chum, 352 thousand coho, and 19 thousand chinook salmon (Foster *in press*). The 2004 harvest is projected to be approximately 23.9 million salmon consisting of 2.6 million sockeye, 19.5 million pink, 1.2 million chum, 495 thousand coho, and 20 thousand chinook salmon (Eggers 2004).

Assignment of salmon catch to river system of origin is a prerequisite for evaluating escapement objectives and forecasting returns. In 1985, an expanded commercial salmon catch sampling operation was initiated in the KMA to establish a database that would help determine stock contribution levels, evaluate escapement goals, and estimate preseason forecasts. This program has continued with the current emphasis on sockeye salmon. Stock identification projects using scale pattern analysis (SPA), as well as age marker analysis, have been conducted within the Afognak, Northwest Kodiak, Southwest Kodiak, Alitak Bay, and Mainland Districts and may continue in 2004.

GOAL

The goal of this project is to provide data from the commercial salmon harvest to assist with the long-term management of the KMA sockeye salmon runs.

OBJECTIVES

The objectives of this project are to provide age data, derived from sampling of the commercial catch of salmon, that will facilitate:

1. Construction of accurate brood tables.
2. Development of accurate run forecasts.
3. Evaluation of escapement goals and run timing.
4. Addressing mixed stock fishery issues and annual run reconstruction projects through scale pattern analysis (SPA) and age marker analysis.

TASK

Collect scale samples (for age determination and SPA) from selected sockeye salmon fisheries.

SUPERVISION

Westward Region finfish research biologist Mark Witteveen will act as overall project leader and supervise inseason progress. Finfish research project biologist Matt Foster will supervise the 2004 KMA salmon catch sampling program, monitor weekly catch sampling, and review incoming data for quality, quantity, and timeliness. A logbook will be maintained by the project biologist, to accurately track all weekly sample events. The catch sampling crewmembers will be notified periodically regarding data quality.

Personnel assignments at the Port of Kodiak, Larsen Bay, and Alitak (Lazy Bay) will be made throughout the season based upon sampling logistics. Available permanent and seasonal staff will assist in catch sampling at the Port of Kodiak when necessary.

PROCEDURES

The standard procedures needed for collecting and recording salmon age and length data are defined in Appendix A. The accuracy of the data and scale sample quality will be the responsibility of the crew leader. If questions or problems arise, the sampling personnel should not hesitate to ask their supervisor for clarification or assistance.

Sockeye salmon catches will be sampled for age (scales) on a weekly basis by the KMA salmon catch sampling crew and several field crews according to the sampling schedule (Table 1). To ensure that sockeye salmon samples are obtained, the crews will begin sampling on the first day of delivery (or harvest) during the designated sampling week (Appendix A.5). Each crew leader should review the 2004 Kodiak Commercial Salmon Fishery Harvest Strategy (Brennan et al. *in press*) and become familiar with the basic management chronology and terminology.

Local and remote processing facilities within the KMA will be contacted by phone daily to assess the potential arrival of tender and fishing vessels offloading salmon from areas prescribed to be sampled.

All catch samples are to be representative and without known bias. Deliveries containing fish harvested from non-targeted areas and deliveries containing loads of mixed origin (< 90% pure by weight) are not to be sampled. There will be no pre-selection of fish for length, sex, condition, or any other factor.

The sample size for most catch samples is 400 fish. The sample size was constructed to permit each age class proportion estimates to be within at least 0.075 of the true proportion with 90% confidence, regardless of number of age classes or population proportions (Thompson 1987, Bromaghin 1993). Samples sizes assume at least 80% of the scale samples will be readable. Typically the percentage of readable scales is greater than 80%. Obtaining scale samples of the highest quality will increase the percentage of readable scales and hence increase the precision of the estimates. A sample size of 600 will be utilized for Cape Alitak and Moser-Olga Sections to ensure that the minimum sample size per age class will be available for SPA.

All scales, when possible, will be collected from the preferred area of each fish following procedures outlined in INPFC (1963). Scales will be mounted on scale “gum” cards and impressions made on acetate/diacetate cards. Fish ages will be assigned by examining scale impressions for annual growth increments using a microfiche reader fitted with a 48X lens following designation criteria established by Mosher (1968). Ages will be recorded on sampling forms using European notation (Koo 1962) where a decimal separates the number of winters spent in fresh water (after emergence) from the number of winters spent in salt water. All data will be recorded on standard age-weight-length (AWL) data forms. AWL forms were digitally scanned and edited for errors.

All correspondence should be directed to Matt Foster. When catch samplers are sampling at remote locations (e.g., Larsen Bay) they will report primarily to Matt Foster by phone on a daily basis. The Port of Kodiak catch sampling crew will be responsible for pressing and aging all sockeye salmon scale samples (including escapement), updating the weekly sampling log, and cataloging all catch and escapement sampling data. Only those personnel passing the 2004 Westward Region scale-aging test administered by the project biologist will age the samples.

Data from both the catch and escapement samples in 2004 will be compiled and reported by Matt Foster in the 2004 Kodiak Management Area Catch and Escapement Sampling Results report that will be published in December of 2004.

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Table 1. Sockeye salmon catch sampling schedule for the Kodiak Management Area, 2004.

District	Geographic Area	Statistical Area	Primary Sampling Site	Crew Leader	Sample		
					Frequency	Dates	Size
Afognak District							
	NW Afognak Section	251-30 - 251-50	Kodiak	Kinsley/Birdsong	weekly	7/6 - 7/25	400
	Waterfall Bay THA ^a	251-84	Waterfall Bay	Swanson	run dependent	6/5 - 7/1	600
	Foul Bay THA ^a	251-41	Foul Bay	Watchers	run dependent	6/5 - 6/9	600
	SW Afognak Section	251-10 - 251-20	Kodiak	Kinsley/Birdsong	weekly	6/5 - 9/5	400
	Kitoi Bay	252-32	Kitoi Bay	Aro	weekly	6/1-8/1	400
NW Kodiak District							
	Uganik Bay	253-11 - 253-35	Kodiak	Kinsley/Birdsong	weekly	6/5 - 9/5	400
	Uyak Bay	254-10 - 254-40	Larsen Bay	Kinsley/Birdsong	weekly	6/5- 9/5	400
	Spiridon THA/Telrod Cove ^b	254-50	Telrod Cove	Watchers	daily	7/15 - 9/15	240
SW Kodiak District							
	Inner/Outer Karluk Section	255-10 - 255-20	Larsen Bay	Kinsley/Birdsong	weekly	6/5 - 9/5	400
	Sturgeon Section	256-40	Kodiak	Kinsley/Birdsong	weekly	6/23 - 8/1	400
	Halibut/Gurney Bay	256-25 - 256-30	Kodiak	Kinsley/Birdsong	weekly	6/23 - 8/1	400
	Inner/Outer Ayakulik Section	256-10 - 256-20	Kodiak	Kinsley/Birdsong	weekly	6/5 - 8/1	400
Alitak Bay District							
	Cape Alitak/Humpy Deadman	257-10,20 257-50-70	Lazy Bay (Alitak)	Sikes	weekly	6/5 - 8/31	600
	Moser/Olga Bay	257-40 - 257-43	Kodiak	Kinsley/Birdsong	weekly	6/5 - 8/31	600

^a Waterfall Bay and Foul Bay terminal harvest areas (THA) will collect 600 samples total, frequency dependent on harvest magnitude.

^b Spiridon will use a weekly sample size of 240 fish (consistent with escapement sampling).

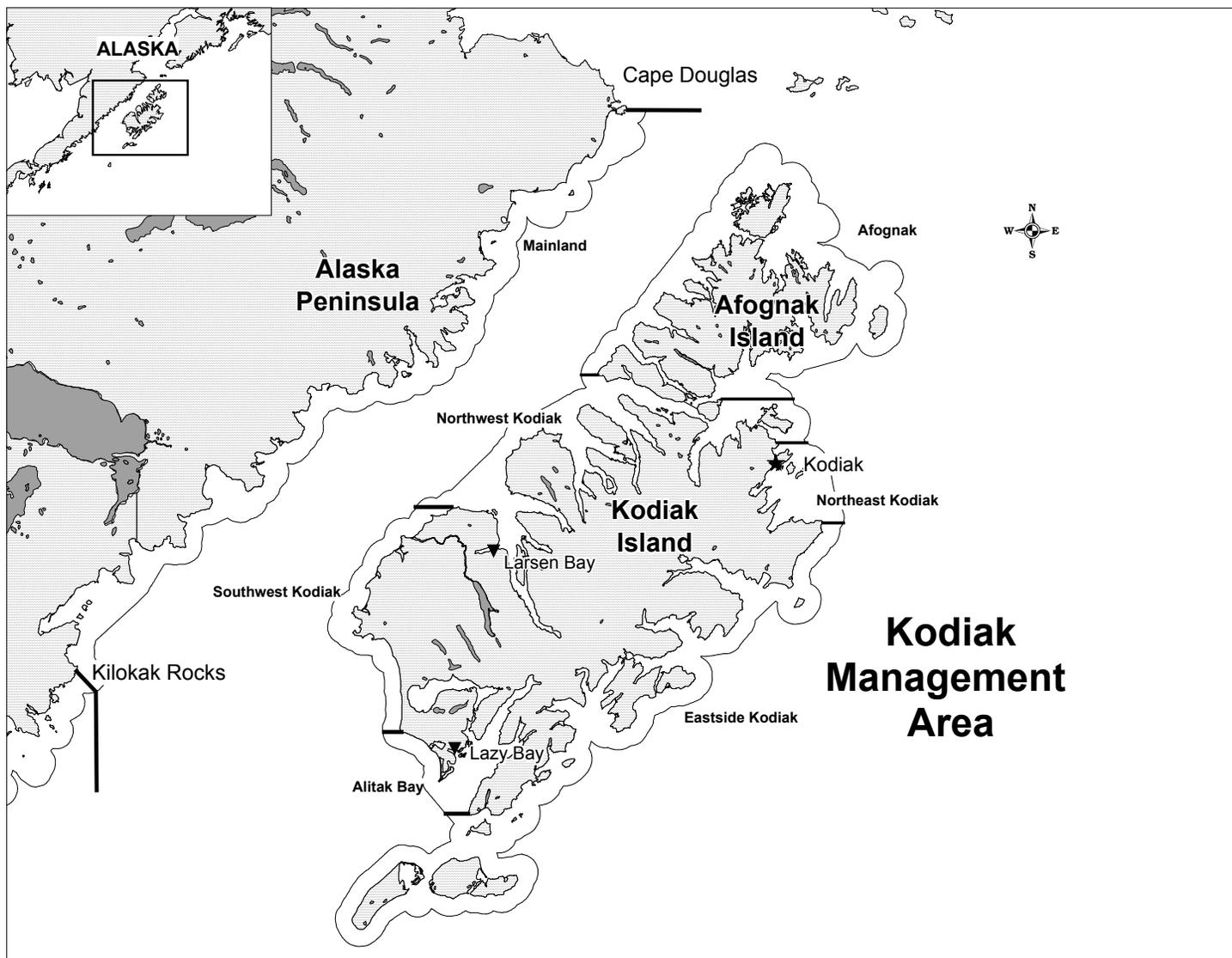


Figure 1. Kodiak Management Area commercial salmon fishing districts and processing facility locations, 2004.

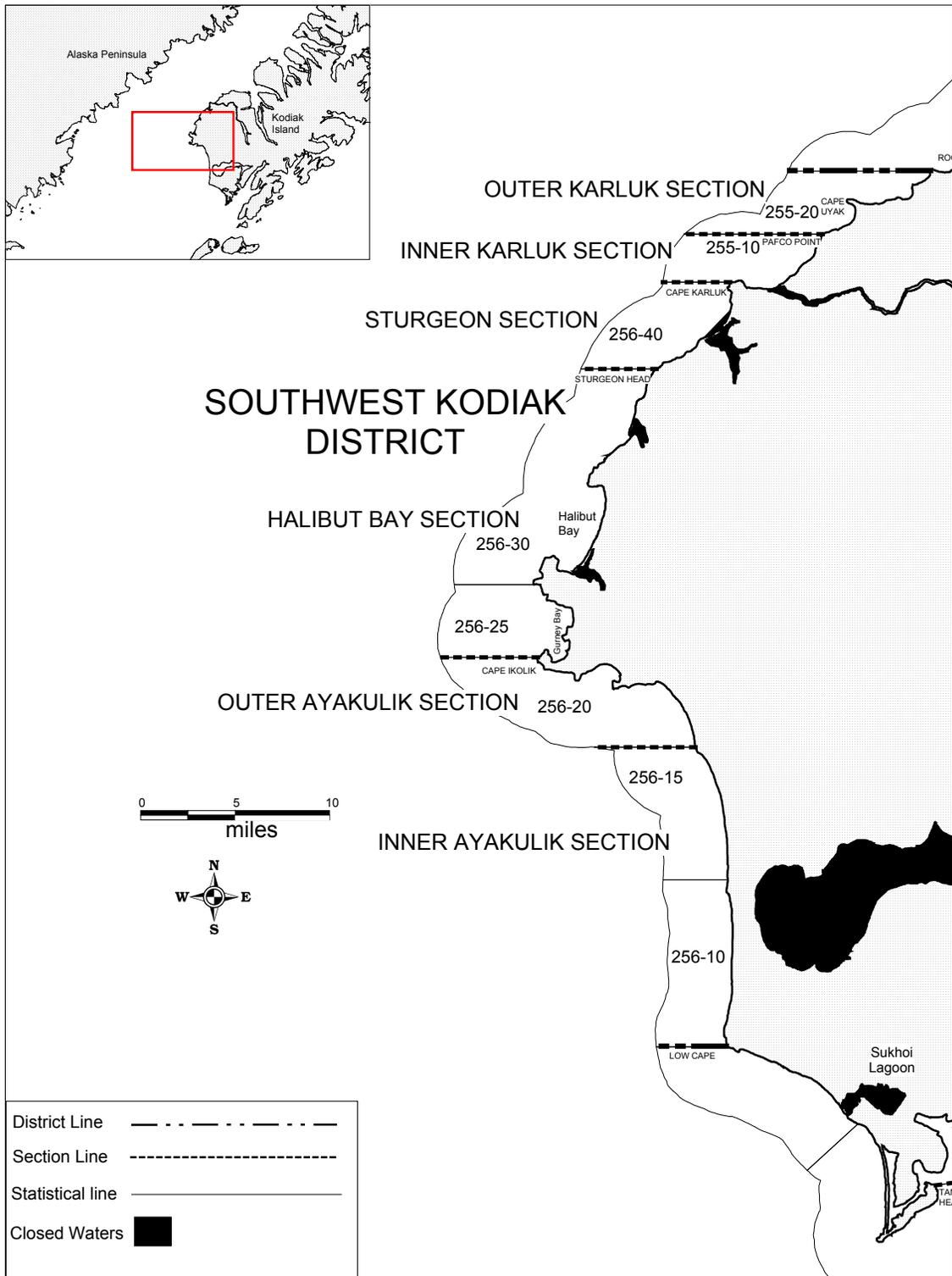


Figure 4. Southwest Kodiak District commercial salmon fishing sections and statistical areas, 2004.

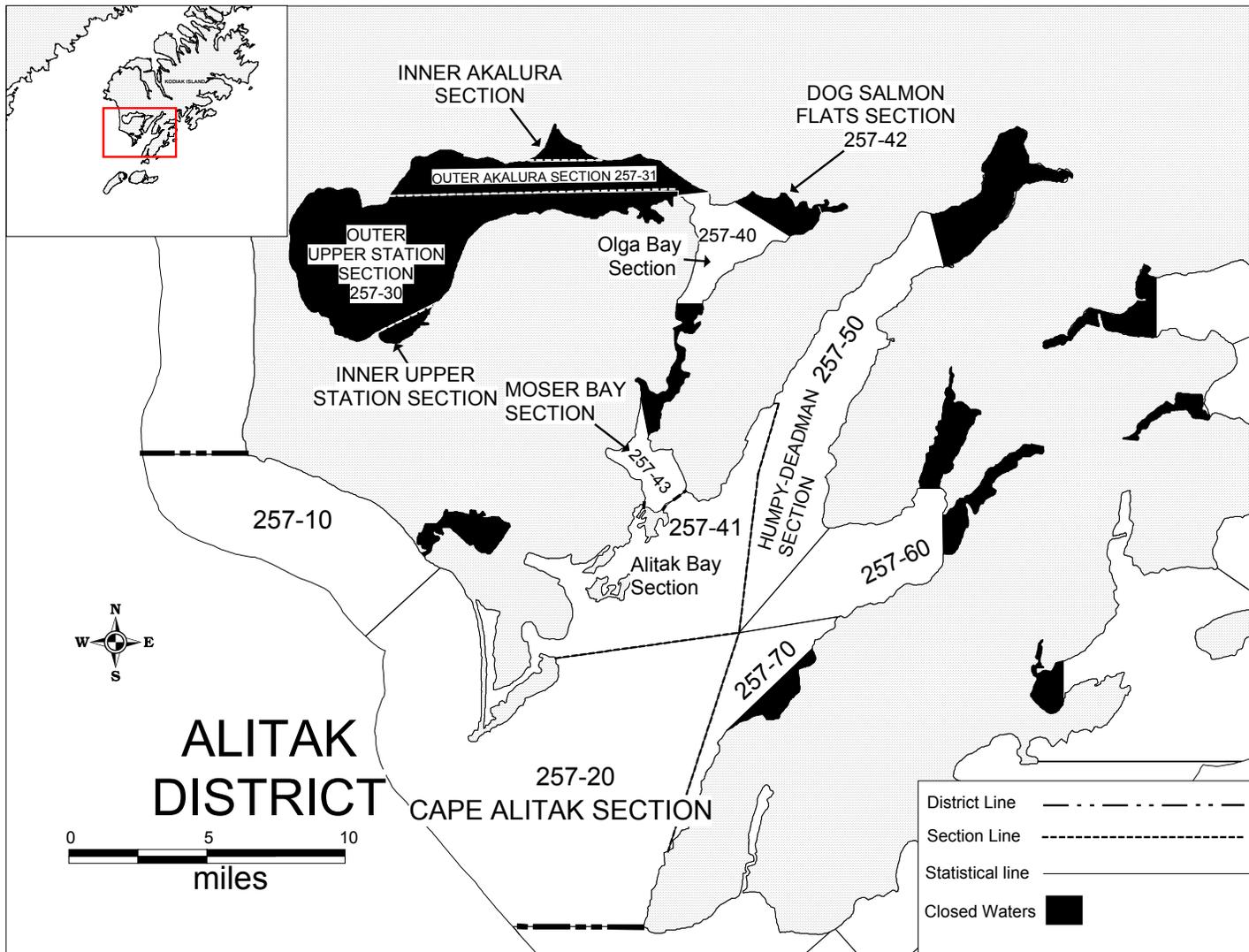


Figure 5. Alitak Bay District commercial salmon fishing sections and statistical areas, 2004.

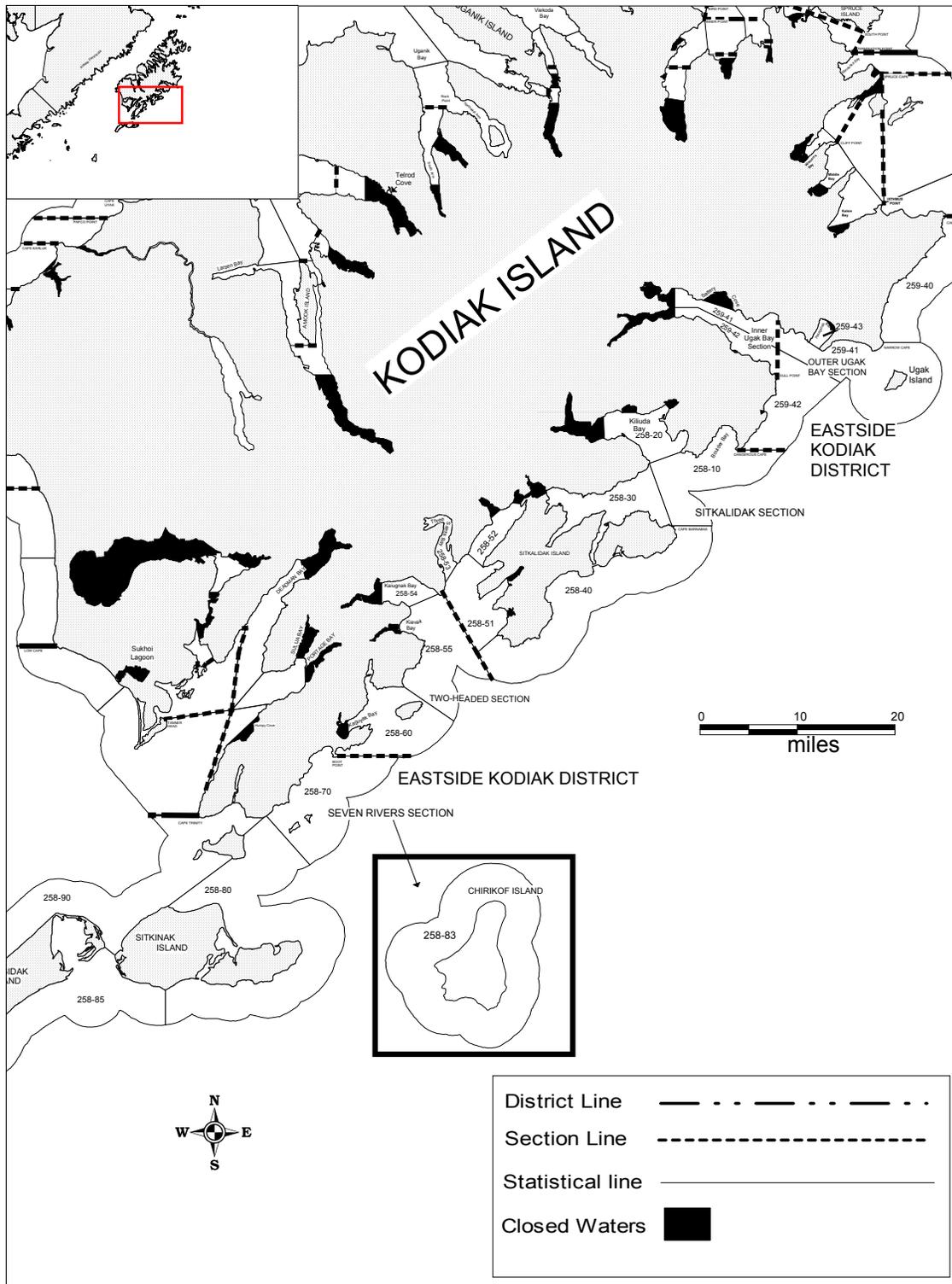


Figure 6. Eastside Kodiak District commercial salmon fishing sections and statistical areas, 2004.

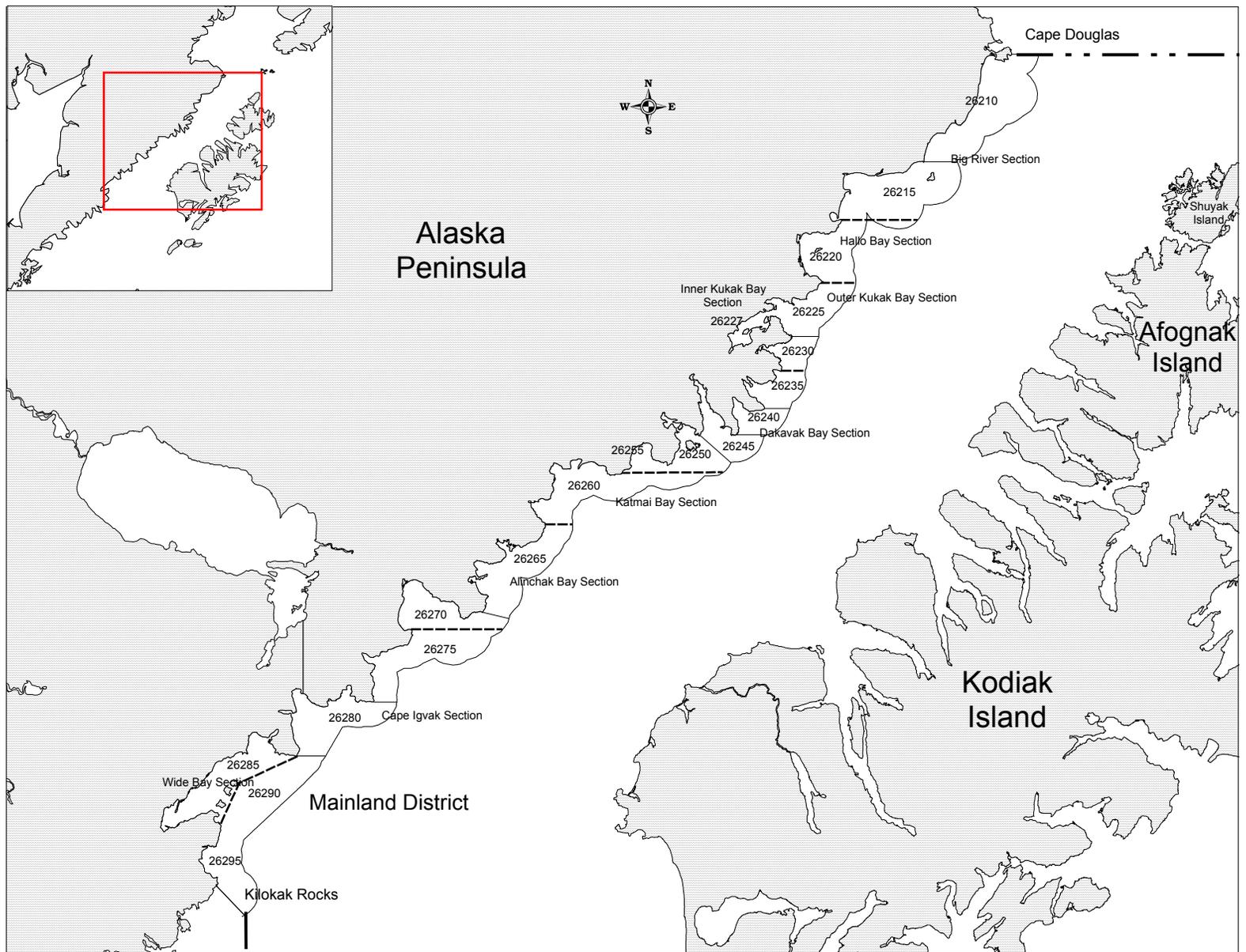


Figure 8. Mainland District commercial salmon fishing sections and statistical areas, 2004.

APPENDIX

Appendix A.1. Procedure for sampling adult salmon for age, length, and sex.

Annually, salmon escapements and catches are sampled for age (scales), length, and sex by field crews throughout the state. 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 (AWL) optical scanning (opscan) forms neatly and accurately. In addition, scale samples must be collected and mounted properly to ensure accurate age determination. The following procedures are to be strictly adhered to when sampling adult salmon for age, length, and sex.

Procedures

COMPLETING THE OPSCAN AWL FORMS:

New **green** AWL forms have been developed which have Y2K date capabilities. Before transcribing any information, make sure the correct form is being used. The department no longer uses the outdated red or blue forms.

A completed AWL form and accompanying scale gum card for sampling sockeye salmon are shown in Appendix A.2. When collecting two scales per fish, as with coho salmon sampling, follow the procedure illustrated in Appendix A.3.

Complete each section on the left side of the AWL form using a No.2 pencil and darken the corresponding circles as shown in the figures. Make every effort to darken the entire circle as the optical scanner, which reads and records the data from the AWL forms, may not recognize partially filled circles. Label only one form at a time to avoid a "carbon paper effect" resulting in stray marks. Special care should be used to ensure that stray marks do not occur on either side of the AWL form. Stray marks and scuffed AWL forms can severely hamper scanning.

Fill out each of the following:

Description

Record the following: species/area/catch or escapement/gear type (if applicable)/samplers.

Card

The AWL forms and corresponding gum card(s) are numbered sequentially by date throughout the season starting with 001. A separate numbering sequence will be used for each species, district, and geographic location. Consult your crew leader for the current card number. Sockeye salmon scale samples will have only one gum card per AWL form as shown in Appendix A.2.

Species

Refer to the reverse side of the AWL form for the correct one-digit code (e.g., sockeye = 2).

-Continued-

Day, Month, Year

Escapement sampling: Use appropriate digits for the date the fish are sampled.

Catch sampling: Use the date the fish were caught. If this differs from the sample date, note the sample date in the top margin.

District

List all districts in which the fish were caught. Consult your area statistical map or project leader for the appropriate district. If more than one district is represented, darken the corresponding circles of the district representing most of the catch and note the other catch areas in the top margin.

Subdistrict (Section)

List all subdistricts in which the fish were caught. If the catch represents more than one section, list each section but do not darken the corresponding circles. Leave blank if the section is unknown.

Stream

Leave blank for catch sampling;

Consult area statistical map for the appropriate stream number when collecting escapement samples.

Location

List the appropriate code associated with the area the fish were sampled as shown in Appendix A.4. For example, if the fish were sampled in the Port of Kodiak, the location code would be 031.

Period

Escapement sampling: List the sample week in which the fish were sampled (Appendix A.5).

Catch sampling: List the sample week in which the fish were caught. If this differs from the week the fish were sampled, note this in the top margin.

Project and Gear

Refer to the reverse side of the AWL form for the correct code. For example, escapement samples collected at a weir would have a project code of 3 and a gear code of 19.

Mesh

Leave blank unless specifically instructed by supervisor to do otherwise.

Type of length measurement

Refer to the reverse side of the AWL form for the correct code (e.g., mid eye to tail fork = 2).

Refer to Appendix A.6.

-Continued-

Number of scales per fish

Fill in the number of scales collected per fish. For sockeye, one scale per fish is collected unless otherwise instructed by supervisor.

of cards

of cards always = 1 (each AWL form has an individual and unique “litho code”).

If possible, keep the AWL form litho codes in numerical order throughout the season and keep all forms flat, dry, and clean. Fish gurry and water curling may cause data to be misinterpreted by the optical scanning machine. **It is the responsibility of the crew leader to make sure that all forms are carefully edited before returning them to their supervisor.**

SCALE GUM CARDS

A completed AWL form and accompanying gum card for sampling sockeye salmon are shown in Appendix A.2. When collecting two scales per fish, as with coho salmon sampling, follow the procedure illustrated in Appendix A.3. Be sure to fill out the gum cards in pencil as shown in Appendix A.2 and A.3.

Species

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

Locality

Escapement sampling: Include the weir site followed by “escapement” (e.g., Karluk River escapement).

Catch sampling: Include the area(s) where the fish were caught followed by “catch” (e.g., Uganik Bay catch).

Statistical Area Code

Fill in the appropriate digits from the AWL form. If catch samples are from a variety of statistical areas be sure to list each statistical area and approximate percentage from each (if available).

Sampling date

Escapement sampling: Fill in the date the fish were sampled.

Catch sampling: Fill in the date the fish were caught. The sample date, if different from the catch date, may be noted in “remarks”.

Gear

Write out completely. If catch samples include multiple gear types, be sure to list each gear and approximate percentage from each (if available).

Collector(s)

Record the last names of each person collecting the sample.

-Continued-

Remarks

Record any pertinent information such as the number of scales per fish sampled, processing facility where the sampling took place, vessel/tender name, etc. Be sure to transfer this information to the top margin of the AWL form.

SAMPLING PROCEDURE

1. Place the fish on its right side to sample the left side.
2. Determine the sex of the fish (escapement sampling only) and darken M or F in the sex columns. If any difficulty is encountered with this procedure, write "I had trouble sexing these fish" on the top margin of the AWL form and ask your supervisor for help as soon as possible before sexing additional fish.
3. Measure fish length in millimeters from mid eye to tail fork (escapement sampling only; Appendix A.6). Record length by blackening the appropriate column circles on the AWL form. Column 3 on the AWL form is used for fish with a length greater than 999 millimeters (Chinook). Measure all species of salmon to the nearest mm. When collecting length data, take care to ensure that each length corresponds to the appropriate scale mounted on the gum card, as length-at-age is evaluated for each sample.
4. Remove the "preferred scale" from the fish by grasping the scale's exposed posterior edge with forceps and pulling free (Appendix A.7). Remove all slime, grit, and skin from the scale (neoprene wristers work well for this). 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. If the preferred scale is missing, select a scale within the preferred area on the other side of the fish. If no scales are present in the preferred area on either side 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. Do not select a scale located on the lateral line.
5. It is important to take care that scales adhere to the gum card, rough side up. Therefore, without turning the forceps over, clean, moisten, and mount the scale on the gum card with your thumb or forefinger. Exert just enough pressure to spread and smooth the scales directly over the number as shown in Appendix A.7. The ridges on the sculptured side can be felt with a fingernail or forceps. Mount the scale with the anterior end oriented toward top of gum card. All scales should be correctly oriented on the card in the same direction (Appendix A.8.).
6. Repeat steps 1 through 4 for up to 40 fish on each AWL form.

-Continued-

7. When sampling at weirs you may use “Rite in the Rain”® books to record the data. Keep the AWL forms in camp where they will be clean, dry, and flat. After sampling is done for the day, transfer the data to the AWL forms. **Each length, sex, and scale must correspond to a single fish! It is the responsibility of the crew leader to be sure the data has been transcribed correctly and the AWL forms filled out completely. Log books containing length and sex data should be returned to Matt Foster at the end of the season.** These are considered raw data and need to be archived. If you choose to record raw data on tape, these tapes must be returned to Matt Foster.

SAMPLING CHECKLIST

OPERATIONAL PLAN	PENCILS (NO. 2)
GUM CARDS	FORCEPS
AWL FORMS (GREEN)	PLASTIC CARD HOLDERS
NEOPRENE WRISTERS	CLIPBOARD
MEASURING BOARD	LOG BOOK

SOME REMINDERS

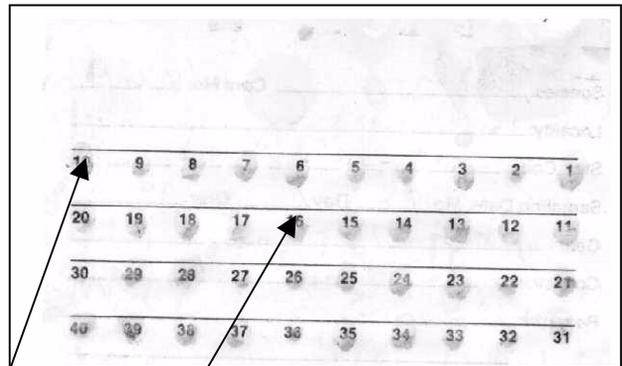
1. For greater efficiency in scale reading, mount scales with anterior end toward top of gum card.
2. AWL forms should be carefully edited. Remember to use the new AWL forms (green) as the red and blue forms are outdated. Re-check header information on AWL forms; make sure all available information is filled in. Take extra care to use the correct period code (sampling week) for the sampling or catch date. AWL form numbers should not be repeated; a frequent error is to begin a week's sample with the last AWL number used the week before. This is particularly important if the data is regularly sent to town; it is easy to forget which AWL form numbers were used. Crew leaders should take time to ensure that the circles are being blackened correctly. If the circles are sloppily marked, the optical scanner records the information incorrectly or misses it entirely.
3. Transfer important comments from the gum cards to the AWL forms. After pressing scales, the cards are seldom referred to again, and important remarks can be lost. Write comments in the top right margin. If there is not room on the AWL form to completely explain the remarks, use a separate piece of paper.

-Continued-

4. Never put data from different dates on one AWL form or one gum card. Even if only one scale is collected that day, begin a new AWL form and gum card the next day.
 5. If weights are taken, they may be noted in the right margin of the AWL form during sampling, but be sure to transfer the weights and litho code to the appropriate columns on the reverse of the AWL form before submitting it to your supervisor.
 6. Try to keep the litho codes (located in the left margin of the AWL form) in numerical order. This should not be hard to do if they are arranged that way before page numbering. When sampling different areas throughout the season, arrange the litho codes in order before each sample is taken.
 7. If AWL forms get wrinkled or splotched the data should be transcribed onto a new AWL form prior to sending in. The optical scanning computer will misread or reject torn or wrinkled sheets. Do not use paperclips on AWL forms.
 8. Be careful when collecting and mounting scales in wet conditions (rain, high humidity, etc.). If glue dries on top of the scale, it often obscures scale features, resulting in an unreadable scale. In addition, scales frequently adhere poorly to a wet gum card. Protect the cards and keep them dry to avoid having to remount the scales on a new card. If the cards get wet, try to dry them in a protected area or remount if necessary. Remember, use a pencil when filling out gum cards, because ink will come off during pressing.
 9. Visually scan all AWL forms for mistakes. A common error occurs, for instance, in placing both the 4 and 7 of a 475mm fish in the 100s column with nothing in the 10s column.
 10. Avoid accumulation of incomplete AWL forms. In previous years, there have been cases where individuals have completed several samples before transcribing the information on the AWL forms. This may lead to an increase in errors. After a sample has been completed, try to get the AWL forms filled out as soon as possible. This will ensure more accurate information, as any problems or abnormalities concerning the sample (e.g., many jacks in sample, many fish lacking preferred scale, number of scales do not match number of lengths recorded, etc.) will be fresh in your mind.
 11. Responsibility for accuracy lies first with the primary data collector(s) and finally with the crew leader. Sloppy or incomplete data forms or gum cards will be returned to individual collectors for correction.
-

Appendix A.2. Completed adult salmon AWL form (front side) and associated gum card.

Species: Sockeye Card No: 014
 Locality: Frazer Esc.
 Stat. Code: 257-40-403
 Sampling Date: Mo. 06 Day 07 Year 2000
 Gear: Weir/Trap
 Collector(s): D. Roberts, C. Selby
 Remarks: _____



DESCRIPTION: Sockeye \ Frazer \ Esc. Samplers: Roberts, Selby ADF&G ADULT SALMON AGE-LENGTH FORM VERSION 2.1

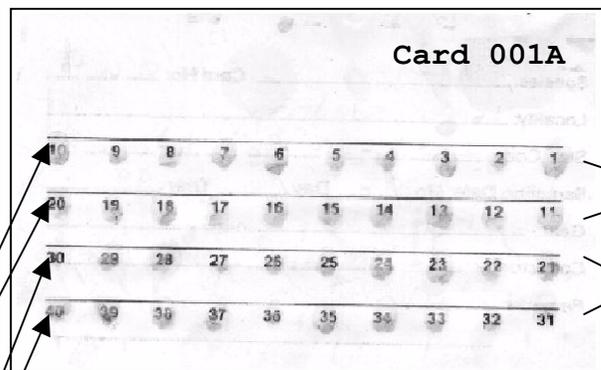
DO NOT WRITE IN THIS MARGIN
 15429
 DO NOT WRITE IN THIS AREA

CARD: 014	SEX: 1	100's: 2	LENGTH: 5	1's: 7	AGE GROUP: 6	AGE ERROR CODE: 0
SPECIES: Sockeye	2	3	4	5	6	7
DAY: 07	8	9	0	1	2	3
MONTH: 06	4	5	6	7	8	9
YEAR: 2000	0	1	2	3	4	5
DISTRICT: 257	6	7	8	9	0	1
SUBDISTRICT: 40	2	3	4	5	6	7
STREAM: 403	8	9	0	1	2	3
LOCATION: 038	4	5	6	7	8	9
PERIOD: 24	0	1	2	3	4	5
PROJECT: 3	6	7	8	9	0	1
GEAR: 19	2	3	4	5	6	7
MESH:	8	9	0	1	2	3
TYPE OF LENGTH MEASUREMENT: 2	4	5	6	7	8	9
NUMBER SCALES/FISH: 1	0	1	2	3	4	5
# OF CARDS: 1	6	7	8	9	0	1

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Appendix A.3. Completed adult salmon AWL form (front side) and associated gum card when sampling 2 scales per fish.

Species: Coho Card No: 001A
 Locality: Karluk Esc.
 Stat. Code: 255-10-101-
 Sampling Date: Mo. 08 Day 29 Year 2000
 Gear: Weir / Trap
 Collector(s): Russell, Peterson, McCall
 Remarks: 2 scales / fish



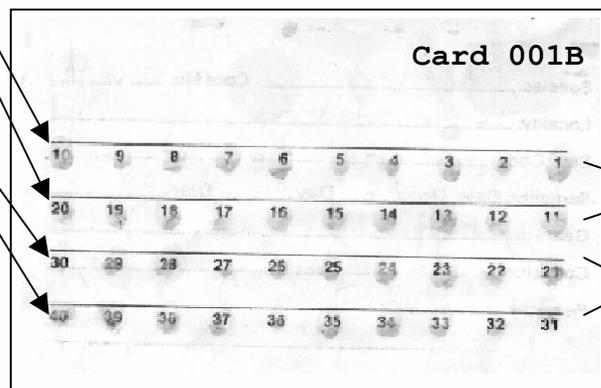
DESCRIPTION: Coho / Karluk / Esc. Samplers: Russell, Peterson, McCall ADF&G ADULT SALMON AGE-LENGTH FORM VERSION 2.1

CARD:	#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
001	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	11						
	12						
	13						
	14						
	15						
	16						
	17						
	18						
	19						
	20						
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	22						
	23						
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	27						
	28						
	29						
	30						
	31						
	32						
	33						
	34						
	35						
	36						
	37						
	38						
	39						
	40						

Left margin: DO NOT WRITE IN THIS MARGIN. 15430. DO NOT WRITE IN THIS AREA.

Form fields: CARD: 001, SPECIES: Coho, DAY: 29, MONTH: 08, YEAR: 2000, DISTRICT: 255, SUBDISTRICT: 10, STREAM: 101, LOCATION: 035, PERIOD: —, PROJECT: Esc., GEAR: Weir / Trap, MESH: —, TYPE OF LENGTH MEASUREMENT: 2, NUMBER SCALES/FISH: 2, # OF CARDS: 1.

Species: Coho Card No: 001B
 Locality: Karluk Esc.
 Stat. Code: 255-10-101-
 Sampling Date: Mo. 08 Day 29 Year 2000
 Gear: Weir / Trap
 Collector(s): Russell, Peterson, McCall
 Remarks: 2 scales / fish



Appendix A.4. Assigned port and weir location codes.

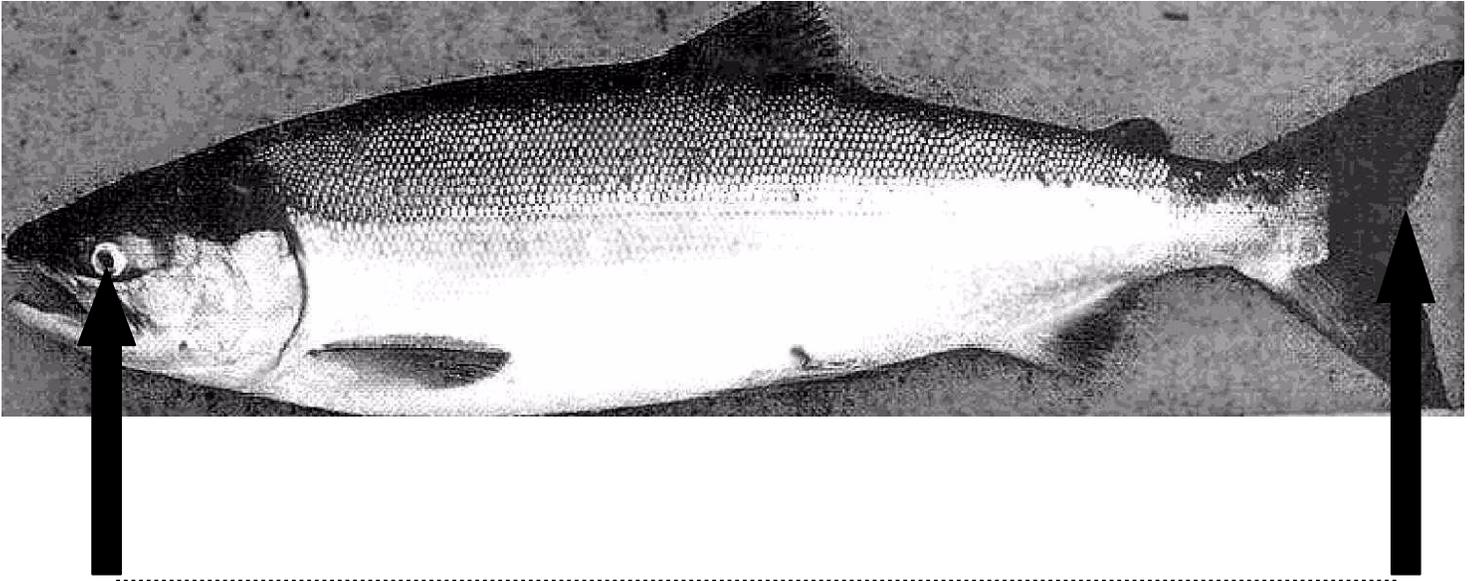
Port and Location Codes

029	Uganik
030	Lazy Bay
031	Port of Kodiak
032	Pauls Lake
033	Thorsheim
034	Afognak River
035	Karluk River
036	Ayakulik (Red River)
037	Upper Station
038	Frazer Lake
039	Dog Salmon
040	Akalura River
041	Uganik River
042	Malina Creek
043	Portage Lake
044	Foul Bay (FBTHA)
045	Larsen Bay
046	Spiridon (SLTHA)
047	Little Kitoi
048	Waterfall Bay (WBTHA)
049	Little River
050	King Cove
051	Port Moller
052	Dutch Harbor
053	Akutan
054	Sand Point
055	Bear River
056	Nelson River
057	Canoe Bay
058	Ilnik Lagoon
059	Orzinski River
060	Sandy River
061	Thin Point Lagoon
062	Middle Lagoon
070	Black Lake
071	Chignik Weir
072	Chignik (Processing facilities)

Appendix A.5. Sampling weeks and associated calendar dates, 2004.

Week	Calendar Dates	Week	Calendar Dates
10	1-Mar - 7-Mar	28	5-Jul - 11-Jul
11	8-Mar - 14-Mar	29	12-Jul - 18-Jul
12	15-Mar - 21-Mar	30	19-Jul - 25-Jul
13	22-Mar - 28-Mar	31	26-Jul - 1-Aug
14	29-Mar - 4-Apr	32	2-Aug - 8-Aug
15	5-Apr - 11-Apr	33	9-Aug - 15-Aug
16	12-Apr - 18-Apr	34	16-Aug - 22-Aug
17	19-Apr - 25-Apr	35	23-Aug - 29-Aug
18	26-Apr - 2-May	36	30-Aug - 5-Sep
19	3-May - 9-May	37	6-Sep - 12-Sep
20	10-May - 16-May	38	13-Sep - 19-Sep
21	17-May - 23-May	39	20-Sep - 26-Sep
22	24-May - 30-May	40	27-Sep - 3-Oct
23	31-May - 6-Jun	41	4-Oct - 10-Oct
24	7-Jun - 13-Jun	42	11-Oct - 17-Oct
25	14-Jun - 20-Jun	43	18-Oct - 24-Oct
26	21-Jun - 27-Jun	44	25-Oct - 31-Oct
27	28-Jun - 4-Jul	45	1-Nov - 7-Nov

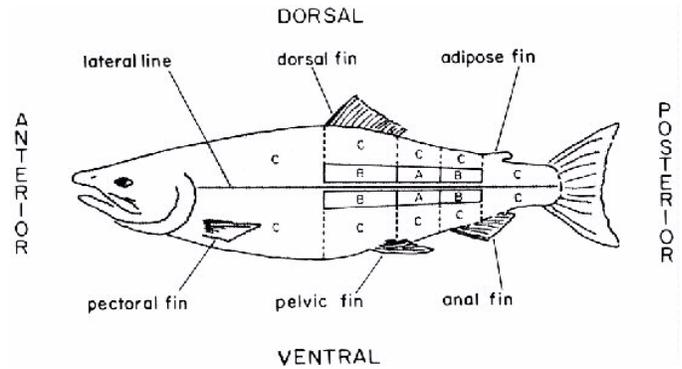
Appendix A.6. Measuring fish length from mid eye to tail fork.



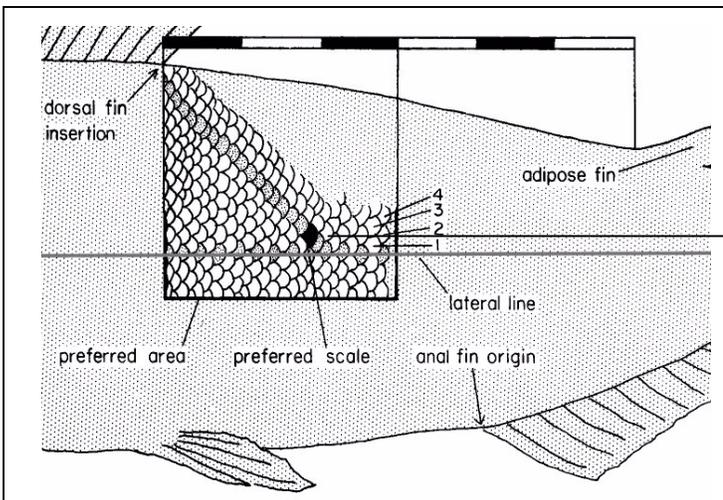
Adult salmon length is measured from mid eye to tail fork because the shape of the salmon's snout changes as it approaches sexual maturity. The procedure for measuring by this method is as follows.

- 1) Place the salmon flat on its right side (on the measuring board) with its head to your left and the dorsal fin away from you.
- 2) Slide the fish in place so that the middle of the eye is in line with the edge of the meter stick and hold the head in place with your left hand.
- 3) Flatten and spread the tail against the board with your right hand.
- 4) Read and record the mid eye to tail fork length to the nearest millimeter.

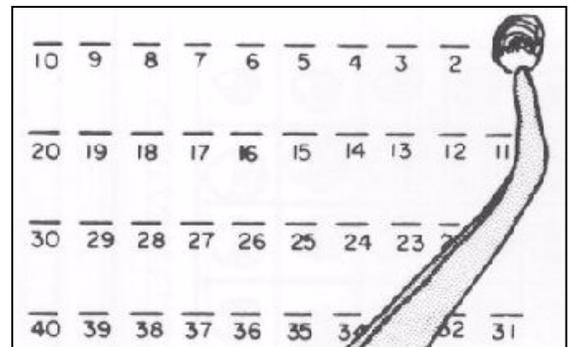
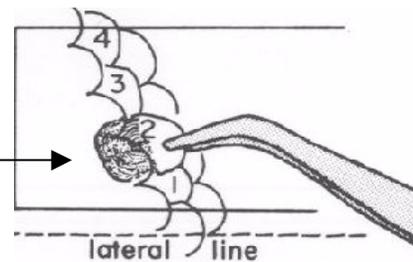
Appendix A.7. Removal and mounting of the preferred salmon scale.



INPFC rated areas for scale removal. Area A is the preferred area. If scales on the left side are missing, try the right side. Area B is the second choice if there are no scales in area A on either side of the fish. Area C designates non preferred areas.

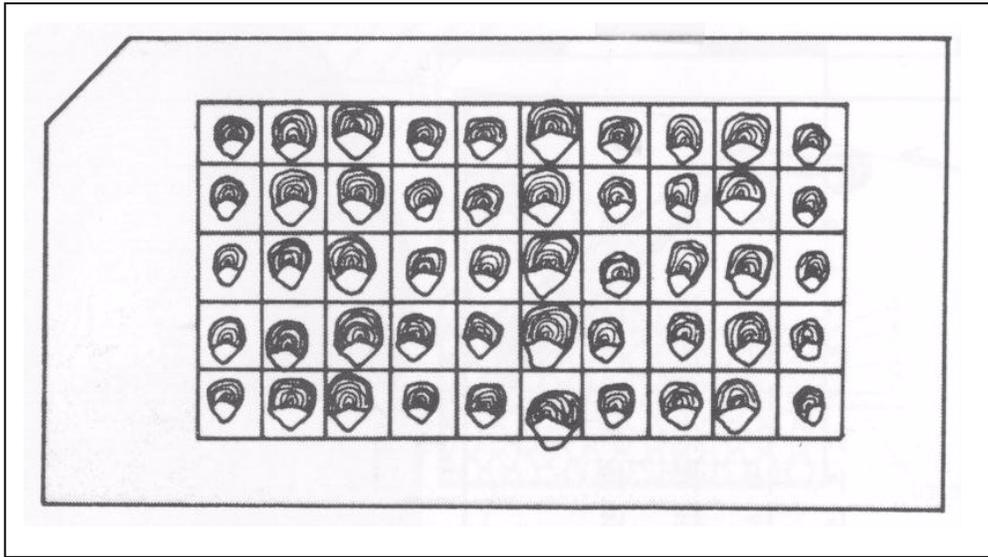


Do not turn scale over.

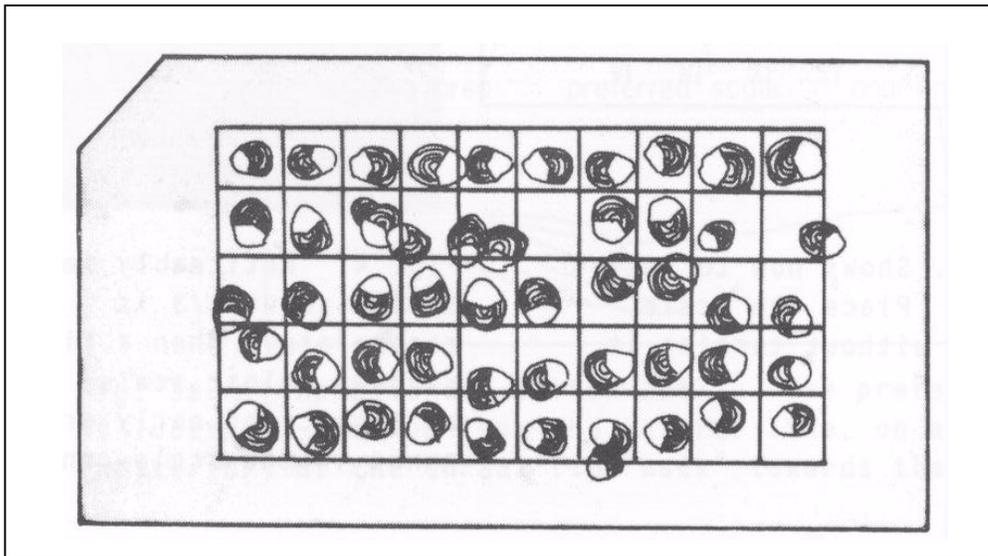


The preferred scale in this diagram is solid black. It is located 2 rows up from the lateral line, on a diagonal from the insertion (posterior) of the dorsal fin “back” toward the origin of the anal fin.

Appendix A.8. Scale orientation on the salmon scale gum card.



The scales are all correctly oriented on the card in the same direction, with the anterior portion of the scale pointed toward the top of the card and the posterior portion (which is that portion of the scale held in the forceps) pointed toward the bottom of the card.



The scales are incorrectly oriented in different directions. This increases the time spent to age samples.

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KODIAK MANAGEMENT AREA SALMON ESCAPEMENT SAMPLING
OPERATIONAL PLAN, 2004



By

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May 2004

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INTRODUCTION

The Kodiak Management Area (KMA) encompasses the entire Kodiak Archipelago and that portion of the Alaska Peninsula draining into Shelikof Strait from Cape Douglas to Kilokak Rocks (Figure 1). The Kodiak archipelago and Alaska Peninsula portions of the management area are each about 241 km in length and Shelikof Strait, separating the two, averages 48 km in width.

The KMA is composed of seven commercial salmon fishing districts and 56 sections, which include 440 streams supporting annual salmon spawning populations (Wadle 2004). The emphasis of the commercial salmon management program is to: (1) ensure sufficient salmon escapement, (2) prosecute orderly fisheries while maximizing harvest, and (3) adhere to the constraints of the management plans set forth by the Alaska Board of Fisheries (Brennan et al. *in press*). Five species of salmon are harvested within the KMA. The “targeted” escapement goals for KMA salmon are: 11 thousand to 18 thousand chinook *Oncorhynchus tshawytscha*, 1.3 million to 1.8 million sockeye *O. nerka*, 2.4 million to 6.0 million pink *O. gorbuscha* (even year), 55 thousand to 94 thousand coho *O. kisutch*, and 273 thousand to 819 thousand chum salmon *O. keta* (Nelson and Lloyd 2001). Directed commercial fisheries occur on sockeye, pink, coho, and chum salmon, whereas chinook salmon are not targeted. To open and close the fishery inseason, managers employ qualitative analysis of run timing, catch per unit effort (CPUE), species composition of commercial catch, regulatory management plans, aerial surveys, test fisheries, and estimates of salmon build-up and escapement (daily weir counts).

Weirs provide the primary mode of enumeration for virtually all chinook salmon and a majority of the sockeye salmon escapements into area streams (Wadle 2004). In addition to escapement counts, aerial and skiff surveys are conducted on area streams for indexing pink, chum, and coho salmon escapements (Brennan et al. *in press*). Annually, the Alaska Department of Fish and Game (ADF&G), Division of Commercial Fisheries, samples sockeye salmon escapements from major and minor systems (Table 1) for biological characteristics (age, length, and sex). These samples provide the foundation for preseason run forecasts, escapement goal evaluation, and accurate assignment of the run to stock of origin (run reconstruction). As the demand on KMA salmon resource increases, so does the intrinsic value of these data. Therefore, it is imperative that all data collected be of the highest quality possible.

GOAL

The goal of this project is to provide age, length, and sex (ALS) composition data from the KMA sockeye salmon escapements to assist with the long-term management of the KMA salmon runs.

OBJECTIVES

The main objectives are to provide specific data, derived from sampling of the KMA salmon escapement, that will facilitate:

1. Estimation of the age (scales), length, and sex composition of sockeye salmon escapements into five major and seven minor systems in the KMA.
2. Construction of accurate brood tables.
3. Development of accurate run forecasts.
4. Evaluation of escapement goals and run timing.
5. Addressing mixed stock fishery issues and annual run reconstruction projects through scale pattern analysis (SPA).

TASK

Collect representative samples of scales (for age determination and SPA), length, and sex from escapement into five major and seven minor sockeye salmon systems within the KMA.

SUPERVISION

Westward Region finfish research biologist Mark Witteveen will act as overall project leader and supervise inseason progress. KMA biologists will supervise escapement and terminal harvest area (THA) sampling crews (Table 1). The Kodiak catch sampling project biologist will monitor weekly escapement sampling and review incoming data for quality, quantity, and timeliness. A logbook will be maintained by the project biologist tracking weekly samples, and the weir crew leaders will be given periodic feedback regarding data quality.

PROCEDURES

The standard procedures for collecting and recording salmon age, length, and sex data are defined in Appendix A. The accuracy of the data and scale sample quality will be the responsibility of the field camp crew leader. Because it is essential that all samples be representative of the true escapement, bias will be avoided by NOT pre-selecting fish based upon size, sex, condition or any other factor. If questions or problems arise, the project biologist should be contacted immediately for clarification or assistance.

For the major sockeye salmon systems, weekly sockeye salmon escapement sampling for (ALS) will be conducted at Karluk River, Upper Station, and Ayakulik River weirs and Frazer Lake fish pass (Figure 1). Samples will be collected using a “Scott” six-panel adult salmon live box trap (Figure 2). Spiridon Lake sockeye salmon are harvested in Telrod Cove via a terminal commercial fishery; sampling of the commercial catch will be used in lieu of escapement to represent the run. Three 80 fish samples will be collected weekly (sample week) on alternating days (i.e., Monday, Wednesday, and Friday), to provide a better representation of weekly escapement (Table 1). The weekly minimum sample size is 240 fish (Thompson 1987). If escapement numbers decline and there is concern that the minimum sample size will not be achieved, adjustments in sampling efforts should be implemented so that the weekly goal of 240 is met. During 2004, the sampling week starts on Monday and ends on Sunday. Sampling weeks and corresponding calendar dates are listed in Appendix A.5.

The minor sockeye salmon systems will be sampled with reduced frequency (Table 1), and will be conducted at Malina Creek, Pauls Lake, Little Kitoi fish pass, Litnik, and Buskin River. The Foul Bay and Waterfall Bay THAs commercial catch will be sampled as well to represent the run. Sampling effort will be distributed throughout the season and proportional to escapement counts (i.e., peaks in sampling effort will occur during peaks of escapement).

All scales, when possible, will be collected from the preferred area of each fish following procedures outlined in INPFC (1963). Scales will be mounted on scale “gum” cards and impressions made on acetate/diacetate cards. Fish ages will be assigned by examining scale impressions for annual growth increments using a microfiche reader fitted with a 48X lens following designation criteria established by Mosher (1968). Ages will be recorded on sampling forms using European notation (Koo 1962) where a decimal separates the number of winters spent in fresh water (after emergence) from the number of winters spent in salt water. All data will be recorded on standard age-weight-length (AWL) data forms. AWL forms were digitally scanned and edited for errors.

DATA REPORTING

KMA weir crew leaders will notify Kevin Brennan, Dennis Gretsche, or Jeff Wadle, via Single Side Band (SSB) radio or satellite telephone, of weekly sampling results (i.e., did achieve or did not achieve the weekly sampling goal and why). Field camp personnel will send completed samples back to Kodiak on return grocery or mail flights. Packages should be clearly labeled to include: system, sample dates, and Attn: Matt Foster. The pilot should be instructed to call Fish and Game at 486-1857 for package pick-up.

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- Mosher, K. H. 1968. Photographic atlas of sockeye salmon scales. Bureau of the U.S. Fish and Wildlife Service. Fishery Bulletin 67(2):243-280.
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- Thompson, S. K. 1987. Sample size for estimating multinomial proportions. The American Statistician 41 (1):42-46.
- Wadle, J. A. 2004. Kodiak management area commercial salmon annual management report, 2002 Alaska Department of Fish and Game, Commercial Fisheries Division, Regional Information Report No. 4K04-01, Kodiak.

Table 1. Kodiak Management Area sockeye salmon escapement sampling schedule, 2004.

<i>System</i>				Date		Sample
Sample Location	Supervision	Statistical Area	Sampling Frequency	Starting	Ending	Size
<i>Major Systems</i>						
Spiridon Lake THA ^a	S. Schrof	254-50	daily	1-Jul	31-Aug	240 (weekly total)
Karluk River weir	J. Wadle	255-10-101	3 times per week	1-Jun	30-Sep	240 (weekly total)
Ayakulik River weir	D. Gretsches	256-15-201	3 times per week	1-Jun	1-Aug	240 (weekly total)
Upper Station weir	D. Gretsches	257-30-304	3 times per week	1-Jun	30-Sep	240 (weekly total)
Frazer Lake Fishpass	N. Sagalkin	257-40-403	3 times per week	15-Jun	30-Aug	240 (weekly total)
<i>Minor Systems</i>						
Malina Lake weir	R. Baer	251-12-105	Run-dependent	1-Jun	1-Jul	600 (season total)
Foul Bay THA ^a	R. Baer	251-41	Run-dependent	5-Jun	9-Jun	600 (season total)
Pauls Lake weir	R. Baer	251-85-831	Run-dependent	1-Jun	1-Jul	600 (season total)
Waterfall Bay THA ^a	R. Baer	251-84	Run-dependent	5-Jun	1-Jul	600 (season total)
Little Kitoi fish pass ^b	KRAA	252-32-323	Run-dependent	1-Jun	15-Aug	600 (season total)
Litnik (Afognak) weir	J. Wadle	252-34-342	Run-dependent	1-Jun	20-Jul	600 (season total)
Buskin River weir ^c	D. Tracy	259-21-211	3 times per week	20-May	15-Aug	653 (season total)

^a Terminal Harvest Area : terminal catch sampling will be done to represent the sockeye run.

^b Little Kitoi fish pass will be operated by Kodiak Regional Aquaculture Assoc. (ADF&G liason is R. Baer).

^c Buskin River weir is operated by ADF&G Division of Sport Fisheries. Escapement sampling is supplemented with subsistence harvest sampling.

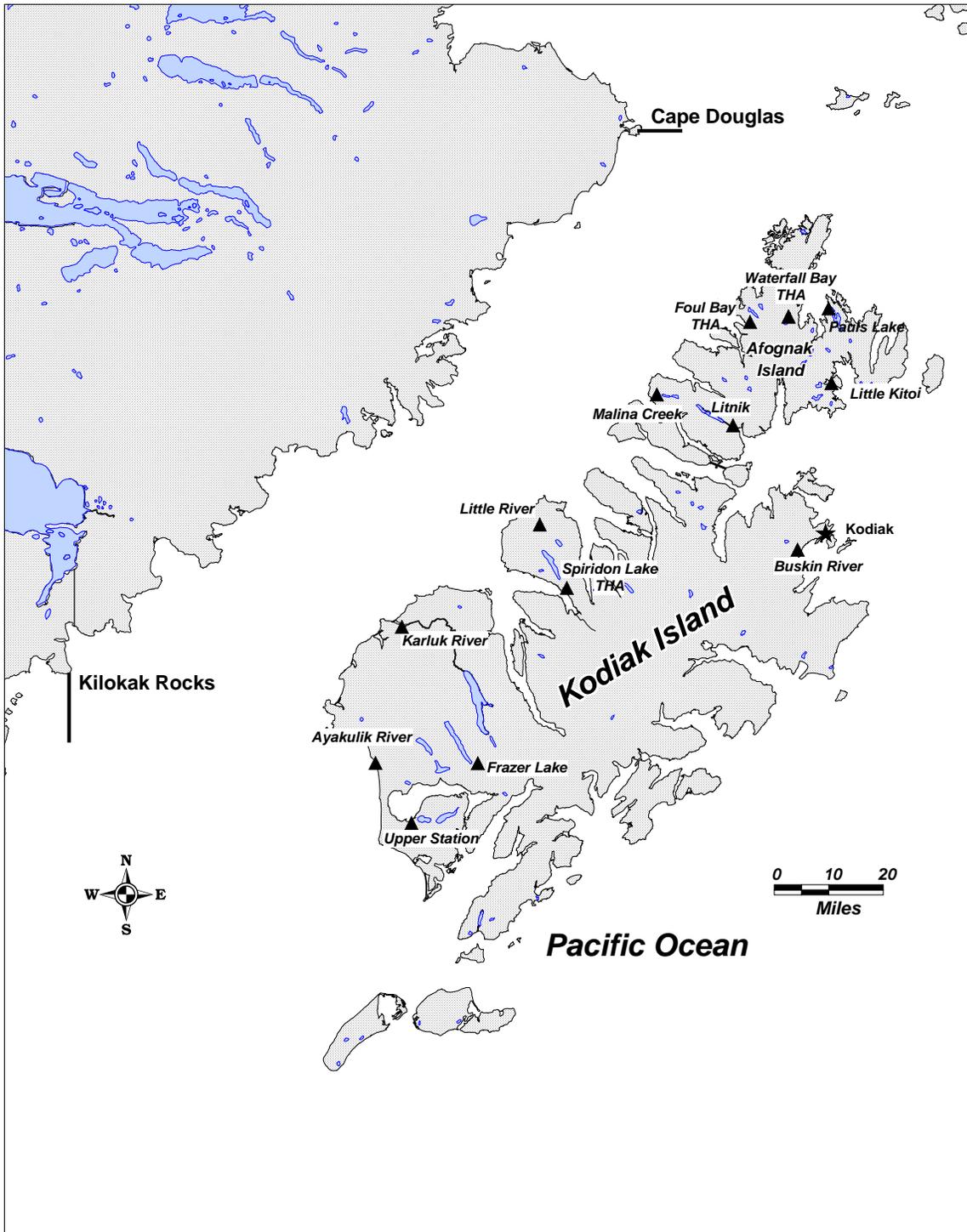


Figure 1. Salmon escapement sampling locations in the Kodiak Management Area, 2004.



Figure 2. The “Scott” six-panel adult salmon live box trap (photo taken at Upper Station weir).

APPENDIX

Appendix A.1. Procedure for sampling adult salmon for age, length, and sex.

Annually, salmon escapements and catches are sampled for age (scales), length, and sex by field crews throughout the state. 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 (AWL) optical scanning (opscan) forms neatly and accurately. In addition, scale samples must be collected and mounted properly to ensure accurate age determination. The following procedures are to be strictly adhered to when sampling adult salmon for age, length, and sex.

Procedures

COMPLETING THE OPSCAN AWL FORMS:

New **green** AWL forms have been developed which have Y2K date capabilities. Before transcribing any information, make sure the correct form is being used. The department no longer uses the outdated red or blue forms.

A completed AWL form and accompanying scale gum card for sampling sockeye salmon are shown in Appendix A.2. When collecting two scales per fish, as with coho salmon sampling, follow the procedure illustrated in Appendix A.3.

Complete each section on the left side of the AWL form using a No.2 pencil and darken the corresponding circles as shown in the figures. Make every effort to darken the entire circle as the optical scanner, which reads and records the data from the AWL forms, may not recognize partially filled circles. Label only one form at a time to avoid a "carbon paper effect" resulting in stray marks. Special care should be used to ensure that stray marks do not occur on either side of the AWL form. Stray marks and scuffed AWL forms can severely hamper scanning.

Fill out each of the following:

Description

Record the following: species/area/catch or escapement/gear type (if applicable)/samplers.

Card

The AWL forms and corresponding gum card(s) are numbered sequentially by date throughout the season starting with 001. A separate numbering sequence will be used for each species, district, and geographic location. Consult your crew leader for the current card number. Sockeye salmon scale samples will have only one gum card per AWL form as shown in Appendix A.2.

Species

Refer to the reverse side of the AWL form for the correct one-digit code (e.g., sockeye = 2).

-Continued-

Day, Month, Year

Escapement sampling: Use appropriate digits for the date the fish are sampled.

Catch sampling: Use the date the fish were caught. If this differs from the sample date, note the sample date in the top margin.

District

List all districts in which the fish were caught. Consult your area statistical map or project leader for the appropriate district. If more than one district is represented, darken the corresponding circles of the district representing most of the catch and note the other catch areas in the top margin.

Subdistrict (Section)

List all subdistricts in which the fish were caught. If the catch represents more than one section, list each section but do not darken the corresponding circles. Leave blank if the section is unknown.

Stream

Leave blank for catch sampling;

Consult area statistical map for the appropriate stream number when collecting escapement samples.

Location

List the appropriate code associated with the area the fish were sampled as shown in Appendix A.4. For example, if the fish were sampled in the Port of Kodiak, the location code would be 031.

Period

Escapement sampling: List the sample week in which the fish were sampled (Appendix A.5.).

Catch sampling: List the sample week in which the fish were caught. If this differs from the week the fish were sampled, note this in the top margin.

Project and Gear

Refer to the reverse side of the AWL form for the correct code. For example, escapement samples collected at a weir would have a project code of 3 and a gear code of 19.

Mesh

Leave blank unless specifically instructed by supervisor to do otherwise.

Type of length measurement

Refer to the reverse side of the AWL form for the correct code (e.g., mid eye to tail fork = 2).
Refer to Appendix A.6.

-Continued-

Number of scales per fish

Fill in the number of scales collected per fish. For sockeye, one scale per fish is collected unless otherwise instructed by supervisor.

of cards

of cards always = 1 (each AWL form has an individual and unique “litho code”).

If possible, keep the AWL form litho codes in numerical order throughout the season and keep all forms flat, dry, and clean. Fish gurry and water curling may cause data to be misinterpreted by the optical scanning machine. **It is the responsibility of the crew leader to make sure that all forms are carefully edited before returning them to their supervisor.**

SCALE GUM CARDS

A completed AWL form and accompanying gum card for sampling sockeye salmon are shown in Appendix A.2. When collecting two scales per fish, as with coho salmon sampling, follow the procedure illustrated in Appendix A.3. Be sure to fill out the gum cards in pencil as shown in Appendix A.2 and A.3.

Species

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

Locality

Escapement sampling: Include the weir site followed by “escapement” (e.g., Karluk River escapement).

Catch sampling: Include the area(s) where the fish were caught followed by “catch” (e.g., Uganik Bay catch).

Statistical Area Code

Fill in the appropriate digits from the AWL form. If catch samples are from a variety of statistical areas be sure to list each statistical area and approximate percentage from each (if available).

Sampling date

Escapement sampling: Fill in the date the fish were sampled.

Catch sampling: Fill in the date the fish were caught. The sample date, if different from the catch date, may be noted in “remarks”.

Gear

Write out completely. If catch samples include multiple gear types, be sure to list each gear and approximate percentage from each (if available).

Collector(s)

Record the last names of each person collecting the sample.

-Continued-

Remarks

Record any pertinent information such as the number of scales per fish sampled, processing facility where the sampling took place, vessel/tender name, etc. Be sure to transfer this information to the top margin of the AWL form.

SAMPLING PROCEDURE

1. Place the fish on its right side to sample the left side.
2. Determine the sex of the fish (escapement sampling only) and darken M or F in the sex columns. If any difficulty is encountered with this procedure, write "I had trouble sexing these fish" on the top margin of the AWL form and ask your supervisor for help as soon as possible before sexing additional fish.
3. Measure fish length in millimeters from mid eye to tail fork (escapement sampling only; Appendix A.6). Record length by blackening the appropriate column circles on the AWL form. Column 3 on the AWL form is used for fish with a length greater than 999 millimeters (Chinook). Measure all species of salmon to the nearest mm. When collecting length data, take care to ensure that each length corresponds to the appropriate scale mounted on the gum card, as length-at-age is evaluated for each sample.
4. Remove the "preferred scale" from the fish by grasping the scale's exposed posterior edge with forceps and pulling free (Appendix A.7). Remove all slime, grit, and skin from the scale (neoprene wristers work well for this). 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. If the preferred scale is missing, select a scale within the preferred area on the other side of the fish. If no scales are present in the preferred area on either side 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. Do not select a scale located on the lateral line.
5. It is important to take care that scales adhere to the gum card, rough side up. Therefore, without turning the forceps over, clean, moisten, and mount the scale on the gum card with your thumb or forefinger. Exert just enough pressure to spread and smooth the scales directly over the number as shown in Appendix A.7. The ridges on the sculptured side can be felt with a fingernail or forceps. Mount the scale with the anterior end oriented toward top of gum card. All scales should be correctly oriented on the card in the same direction (Appendix A.8.).
6. Repeat steps 1 through 4 for up to 40 fish on each AWL form.

-Continued-

7. When sampling at weirs you may use “Rite in the Rain”® books to record the data. Keep the AWL forms in camp where they will be clean, dry, and flat. After sampling is done for the day, transfer the data to the AWL forms. Each length, sex, and scale must correspond to a single fish! It is the responsibility of the crew leader to be sure the data has been transcribed correctly and the AWL forms filled out completely. Log books containing length and sex data should be returned to Matt Foster at the end of the season. These are considered raw data and need to be archived. If you choose to record raw data on tape, these tapes must be returned to Matt Foster.

SAMPLING CHECKLIST

OPERATIONAL PLAN	PENCILS (NO. 2)
GUM CARDS	FORCEPS
AWL FORMS (GREEN)	PLASTIC CARD HOLDERS
NEOPRENE WRISTERS	CLIPBOARD
MEASURING BOARD	LOG BOOK

SOME REMINDERS

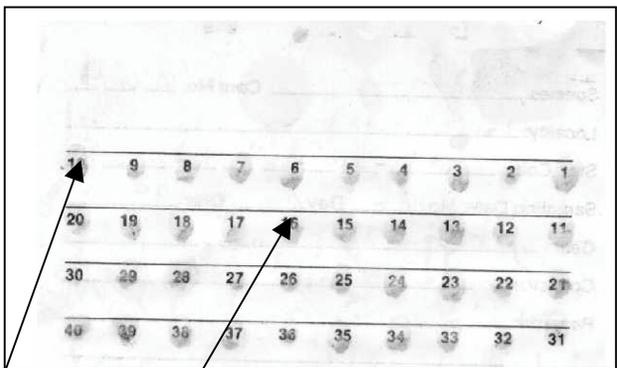
1. For greater efficiency in scale reading, mount scales with anterior end toward top of gum card.
2. AWL forms should be carefully edited. Remember to use the new AWL forms (green) as the red and blue forms are outdated. Re-check header information on AWL forms; make sure all available information is filled in. Take extra care to use the correct period code (sampling week) for the sampling or catch date. AWL form numbers should not be repeated; a frequent error is to begin a week's sample with the last AWL number used the week before. This is particularly important if the data is regularly sent to town; it is easy to forget which AWL form numbers were used. Crew leaders should take time to ensure that the circles are being blackened correctly. If the circles are sloppily marked, the optical scanner records the information incorrectly or misses it entirely.
3. Transfer important comments from the gum cards to the AWL forms. After pressing scales, the cards are seldom referred to again, and important remarks can be lost. Write comments in the top right margin. If there is not room on the AWL form to completely explain the remarks, use a separate piece of paper.

-Continued-

4. Never put data from different dates on one AWL form or one gum card. Even if only one scale is collected that day, begin a new AWL form and gum card the next day.
 5. If weights are taken, they may be noted in the right margin of the AWL form during sampling, but be sure to transfer the weights and litho code to the appropriate columns on the reverse of the AWL form before submitting it to your supervisor.
 6. Try to keep the litho codes (located in the left margin of the AWL form) in numerical order. This should not be hard to do if they are arranged that way before page numbering. When sampling different areas throughout the season, arrange the litho codes in order before each sample is taken.
 7. If AWL forms get wrinkled or splotted the data should be transcribed onto a new AWL form prior to sending in. The optical scanning computer will misread or reject torn or wrinkled sheets. Do not use paperclips on AWL forms.
 8. Be careful when collecting and mounting scales in wet conditions (rain, high humidity, etc.). If glue dries on top of the scale, it often obscures scale features, resulting in an unreadable scale. In addition, scales frequently adhere poorly to a wet gum card. Protect the cards and keep them dry to avoid having to remount the scales on a new card. If the cards get wet, try to dry them in a protected area or remount if necessary. Remember, use a pencil when filling out gum cards, because ink will come off during pressing.
 9. Visually scan all AWL forms for mistakes. A common error occurs, for instance, in placing both the 4 and 7 of a 475mm fish in the 100s column with nothing in the 10s column.
 10. Avoid accumulation of incomplete AWL forms. In previous years, there have been cases where individuals have completed several samples before transcribing the information on the AWL forms. This may lead to an increase in errors. After a sample has been completed, try to get the AWL forms filled out as soon as possible. This will ensure more accurate information, as any problems or abnormalities concerning the sample (e.g., many jacks in sample, many fish lacking preferred scale, number of scales do not match number of lengths recorded, etc.) will be fresh in your mind.
 11. Responsibility for accuracy lies first with the primary data collector(s) and finally with the crew leader. Sloppy or incomplete data forms or gum cards will be returned to individual collectors for correction.
-

Appendix A.2. Completed adult salmon AWL form (front side) and associated gum card.

Species: Sockeye Card No: 014
 Locality: Frazer Esc.
 Stat. Code: 257-40-403-
 Sampling Date: Mo. 06 Day 07 Year 2000
 Gear: Weir/Trap
 Collector(s): D. Roberts, C. Selby
 Remarks: _____



DESCRIPTION: Sockeye \ Frazer \ Esc. Samplers: Roberts, Selby ADF&G ADULT SALMON AGE-LENGTH FORM VERSION 2.1

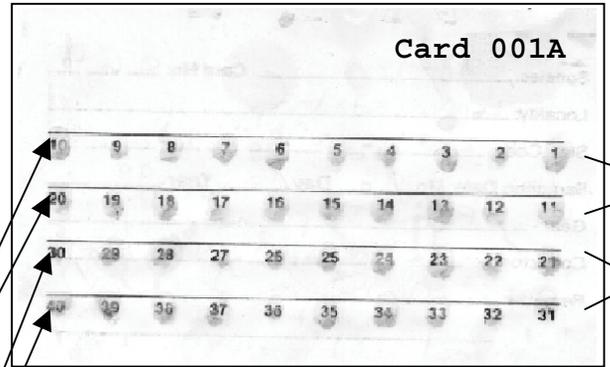
CARD:	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
014						
SPECIES: Sockeye						
DAY: 07						
MONTH: 06						
YEAR: 2000						
DISTRICT: 257						
SUBDISTRICT: 40						
STREAM: 403						
LOCATION: 038						
PERIOD: 24						
PROJECT: 3						
GEAR: 19						
MESH:						
TYPE OF LENGTH MEASUREMENT: 2						
NUMBER SCALEY FISH: 1						
# OF CARDS: 1						

15429

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Appendix A.3. Completed adult salmon AWL form (front side) and associated gum card when sampling 2 scales per fish.

Species: Coho Card No: 001A
 Locality: Karluk Esc.
 Stat. Code: 255-10-101-
 Sampling Date: Mo. 08 Day 29 Year 2000
 Gear: Weir/Trap
 Collector(s): Russell, Peterson, McCall
 Remarks: 2 scales / fish



DESCRIPTION: Coho / Karluk / Esc. Samplers: Russell, Peterson, McCall ADF&G ADULT SALMON AGE-LENGTH FORM VERSION 2.1

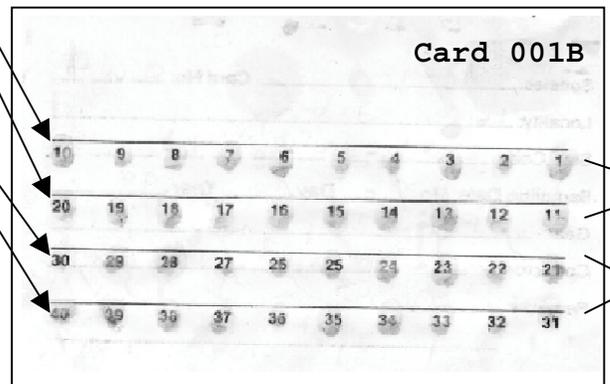
CARD:	#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
001	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	11						
	12						
	13						
	14						
	15						
	16						
	17						
	18						
	19						
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	30						
	31						
	32						
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	34						
	35						
	36						
	37						
	38						
	39						
	40						

DO NOT WRITE IN THIS MARGIN

15430

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Species: Coho Card No: 001B
 Locality: Karluk Esc.
 Stat. Code: 255-10-101-
 Sampling Date: Mo. 08 Day 29 Year 2000
 Gear: Weir/Trap
 Collector(s): Russell, Peterson, McCall
 Remarks: 2 scales / fish



Appendix A.4. Assigned port and weir location codes.

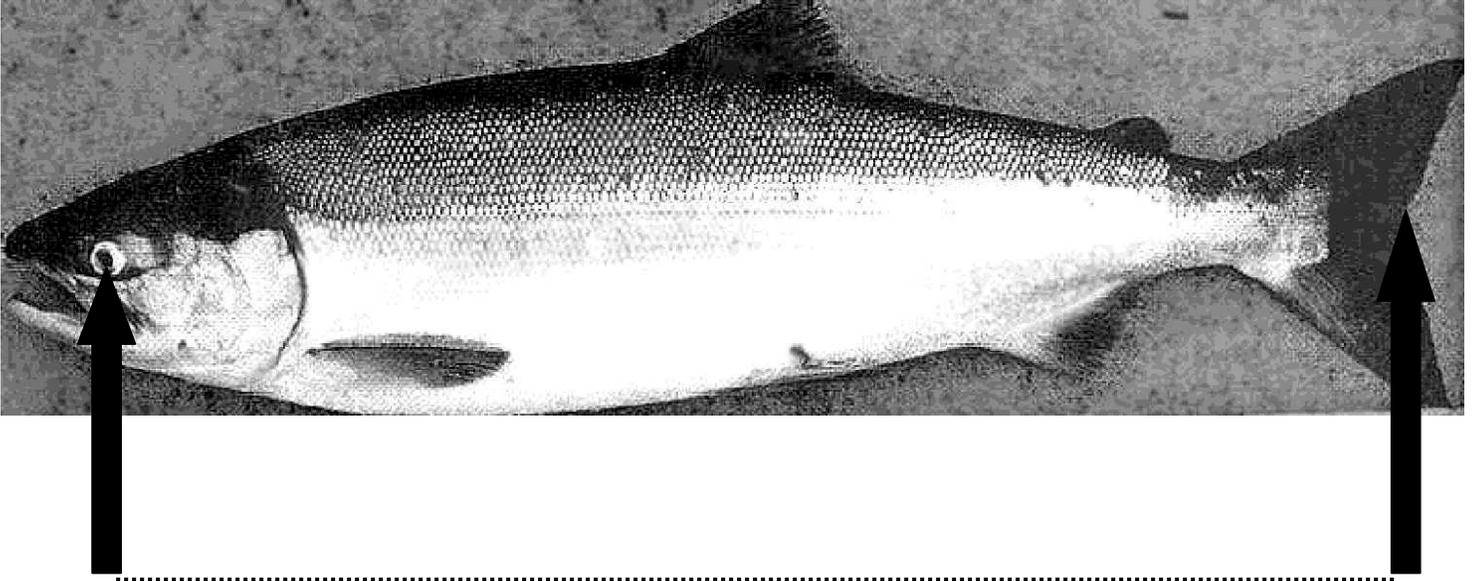
Port and Location Codes

029	Uganik
030	Lazy Bay
031	Port of Kodiak
032	Pauls Lake
033	Thorsheim
034	Afognak River
035	Karluk River
036	Ayakulik (Red River)
037	Upper Station
038	Frazer Lake
039	Dog Salmon
040	Akalura River
041	Uganik River
042	Malina Creek
043	Portage Lake
044	Foul Bay (FBTHA)
045	Larsen Bay
046	Spiridon (SLTHA)
047	Little Kitoi
048	Waterfall Bay (WBTHA)
049	Little River
050	King Cove
051	Port Moller
052	Dutch Harbor
053	Akutan
054	Sand Point
055	Bear River
056	Nelson River
057	Canoe Bay
058	Ilnik Lagoon
059	Orzinski River
060	Sandy River
061	Thin Point Lagoon
062	Middle Lagoon
070	Black Lake
071	Chignik Weir
072	Chignik (Processing facilities)

Appendix A.5. Sampling weeks and associated calendar dates, 2004.

Week	Calendar Dates	Week	Calendar Dates
10	1-Mar - 7-Mar	28	5-Jul - 11-Jul
11	8-Mar - 14-Mar	29	12-Jul - 18-Jul
12	15-Mar - 21-Mar	30	19-Jul - 25-Jul
13	22-Mar - 28-Mar	31	26-Jul - 1-Aug
14	29-Mar - 4-Apr	32	2-Aug - 8-Aug
15	5-Apr - 11-Apr	33	9-Aug - 15-Aug
16	12-Apr - 18-Apr	34	16-Aug - 22-Aug
17	19-Apr - 25-Apr	35	23-Aug - 29-Aug
18	26-Apr - 2-May	36	30-Aug - 5-Sep
19	3-May - 9-May	37	6-Sep - 12-Sep
20	10-May - 16-May	38	13-Sep - 19-Sep
21	17-May - 23-May	39	20-Sep - 26-Sep
22	24-May - 30-May	40	27-Sep - 3-Oct
23	31-May - 6-Jun	41	4-Oct - 10-Oct
24	7-Jun - 13-Jun	42	11-Oct - 17-Oct
25	14-Jun - 20-Jun	43	18-Oct - 24-Oct
26	21-Jun - 27-Jun	44	25-Oct - 31-Oct
27	28-Jun - 4-Jul	45	1-Nov - 7-Nov

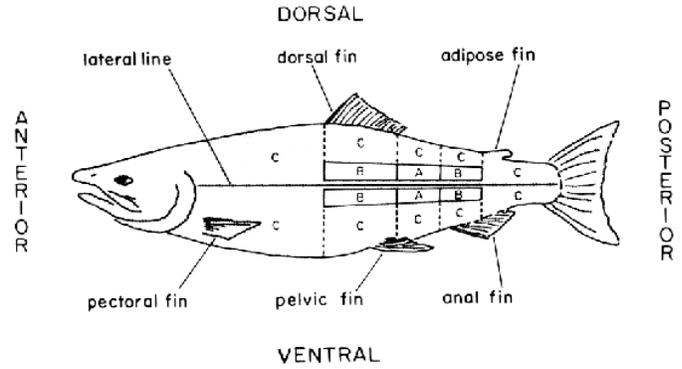
Appendix A.6. Measuring fish length from mid eye to tail fork.



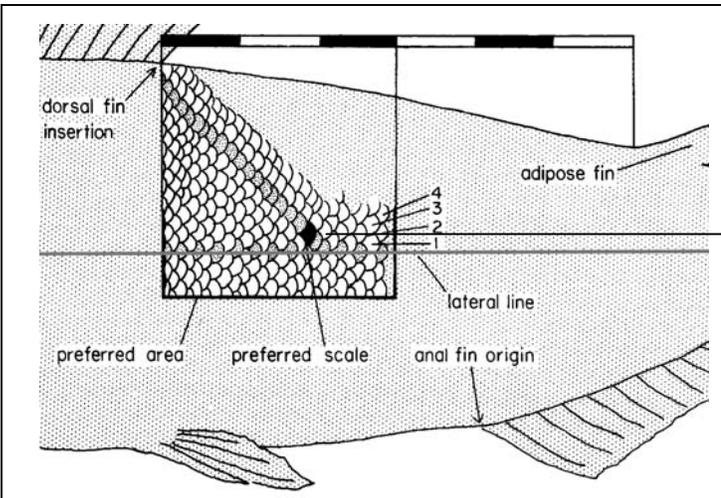
Adult salmon length is measured from mid eye to tail fork because the shape of the salmon's snout changes as it approaches sexual maturity. The procedure for measuring by this method is as follows.

- 1) Place the salmon flat on its right side (on the measuring board) with its head to your left and the dorsal fin away from you.
- 2) Slide the fish in place so that the middle of the eye is in line with the edge of the meter stick and hold the head in place with your left hand.
- 3) Flatten and spread the tail against the board with your right hand.
- 4) Read and record the mid eye to tail fork length to the nearest millimeter.

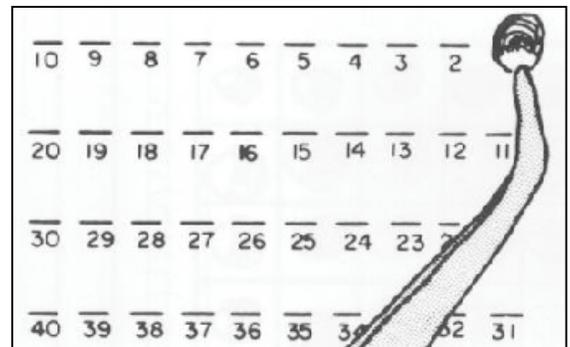
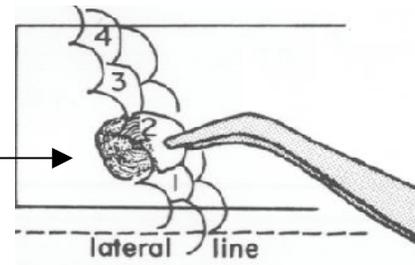
Appendix A.7. Removal and mounting of the preferred salmon scale.



INPFC rated areas for scale removal. Area A is the preferred area. If scales on the left side are missing, try the right side. Area B is the second choice if there are no scales in area A on either side of the fish. Area C designates non preferred areas.

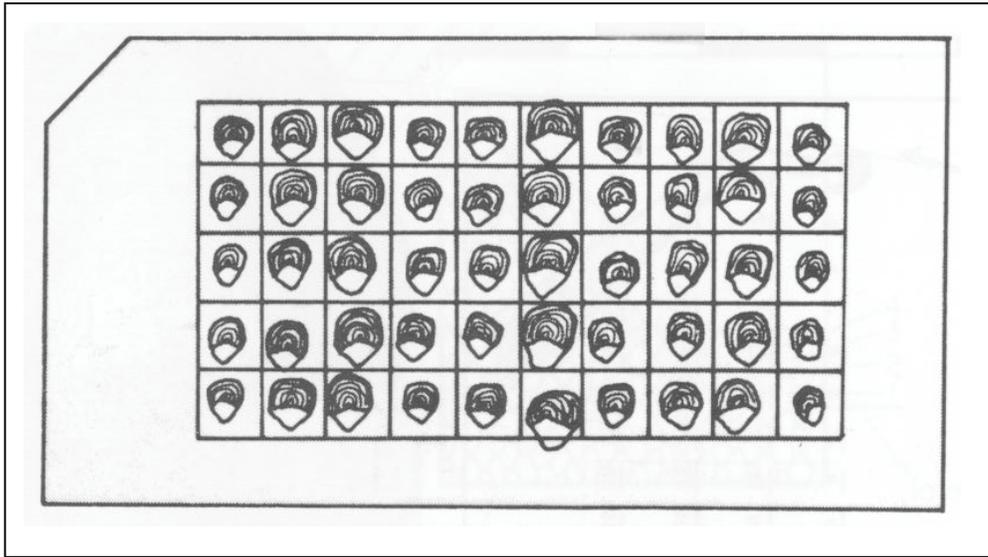


Do not turn scale over.

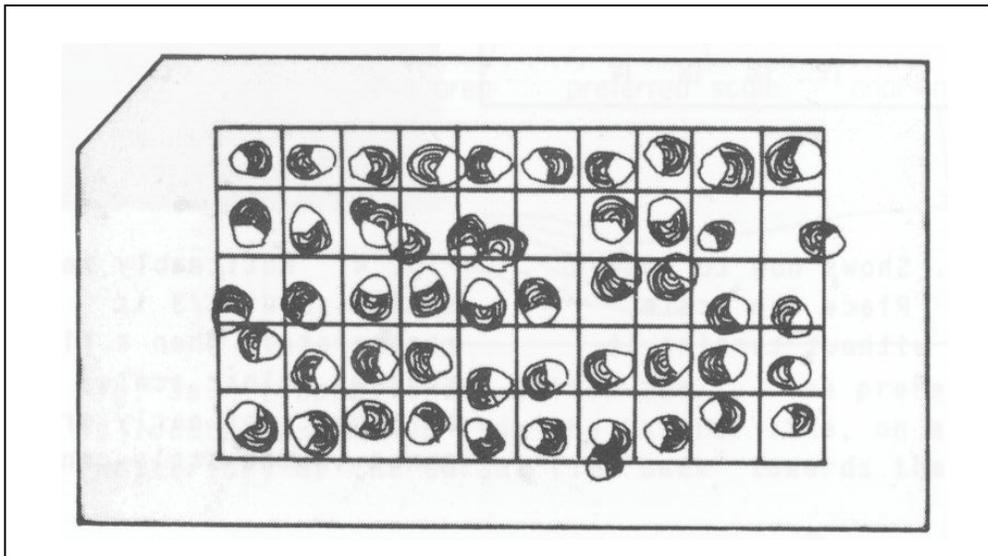


The preferred scale in this diagram is solid black. It is located 2 rows up from the lateral line, on a diagonal from the insertion (posterior) of the dorsal fin “back” toward the origin of the anal fin.

Appendix A.8. Scale orientation on the salmon scale gum card.



The scales are all correctly oriented on the card in the same direction, with the anterior portion of the scale pointed toward the top of the card and the posterior portion (which is that portion of the scale held in the forceps) pointed toward the bottom of the card.



The scales are incorrectly oriented in different directions. This increases the time spent to age samples.

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ALITAK BAY SOCKEYE SALMON TEST FISHERY
OPERATIONAL PLAN, 2004



By

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Division of Commercial Fisheries
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May 2004

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INTRODUCTION

Since 1986, the Alaska Department of Fish and Game (ADF&G) based in Kodiak has operated a set gillnet test fishery to assist in the management of the Alitak Bay District (ABD) commercial sockeye salmon *Oncorhynchus nerka* fishery (Figure 1). The objective of the test fishery has been to approximate the number of sockeye salmon transiting Olga Narrows into Olga Bay in advance of escapement counts at the Dog Salmon Creek and Upper Station weirs (Figure 2). This report outlines the history of the Alitak Bay test fishery and defines the test fishery project operational protocol for the 2004 season.

Sockeye Salmon Stocks

Frazer Lake (Dog Salmon Creek) and South Olga Lakes (Upper Station) are the two major sockeye salmon systems in Alitak Bay (Figure 2). The minor sockeye salmon systems in the bay are Akalura, Horse Marine, and Silver Salmon Lakes. All of these systems drain into Olga Bay. Between 1951 and 1971, sockeye salmon were introduced into Frazer Lake, which, due to a barrier falls, was barren of Pacific salmon (Blackett 1979). In 1962, a fish pass was constructed at the falls which permitted salmon to return to the lake to spawn. This resulted in a self-sustaining population that greatly increased the number of sockeye salmon bound for Olga Bay that were accessible for commercial harvest in the ABD.

Commercial Salmon Fishery

The ABD is one of seven commercial fishing districts within the Kodiak Management Area (KMA). The ABD is delimited by Low Cape on the southwest corner of Kodiak Island and Cape Trinity on the Aliulik Peninsula (Figure 1). Due, in part, to the success of the Frazer fish pass, the annual ABD sockeye salmon harvest has increased from an average of 104 thousand fish in the 1970s to 670 thousand fish in the 1980s, and up to 1.1 million fish during the 1990s. Sockeye salmon are harvested in the ABD using both gillnet and purse seine gear. Gear types are separated by fishing section. The district is divided into 10 fishing sections: The Cape Alitak and Humpy-Deadman Sections are open to purse seiners and the Alitak, Moser, and Olga Bay Sections are open to gillnetters (Figure 1). The remaining sections, Dog Salmon Flats, Inner and Outer Akalura, and Inner and Outer Upper Station Sections are closed to fishing unless they are opened, by emergency order, to minimize overescapement into a specific systems.

In the ABD, there are two principal early sockeye salmon runs. Migration timing for the South Olga Lakes (Upper Station) early run begins in late May and runs until mid-July. Frazer Lake migration begins in early June and runs until late July. Both runs greatly contribute to the economically important commercial salmon harvest in the district, which predominantly occurs during June and July. The Frazer Lake sockeye run is most influential because its run potential is four times that of the South Olga Lakes early run (Barrett 1988) and the Frazer Lake sockeye salmon escapement goal is almost six times that of the South Olga Lakes early run.

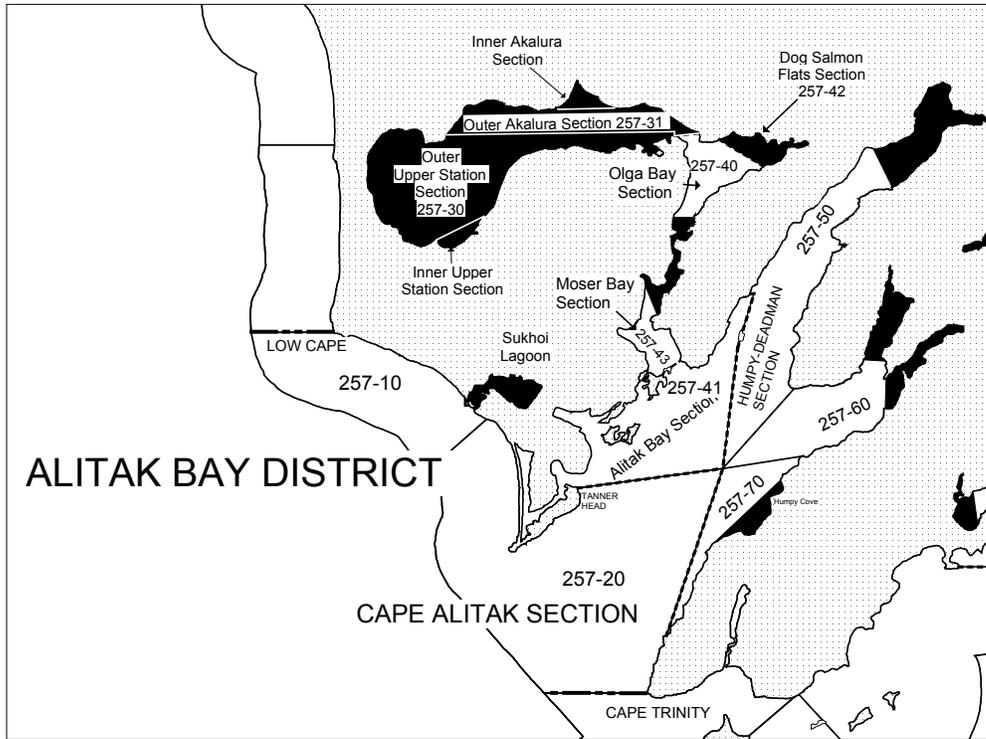


Figure 1. Kodiak Management Area Alitak Bay District commercial salmon fishing sections.

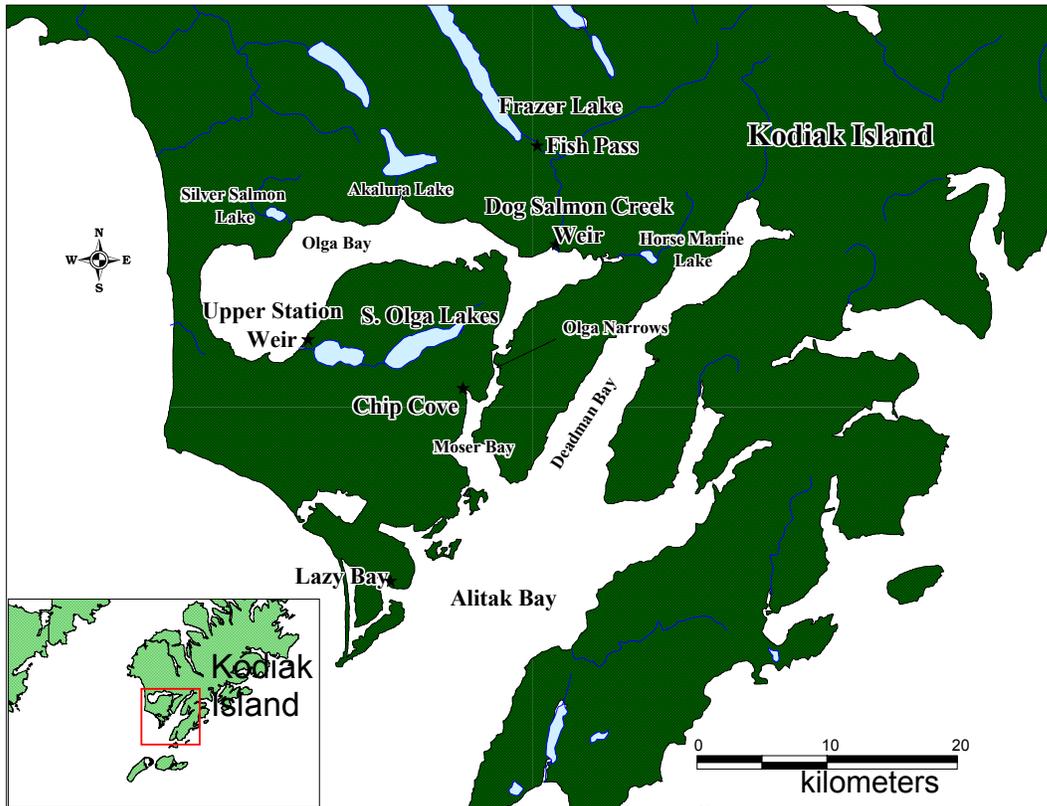


Figure 2 Alitak Bay sockeye salmon system, weir, test fishery, and processing facility (Lazy Bay) locations.

The ABD is currently managed under the guidelines set forth by the Alaska Board of Fisheries (BOF) in the Alitak Bay District Salmon Management Plan (5AAC 18.361). The ADF&G attempts to meet system-specific sockeye salmon escapement goals (interim objectives and overall goals) allowing harvest of fish surplus to escapement needs during the commercial fishery season (Brennan et al. 2002). From 5 June to 12 June, ADF&G opens short commercial fisheries (33 hours) in the Alitak Bay District to test the strength of the sockeye runs to local systems (Brennan 1998). From 13 June to 15 July, the Cape Alitak, Alitak Bay, Moser Bay, and Olga Bay Sections are managed based on sockeye salmon escapement at Dog Salmon Creek and Upper Station weirs. Except during the initial fishing period (5 June to 9 June), differential openings times will occur between sections:

- 1) Olga Bay—6:00 AM,
- 2) Moser Bay—NOON, and
- 3) Alitak Bay and Cape Alitak— 6:00 PM.

Alitak Bay Test Fishery

A reliable inseason run strength indicator for the ABD is necessary to ensure optimum escapement while maximizing harvest potential in traditional fishing sections. Prior to 1986, the inseason methods for assessing run strength included sockeye salmon escapement counts at the Dog Salmon Creek and Upper Station weirs, aerial surveys of escapement buildup on the Dog Salmon Flats, and the 9 June ABD commercial fishery sockeye salmon catch. This information was not always timely enough to ensure maximum harvest of surplus production in traditional fishing areas while achieving the of optimum escapement objectives. A vast majority of salmon that move through Olga Narrows eventually will be harvested in the Olga Bay commercial fishery or counted as escapement at the Dog Salmon Creek and Upper Station weirs; typically, however, this takes between two to six days (Foster 2003). Salmon bound for both South Olga Lakes and Frazer Lake occasionally mill on Dog Salmon Flats prior to stream migration (Sagalkin and Swanton 2000).

Currently, the ADF&G Alitak Bay test fishery located in Chip Cove at the mouth of Olga Narrows (Figure 2) is operated during June and July. This inseason indicator of sockeye salmon run strength is utilized in the management of the ABD (Wadle 2004). A three-hour set gillnet test fishery is performed daily surrounding the daylight high tide. The data gathered are in the form of catch per unit effort (CPUE) of sockeye salmon in the gillnet set (Appendix A). An inseason test fishery at Chip Cove, in conjunction with abundance indices from the ABD commercial fishery, provides a more timely and accurate gauge of the run strength and timing of the Frazer Lake and Upper Station early run sockeye salmon stocks.

Historical Background

The Alitak Bay sockeye salmon test fishery was initiated in 1986 with four different sites utilizing existing private set gillnet locations during commercial fishery closures. These sites included one in Deadman Bay, two in Moser Bay, and one in Alitak Bay. The test fishery sites were fished between

14 June and 6 July with 50 fathoms of multistrand monofilament gillnet. The catch at each site was summed to form a single day's index. Due to the logistics and monitoring of four different catch sites as well as standardizing fishing time, it was recommended that the test fishery be confined to one area (Barrett 1987). The test fishery was moved to Egg Island, at the mouth of Lazy Bay (Figure 2), in 1987 but the catches were insignificant.

In 1988, the test fishery was moved to the north side of Chip Cove at the mouth of Olga Narrows where it has remained since. The test fishery operated during the month of June only and was fished for two hours, one hour before and one hour after the high tide of the day. Starting in 1989, the test fishery set time was increased to 3 hours a day (1.5 hours before and 1.5 after the high tide of the day) and operated through the month of June, until 1991 when it was extended until mid-July.

Between 1991 and 1997, with the exception of 1995, the test fishery was conducted on a daily basis, regardless of commercial fishery openings. In an effort to subsidize the test fishery operation, fishing time during the 1997 season was extended until dark. A 1997 strike by the fishermen, in addition to the extended test fishery time, provoked criticism from local area fishermen about the value of the test fishery project (Sagalkin and Swanton 2000).

In response to public disapproval, the test fishery was reorganized for the 1998 season and returned to the 3-hour set during the daylight high tide. In addition, the test fishery was reduced to fishing only during commercial closures. In 1999, the test fishery operation was expanded to operate through the month of July though still only during commercial closures. Since 2000, the test fishery operation has remained relatively consistent. Starting on 27–29 May and going through 28–29 July, the test fishery operates, on average, at least six days a week. Normally, test fishery breaks are selected in conjunction with commercial fishery openings, when catch rates are extremely low and far more predictable. For the complete history of the test fishery research and modeling endeavors, refer to Foster (2003).

GOAL

The goal of the Alitak Bay test fishery is to provide data to aid in the Alaska Department of Fish and Game's (ADF&G) management of the Alitak Bay District commercial salmon fishery.

OBJECTIVES

The objectives of the Alitak Bay test fishery are:

1. Provide KMA management staff with a daily index of the strength and timing of the sockeye salmon migration into Olga Bay.
2. Estimate the age of the sockeye salmon caught in test fishery.

TASKS

The major tasks to be completed by the Alitak Bay test fishery crew are:

1. Open up the cabin in Alitak and prepare equipment for the test fishery season. Target date: 24 May.
2. Prepare test fishery staging area at Trap Point. Target date: 25 May.
3. Install test fishery setline. Target Date: 26 May.
4. Fish a 50 fathom set gillnet with 20 fathom lead three hours daily at high tide, during daylight hours at the Chip Cove test fishery site. Target Dates: 27 May–29 July.
5. Enumerate the salmon, by species, from the daily test fishery set and report data in a timely manner to the Kodiak ADF&G office
6. Sample the daily test fish catch for age by collecting scale samples.
7. Record the daily weather, observations and other physical parameters in conjunction with the test fishery.

PROCEDURES

Project Setup

After arrival in Lazy Bay (Alitak), open-up the ADF&G cabin. This property is leased from the cannery owners, thus the plant manager should be consulted prior to arriving. Disassemble the winterizing mechanisms (e.g., lavatory, water heater). Turn on the water valve to the electric water heater (filling the reservoir) prior to plugging the unit in.

The test fishery equipment is housed in the cannery web loft storage bin (miscellaneous equipment and pressure washer), the west cannery warehouse (gillnet, setlines, anchors, etc.), and the canning room (test fish skiff). Inventory the quantity and condition of gear and prepare for deployment. Schedule time with cannery personnel to assist in crane and forklift operations to mobilize the skiff and haul the gillnet equipment to the main dock. Obtain a fish tote and ice from the cannery to transport the test fishery catch.

Transport equipment from Alitak to the staging area on the north side of Trap Pt in Moser Bay. This property is also leased by ADF&G and the owner should be consulted before area preparation begins. Stage the diesel pressure washer and gillnet cleaning hardware above the tide line. Install freshwater pipe from reservoir to supply water for the pressure washer. Set up the single side band radio (SSB), satellite phone, solar panel charging system, spare tools, and other necessary gear at the north Trap Point hunter shack.

Transport the gillnet equipment to the test fishery location at Chip Cove. Install the test fishery setline as outlined in Appendix B. (*Alitak test fishery setline installation schematic and definitions*).

Test Fishery Protocol

Conduct test fishing at the Chip Cove site from 27 May through 29 July on the northeast side of Chip Cove in Moser Bay (Figure 1). Fish a 50-fathom, 4.75-inch stretch-mesh (tapered 43 to 53 mesh deep) set gillnet attached to a 20-fathom lead for a three-hour soak time. The strategy is to fish the high tide of the daylight hours. When two high tides occur during daylight hours, fish the high tide that is furthest from sunrise/sunset respective to the AM or PM high tide. Daily, commence fishing 1.5 hrs. before high tide and terminate 1.5 hrs. after high tide. Start deploying the gillnet exactly at the scheduled start time and begin pulling the net at the scheduled end time (3 hours later). The tides for the test fishery are determined using the tidal fluctuations for Moser Bay at Trap Point (Appendix C.).

At slack tide, 1.5 hours into the test fish set, make a visual check of the net and estimate the number of fish captured at that time. Quantify light levels in the water surrounding the test fishery with an electronic photometer. Just prior to the half-time check, record light readings (in kLux) at the end of the setline (between the tag-line buoys) from just above the surface (incidence), right below surface, and then at one meter intervals down to a depth of 5 meters. Record the data onto the *Alitak Bay test fishery water light level form* (Appendix D.1).

When the set is finished, enumerate and speciate all fish captured in the test fishery and release the non-salmon catch. When extracting the fish from the gillnet, note the orientation in the net to estimate the direction of travel when captured. Transfer all salmon to an ice-filled cannery tote and separate by gillnet orientation (i.e., eastbound and westbound). Collect scale samples from all sockeye salmon, using separate gum cards for eastbound and westbound salmon. The KMA Salmon Catch Sampling Operational Plan (Foster *in press*) contains specifics on sampling sockeye salmon.

In addition, record a tally of fish species, soak time (in minutes), meteorological data, and fishing conditions on the *Alitak Bay test fishery catch and conditions form* (Appendix D.2). Record number of eastbound/westbound sockeye salmon in the “comments” section. Note the number of marine mammals (e.g., harbor seal *Phoca vitulina*) in the vicinity of the gillnet. As soon as time permits, communicate sockeye salmon test fishery numbers to the Kodiak office via SSB or satellite phone. For the Marine Stewardship Council (MSC) certification, test fisheries are required to record bycatch; all fish species captured, released or not, will be logged.

After sampling the catch, properly ice the fish by breaking up hardened ice and redistributing to cover the fish with at least 1-inch of ice. Sell the test fishery catch to the processing facility in Lazy Bay or to tenders anchored in Moser or Olga Bay’s. Issue the fish ticket receipts to the State of Alaska, Department of Fish and Game, Division of Commercial Fisheries, Kodiak. Double-check date, pounds, number and retain and file all fish tickets in chronological order.

Maintenance and Safety

Maintain all equipment used for the test fishery project. After each test fishery set, clean the gillnet with the pressure washer and inspect and repair any damage to the net. Keep the skiff deck clean, organized, and free of debris for safety. Stow and secure all items in the skiff when traveling to and from Moser Bay. It is extremely important to strap down the fish tote when traveling in rough seas. Check the 115-horsepower outboard and spare 15-horsepower outboard daily for signs of abnormal operation. Carry spare spark plugs, propeller, fuel filter, four-stroke oil, and fuel in the skiff, as well as a tool kit, laminated navigational chart, VHF radio, first aid kit and emergency flares for safety. Maintain an orderly appearance of the ADF&G cabin at Lazy Bay and the test fishery staging area at Trap Point. The public frequently notices the condition of the field cabins and it is important for these camps to be maintained and presentable.

Wear United States Coast Guard approved personal flotation devices at all times on the water. Navigate the skiff between Moser Bay and Alitak with the proper regard, caution and respect for weather, seas, submerged objects, outboard engines, commercial fishers and gear, and your personal safety.

Safety is the highest priority of this project. State safety regulations and Standard Operating Procedures (SOPs) will be followed at all times. Employees are required to review and sign the following SOPs before beginning work:

- 111-700 Safety Policies and Standards;
- 111-720 Field Camp Safety;
- 111-730 Aircraft Safety for Passengers;
- 111-740 Boating Safety;

Work Schedule

Schedule all duties to be completed in a 7.5 hour day. Once the test fishery is operational, test fish every day unless the project biologist instructs otherwise. Typically days off from the test fishery are during extended commercial fishery openings. Complete, sign, and date timesheets and fax to the Kodiak office on the 15th and 30th of every month (in conjunction with the grocery orders). Under general conditions (non-emergencies) consult the project biologist before conducting overtime work.

REPORTING

Report test fish data, as soon as possible, to Kevin Brennan or Jeff Wadle in the Kodiak office via single side band radio (frequency 3.230 MHz) during the morning radio schedule (between 0800 and 0830 hours). The project biologist will fax standardized daily test fishery sockeye salmon catch per unit effort to the processing facility.

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APPENDIX

Appendix A. Daily estimates of catch per unit effort (CPUE) for the Alitak Bay Test Fishery at Chip Cove, 1988 to 2003.

Date	Year															
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
5/27	a	a	a	a	a	a	a	a	a	a	a	a	7	a	a	4
5/28	a	a	a	a	a	a	a	a	a	a	a	a	18	a	0	0
5/29	a	10	7	26	2	a	4	44	a	a	a	a	8	47	3	1
5/30	a	15	3	26	5	a	29	18	30	38	a	a	2	47	3	5
5/31	11	21	4	30	10	57	2	11	17	72	a	a	a	a	a	12
6/1	42	8	7	34	14	67	16	30	73	12	0	a	51	101	0	10
6/2	59	16	6	37	16	19	17	50	87	15	30	a	29	99	2	73
6/3	42	79	23	6	24	3	36	75	30	44	0	36	55	6	0	16
6/4	9	122	24	8	30	58	13	74	100	72	0	89	44	a	a	6
6/5	36	42	30	12	12	87	32	30	62	47	2	24	40	a	41	a
6/6	8	92	44	22	6	18	8	132	102	91	33	21	77	121	12	a
6/7	24	61	52	25	63	77	4	40	26	95	0	8	3	104	1	11
6/8	13	42	34	41	90	59	58	61	120	33	0	12	35	82	15	8
6/9	26	54	14	11	20	2	1	a	98	0	a	a	a	5	0	1
6/10	a	58	14	19	0	3	0	a	0	0	a	a	4	a	10	a
6/11	17	20	57	36	7	89	26	185	75	49	1	15	0	29	2	17
6/12	65	55	16	29	66	1	6	a	40	56	5	33	2	203	88	18
6/13	48	71	6	12	10	23	47	a	18	65	60	83	37	123	19	79
6/14	191	20	2	22	53	27	111	a	10	48	a	20	85	139	31	20
6/15	a	59	5	24	100	5	75	a	9	79	a	23	1	a	37	38
6/16	22	40	16	37	60	3	120	a	6	83	61	35	a	a	12	8
6/17	48	21	18	43	22	4	45	a	2	115	a	32	2	4	26	4
6/18	35	76	22	19	14	8	0	a	0	125	a	70	1	0	12	34
6/19	89	a	27	5	3	130	2	a	8	62	a	48	1	0	36	28
6/20	19	a	26	4	1	97	5	a	1	37	a	a	a	16	23	4
6/21	66	a	92	3	18	27	0	a	3	135	a	a	9	a	40	22
6/22	15	a	98	4	24	7	11	a	5	12	a	51	18	66	40	37
6/23	61	a	26	12	1	35	48	a	83	6	a	60	12	46	35	21
6/24	39	90	45	15	2	39	35	a	57	3	a	36	2	0	2	8
6/25	27	54	26	41	2	54	121	a	120	4	a	a	0	a	4	8
6/26	a	63	12	27	0	4	35	a	50	2	103	a	4	31	16	10
6/27	a	104	4	106	a	0	2	a	26	5	40	a	a	39	4	44
6/28	a	82	42	97	2	8	4	a	12	6	56	a	4	12	30	69
6/29	8	72	16	47	33	22	0	a	14	2	a	19	3	a	23	18
6/30	5	81	2	90	100	56	0	a	16	4	a	69	6	0	1	24
7/1	a	123	10	53	93	89	0	a	45	44	a	24	14	5	23	19
7/2	a	72	1	122	10	13	1	a	18	48	27	28	15	24	25	14

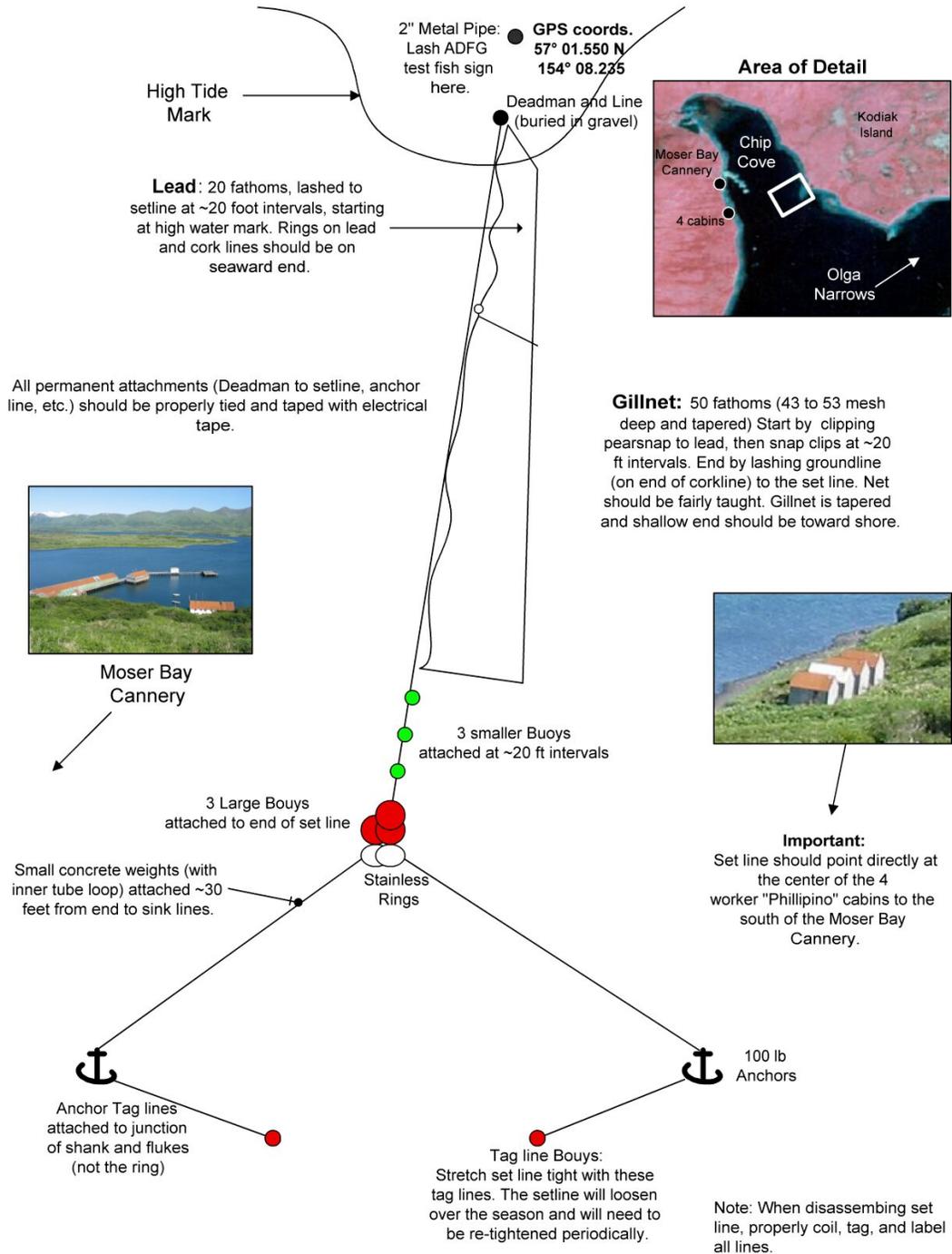
-Continued-

Appendix A. (page 2 of 2)

Date	Year															
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
7/3	^a	22	1	74	5	41	18	76	7	54	49	22	4	28	14	9
7/4	^a	18	1	40	10	31	17	89	^a	^a	43	53	7	17	^a	11
7/5	^a	48	3	46	0	5	114	52	84	89	^a	95	^a	^a	49	^a
7/6	^a	30	2	6	0	2	105	27	0	113	^a	29	0	3	16	50
7/7	^a	51	3	19	2	4	5	^a	0	105	^a	50	0	0	11	16
7/8	^a	28	2	17	1	2	1	^a	5	6	^a	64	0	0	18	34
7/9	^a	38	2	14	19	3	1	^a	0	0	^a	126	12	1	^a	43
7/10	^a	34	2	5	12	1	0	^a	0	15	^a	64	43	^a	3	4
7/11	^a	34	2	46	62	1	^a	^a	0	20	^a	84	35	0	1	17
7/12	^a	28	^a	2	72	1	^a	^a	1	120	^a	76	45	41	10	9
7/13	^a	15	^a	5	37	0	^a	^a	0	103	76	84	33	31	2	29
7/14	^a	^a	^a	2	27	0	^a	^a	0	64	78	69	2	57	4	^a
7/15	^a	^a	^a	3	6	1	^a	^a	2	4		54	^a	1	4	^a
7/16	^a	56	1	5	4	8										
7/17	^a	35	20	^a	2	^a										
7/18	^a	56	14	1	6	1										
7/19	^a	66	65	^a	0	25										
7/20	^a	71	1	6	0	19										
7/21	^a	89	1	42	8	24										
7/22	^a	2	26	4	^a											
7/23	^a	8	2	^a												
7/24	^a	10	2	2	10	0										
7/25	^a	83	49	^a	1	0										
7/26	^a	72	27	53	3	^a										
7/27	^a	42	22	8	12											
7/28	^a	4	14	4	9											
7/29	^a	45	^a	9												
7/30	^a															
7/31	^a															
Total	1,023	2,068	846	1,425	1,166	1,285	1,175	993	1,463	2,202	664	2,244	990	1,751	800	1,020

^a Test Fishery not conducted.

Appendix B. Alitak Bay test fishery setline installation schematic and definitions.



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FRAZER LAKE
OPERATIONAL PLAN, 2004



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May 2004

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INTRODUCTION

Frazer Lake is located on the southern end of Kodiak Island and is the second largest lake within the Kodiak Archipelago. Frazer Lake is 14.2 km long, 1.6 km wide, with a surface area of 16.1 km² (Figure 1). Dog Salmon Creek is the outlet to Frazer Lake and drains into Olga Bay. Prior to 1951, Frazer Lake was void of sockeye salmon *Oncorhynchus nerka* because of a 10-meter barrier falls, which prohibited anadromous fish from entering the lake (Russell 1972). Egg, fry, and adult transplants (1951-1971) from sockeye salmon systems on Kodiak Island (Karluk and Red Lakes) and the Alaska Peninsula (Becharof Lake) established a sockeye salmon run with adults returning for the first time in 1956 (Russell 1972). From 1956-1961, returning adults were backpacked around the falls and, in 1962, a fish pass was constructed to provide access to the lake environment. A second fish pass was installed in 1979, allowing for increased fish passage during peak emigration periods.

In 1983, a weir was installed on Dog Salmon Creek, located 0.7 km upstream from lower Olga Bay. The purpose for the Dog Salmon weir was to provide more timely sockeye, chum *O. keta*, and pink salmon *O. gorbuscha* escapement counts to more effectively manage the commercial fishery.

Conservative fishery management practices have been very successful at building the Frazer Lake run from 25,000 sockeye salmon in 1971 to 645,739 fish in 1985. Blackett (1979) established an escapement goal range of 383,000 adults based upon limnological and spawning habitat calculations. Subsequent declines in smolt condition factor, and shifts in zooplankton size and community composition demonstrated by Kyle et al. (1988) prompted lowering of the escapement goal. In 1986 the escapement goal range was lowered to 200,000-275,000 adults; goals were lowered again to 140,000-200,000 in 1988 (Nelson and Lloyd 2001). Fertilizer (a mixture of nitrogen and phosphorous) was applied to the lake, from 1988-1992 in an attempt to increase survival of lake rearing sockeye salmon fry. This program was instituted in response to dramatic declines in smolt size resulting from high escapements into the lake that occurred during 1980-1982 and 1985.

The Frazer Lake sockeye salmon stock is now considered of major importance to the island-wide salmon fishery. Also, this introduced run provides for an enhanced food resource for the local Kodiak Island brown bear population, which has resulted in increases in bear densities along Frazer Lake and Dog Salmon Creek streams.

Since 1956, enumeration of adults and age and length sampling has been conducted at the Frazer Lake fish pass. Spawning ground surveys have been performed since 1964. Since 1985, smolt emigration timing and magnitude and zooplankton density and community composition have been measured (Sagalkin 1999; Sagalkin *in press*). This document provides a description of the current research conducted at Frazer Lake and specific methods used in data collection.

PROJECT OBJECTIVES

The Commercial Fisheries Division's goals for the Frazer Lake project are optimizing natural sockeye salmon production and collecting of data relevant to generating accurate preseason run forecasts and escapement goal evaluations. For 2004, specific objectives are:

1. Determine sockeye salmon smolt abundance, timing, and age composition.
2. Provide unobstructed and timely adult fish passage into Frazer Lake.
3. Determine escapement timing, magnitude, and spawner distribution of adult sockeye salmon.
4. Collect age, length, and sex (ALS) data from the adult sockeye salmon escapement, and age, weight, and length (AWL) data from the sockeye salmon smolt emigration.

SUPERVISION AND TRAINING

The project biologist is Nick Sagalkin (Fishery Biologist II), and a Fish and Wildlife Technician III will be the crew leader. The crew leader is responsible for scheduling daily work assignments, ensuring that collected data adheres to plan standards, and ensuring that safety is a priority. A brief chronology of assignments is presented in Table 1. More detail on crew leader and field crew responsibilities is presented in a later section (see 'Crew Leader Responsibilities').

SMOLT SAMPLING AND POPULATION ESTIMATION PROCEDURES

Objectives

1. Estimate the total number of emigrating sockeye salmon smolts by age from Frazer Lake.
2. Estimate sockeye salmon smolt age composition and average smolt length, weight, and condition factor.
3. Estimate the timing of the sockeye salmon smolt emigration by age class.

Tasks

1. Operate the inclined plane trap continuously throughout the sockeye salmon smolt emigration.
2. Count the daily catch by species noting the number of dyed and un-dyed sockeye salmon smolts.

3. Sample 40 sockeye salmon smolts per day, five days each week, for age, weight, and length throughout the emigration.
4. One day each week conduct a mark-recapture experiment to determine trap capture efficiency.

Trap Location, Setup, and Maintenance

Install a single incline plane trap (Todd 1994) approximately 100 m upstream of the fish pass diversion weir (identical location as used in 2003; Appendix A). Document the location of the trap in the river along with the dimensions of the trap leads in the form of a scale drawing with each dimension clearly labeled. If the trap is repositioned or lead material is added or deleted, notify the project biologist, and document the change in the comment section of the *Daily Smolt Catch Reporting Form* (Figure 2), and complete a new drawing. In addition, determine the new trap catch efficiency as soon as possible after modifications are made (trap efficiency is described in more detail in a later section).

Check the trap every 30 minutes, at a minimum, between sunset and sunrise. Increase the frequency of checking the trap when larger numbers of smolts are emigrating to prevent overcrowding. During daylight hours, one trap check every four hours is usually adequate. Make the last trap check at the conclusion of the smolt day (1200 hours). Although smolts generally emigrate in the evening hours, large numbers of smolts emigrated in 2003 in the mid-afternoon hours. **It is essential that the crew keep a close watch on the smolt trap to avoid significant mortality due to crowding.**

Species Identification and Quantification of Trap Catch

The preferred method of counting the trap catch is to individually count the fish by species while emptying the live box with a dip net. Record this number on the *Daily Smolt Catch Reporting Form* (Figure 2). The second method uses a catch-weight sampling procedure where the catch is transferred by dip net into a small mesh netted basket suspended over the creek from a hanging scale. The aggregate weight of the catch is then recorded, and the process is continued until the live box is emptied. Catch-weight data should be recorded on the *Catch-Weight Sampling Form* (Figure 3). During the catch-weight sampling process, samples are taken to determine species count by weight. This involves counting the number of fish by species from a known aggregate weight obtained using a hanging scale. Generally, sample every 10th dip net of fish for a species count by weight. **Only use the catch-weight method when there are large numbers of smolts being caught, and there is not enough time to count all the fish without incurring significant fish mortalities.** It should be noted in the comments section of the daily smolt reporting form when the catch-weight method is used. The daily total should be recorded on the *Sockeye Salmon Smolt Summary Form* (Figure 4).

Count and identify (to species) all of the catch. A species identification key is provided in Appendix B. Another helpful source is 'Field Identification of Coastal Salmonids' by Pollard et.

al. (1997). It is the responsibility of the crew leader to ensure that the crew use the keys to properly identify the catch.

Trap Efficiency

Once a week (or after a trap modification), estimate the trap efficiency by marking sockeye salmon smolts, releasing these smolts, and counting the number of recaptured smolts. Marking is accomplished using Bismark Brown Y (BBY) dye. The dyeing process can be stressful on sockeye salmon smolts, which is important to keep in mind at all times during the procedure. Minimizing unnecessary stress is the key in the dyeing process. Excessive handling (netting), elevated water temperature, and exposure to the dye are the primary stress factors. All of these factors can induce mortality alone, so if one or more of these are combined, significant mortality may occur. Time the process for the late afternoon or early evening (1900-2100 hours). Again, if modifications are made to the trap, that might affect trap efficiency, conduct a test as soon as possible. Follow these steps to minimize mortality:

1. **Collect 1,100 sockeye salmon smolts.** Collect sockeye salmon smolts once per week for the dye test, preferably on large emigration days. If you are unable to collect 1,100 smolts in a single night, you may need to collect fish over two days. Do not hold smolts for more than three consecutive nights when trying to collect the 1,100 for marking. **It is better to perform the test on a smaller number of fish than to hold fish for a longer duration.** A minimum of 300 smolts (250 for release and 50 for monitoring) should be used if an extended collection time is required. Record the time, water temperature, and number of smolts collected on the *Smolt Dye Release Form* (Figure 5).
2. **Setup dyeing station at release site.** Use the same release site location that was used in 2003 (consistent site since 1996; approximately ½ mile (0.8 km) upstream). Place a live box in the stream, preferably in a “pool” area, while marking smolts. Assemble other marking equipment: 30-gallon (113 l) garbage can or tote, BBY dye, supplemental oxygen (O₂ bottle, regulator, tubing, air stone), aerators, thermometer, and log book.
3. **Move smolts to release site.** Use three or more buckets to hold the smolts (approx. 200-250 smolts per bucket). Use an aerator (“bubbler” or supplemented oxygen) to aerate the water in each bucket and secure the lids with duct tape prior to transport. It is important to be efficient when moving the smolts to the release site. Record the water temperature from the live box and in the transport bucket prior to bringing the smolts to the release site.
4. **Dye and release smolts.** Upon reaching the release site, hold the smolts in a live box or tote anchored in the stream for a minimum of 30 minutes. Record the water temperature at the start of the recovery period and any mortality at the end of the recovery period. If the stream temperature is >8° C or there are obvious signs of stress, oxygenate the water using the portable aerators and/or oxygen bottle. For dyeing the smolts, use 1 gram of BBY dye per 8 gallons (30 liters) of water. Mix 15 gallons of water (56 l) and 1.9 g of dye in a 30-gallon container. Use an aerator and supplemental oxygen to maintain the oxygen level. Record the water temperature in the dye container. Using a dip net, place the smolts into the dye/water

mixture for 30 minutes. Keep the dye container (with the lid on) in the stream to maintain ambient water temperature and record any mortality that occurs. After the smolts are dyed, place them into the instream live box until release, which should occur between 2200 and 2300 hours. At the time of release, transfer only the healthy smolts to water filled buckets and release them evenly across the stream. Smolts that behave abnormally (e.g., gasping for air, erratic swimming, swimming on their side, or upside-down) should be discarded. Record the number of healthy smolts released, time of release, water temperatures, and other data on the *Smolt Dye Release Form* (Figure 5). Retain at least 100 healthy smolts in the instream live box (record the actual number on the *Smolt Dye Release Form*, Figure 5). To prevent bird or otter predation on retained smolts, make sure to anchor and cover the box securely. All sick and dead smolts should be placed in the river below the trap.

5. **Examine for marked smolts.** Following the release of dyed smolts, examine the smolt catch for marked fish until the day of the next test. The first day of smolt examination is the day of release. The last smolt examination should occur on the day of the next release at 1200 hours. Trap efficiency is measured by the number of marked fish recovered relative to the number released. Record mark recapture data on the *Daily Smolt Catch Reporting Form* (Figure 2), and summarize the data on the *Sockeye Salmon Smolt Summary Form* (Figure 4). Remember that the number of smolts examined in a day is the sum of marked and un-marked smolts caught that day. Daily smolt catch should equal the number examined minus the number marked because marked smolts were previously counted.

There might be occasions when all the smolts are not individually counted. These will be limited to the following: 1) too many smolts emigrating to safely count individually without incurring mortality (i.e., using catch-weight methods) or 2) a problem with the trap. If all fish are not examined, be sure to record it with an explanation in the comments section of the *Daily Smolt Catch Reporting Form* (Figure 2).

6. **Monitor the instream live box for smolt mortalities (delayed mortality experiment).** Once each evening for three days at approximately 1800 hours, count and remove any dead smolts in the instream live box. Attempt to do this quickly and without stressing the smolts unnecessarily. Record the number of dead smolts on the *Smolt Dye Release Form* (Figure 5). On the fourth day after initiating a dye test, release the dyed smolts remaining in the instream live box downstream of the trap.

Age, Weight, and Length Sampling

Sample 40 sockeye smolts per day for age, weight, and length, five days per week. If daily sampling objectives are being met, do not sample on Wednesday and Sunday. Specific procedures for collecting and recording the information is in Appendix C. Each sample should be taken from a single day's catch. Do not mix samples between days. If less than 40 fish are caught in a day, the sample size for that day will be the number of fish caught on that day. **Smolts primarily emigrate at night, so a single sampling day is the 24 hr. period from noon to noon and is identified by the calendar date corresponding to the first noon.**

Climate Data

Collect climate data every day at approximately 1800 hours. Record the information on the *Climate Observation Form*. These data include water and air temperatures (°C), stream height (cm), estimated percent cloud cover, barometric pressure, and wind direction and velocity (Figure 6). Measure stream height from a stream gauge in the stream in a location not directly affected by the trap, generally upstream a few meters.

Termination of Smolt Estimation

Remove the smolt trap at Frazer Lake at the end of the smolt emigration, which is expected to be approximately 30 June. The exact date for trap removal will be determined by the project biologist, Nick Sagalkin, based on trap catch rate performance compared to previous years and consultation with the field crew.

FISH PASS OPERATION AND ADULT SAMPLING

Objectives

1. Enumerate adult salmon escapement and estimate the adult sockeye salmon escapement by age class into Frazer Lake.
2. Estimate sockeye salmon average length and sex ratios by age class.
3. Monitor escapement quality with respect to numbers of net-marked and “jack” sockeye salmon.

Tasks

1. Operate the old fish pass continuously until a decision to close the fish pass is made by the project biologist.
2. Count the daily escapement by species, and record the number of net-marked and “jack” (less than 400 mm) sockeye salmon.
3. Sample 80 adult sockeye salmon three times per week for age, length, and sex.
4. Beginning in mid-July and extending through August conduct lake and stream surveys to document distribution and spawning abundance patterns.
5. Sample for zooplankton in Frazer Lake monthly from May through the termination of the project.

Fish Pass Procedures

Operate the old fish pass from approximately 15 June through 10 August; the starting date should minimize smolt passage through the fish pass. Begin operating the fish pass the day after sockeye salmon are first counted through Dog Salmon weir. Only use the ‘new fish pass’ after consulting with the project biologist. The new fish pass has not been used for fish passage since about 1986. Diversion weirs above and below the Frazer falls should be inspected daily for holes and cleaned when required. Specific instructions for fish pass maintenance and operation are provided in Appendix D. These steps prevent fish from escaping through the lower diversion weir, which has been a major problem in the past. All weir panels on the lower diversion weir should be wired tightly together at the base. Panels fit in a channel formed by two pieces of angle iron. This ‘groove’ may need to be cleaned out prior to installing the lower weir. All gaps between the weir panels greater than about 76 mm (1.5 inches) should be covered with perforated plate, and holes at the base of the weir should be blocked with sandbags or large rocks. This is important because fish that escape through the lower diversion weir become trapped at the base of the falls.

Count escapement through the fish pass to minimize emigration delay. Count escapement at least four times daily, and increase the frequency during the peak of the escapement. Record the individual counts by species using hand-held tally counters. Data should be recorded on the *Weekly Escapement Enumeration Form* (Figure 7). The sampling week for escapement counting and sampling extends from Monday to Sunday (statistical week; Appendix E).

Escapement Sampling

As in previous years, sample sockeye salmon adult escapement for ALS at a rate of 240 fish per statistical week. In general, collect 80 samples every other day of the statistical week. Ideally, collect 80 samples each Monday, Wednesday, and Friday; statistical weeks begin each Monday.

“Jack” salmon may behave differently than other age classes when they are migrating through the fish ladder. To counteract this apparent bias in sampling, obtain samples during different times of the day or after different periods of time have elapsed since opening the gate. However, randomizing the sample is important so that the sample is not biased towards “non-jacks”. Recording the number of “jacks” versus the number of “non-jacks” is important as these segregated counts will allow for the partial validation of this change in sampling design.

Stream and Lake Escapement Surveys

The primary objectives of lake and stream surveys are to document distribution and abundance of sockeye salmon within stream and lake shoal areas. Conduct surveys on spawning shoals of Linda and Midway Creeks at a minimum and other streams once per week from 15 July through 10 August (Appendix F). Streams should be surveyed to the upper limits of spawner distribution, and the number of live and dead fish recorded (Figure 8). Record stream mouth counts separately from actual stream counts. Observers will survey the rivers on foot and count live and dead

sockeye salmon using polarized glasses and tally counters. Check tally counters before surveys to ensure they are working properly. While conducting these surveys it has been found that using one person to count and the other as a guard against bears has been the approach that works best.

Zooplankton Sampling

Collect zooplankton samples from Frazer Lake once per month (15th of each month) starting mid-May. Sampling supplies will be provided by staff from the ADF&G Near Island Limnology Laboratory. Sampling locations are located at the southeast and northwest ends of the lake and will be marked with buoys (Figure 1). Sample zooplankton at each limnology station using a 0.2-m diameter, 153-micron mesh conical net. Before the tow is started, measure the station depth by lowering a weighted, metered line to the lake bottom. Check to make sure the collection basin and townet are clean of old tow sample contents or debris by rinsing with filtered water. Lower the townet down at a steady rate, so that the cod-end stays below the opening of the net, until the bottom of the net is ~1 meter from the lake bottom. Retrieve the net manually at a constant rate of ~0.5 m/sec., stopping when the rim of the net is just above the surface, slowly working the contents of the tow towards the collection basin. Wash the net down with filtered water from the squirt bottle, remove the collection basin from the net and pour the contents into a 125-ml poly bottle containing 12.5 ml (10% of volume) of buffered formalin. Rinse the remaining tow contents off the collection basin screen using the squirt bottle containing filtered water. Continue rinsing the collection basin, and pouring the sample contents into a poly bottle until full. Cap the bottle and invert the bottle a couple of times to mix the sample and the formalin. Make sure the bottle is labeled with lake, station, date, depth, and the lid sealed with electrical tape to prevent contents from leaking out. Place containers in ziploc bags as an added precaution.

CREW LEADER RESPONSIBILITIES

The crew leader is responsible for making sure that the crew read and understand the Department's **field safety policy** and sign **the EMPLOYEE SAFETY SOP VERIFICATION**. The crew leader should also make sure that these documents are secured by the project biologist prior to departing for the field. The crew leader is also responsible for the accuracy, completeness, and neatness of the collected data. While no single task is very complicated, there are many assignments. Make sure you are familiar with the operational plan and refer to it often; refer to Table 2 for a list of important tasks to remember.

Season Summary Report

The crew leader is responsible for writing a season summary report. The summary report will be a brief synopsis of the field season and include the following: (1) a chronology of sampling events and data collection, (2) problems incurred during the season including sampling and field camp operations, (3) suggestions for improvements/modifications to the enumeration and

sampling programs, (4) equipment/building supplies for the following field season, and (5) an accurate log of fuel and bottled oxygen consumption.

Daily Radio Schedule

Report daily and cumulative smolt catch, dye test information, and current trap efficiency at approximately 1300 hours on SSB frequency 3.230 MHz Monday through Friday and 1950 hours on Saturdays and Sundays. Record this information on the *Daily Smolt Radio Schedule Reporting Form* (Figure 9) and carefully edit prior to radio schedule. Use this same schedule to report adult fish passage through the fish ladder. An additional radio check will be scheduled at 0800 hours for management; this schedule will not be implemented until June. Radio schedules are very important and should be taken seriously. Failure to make radio schedule for two consecutive schedules will result in a flight to the camp to ensure the safety of the crew. Satellite phones are also available for emergency (**800-478-5555**) and communicating with the project biologist (907-486-1848; Appendix G).

Air Charters

Kodiak staff coordinates and schedules all air charters. Appropriate information regarding charters will be relayed through daily radio contact. It is important to properly label (name and phone numbers) and contact office personnel when any data, equipment, or other freight is “back hauled” to Kodiak.

Time Sheets and Leave

During the field season, crewmembers are responsible for keeping track of their working time. Time sheets will be provided and a template with the appropriate codes will be sent out for review. Recorded time on the time sheets will be ‘actual hours’ spent on the job. Obviously, there is a finite budget and a list of priorities. Complete tasks in their order of importance without accruing excessive overtime. Generally, most projects can be finished within normal working hours; however, there will be occasions when the normal working day (i.e., 7.5 hours/day) is insufficient to complete the necessary tasks. If unusual circumstances arise that necessitate extensive overtime, the project biologist should be notified immediately, except in or during emergency situations that jeopardize property or personnel.

During the field season, crewmembers have days off (not necessarily the weekend). The crew leader will decide when the crew will have normal working days off. During these normal working days off, crewmembers should realize that they are still ADF&G employees and their actions reflect on the department. Extended leave is not allowed during the field season; flights in and out of camps are too expensive and field staff is limited. Likewise, due to safety issues, staff should remain in the project vicinity during their day off.

Data Management

Crew leaders are responsible for recording all of the job activities and compiling biological data. Use pencil rather than pen for data entry. Complete data forms and a field log daily. Use Rite-in-rain logbooks while collecting data and then transfer data to forms after returning to the cabin. Use a number 2 pencil when filling in the AWL forms. Report all data to Kodiak staff via SSB radio, and send completed data forms to Kodiak as scheduled flights permit. Properly package and label data that is sent to Kodiak. Send a report of weekly project activities to the project biologist on scheduled flights.

Purchasing

During the field season, field crews will require additional items (e.g., groceries, fuel, or tools). Small lists may be read over the satellite phones during the scheduled radio meeting; however, these lists should be limited to just a few items. Remember that radio time is limited and there are a number of other camps region-wide that are using the same frequency. Longer lists of materials should be sent to town on supply flights. Blank grocery lists will be sent to the field and the crew leader should remember to send orders in advance to ensure the correct grocery order for the next supply flight. It should also be remembered that the Frazer Lake budget allocates \$20/day/person for groceries. Crew leaders should track grocery expenses and limit the number of requested specialty items. Similarly, planning should be made for fuel. Fuel is a necessity for many camp operations including heating the facility. However, past camps have left stoves on during the day while the crew was working outside unnecessarily burning fuel. These situations should be minimized.

Carbon Monoxide

Several years ago an employee working at a remote field camp was exposed to excessive levels of carbon monoxide from a non-vented kerosene heater. The employee became quite ill, was briefly hospitalized in Kodiak, and received oxygen therapy before recovering from the exposure.

The misuse and/or use of improperly maintained or aging equipment fueled by kerosene, diesel, or propane such as heaters, stoves, and refrigerators increase the danger for carbon monoxide poisoning. This is a serious issue because carbon monoxide gas can be fatal. Carbon monoxide is an invisible, odorless, tasteless gas produced when fossil fuels do not burn completely, or are exposed to heat (usually fire). Symptoms of carbon monoxide exposure include:

Mild Exposure-Slight headache, nausea, vomiting, fatigue (flu-like symptoms).

Medium Exposure-Throbbing headaches, drowsiness, confusion, poor judgment, dizziness, vertigo, fast heart rate.

Extreme Exposure-Convulsions, unconsciousness, heart and lung failure. Exposure to carbon monoxide can cause brain damage and death.

If you experience any of these symptoms and suspect carbon monoxide poisoning, immediately move into an area with fresh air flow and avoid all contact with the suspected source of carbon monoxide until symptoms dissipate, and contact the ADF&G office to notify them of the problem.

It is essential that all employees review operating instructions for all equipment, which burn wood, charcoal, oil, diesel gas, gasoline, kerosene, or propane. Crew leaders must inspect all equipment to assure each item is in good working order and, if applicable, is properly ventilated. As a safety precaution, each camp will be provided with a carbon monoxide detector. Please make sure the detector is located in a proper area and is in working order.

Camp Inventory and Close Up

Inventory the Frazer Lake camp for all gear prior to leaving. Include serial or ADF&G numbers along with the condition of each item in the inventory. Winterizing the cabin should include (but is not limited to): covering windows with plywood, covering propane connections, closing and locking all doors, winterizing the tractor (disconnecting battery, changing oil, and lubing grease fittings), and bringing the boat onshore in along with the mooring line. We have had problems with people getting into cabins over the winter. Make sure the cabin is secure with plywood and locks.

Photo Documentation

The crew leader is responsible for photo documenting project activities. It is important to photograph specific aspects such as trap installation, dye site, smolt sampling, adult sampling, fish pass operation, structural problems and remedies to the fish pass, and other detailed tasks. When possible ADF&G cameras and film will be used. If, however, ADF&G cameras are not available, film will be provided for use with personal cameras; in this case, the use of personal cameras is suggested, but not required. The department will pay for processing the film.

Visitors / Public Interaction

Frazer Lake gets many visitors, from day-use fishing and bear viewing to extended use through the refuge cabins or campers. Most of these visitors come by the camp because the falls and the weir attract bears for good bear viewing. Visitors also like to see the fish exiting the fish pass. Because of this contact, try to keep the camp clean and be courteous and helpful to visitors, but also inform them of boundaries. Be helpful when you can, but remember your primary role is to run the smolt and adult sockeye salmon research project.

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Table 1. Season summary of events.

Target Date	Event	Frequency
5/05-5/07	(2 days) Open camp	
5/07- 5/09	(2 days) Install smolt trap	
5/10-5/12	(2 days) Assemble and organize work platform, work lights, and dye release station.	
6/1-6/14	(2 weeks) repair and install lower diversion weir	
5/26-8/10	Camp and equipment maintenance	as needed
5/20-6/15	Fish pass maintenance	as needed
5/05--7/1	Sockeye smolt enumeration as necessary	Daily; sample 40/day 5 days/week; mark-recapture 1,000/week (if available).
5/10-8/15	Zooplankton sampling	Once per month
~6/15-8/10	Adult sockeye enumeration	Daily, ALS sample: 80/day 3 day/week (240 total/week).
7/15-8/10	Foot surveys	Linda and Midway Creeks (once a week).
~8/15	Close camp	

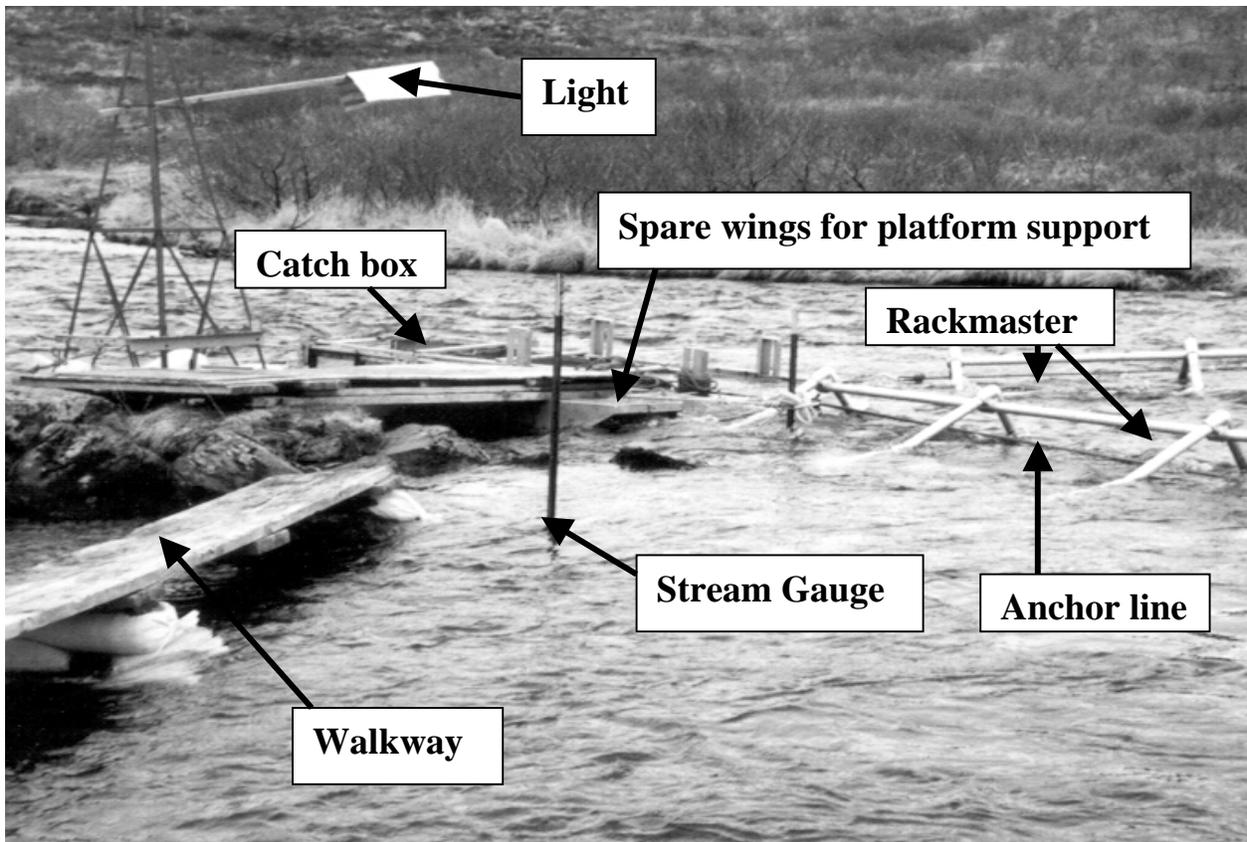
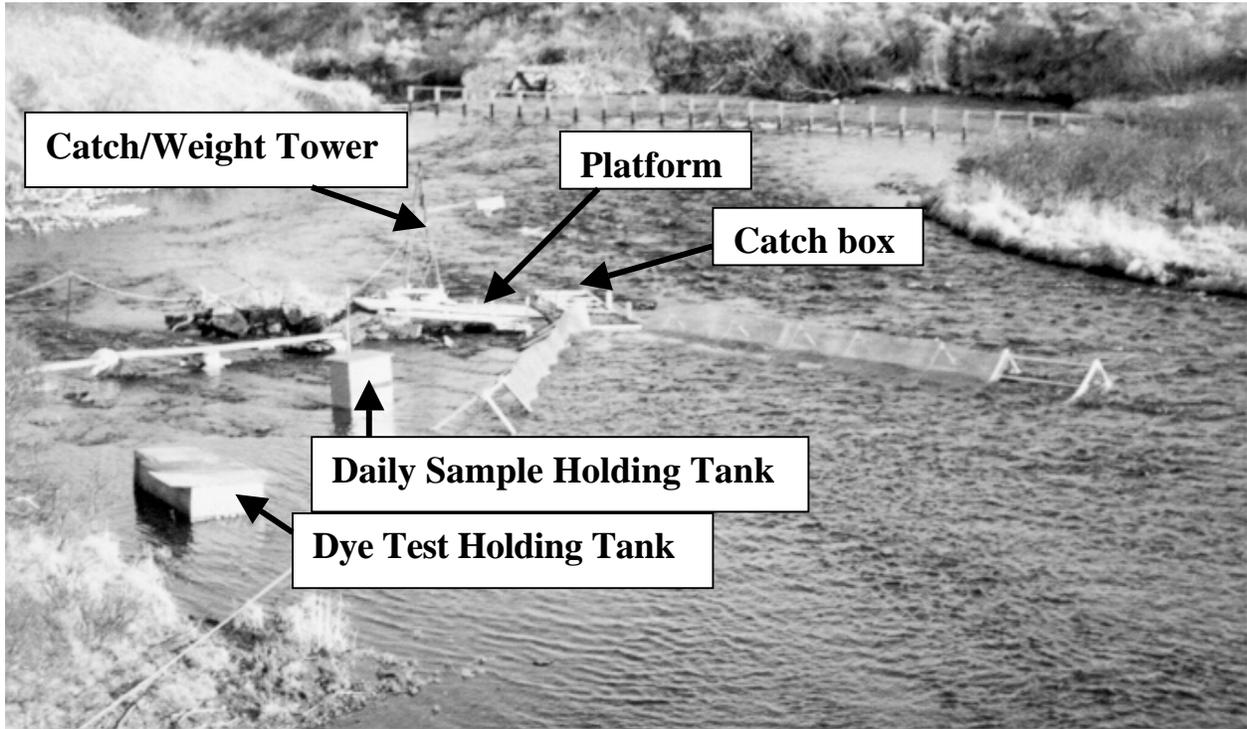
Table 2. Important tasks to remember.

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1. Data on forms should be complete. Be familiar with the forms and when and how to collect the data. All crew should be familiar with the proper data collection methods.
 2. Data should be collected as consistently as possible. For example, water temperature data should be collected at the same time and location each day.
 3. Remember to record use of all expendables because this is a necessary item for future planning, and it is also a requirement for the crew leader summary report.
 4. Remember to make scale drawings of the smolt trap, and photo document as many aspects of field and data collection as possible.
 5. A daily crew log is a valuable way to record observations that may not be apparent from the data sheets.
 6. Be familiar with the operational plan. The procedures used at Frazer Lake have many details, and it is important to be familiar with them.
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APPENDIX

Appendix A. Photos of the Frazer Lake smolt trap.



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

By

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ABSTRACT

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

INTRODUCTION

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

Five species of Pacific salmon (pink, chum, sockeye, chinook, and coho); four species of trout (cutthroat, brown, Dolly Varden, and rainbow or steelhead); and other juvenile and adult 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-

¹ Especially adult smelt, family Osmeridae.

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

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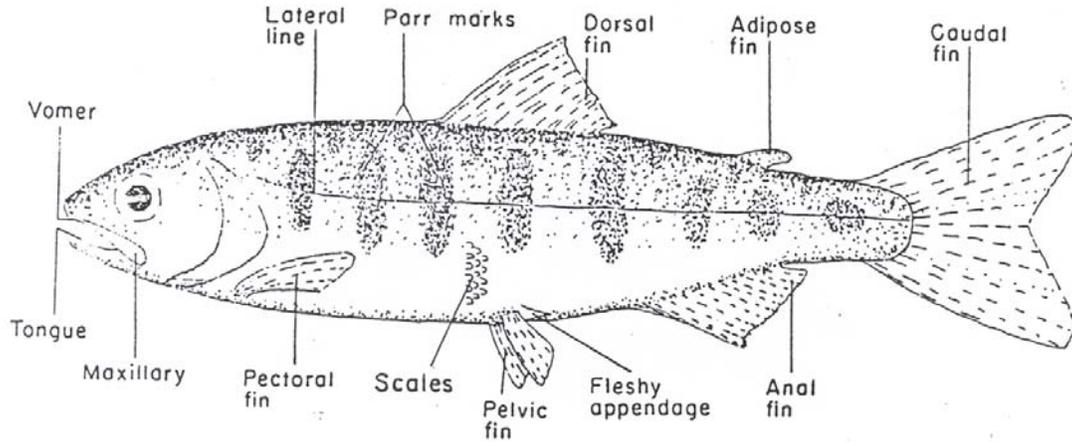


Figure 1.—A hypothetical salmonid showing external characteristics.

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

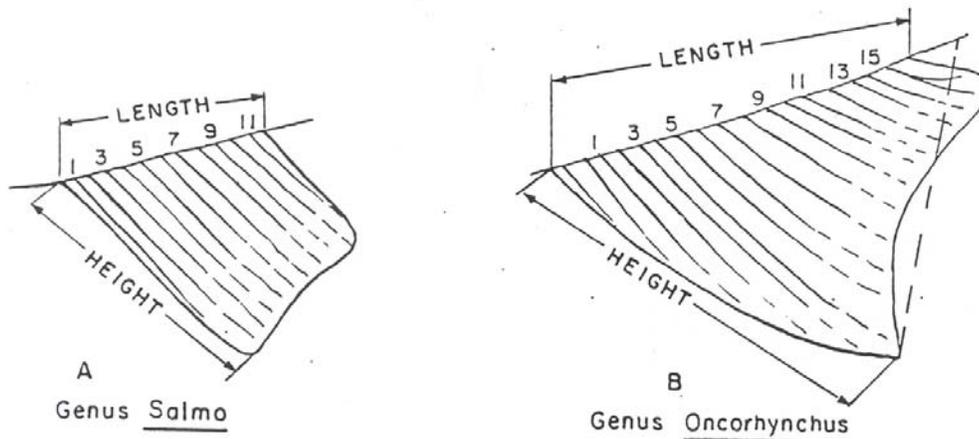


Figure 2.—Anal fins: (A) Trout, genus *Salmo*; (B) Pacific salmon, genus *Oncorhynchus*. The two drawings show differences in structure and fin ray count. (Note that the length of the anal fin is its overall basal length, and its height is that distance from the origin of the fin to the tip of the anterior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

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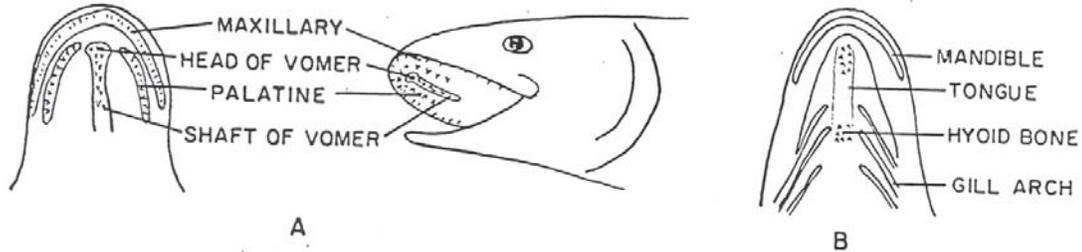
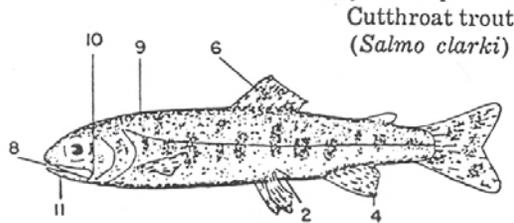


Figure 3.—Location of dentition in (A) the roof and (B) the floor of the mouth of salmonid fishes. (Presence or absence of teeth on the vomer or tongue may be determined by use of the little finger or a blunt instrument. The small hyoid teeth at the base of the tongue are located between the gill arches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

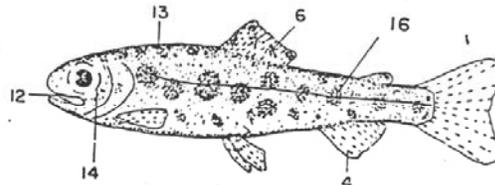
6. (18) Dorsal fin with large dark spots.
Trout
Genus *Salmo*

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



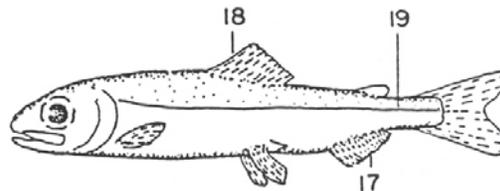
12. (8) *No teeth at base of tongue.
13. (9) Five to 10 parr marks along mid-dorsal ridge ahead of dorsal fin.
14. (10) Maxillary short, not reaching past posterior margin of eye.
15. (11) No hyoid mark under lower jaw. Few or no spots on tail.

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



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

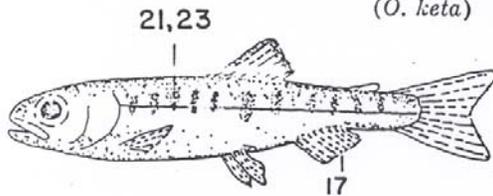
19. (20) No parr marks. Fry leave fresh water while small—approximately 1.75 inches (45 mm) long.
Pink salmon
(*O. gorbuscha*)



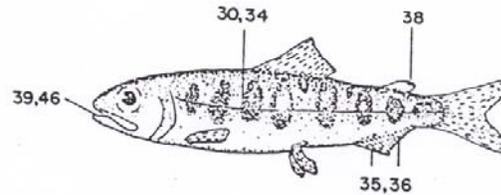
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- 20. (16) Parr marks present as vertical bars or oval spots.
- 21. (30) Parr marks short, extending little, if any, below lateral line.
- 22. (25) Gill rakers on first arch, 19 to 26.
** Pyloric caeca, 140 to 186.
- 23. (26) Parr marks faint. Sides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

Chum salmon
(*O. keta*)

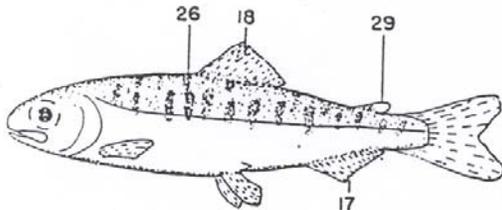


- 30. (21) Parr marks large, vertical bars centered by lateral line.
- 31. (28) **Gill rakers short and thick, fewer than 29 on first arch.
- 32. (29) Adipose fin at least partially pigmented.
- 33. (40) **Pyloric caeca more than 90.
- 34. (41) Parr marks broader than interspaces.
- 35. (42) Anterior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



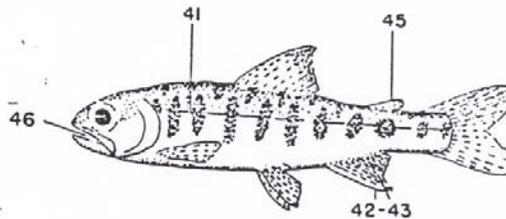
- 25. (22) Gill rakers on first arch, 30 to 40.
**Pyloric caeca 60 to 115.
- 26. (23) Parr marks usually sharply defined. Sides below lateral line silvery, not iridescent green.
- 27. (24) Relatively large when migrating from fresh water, approximately 3 to 5 inches (80 to 126 mm) long.
- 28. (31) Gill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

Sockeye salmon
(*O. nerka*)



- 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*)



-Continued-

47. (1) Adipose fin not present; scales present or lacking.
Not Salmonidae
48. (2) No fleshy appendage at base of pelvic fins.
Smelts
Family Osmeridae
49. (3) Mouth small, not reaching center of eye; teeth weak or absent.
50. (51) Depressed dorsal fin, shorter than head.
Whitefishes
Genus *Coregonus*
51. (50) Depressed dorsal fin, longer than head.
Arctic grayling
(*Thymallus arcticus*)
52. (5) **Teeth on head of vomer only.
Charrs
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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Appendix C.1. Smolt age-weight-length (AWL) sampling materials and methods.

Annually, outmigrating salmon smolt are sampled for age (scales), weight, and length, by field crews throughout the Westward Region. These data are essential for sound management of the State's salmon resources.

To be useful, data must be recorded on the age, weight, length (AWL) optical scanning (opscan) forms neatly and accurately. In addition, scale samples must be collected and mounted properly to ensure accurate age determination. The following procedures are to be strictly adhered to when sampling juvenile salmon for age, weight, and length.

Complete each section on the left side of the AWL form using a No.2 pencil and darken the corresponding circles as shown in the figures. Make every effort to darken the entire circle as the optical scanner, which reads and records the data from the AWL forms, may not recognize partially filled circles. Be sure to transfer the litho code, located in the left margin on the front side of the AWL form to the back side of the form by darkening the appropriate circles (see Appendix C.3.).

Label only one form at a time to avoid a "carbon paper effect" resulting in stray marks. Special care should be used to ensure that stray marks do not occur on either side of the AWL form. Stray marks and scuffed AWL forms can severely hamper scanning. The AWL forms should be treated carefully; the scanner in the Kodiak office cannot read damaged forms. The forms should not be stapled, bent, paper-clipped or folded. Specific instructions for completing AWL forms are listed in Appendix C.2 and an example of an AWL form filled out for smolt sampled can be found in Appendix C.3.

All juvenile salmon AWL data will be recorded in a field notebook dedicated to smolt sampling. These data will then be transferred from the field notebook to the AWL forms. Each species will have its own AWL sample number series that runs sequentially throughout the season. Up to 40 individual fish per smolt day may be included in one AWL sample. If more than 40 fish are sampled in a single smolt day, then multiple AWL numbers will be used on that day. For example, if 70 sockeye salmon smolt are sampled in a single day (day 1), the AWL numbers will be AWL #001 (fish 1-40; 8 slides) and AWL #002 (fish 1-30; 6 slides). The next day will start with AWL #003. Each day's sample will start with a new AWL number.

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

Tricane Methanesulfate (MS-222) will be used to anesthetize the smolt; latex gloves will be worn to prevent direct exposure to the anesthetic. The use of this chemical will be demonstrated by experienced personnel. A small amount (approximately 1 g) of MS-222 and a

-Continued-

small amount of baking soda will be dissolved in approximately 2 L of cold water. The amount of anesthetic used will vary depending on the water temperature, freshness of the chemical, and size of the smolt. A few smolt will be placed in the anesthetic solution until subdued to a point where they can no longer flex their axial musculature but can still ventilate their gills. The concentration of the solution should be such that it immobilizes the fish in 2-3 minutes. After the fish are anesthetized, it is important to sample them quickly and place them in a recovery container to prevent mortality. No more than 80 smolt will be anesthetized with one batch of solution.

After the smolts have been immobilized, excess water will be gently removed from the fish using a paper towel or a wet sponge as a blotter. Place the fish on its right side to sample the left side. Measure smolt length, to the nearest mm, from tip-of-snout to tail fork (Appendix C.4). Record length by blackening the appropriate column circles on the front side of the AWL form. When collecting length data, take care to ensure that each length corresponds to the appropriate scale smear mounted on the slide, as length-at-age is evaluated for each sample. Weigh each smolt to the nearest 0.1 g, and record the weight by blackening the appropriate column circles on the back side of the AWL form.

On salmon species, the preferred scale is located where a straight line between the posterior insertion of the dorsal fin and the anterior insertion of the anal fin crosses the second scale row dorsal to the lateral line. In smolt, the area directly around this scale is considered the preferred area (Appendix C.4). If scales are not present in this area then scales should be taken from the secondary location, which is the same area on the right side of the fish. A scalpel will be used to remove 5-10 scales from the preferred area. These scales will be mounted on a glass slide using a probe to position the scales. Scales from five fish will be mounted on each slide. The scalpel will be wiped clean of scales and slime between each fish. A diagram of a slide with scales mounted correctly is located in Appendix C.5.

The left portion of each slide will be labeled with AWL number, sample location, species, date, and inclusive fish numbers. A diagram of a properly labeled slide is located in Appendix C.5. After sampling, fish will be held in a recovery container until they are swimming normally and then released downstream of the trapping location. When the slides are completed, return them to the box in order by AWL # and fish #. Label the slide box on top with the information listed in Appendix C.5.

Appendix C.2. Procedure for recording salmon smolt age-weight-length data on AWL forms.

Smolt length and weight will be recorded on AWL forms (Appendix C.3.). Using a No.2 pencil, complete each section of the left side of the AWL and darken the corresponding blocks.

Fill out each of the following:

Description

Record the following: species, location, year and samplers names (e.g., sockeye smolt, Frazer fish pass, 2003, Sagalkin, Schrof).

Card

The AWL forms and corresponding slides are numbered sequentially by date throughout the season starting with 001. A new, consecutively numbered AWL form is used each day even if the previous AWL form is not full. There may be a minimum of one fish and a maximum of 40 fish (8 slides) per AWL form.

Species

Refer to the reverse side of the AWL form for the correct one digit code (e.g., sockeye = 2).

Day, Month, Year

Use appropriate digits for the date the fish are sampled.

District

List the district in which the fish were sampled. District=257

Subdistrict (Section)

List the subdistrict in which the fish were sampled. Section = 40

Stream

List the stream in which the fish were sampled. Stream = 403

Location

Location=038

Period

List the period (sample week) in which the fish were sampled (Appendix C.6.).

-Continued-

Project and Gear

Refer to the reverse side of the AWL form for the correct code. For example, smolt samples collected in a trap would have a project code of 8 and a gear code of 00.

Mesh

Leave blank unless specifically instructed by supervisor to do otherwise.

Type of length measurement

Refer to the reverse side of the AWL form for the correct code (e.g., tip of snout to tail fork = 2).

Number of scales per fish

Fill in the number of scales (smears) collected per fish. For smolt, one scale smear per fish is collected.

of cards

of cards always = 1 (each AWL form is individually numbered).

If possible, keep the AWL form litho codes in numerical order throughout the season and keep all forms flat, dry, and clean. Remember that when sampling smolt, weight data is recorded on the back side of the AWL form and the litho code, located in the left margin on the front side of the AWL form must be transferred to the back side of the form (see Appendix C.3.). Fish gurry and water curling may cause data to be misinterpreted by the optical scanning machine. **It is the responsibility of the crew leader to make sure that all forms are carefully edited before returning them to their supervisor.**

Appendix C.3. Example of an AWL form filled out for smolt sampled (Note: Project code should be 8 not 4).

DESCRIPTION: *Penalty/Thomas 1999*
Sockeye Smolt/Hidden Creek/DipNet

ADF&G ADULT SALMON AGE-LENGTH
 FORM VERSION 2.1 *JAG*

CARD: 001

SPECIES: 2

DAY: 04

MONTH: 06

YEAR: 99

DISTRICT: 251

SUBDISTRICT: 40

STREAM: 406

LOCATION:

PERIOD: 23

PROJECT: 4

GEAR: 13

MESH:

TYPE OF LENGTH MEASUREMENT

NUMBER SCALES/FISH

OF CARDS: 1

Mark Refill by NCS M800800-3 PECO Printed in U.S.A.

#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
1	M	1	0	2	2	1
2	M	1	0	2	2	1
3	M	1	0	2	2	1
4	M	1	0	2	2	1
5	M	1	0	2	2	1
6	M	1	0	2	2	1
7	M	1	0	2	2	1
8	M	1	0	2	2	1
9	M	1	0	2	2	1
10	M	1	0	2	2	1
11	M	1	0	2	2	1
12	M	1	0	2	2	1
13	M	1	0	2	2	1
14	M	1	0	2	2	1
15	M	1	0	2	2	1
16	M	1	0	2	2	1
17	M	1	0	2	2	1
18	M	1	0	2	2	1
19	M	1	0	2	2	1
20	M	1	0	2	2	1
21	M	1	0	2	2	1
22	M	1	0	2	2	1
23	M	1	0	2	2	1
24	M	1	0	2	2	1
25	M	1	0	2	2	1
26	M	1	0	2	2	1
27	M	1	0	2	2	1
28	M	1	0	2	2	1
29	M	1	0	2	2	1
30	M	1	0	2	2	1
31	M	1	0	2	2	1
32	M	1	0	2	2	1
33	M	1	0	2	2	1
34	M	1	0	2	2	1
35	M	1	0	2	2	1
36	M	1	0	2	2	1
37	M	1	0	2	2	1
38	M	1	0	2	2	1
39	M	1	0	2	2	1
40	M	1	0	2	2	1

DO NOT WRITE IN THIS MARGIN

TRANSFER RESPONSES EXACTLY AS PRINTED ON FRONT TO THIS GRID

DO NOT WRITE IN THIS AREA

SPECIES

- 1 - Chinook (log)
- 2 - Sockeye (red)
- 3 - Coho (silver)
- 4 - Pink (shappy)
- 5 - Chum (dog)

PROJECT

- 1 - Commercial catch
- 2 - Subsistence catch
- 3 - Escapement (lower, weir, sear, etc.)
- 4 - Escapement - spawning grounds
- 5 - Test fishing
- 6 - Sport catch (marine)
- 7 - Sport catch (freshwater)

GEAR TYPE

- 0 - Trap
- 1 - Purse seine
- 2 - Beach seine
- 3 - Drift gillnet
- 4 - Set gillnet
- 5 - Trawl
- 6 - Long line
- 7 - Other trawl
- 8 - Poth
- 9 - Sport hook and line
- 10 - Trap
- 11 - Herring purse seine
- 12 - Handtrawl
- 13 - Dip net
- 14 - 18' Unassisted
- 15 - 30' Boat tow
- 16 - Shovel
- 17 - Weir
- 18 - 99 Unassisted

LENGTH TYPE

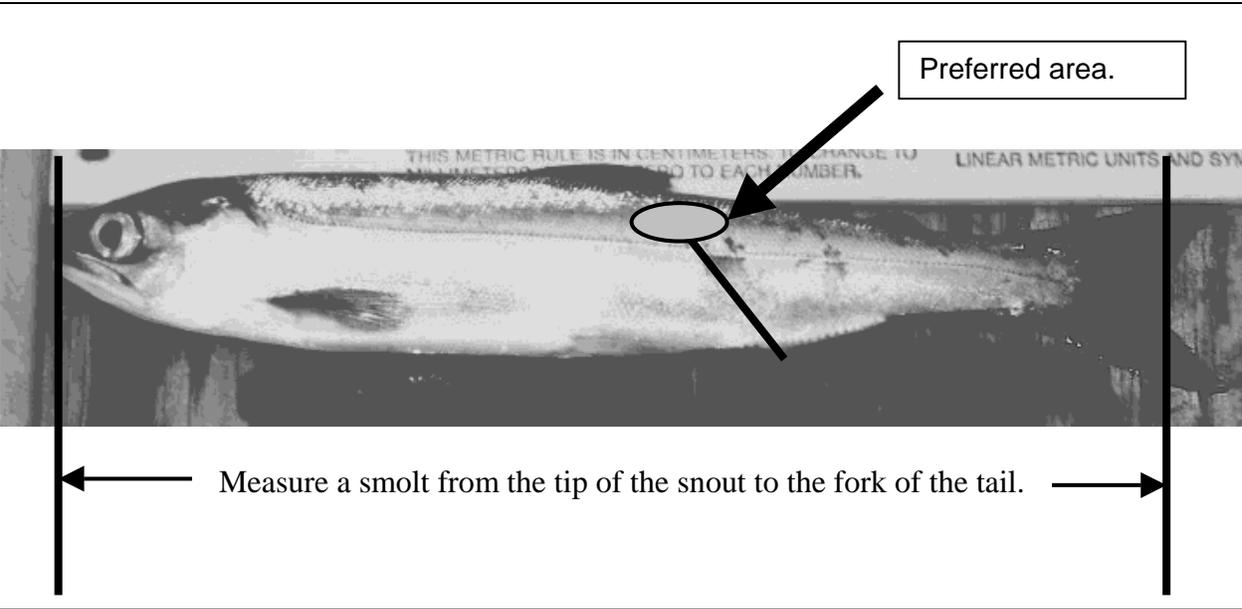
- 1 - Tip of snout to fork of tail
- 2 - Mid-eye to fork of tail
- 3 - Post orbit to fork of tail
- 4 - Mid-eye to hypural plate
- 5 - Post orbit to hypural plate
- 6 - Unassigned

AGE ERROR CODES

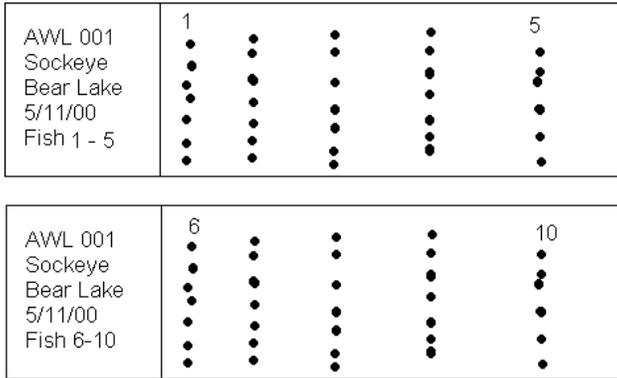
- 1 - Death
- 2 - Inverted
- 3 - Regenerated
- 4 - Irregular
- 5 - Missing
- 6 - Reabsorbed
- 7 - Wrong species
- 8 - Not preferred

#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
1	M	1	0	2	2	1
2	M	1	0	2	2	1
3	M	1	0	2	2	1
4	M	1	0	2	2	1
5	M	1	0	2	2	1
6	M	1	0	2	2	1
7	M	1	0	2	2	1
8	M	1	0	2	2	1
9	M	1	0	2	2	1
10	M	1	0	2	2	1
11	M	1	0	2	2	1
12	M	1	0	2	2	1
13	M	1	0	2	2	1
14	M	1	0	2	2	1
15	M	1	0	2	2	1
16	M	1	0	2	2	1
17	M	1	0	2	2	1
18	M	1	0	2	2	1
19	M	1	0	2	2	1
20	M	1	0	2	2	1
21	M	1	0	2	2	1
22	M	1	0	2	2	1
23	M	1	0	2	2	1
24	M	1	0	2	2	1
25	M	1	0	2	2	1
26	M	1	0	2	2	1
27	M	1	0	2	2	1
28	M	1	0	2	2	1
29	M	1	0	2	2	1
30	M	1	0	2	2	1
31	M	1	0	2	2	1
32	M	1	0	2	2	1
33	M	1	0	2	2	1
34	M	1	0	2	2	1
35	M	1	0	2	2	1
36	M	1	0	2	2	1
37	M	1	0	2	2	1
38	M	1	0	2	2	1
39	M	1	0	2	2	1
40	M	1	0	2	2	1

Appendix C.4. Photo of a smolt with the preferred area highlighted.



Appendix C.5. An example of two correctly labeled smolt slides representing fish 1 through 10 from a sample collected on 5/11/00.



When the slides are completed, return them to the box in order by AWL # and fish #, and label the slide box on top with the following information:

Location: Frazer Lake
 AWL Number: AWL 001-003
 Beginning and end dates: 6/12-7/13/00
 Sockeye Salmon Smolt

Appendix C.6. Sampling weeks and associated calendar dates, 2004.

Week	Calendar Dates	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-Aug
9	22-Feb to 28-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		

Initial maintenance of the fish pass should be completed prior to 1 June to ensure proper functioning of the facility.

Maintenance consists of the following:

1. Inspect the fish passes for structural damage.
2. Install the modified I-beam supports on the diversion weir above the falls.
3. Clean the debris from the fish pass tanks.
4. Clean the fish pass entrance and add rocks if necessary.
5. Clear rocks and streambed materials from the exit tank, channel, stop-log base of water control weir, and entrance tanks.
6. Pad the inside of tank lids with astroturf to reduce fish mortality while insuring that it is securely fastened.
7. Replace damaged plywood fishpass covers.

Fish pass opening procedures include:

1. Insert wood drain plugs from the inside of the tanks into drain holes. Plugs should fit tightly, so that internal tank water pressure holds the plug in place. Install the tank caps by screwing them on from the outside.
2. Position tank covers, and remove stop-logs slowly from exit tank. The **bottom stop-log remains in place**. Note that if stop-logs are removed rapidly gravel is deposited into tank.
3. Make sure no holes are present where fish could escape uncounted.

The fish pass should be operated so that the steep pass is about 3/4 full of water. This volume is necessary to attract sockeye salmon to the entrance tank and promote optimum fish passage. A water level of 1.8-1.9 feet should be maintained on the staff gauge by removing or placing stop-logs at the water control diversion (top of falls). At this level the old fish pass should be 3/4 full. Try to keep stop logs relatively even level across the weir to prevent excessive erosion.

A vertical slot "door" should be placed at the entrance tank during the sockeye salmon run. This door should be checked daily during fish passage to assure it is completely down. It can open, inadvertently, when sockeye salmon hit against it. The opening space (23 cm) is needed to maintain velocity for fish attraction. The door can be opened to 1 foot (30 cm) at seasons end to further attract fish.

The fish pass should be checked daily for cover tightness and unobstructed water flow. Under no circumstances should obstructive materials be placed in the exit tank or steep passes. Make sure to remove any dead fish observed in the exit tank as soon as possible because dead fish will accumulate in the resting tanks making the end of season task of cleaning extremely unpleasant.

Avoid allowing detergents or chemicals from entering the fish pass water supply.

Post a "keep off the fish pass sign" on the trail between the cabin and the fishpass and put up other signs directing visitor traffic to appropriate trails.

-Continued-

Fish pass closing procedures (approximately 25 August):

1. Remove stop-logs and I-beam supports from the water control weir. Stack logs on the stream bank and store the I-beams (well greased) in the tractor shed. Replace stop-logs in the exit tank, and visqueen as necessary to stop water flow between logs.
 2. Remove all the drain caps by lightly tapping them from outside of the tanks, and store the plugs in the tractor shed. All water should be drained from the tanks. All residual materials within the tanks should be removed.
 3. Remove the vertical slot door and replace it with a solid door to prevent unwanted animals from entering.
 4. Inspect the fish pass and the facility for needed repairs, and list needed materials in the daily log/annual report. **Also include fuel caches and propane so that we know what is left behind.**
 4. When the lower weir is removed, panels should be stored on the lower stream banks. Bolts on the weir should be tightened and replaced if necessary. Catwalk and stringer materials should be inspected and replaced if required. Add lumber needs to the materials list.
-

Appendix E.1. Procedure for sampling adult salmon for age, length, and sex.

Annually, salmon escapements and catches are sampled for age (scales), length, and sex by field crews throughout the state. 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 (AWL) optical scanning (opscan) forms neatly and accurately. In addition, scale samples must be collected and mounted properly to ensure accurate age determination. The following procedures are to be strictly adhered to when sampling adult salmon for age, length, and sex.

Procedures

COMPLETING THE OPSCAN AWL FORMS:

New **green** AWL forms have been developed which have Y2K date capabilities. Before transcribing any information, make sure the correct form is being used. The department no longer uses the outdated red or blue forms.

A completed AWL form and accompanying scale gum card for sampling sockeye salmon are shown in Appendix E.2. When collecting two scales per fish, as with coho salmon sampling, follow the procedure illustrated in Appendix E.3.

Complete each section on the left side of the AWL form using a No.2 pencil and darken the corresponding circles as shown in the figures. Make every effort to darken the entire circle as the optical scanner, which reads and records the data from the AWL forms, may not recognize partially filled circles. Label only one form at a time to avoid a "carbon paper effect" resulting in stray marks. Special care should be used to ensure that stray marks do not occur on either side of the AWL form. Stray marks and scuffed AWL forms can severely hamper scanning.

Fill out each of the following:

Description

Record the following: species/area/catch or escapement/gear type (if applicable)/samplers.

Card

The AWL forms and corresponding gum card(s) are numbered sequentially by date throughout the season starting with 001. A separate numbering sequence will be used for each species, district, and geographic location. Consult your crew leader for the current card number. Sockeye salmon scale samples will have only one gum card per AWL form as shown in Appendix E.2.

Species

Refer to the reverse side of the AWL form for the correct one-digit code (e.g., sockeye = 2).

-Continued-

Day, Month, Year

Escapement sampling: Use appropriate digits for the date the fish are sampled.

Catch sampling: Use the date the fish were caught. If this differs from the sample date, note the sample date in the top margin.

District

District = 257

Subdistrict (Section)

Section = 40

Stream

Stream = 403

Location

Location = 038

Period

Escapement sampling: List the sample week in which the fish were sampled (Appendix C.6.).

Catch sampling: List the sample week in which the fish were caught. If this differs from the week the fish were sampled, note this in the top margin.

Project and Gear

Refer to the reverse side of the AWL form for the correct code. For example, escapement samples collected at a weir would have a project code of 3 and a gear code of 19.

Mesh

Leave blank unless specifically instructed by supervisor to do otherwise.

Type of length measurement

Refer to the reverse side of the AWL form for the correct code (e.g., mid eye to tail fork = 2).

Refer to Appendix E.5.

Number of scales per fish

Fill in the number of scales collected per fish. For sockeye, one scale per fish is collected unless otherwise instructed by supervisor.

-Continued-

of cards

of cards always = 1 (each AWL form is individually numbered).

If possible, keep the AWL form litho codes in numerical order throughout the season and keep all forms flat, dry, and clean. Fish gurry and water curling may cause data to be misinterpreted by the optical scanning machine. **It is the responsibility of the crew leader to make sure that all forms are carefully edited before returning them to their supervisor.**

SCALE GUM CARDS

A completed AWL form and accompanying gum card for sampling sockeye salmon are shown in Appendix E.2. When collecting two scales per fish, as with coho salmon sampling, follow the procedure illustrated in Appendix E.3. Be sure to fill out the gum cards in pencil as shown in Appendix E.2 and E.3.

Species

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

Locality

Escapement sampling: Include the weir site followed by “escapement” (e.g., Karluk River escapement).

Catch sampling: Include the area(s) where the fish were caught followed by “catch” (e.g., Uganik Bay catch).

Statistical Area Code

Fill in the appropriate digits from the AWL form. If catch samples are from a variety of statistical areas be sure to list each statistical area and approximate percentage from each (if available).

Sampling date

Escapement sampling: Fill in the date the fish were sampled.

Catch sampling: Fill in the date the fish were caught. The sample date, if different from the catch date, may be noted in “remarks”.

Gear

Write out completely. If catch samples include multiple gear types, be sure to list each gear and approximate percentage from each (if available).

Collector(s)

Record the last names of each person collecting the sample.

Remarks

Record any pertinent information such as the number of scales per fish sampled, processing facility where the sampling took place, vessel/tender name, etc. Be sure to transfer this information to the top margin of the AWL form.

-Continued-

SAMPLING PROCEDURE

1. Place the fish on its right side to sample the left side.
2. Determine the sex of the fish (escapement sampling only) and darken M or F in the sex columns. If any difficulty is encountered with this procedure, write "I had trouble sexing these fish" on the top margin of the AWL form and ask your supervisor for help as soon as possible before sexing additional fish.
3. Measure fish length in millimeters from mid eye to tail fork (escapement sampling only; Appendix E.5). Record length by blackening the appropriate column circles on the AWL form. Column 3 on the AWL form is used for fish with a length greater than 999 millimeters (Chinook). Measure all species of salmon to the nearest mm. When collecting length data, take care to ensure that each length corresponds to the appropriate scale mounted on the gum card, as length-at-age is evaluated for each sample.
4. Remove the "preferred scale" from the fish by grasping the scale's exposed posterior edge with forceps and pulling free (Appendix E.6). Remove all slime, grit, and skin from the scale (neoprene wristers work well for this). 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. If the preferred scale is missing, select a scale within the preferred area on the other side of the fish. If no scales are present in the preferred area on either side 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. Do not select a scale located on the lateral line.
5. It is important to take care that scales adhere to the gum card, rough side up. Therefore, without turning the forceps over, clean, moisten, and mount the scale on the gum card with your thumb or forefinger. Exert just enough pressure to spread and smooth the scales directly over the number as shown in Appendix E.6. The ridges on the sculptured side can be felt with a fingernail or forceps. Mount the scale with the anterior end oriented toward top of gum card. All scales should be correctly oriented on the card in the same direction (Appendix E.7.).
6. Repeat steps 1 through 4 for up to 40 fish on each AWL form.
7. When sampling at weirs you may use "Rite in the Rain"[®] books to record the data. Keep the AWL forms in camp where they will be clean, dry, and flat. After sampling is done for the day, transfer the data to the AWL forms. **Each length, sex, and scale must correspond to a single fish! It is the responsibility of the crew leader to be sure the data has been transcribed correctly and the AWL forms filled out completely. Log books containing length and sex data should be returned to Matt Foster at the end of the season.** These are considered raw data and need to be archived. If you choose to record raw data on tape, these tapes must be returned to Matt Foster.

SAMPLING CHECKLIST

OPERATIONAL PLAN	PENCILS (NO. 2)
GUM CARDS	FORCEPS
AWL FORMS (GREEN)	PLASTIC CARD HOLDERS
NEOPRENE WRISTERS	CLIPBOARD
MEASURING BOARD	LOG BOOK

SOME REMINDERS

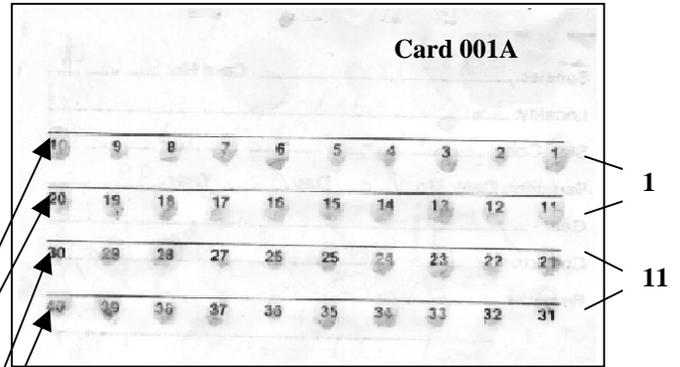
1. For greater efficiency in scale reading, mount scales with anterior end toward top of gum card.
2. AWL forms should be carefully edited. Remember to use the new AWL forms (green) as the red and blue forms are outdated. Re-check header information on AWL forms; make sure all available information is filled in. Take extra care to use the correct period code (sampling week) for the sampling or catch date. AWL form numbers should not be repeated; a frequent error is to begin a week's sample with the last AWL number used the week before. This is particularly important if the data is regularly sent to town; it is easy to forget which AWL form numbers were used. Crew leaders should take time to ensure that the circles are being blackened correctly. If the circles are sloppily marked, the optical scanner records the information incorrectly or misses it entirely.
3. Transfer important comments from the gum cards to the AWL forms. After pressing scales, the cards are seldom referred to again, and important remarks can be lost. Write comments in the top right margin. If there is not room on the AWL form to completely explain the remarks, use a separate piece of paper.
4. Never put data from different dates on one AWL form or one gum card. Even if only one scale is collected that day, begin a new AWL form and gum card the next day.
5. If weights are taken, they may be noted in the right margin of the AWL form during sampling, but be sure to transfer the weights and litho code to the appropriate columns on the reverse of the AWL form before submitting it to your supervisor.
6. Try to keep the litho codes (located in the left margin of the AWL form) in numerical order. This should not be hard to do if they are arranged that way before page numbering. When sampling different areas throughout the season, arrange the litho codes in order before each sample is taken.

-Continued-

7. If AWL forms get wrinkled or splotted the data should be transcribed onto a new AWL form prior to sending in. The optical scanning computer will misread or reject torn or wrinkled sheets. Do not use paperclips on AWL forms.
 8. Be careful when collecting and mounting scales in wet conditions (rain, high humidity, etc.). If glue dries on top of the scale, it often obscures scale features, resulting in an unreadable scale. In addition, scales frequently adhere poorly to a wet gum card. Protect the cards and keep them dry to avoid having to remount the scales on a new card. If the cards get wet, try to dry them in a protected area or remount if necessary. Remember, use a pencil when filling out gum cards, because ink will come off during pressing.
 9. Visually scan all AWL forms for mistakes. A common error occurs, for instance, in placing both the 4 and 7 of a 475mm fish in the 100s column with nothing in the 10s column.
 10. Avoid accumulation of incomplete AWL forms. In previous years, there have been cases where individuals have completed several samples before transcribing the information on the AWL forms. This may lead to an increase in errors. After a sample has been completed, try to get the AWL forms filled out as soon as possible. This will ensure more accurate information, as any problems or abnormalities concerning the sample (e.g., many jacks in sample, many fish lacking preferred scale, number of scales do not match number of lengths recorded, etc.) will be fresh in your mind.
 11. Responsibility for accuracy lies first with the primary data collector(s) and finally with the crew leader. Sloppy or incomplete data forms or gum cards will be returned to individual collectors for correction.
-

Appendix E.3. Completed adult salmon AWL form (front side) and associated gum card when sampling 2 scales per fish.

Species: Coho Card No: 001A
 Locality: Karluk Esc.
 Stat. Code: 255-10-101-
 Sampling Date: Mo. 08 Day 29 Year 2000
 Gear: Weir/Trap
 Collector(s): Russell, Peterson, McCall
 Remarks: 2 scales / fish



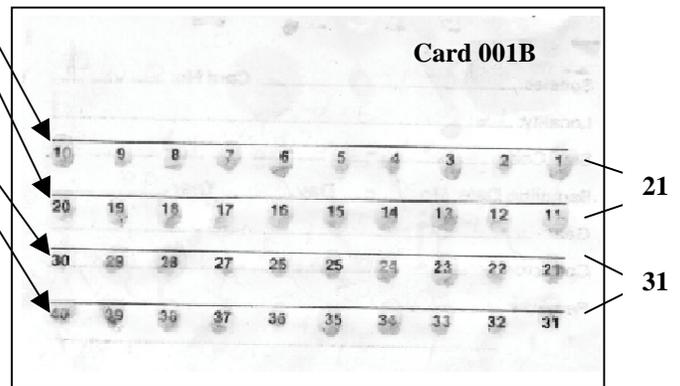
DESCRIPTION: Coho / Karluk / Esc. Samplers: Russell, Peterson, McCall ADF&G ADULT SALMON AGE-LENGTH FORM VERSION 2.1

CARD:	#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
001	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	11						
	12						
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	37						
	38						
	39						
	40						

DO NOT WRITE IN THIS MARGIN
15430

Mark Reflex® by NCS MM206902-1 3 PE03 Printed in U.S.A.

Species: Coho Card No: 001B
 Locality: Karluk Esc.
 Stat. Code: 255-10-101-
 Sampling Date: Mo. 08 Day 29 Year 2000
 Gear: Weir/Trap
 Collector(s): Russell, Peterson, McCall
 Remarks: 2 scales / fish

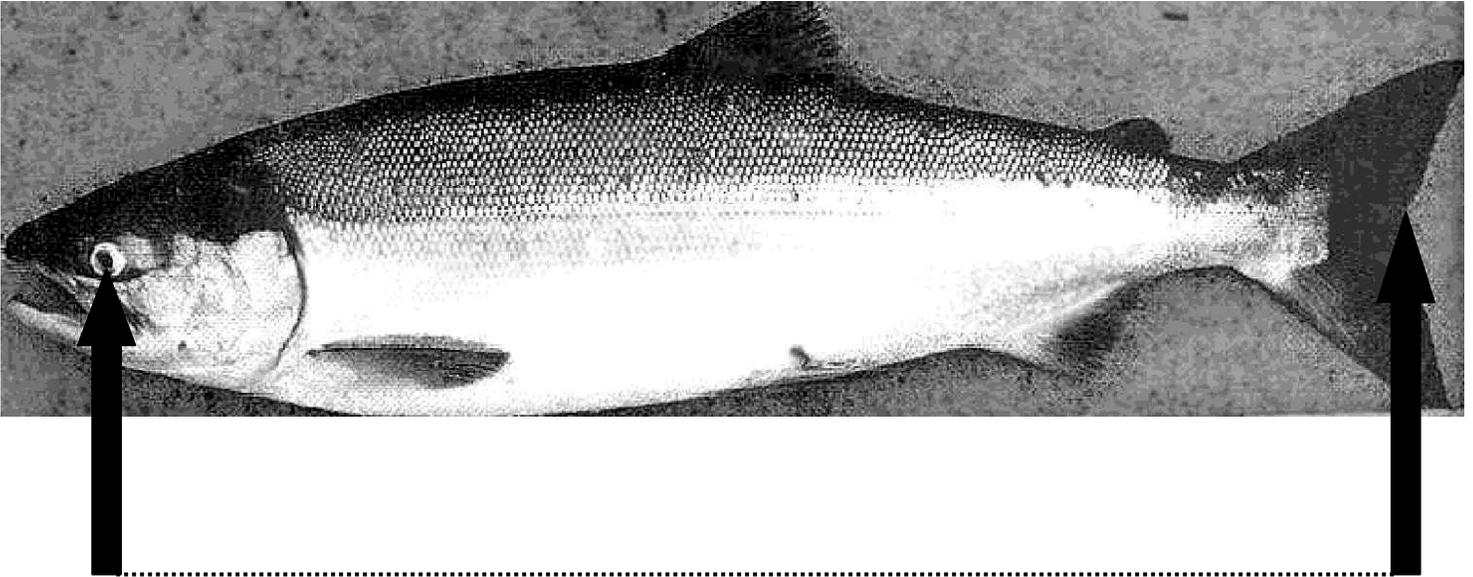


Appendix E.4. Assigned port and weir location codes.

Port and Location Codes

029	Uganik
030	Lazy Bay
031	Port of Kodiak
032	Pauls Lake
033	Thorsheim
034	Afognak River
035	Karluk River
036	Ayakulik (Red River)
037	Upper Station
038	Frazer Lake
039	Dog Salmon
040	Akalura River
041	Uganik River
042	Malina Creek
043	Portage Lake
044	Foul Bay (FBTHA)
045	Larsen Bay
046	Spiridon (SLTHA)
047	Little Kitoi
048	Waterfall Bay (WBTHA)
049	Little River
050	King Cove
051	Port Moller
052	Dutch Harbor
053	Akutan
054	Sand Point
055	Bear River
056	Nelson River
057	Canoe Bay
058	Ilnik Lagoon
059	Orzinski River
060	Sandy River
061	Thin Point Lagoon
062	Middle Lagoon
070	Black Lake
071	Chignik Weir
072	Chignik (Processing facilities)

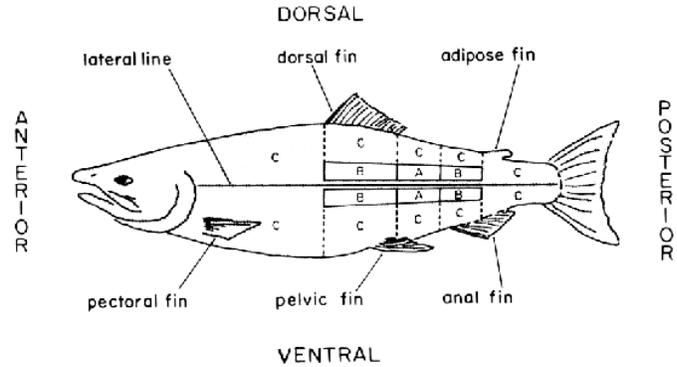
Appendix E.5. Measuring fish length from mid eye to tail fork.



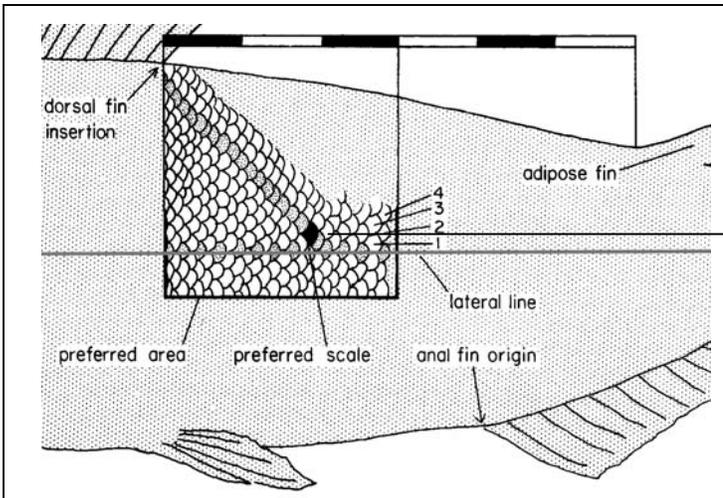
Adult salmon length is measured from mid eye to tail fork because the shape of the salmon's snout changes as it approaches sexual maturity. The procedure for measuring by this method is as follows.

- 1) Place the salmon flat on its right side (on the measuring board) with its head to your left and the dorsal fin away from you.
- 2) Slide the fish in place so that the middle of the eye is in line with the edge of the meter stick and hold the head in place with your left hand.
- 3) Flatten and spread the tail against the board with your right hand.
- 4) Read and record the mid eye to tail fork length to the nearest millimeter.

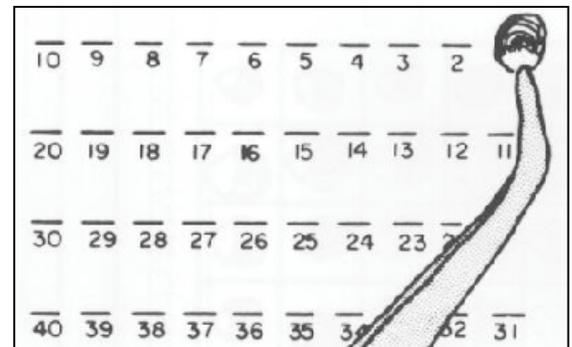
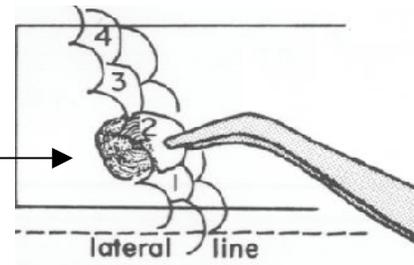
Appendix E.6. Removal and mounting of the preferred salmon scale.



INPFC rated areas for scale removal. Area A is the preferred area. If scales on the left side are missing, try the right side. Area B is the second choice if there are no scales in area A on either side of the fish. Area C designates non preferred areas.

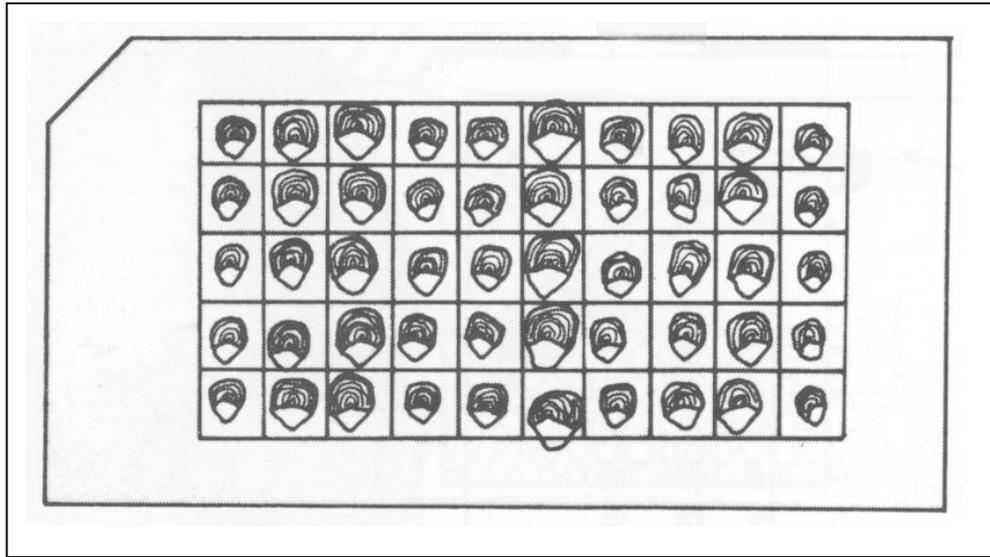


Do not turn scale over.

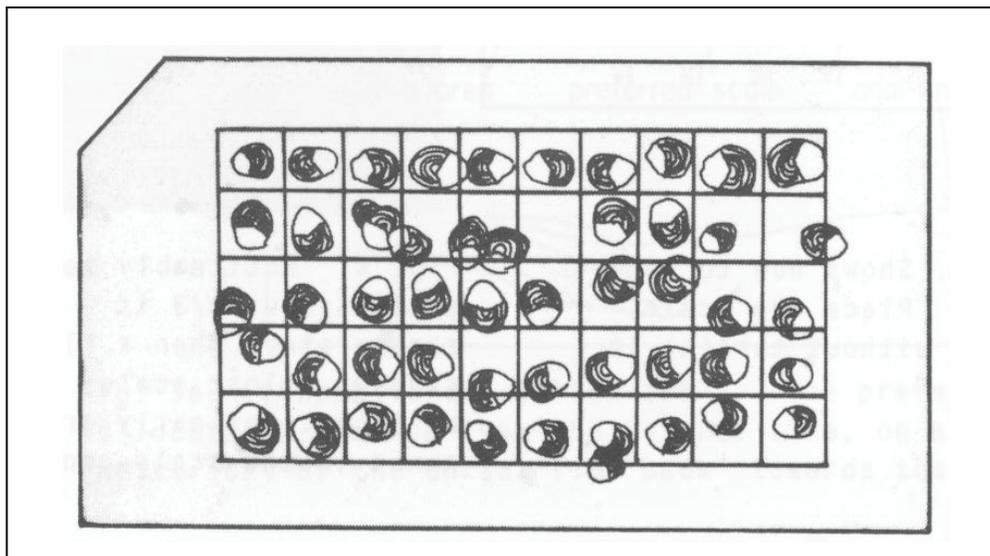


The preferred scale in this diagram is solid black. It is located 2 rows up from the lateral line, on a diagonal from the insertion (posterior) of the dorsal fin “back” toward the origin of the anal fin.

Appendix E.7. Scale orientation on the salmon scale gum card.

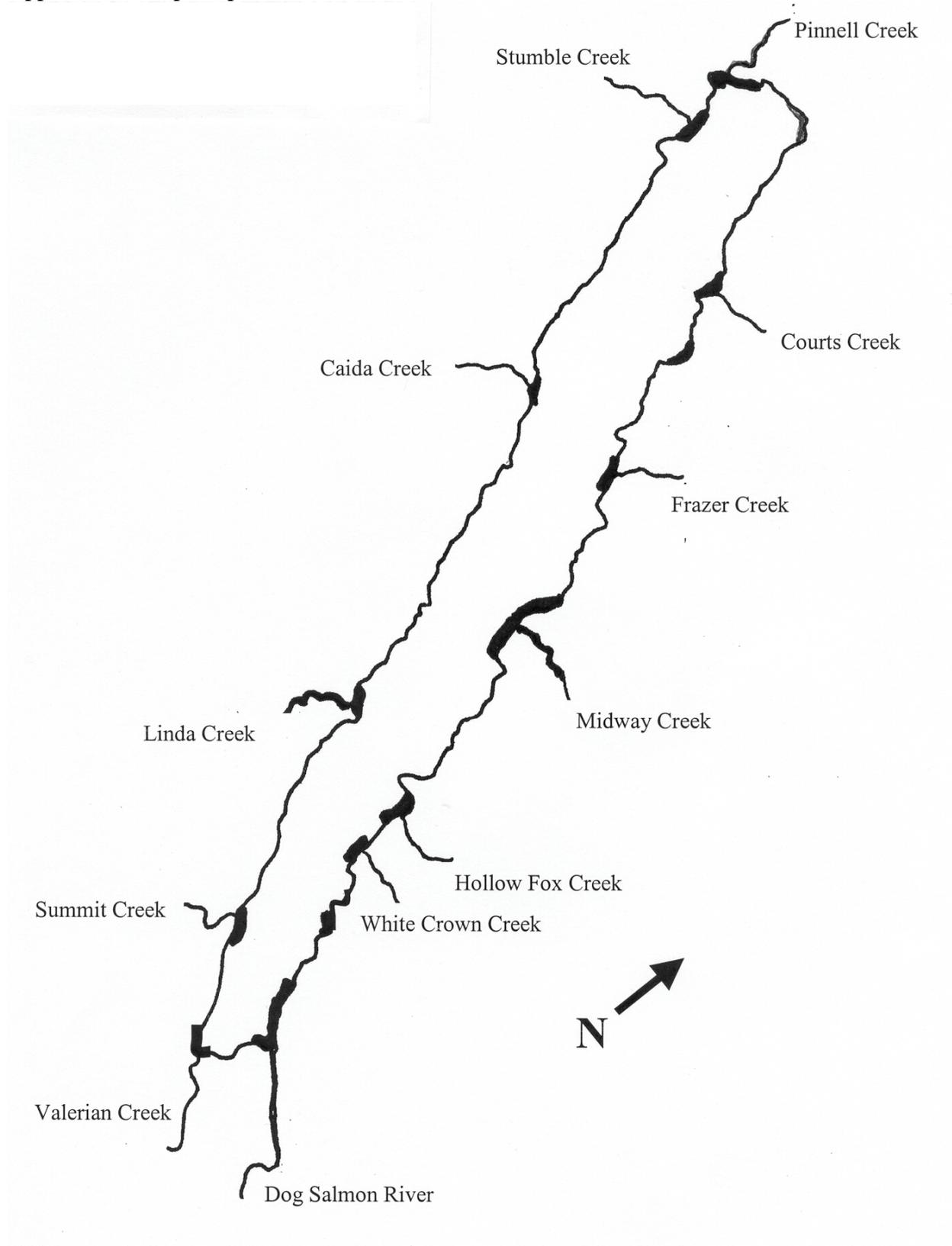


The scales are all correctly oriented on the card in the same direction, with the anterior portion of the scale pointed toward the top of the card and the posterior portion (which is that portion of the scale held in the forceps) pointed toward the bottom of the card.



The scales are incorrectly oriented in different directions. This increases the time spent to age samples.

Appendix F. Map of spawner distribution on Frazer Lake.



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KARLUK LAKE SOCKEYE SALMON SMOLT STUDY
OPERATIONAL PLAN, 2004



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INTRODUCTION

Karluk Lake is located on the southwest side of Kodiak Island (Figure 1), and is considered one of the largest sockeye salmon *Oncorhynchus nerka* producing systems in Alaska. Some of the earliest recorded commercial harvests of sockeye salmon are from Karluk Lake, dating from the late 1800s (Rounsefell 1958). In the early 1900s, sockeye salmon harvests and escapements at Karluk Lake were lightly regulated and overfishing is suspected to have occurred. A weir was established on the river in 1912 to enumerate escapement, and the White Act was implemented in 1924 to reserve 50% of the run for escapement. Despite these efforts, Karluk Lake sockeye salmon production continued to decline in the 1940s, and did not significantly increase until the late 1970s (Schmidt et al. 1998).

Sockeye salmon smolt studies have been conducted sporadically on Karluk Lake: 1961 through 1968, 1980 through 1984, 1991 through 1992, and the current study (starting in 1999). Lake residence time of Karluk sockeye salmon smolts is longer than most systems (Koenings and Burkett 1987). Historically, age 2. smolts have been the dominant emigrating age class followed by age 3. smolts. Koenings and Burkett (1987) found that the prolonged lake residence is related to the timing of zooplankton blooms and rearing temperatures. Furthermore, Schmidt et al. (1998) found that competition between early and late run juveniles may impact survival.

The early-run escapement goal range is currently 150,000 to 250,000 fish and the late-run escapement goal is 400,000 to 550,000 sockeye salmon (Nelson and Lloyd 2001). Schmidt et al. (1998) have suggested that the escapement goal for Karluk Lake should be increased and evenly split between the early and late runs. This recommendation would substantially alter the existing overall escapement goal by increasing the early-run goal.

A better understanding of the freshwater productivity of Karluk Lake may prove valuable in understanding overall Karluk Lake sockeye salmon production. In addition, estimates of smolt emigration abundance may assist in forecasting future Karluk Lake sockeye salmon run strength. This document provides a description of the current goals and objectives of research at Karluk Lake for the Karluk Lake smolt field crew and the specific methods used to collect data.

Goals and Objectives

The Commercial Fisheries Division's goals for the Karluk Lake sockeye salmon smolt project are to evaluate current escapement goals, estimate ocean survival, and increase precision of pre-season run forecasts. For 2004, specific objectives include the following:

1. Estimate sockeye salmon smolt emigration abundance and timing.
2. Estimate average weight, length, and condition factor by age of emigrating smolts.
3. Produce a report describing project activities and collected data.

The 2004 Karluk Lake smolt project is a sub-component of a broader limnological project, funded by the Gulf of Alaska Ecosystem Monitoring (GEM) program, investigating marine derived nutrients. The project proposal for this broader project is described in Appendix A.

Tasks

Specific tasks leading toward the objectives include the following:

1. Setup the field camp.
The target date to complete this task is May 07.
2. Install and operate the Canadian fan trap to capture emigrating sockeye smolts.
The target date to install the trap is May 10.
3. Enumerate the daily smolt catch by species.
Enumeration will begin the day the trap is operational (May 10) until the trap is removed (~July 7th).
4. Conduct weekly sampling of 300 sockeye salmon smolts (60 smolts per day, 5 days per week) for age (scale samples), weight, and length (AWL).
5. Mark 1,100 sockeye salmon smolts weekly using Bismakr Brown dye (BBY). This task is used to estimate the trap efficiency.
6. Collect daily air temperature, water temperature, water level, cloud coverage, wind direction, wind velocity, and precipitation.
7. Record daily activities in a journal and write biweekly progress reports and send them to town.
8. Close camp, inventory and store equipment.
The target date to close the camp is July 7, but this date is dependent on the daily smolt counts.
9. Write Season Summary Report.
This task should be started in the field and completed within three days of arriving back into town (target date: July 10).

PROCEDURES

Trap Location, Setup, and Maintenance

Install the Canadian fan trap approximately one mile (1.61 km) downstream from the lake outlet, in the same location used during the 2000-2003 smolt studies. After the initial setup, make a scale drawing, using the provided graph paper, with each of the dimensions (trap and wings), in meters, and location in the river; specifically, indicate distance to right and left banks and the stream current direction. If the trap is repositioned or wing material is added or removed, notify the project biologist and document that a change was made in the 'comments' section of the *Daily Smolt Catch Reporting Form* (Figure 2) and make a new scale drawing.

Setup the catch-weight station next to the trap immediately after trap placement. The catch-weight station is a small meshed basket suspended over the creek from a hanging scale. Place a holding box, used to hold fish for sampling and dye tests, near the catch box. If necessary, anchor the holding box in place with sand bags hanging off the outside. Make sure the placement of the box maintains water flow through the box. Place a similar holding box at the dye release site. The stream flow at the dye release site is stronger. In the past, fence posts have been used to help secure the boxes. Devise a method to control the water flow through the box at the release site. Smolts recovering from the dye may become ‘pinned’ if the current is too strong.

Check the trap as often as necessary to minimize fish mortalities. At a minimum, check the trap every hour between sunset and sunrise. During daylight hours, a check once every four hours is usually adequate. Make the last check at the conclusion of the smolt day (1200 noon). Although smolts generally migrate in the evening hours, smolts may migrate in the mid-afternoon hours especially during changes in weather conditions. **It is essential that the crew keep a close watch on the smolt trap to avoid significant mortality due to crowding.**

Species Identification and Enumerating the Catch

Handle sockeye salmon smolts gently because they are very sensitive to any stress, and mortality can occur with the loss of just a few scales. Identify and count the entire catch by species. Species identification keys are provided in Appendix B. It is the responsibility of the crew leader to ensure that the crew uses the keys to properly identify the catch.

There are two methods used to determine the number of fish caught in a trap. The simplest and most common procedure is to individually count the fish by species while emptying the live box with a dip net; record this number on the *Daily Smolt Catch Reporting Form* (Figure 2). The second method used is the catch-weight sampling procedure where the catch is transferred by dip net into the small meshed basket suspended over the creek from a hanging scale. **Only use this second method (catch-weight) when there are large numbers of smolts being caught, and there is not enough time to count all the fish without incurring mortalities.** During the catch-weight sampling process, take samples to determine species count by weight. This involves counting the number of fish by species from a known aggregate weight obtained using the hanging scale. Generally, the rule is to sample every 10th dip net of fish for a species count by weight. Record the aggregate weight of the catch on the *Catch-Weight Sampling Form* (Figure 3) until the live box is emptied or until they can be individually counted. When you use the catch-weight method, note its use in the ‘comments’ section of the *Daily Smolt Catch Reporting Form* (Figure 2).

The last daily smolt count is at 1200 hrs (noon), which will complete the smolt enumeration for that ‘smolt-day’. Record the daily total on the *Sockeye Salmon Smolt Summary Form* (Figure 4).

Trap Efficiency

Estimate the trap efficiency once per week by marking sockeye salmon smolts, releasing them upriver, and counting the number of recaptured smolts. Mark sockeye salmon smolts with BBY dye following the instructions listed below. Perform the process in the early evening (1900-2100 hrs) to

coincide with natural emigration timing. Keep in mind that the dyeing process is stressful on sockeye salmon smolts. Try to minimize stress as much as possible in the dyeing process by reducing excessive handling (netting), minimizing bright light (keep containers covered), maintaining cooler water temperature throughout the process (including transport and dyeing), and limiting exposure to the dye to the minimum amount of time necessary to stain the smolts. Any of these stresses can cause mortality, so avoid situations that may combine these sources of stress. Follow these steps during the mark-recapture process:

1. **Set up dyeing station at release site.** Use the same release site that was used during the 1999 – 2003 studies, which is approximately 0.5 miles upstream from the trapping location. This site is just downstream from Silver Salmon Creek and adjacent to the location of the old smolt trap site (old camp lumber is still on the bank). Place a holding box in the stream, preferably in a "pool" area, while marking smolts. Assemble other marking equipment: 30 gallon garbage can or tote, BBY dye, supplemental oxygen (O_2 bottle, regulator, tubing, air stone), aerators, thermometer, and logbook.
2. **Collect 1,100 sockeye smolts.** Collect smolts once per week for the dye test, preferably on large emigration days. Use the holding box adjacent to the trap to hold smolts. If you are unable to collect 1,100 smolts in a single night, try to collect fish over two days; however, do not hold smolts for more than three consecutive nights when trying to collect the 1,100 for marking. It is better to perform the test on a smaller number of fish than to hold fish for a longer time. Regardless, use a minimum of 500 smolts during the dye test. At the beginning of the dye test, record the time, water temperature, and number of smolts on the *Smolt Dye Release Form* (Figure 5).
3. **Move smolts to release site.** Prior to transport, record the water temperature. Place a trash can in the raft and fill the trash can half full with water. Count smolts from the holding box into the trash can. Transport smolts in the 55-gallon trash can with four aerators attached to the lid to provide aeration. If water temperatures increase above $7^\circ C$, make two trips with one-half the smolts transported on each trip.

Move smolts quickly but avoid 'sloshing' the water in the trash can. Record the number of mortalities that occur immediately following the transport. In 1999, marking and transport tasks were combined, which resulted in some smolt mortality. From 2000-2003, tasks were split (transport, dye, and recovery), which resulted in less mortality. Continue to split the tasks in 2004 (i.e., transport and then dye smolts).

4. **Dye and release smolts.** Upon reaching the release site, hold the smolts in a live box or tote anchored in the stream for a minimum of 60 minutes letting them recover from the transport. Record the water temperature at the start of the recovery period and any mortality at the end of the recovery period. If the stream temperature is $> 8^\circ C$ or there are obvious signs of stress, oxygenate the water in the live box or tote using the portable aerators and/or oxygen bottle.

When dyeing the smolts, use 1 gram of BBY dye per 8 gallons of water. Mix water (15 gallons) and dye (1.9 g) in a 30-gallon container. Use an aerator and supplemental oxygen to maintain the oxygen level. Before immersing smolts, record the water temperature in the dye

container. Using a dip net, place the smolts into the dye/water mixture; keep smolts in the mixture for 30 minutes. Keep the dye container (with the lid on) in the stream to maintain ambient water temperature. After the smolts are dyed, record any mortality that occurs and place the live smolts into the instream holding box until they are released; release the smolts between 2200 and 2300 hrs. At the time of release, transfer only the healthy smolts to water filled buckets and release them evenly across the stream. Record the number of healthy smolts released, time of release, stream temperature and other data on the *Smolt Dye Release Form* (Figure 5). Retain at least 100 healthy smolts in the instream live box (record the actual number on the *Smolt Dye Release Form*); these smolts will be used to monitor mortality induced from the dye. To prevent bird or otter predation on retained smolts, make sure to anchor and cover the box securely. Dispose of all sick and dead smolts in a manner that will not attract animals or influence trap catches (i.e., release below the trap).

5. **Examine for marked smolts.** Following the release of the dyed smolts, examine the smolts catch for marked fish. Continue monitoring for marked fish until 1200 hours of the day preceding the next dye test. The first day of smolt examination is the day of release. Calculate trap efficiency from the number of marked fish recovered relative to the number of fish released. Record mark recapture data on the *Daily Smolt Catch Reporting Form* (Figure 2), and summarize the data on the *Sockeye Salmon Smolt Summary Form* (Figure 4). Remember that the number of smolts examined in a day equals the number of marked and unmarked smolts caught that day. **Daily smolt catch will then equal the number examined minus the number marked because marked smolts were previously counted.**

There might be occasions when all the smolts are not individually counted. These will be limited to the following: 1) too many smolts emigrating to count individually without incurring mortality (i.e., using catch-weight methods) or 2) a problem with the trap. If all fish are not examined, be sure to record it with an explanation in the ‘comments’ section of the *Daily Smolt Catch Reporting Form* (Figure 2).

Dyed fish that are found dead on the wings or in the trap should be included in the total number of recaptures and noted in the comments as ‘dyed mortalities’.

6. **Monitor the instream live box for smolt mortalities induced from the dye.** Once each evening for three days after a test at approximately 1800 hrs, count and remove any dead smolts in the instream holding box; attempt to do this quickly and without stressing the smolts unnecessarily. Record the number of dead smolts on the *Smolt Dye Release Form* (Figure 5). On the fourth day after initiating a dye test, release the remaining dyed smolts from the instream live box downstream of the trap.

Age, Weight, and Length Sampling

Sample 60 sockeye salmon smolts per day, five days per week for age, weight and length. If daily sampling objectives are being met, sampling will not occur on Wednesday and Sunday. Specific procedures for collecting and recording the information are outlined in Appendix C. Obtain samples randomly (see Appendix C) from a single day’s catch, and do not mix samples between days. If less

than 60 smolts are caught in a day, the sample size for that day will be the number of fish caught on that day. **Smolts primarily migrate at night; therefore, a single sampling day will be the 24-hour period from noon to noon and will be identified by the calendar date corresponding to the first noon.**

Climate Data

Collect climate data at approximately 1800 hrs. Record this information on the *Weather Observation Form* (Figure 6). Climate data includes: water and air temperatures (°C), stream height (cm), estimated percent cloud cover, and wind direction and velocity.

CREW LEADER RESPONSIBILITIES

Season Summary Report

The crew leader is responsible for writing a season summary report. This report may be written in the field, or it may be written in the office at the end of the season. The summary report should be a brief synopsis of the field season and include the following: (1) a chronology of sampling events and data collection, (2) problems incurred during the season including sampling and field camp operations, (3) suggestions for improvements/modifications to the enumeration and sampling programs, (4) a list of equipment/building supplies that are required for the following field season, and (5) an accurate log of fuel and bottled oxygen consumption.

Daily Radio Schedule

Report daily and cumulative smolt catch, dye test information, and current trap efficiency, at approximately 1320 hours on frequency 3.230 MHz Monday through Friday and 1950 on Saturdays and Sundays. This information should be recorded on the *Daily Smolt Radio Schedule Reporting Form* (Figure 7) and carefully edited prior to radio schedule. In addition to relaying information, radio schedules are the primary means for determining crew safety. Failure to make radio schedule for two consecutive schedules will result in an emergency visit by ADF&G staff to verify the safety of the crew.

ALL FIELD PERSONNEL WILL BE AWARE OF EMERGENCY CONTACT PROCEDURES POSTED ON EACH RADIO. The emergency Coast Guard frequency is **4.125 MHz**. The Karluk Smolt camp is located at **57° 23' N lat.; 154° 03' W long**. Crew leaders must train crewmembers in the proper use of the SSB radio and satellite phones. When using the satellite phone, follow the instructions found in Appendix D; in case of emergencies contact the U.S. Coast Guard Emergency Rescue Coordination number is **800-478-5555**.

Air Charters

Kodiak staff schedule all air charters and logistics; field crews do not schedule air charters. Relay appropriate information in regard to charters through daily radio contact. It is important to label items sent back to town (e.g., Nick Sagalkin @ ADF&G; 486-1848). Contact office personnel when any data, equipment, or other freight will be “back hauled” to Kodiak.

Time Sheets and Leave

Refer to Appendix E for the proper method of filling out a timesheet. During the field season, crewmembers are responsible for keeping track of their working time. Recorded time on the time sheets should be ‘actual hours’ spent on the project. Obviously, there is a finite budget and a list of priorities. Tasks should be completed in their order of importance without accruing too much overtime. Generally, most projects can be finished within normal working hours; however, there will be occasions when the normal working day (i.e., 7.5 hours/ 5 days per week) is insufficient to complete the necessary tasks. When these situations occur the crew will work longer and record the overtime. If unusual circumstances arise that necessitate extensive overtime, the project leader should be notified immediately.

Data Management

An important duty of the crew leader is to properly record and safely store the collected data. During in-town training the project leader will review the different biological measurements and the proper way to fill out the data forms with the crew leader. In the field, it is the crew leader’s responsibility to ensure that measurements are being taken properly and accurately. The crew leader is also responsible for ensuring that the forms are completed correctly and neatly. Ensuring neatness may seem like an unnecessary time burden, but it is a very important aspect of the crew leader’s responsibilities. Collected data are scanned and errant or missing marks may erroneously become part of the database. Clear and well-organized data reflect highly on the crew leader and the crew.

Purchasing

While in town, field crews should only purchase items authorized by the project leader. During the field season, field crews may require additional items (e.g., groceries, fuel, and tools). Small lists may be read over the radio during the scheduled radio meeting; however, these lists should be limited to just a few items. Remember that radio time is limited and there are a number of other camps, state-wide, that use the same frequency. Longer lists of materials should be sent to town on supply flights. Crew leaders should track grocery expenses and limit the number of requested specialty items. Fuel is a necessity for many camp operations including heating the weatherport. However, past crews have left stoves burning during the day while working outside, unnecessarily burning fuel; these situations should be minimized.

Camp Inventory and Close Up

Inventory the camp for all gear prior to closing camp. Items of high value should be returned to Kodiak and stored in the Kodiak research locker; some items may be stored at the Frazer Lake fish pass facility. Make sure equipment is stored neatly under the platform. Sandbags, nets, and plastics will be destroyed by bears unless they are hidden. Do not leave equipment at the dye site, and make sure the camp looks clean and orderly prior to your departure. Make sure the smolt trap is secured on the bank and tied to the willow trees.

Photo Documentation

The crew leader is responsible for photo documenting project activities. Specific aspects such as trap installation, dye site, smolt sampling, and other detailed tasks are important to photograph. When possible, ADF&G cameras and film will be used. If State cameras are not available, film will be provided for use with personal cameras. The use of personal cameras is suggested in this case, but not required.

Carbon Monoxide

Several years ago an employee working at a remote field camp was exposed to excessive levels of carbon monoxide from a non-vented kerosene heater. The employee became quite ill, was briefly hospitalized in Kodiak, and received oxygen therapy before recovering from the exposure.

The misuse and/or use of improperly maintained or aging equipment fueled by kerosene, diesel, or propane such as heaters, stoves, and refrigerators increase the danger for carbon monoxide poisoning. This is a serious issue because carbon monoxide gas can be fatal. Carbon monoxide is an invisible, odorless, tasteless gas produced when fossil fuels do not burn completely, or are exposed to heat (usually fire). Symptoms of carbon monoxide exposure include:

Mild Exposure-Slight headache, nausea, vomiting, fatigue (flu-like symptoms).

Medium Exposure-Throbbing headaches, drowsiness, confusion, poor judgment, dizziness, vertigo, fast heart rate.

Extreme Exposure-Convulsions, unconsciousness, heart and lung failure. Exposure to carbon monoxide can cause brain damage and death.

If you experience any of these symptoms and suspect carbon monoxide poisoning, immediately move into an area with fresh air flow and avoid all contact with the suspected source of carbon monoxide until symptoms dissipate, and contact the ADF&G office to notify them of the problem.

It is essential that all employees review operating instructions for all equipment, which burn wood, charcoal, oil, diesel gas, gasoline, kerosene, or propane. Crew leaders must inspect all equipment to assure each item is in good working order and, if applicable, is properly ventilated.

As a safety precaution, each camp will be provided with a carbon monoxide detector. Please make sure the detector is located in a proper area and is in working order.

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APPENDIX

GEM WATERSHEDS RESEARCH PLAN:

Marine-terrestrial linkages in northern Gulf of Alaska watersheds:
Towards monitoring the effects of anadromous marine-derived
nutrients on biological production in sockeye salmon systems

I. NEED FOR THE PROJECT

A. Statement of Problem

It has long been recognized that Pacific salmon transport significant quantities of nutrients, which are derived from marine sources, into freshwater systems when they return to spawn and subsequently die (e.g., Juday et al., 1932, Koenings and Burkett 1987a). For example, a mass balance approach indicates that sockeye salmon-derived phosphorus accounts for up to 60% of the annual P loading into Iliamna Lake (Donaldson 1967). As with P, salmon are highly enriched in nitrogen (Mathisen et al., 1988). Because the N derived from adult salmon is highly enriched in ^{15}N ($^{15}\text{N} \sim 12 \text{‰}$) relative to terrestrially-derived N (atmospheric $^{15}\text{N} = 0 \text{‰}$), stable N isotopic analysis provides a tool to trace marine-derived nutrients (MDN) into freshwater environments (Mathisen et al., 1988, Kline et al., 1990, Bilby et al., 1996). Comparison of biota in salmon systems relative to nearby control systems, that are isolated from salmon, often reveal significant enrichment in ^{15}N (Kline et al., 1990, 1993, Bilby et al., 1996). As freshwater productivity is an important control on sockeye production (Koenings and Burkett 1987a) there may be feedbacks between salmon escapement, nutrient loading, aquatic productivity and subsequent salmon production that are effected by climatic change and commercial fishing (Finney et al., 2000). As marine-derived nutrients (MDN) are also important nutrient sources for riparian vegetation and terrestrial fauna such as eagles, bears and mink (e.g., Ben-David et al., 1997, 1998), changes in the strength of the anadromous marine-nutrient pump may have broad impacts in Gulf of Alaska watersheds.

Most of the research examining MDN in watersheds has focused on detecting and measuring MDN utilization by comparing communities in salmon and control systems, and through stable isotope analysis. Few studies, however, have examined the impacts of temporal changes in MDN input on watershed ecosystems, though evidence from long-term limnological monitoring and paleoecology studies indicate substantial changes can occur. Schmidt et al., (1998) used limnological data from Karluk Lake to demonstrate a reduction in freshwater carrying capacity, and subsequent salmon productivity, was linked to decreased escapement. Paleoecological data from this system clearly indicate that past changes in escapement, due to both natural climate

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change and commercial harvest, have had large impacts on lake primary and zooplankton productivity (Finney et al., 2000, 2002). Thus, holistic ecosystem-based management should consider the role of MDN in determining escapement goals in watersheds where salmon-derived nutrients are important. Any changes in escapement level may result in feedbacks that influence ecosystem processes and productivity in watersheds (e.g., Finney et al., 2000). However, methods by which to assess such changes have not been fully developed.

The project proposed here is a comprehensive study examining the role of MDN in sockeye nursery lake ecosystem productivity. Our research plan integrates studies of nutrient cycling, primary productivity, zooplankton dynamics, and juvenile sockeye abundance and growth, within a framework of stable isotope natural abundance. The study sites are an ideal pair, very similar in characteristics except for access by spawning salmon (anadromous Karluk Lake and control Spiridon Lake). The project will take advantage of the wealth of previous research including relatively long-term limnological data for both sites. This research has demonstrated the important role of MDN in the Karluk ecosystem (e.g. Koenings and Burkett, 1987b, Schmidt et al., 1998, Finney et al., 2000). Thus we anticipate that signals from MDN will be relatively strong, which will help elucidate pathways and robust analytical methods that can be applied to other systems. The research design is the first to utilize detailed vertical and temporal sampling of the water column, coupled with measurements of rates of primary productivity, and fully integrated stable isotope analyses, with contemporaneous sampling in a well matched pair of salmon and control lakes. The overall goal of this project is to provide the framework for designing monitoring projects to detect changes in marine terrestrial linkages in Gulf of Alaska sockeye watersheds.

B. Relevance to GEM Program Goals and Scientific Priorities

This project addresses the main hypotheses and questions regarding watersheds discussed in the GEM program document and current science plan. First, the measurements proposed here will determine how forces that influence salmon escapement (such as climate and fishing) influence marine-related biological production in watersheds, on time-scales from seasonal to multi-decadal (central hypothesis of GEM watersheds program). GEM identified large information gaps relating to how food and energy originating in the offshore marine environments is transported to watersheds, and in detecting changes in the variables that characterize this transfer. Specifically, results from this project will help address the following questions identified in the GEM document:

1. What is the extent to which the functioning and productivity of watersheds depends on marine-nutrient inputs?
2. How can this marine-terrestrial linkage be better detected and understood?
3. Are isotopes such as ^{15}N , ^{13}C and ^{34}S valid tools in detecting marine-related indicators and any temporal changes in their influence?

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4. How does variability in lake water nutrient composition relate to the salmon spawning cycle, and isotopic signatures in lake biota?
5. What is the temporal and spatial variability in the stable isotopic composition of lake biota, and how does it relate to differences in escapement level between watersheds, and within a watershed over time?
6. Which species are best suited to measuring marine linkages?
7. Where, when and how should these species be sampled?

The results from this project have management implications regarding the effect to which fisheries may influence the overall productivity of watersheds. If transport of nutrients from the marine environment to watersheds by salmon is important for sustaining the overall productivity of some types of watersheds, overfishing will reduce the carrying capacity of the system not only for salmon, but for other species. The extent of such "oligotrophication" in Gulf of Alaska watersheds is unknown. This study will help develop tools to detect the influence of salmon escapement on the production of biota in coastal watersheds. Such ecosystem process studies are required to implement ecosystem-based management (Mangel et al., 1996), which will require long-term monitoring of the flux of marine-nutrients. The results from this project will provide information critical in developing a monitoring program to detect annual changes in levels of marine nutrients in watersheds.

II. PROJECT DESIGN

A. Objectives

We focus on sockeye salmon (*Oncorhynchus nerka*) systems for this research, acknowledging that different processes are likely to be important in riverine systems. A focus on sockeye is justified, in part, because the sockeye is Alaska's most important salmon in terms of landed value, and productivity in freshwater systems has been shown to be an important control on adult sockeye productivity. We have selected Karluk Lake as the focus of this research for a number of reasons. First, it is a system that is perhaps the most well studied of all sockeye lakes, and probably has the best long-term limnological and fisheries data sets. The long-term limnological data set covers almost 20 years (starting in about 1980) but has recently been scaled back due to lack of funding. Because of the importance of MDN in this system, this site is ideal for process studies to learn about tracing and quantifying MDN pathways.

The project design utilizes detailed vertical and temporal sampling of the water column, coupled with measurements of rates of primary productivity, that is fully integrated with stable isotope analyses. Furthermore, the project exploits an exceedingly well-matched pair of lakes that are similar in their physical attributes except for access to salmon, with contemporaneous parallel sampling. The project proposed here is the first comprehensive study examining the role of MDN in sockeye nursery lake ecosystem productivity.

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The main objectives of this research are:

1. Conduct parallel studies of seasonal and interannual variability in nutrient concentrations, lake primary productivity, zooplankton biomass and composition, and juvenile sockeye (abundance, size and age) in a sockeye (Karluk) and nearby similar control (Spiridon) lakes.
2. Determine the stable isotopic composition (^{15}N and ^{13}C) of nutrients (nitrate) and lake biota (phytoplankton, zooplankton, juvenile sockeye) corresponding to the sampling in objective (1) both lakes.
3. Determine seasonal and interannual time-series of tributary stream nutrient concentrations and nitrate- ^{15}N .
4. Compare the data derived from objectives 1-3 to seasonal and interannual changes in sockeye escapement, and to climatic data.
5. Conduct exploratory analyses to determine the utility of ^{34}S as a tracer of MDN in lake biota.
6. Conduct exploratory analyses of ^{15}N and ^{13}C of terrestrial biota (several species of plants, birds and bears) on seasonal and interannual scales to determine relationships to MDN imports.
7. Use multivariate statistical methods to compare results between control and salmon lakes, and to determine relationships between nutrients, productivity, lake biota isotopic composition and controlling factors such as escapement level and physical processes, on seasonal and interannual timescales.
8. Synthesize results with previous limnological data to determine long-term trends in productivity and controlling factors.
9. Synthesize results with long-term paleoecological data to assess the state of the system in the longer context.
10. Develop strategies for long-term monitoring of marine-terrestrial linkages based on the results of this study.

The results of this project will test the following hypotheses:

H1: MDN significantly increase primary productivity above the background rates in similar control systems.

H2: The seasonal cycle of primary productivity is different in salmon and control lakes.

H3: Lake biota in salmon systems is enriched in ^{15}N and ^{13}C relative to that in control lakes, and has higher seasonal variability related to the salmon spawning cycle.

H4: The ^{15}N of sockeye smolts outmigrating in the spring reliably integrate relative levels of MDN in the lake during the previous year.

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H5: The transfer of MDN to juvenile salmon is dependent on lake food web interactions.

The intended research is important, as it will be the first to measure rates of productivity, as opposed to standing stocks (e.g. chlorophyll a). By conducting measurements throughout the entire water column over the course of the growing season, we will be able to fully describe the pelagic productivity cycle. A significant new aspect of this research is a fully integrated scheme of isotopic analysis, which will determine the strengths and weaknesses of isotopic tools. Finally, this project represents an important collaboration between the University of Alaska Fairbanks (UAF) and the Alaska Department of Fish and Game (ADF&G) utilizing consistent state-wide fisheries assessment methodologies combined with new approaches, with a unified goal of better understanding of these ecosystems for sustainable management.

B. Procedural and Scientific Methods

Sampling plan. The basic sampling plan will be identical for the sockeye salmon lake (Karluk) and the control lake (Spiridon). Each lake will be sampled 9 times per year for 3 years. Sampling will run from April - October, and the interval between sampling will be no more than ~1 month, with more frequent sampling during important periods.

Sampling localities at each lake consist of two pelagic stations, and two river mouth stations. The pelagic stations at each lake have been carefully selected by previous research by ADF&G. Each pelagic station will be sampled at the following depths (m): 1, 5, 10, 15, 20, 25, 30, 35, 50 and ~ 1 m off bottom. The 1 m and near-bottom depths are the normal sampling depths of the ADF&G limnological protocol (Schrof and Honnold *in press*) so the results of this project will be fully comparable to the long-term data for these lakes, and to the statewide ADF&G limnological database. Further, the detailed sampling will assess how representative these sampling depths are of overall lake nutrient and productivity cycles.

For each lake, two typical rivers will be sampled at their mouths during each of the sampling trips. These samples are designed to describe the seasonal inputs of riverine nutrients into the lakes, which will be controlled by processes such as terrestrial nutrient cycling, runoff and salmon carcass decomposition.

Water analyses and primary productivity. The following analyses will be conducted on each lake and river water sample:

TP, dissolved P, nitrate, ammonia, TKN, Si, chlorophyll *a*. Nitrate- ¹⁵N will also be measured on selected samples. The water will be filtered for POM, which will be analyzed for C%, N%, ¹⁵N and ¹³C.

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At each lake station, standard profiles/measurements of temperature, DO, secchi depth, light attenuation and conductivity will be conducted. These variables will also be measured at the river mouths. In addition, at each lake station, continuous profiles of fluorescence and nitrate will be measured. Primary productivity will be measured using dual-label nitrogen and carbon productivity measurements six times/year. These rate estimates will be focused around the sockeye returns. Nitrogen productivity will be determined at three light depths (surface, 1% light depth and 0.1% light depth) using ^{15}N -labeled nitrate and ammonium to measure uptake while carbon productivity will be determined by uptake of ^{13}C -labeled bicarbonate. The productivity samples will also provide concentrations of particulate organic carbon and nitrogen as a result of the required mass spectrometric analytical determinations of ^{15}N and ^{13}C . Rates of size-fractionated phytoplankton primary production will be monitored using ^{14}C incubations and natural sunlight using the method of O'Reilly and Thomas (1983).

Zooplankton. Vertical zooplankton hauls covering the entire water column will be conducted at each sampling period at each lake station. Species assemblages, sizes and biomass will be determined. The two main species, *Bosmina* and *Cyclops*, will be physically separated under a dissecting microscope for separate ^{15}N and ^{13}C analyses.

Juvenile sockeye salmon. Smolts outmigrating in the spring will be estimated at each lake using a smolt trap and, where applicable (Karluk), mark-recapture experiments (smolts outmigrating from Spiridon Lake are estimated by a time counting method). In addition, fry stocking levels will be known for each year at Spiridon Lake. Lengths, weights, and ages will be estimated by obtaining samples throughout the outmigration period. Representative samples will be collected for ^{15}N and ^{13}C analysis (40 per lake per year). Scale pattern analyses will be conducted to determine seasonal and annual variations in growth, which may be related to limnologic conditions.

Adult salmon. Under separate funding, adult salmon returning to Karluk Lake are counted through a weir installed each year in Karluk River (Kuriscak *in press*). There is no escapement to Spiridon Lake because none of the adults returning are able to enter the lake due to impassable barrier falls. Sockeye salmon originally stocked into Spiridon Lake are harvested in traditional fishing areas as they return to Telrod Cove, where the outlet of the lake enters the ocean (Honnold 1997). Adults not harvested in traditional areas are harvested in the Spiridon Lake Terminal Harvest Area (SLTHA) in Telrod Cove. Commercial, sport, and subsistence harvests are tracked via the ADF&G fish ticket database and are assigned to stock of origin, including the Karluk Lake and Spiridon Lake (Witteveen et al., *in press*). The ^{15}N and ^{13}C composition of adult sockeye have been determined, but will be further assessed during the course of this study.

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Exploratory studies.

a) ³⁴S analysis. We will test the utility of ³⁴S analysis in detecting and tracing MDN, through analyses of selected samples. Peterson and Howarth (1987) suggest that such analyses have the potential to trace marine sources, and have different isotopic controls than ¹⁵N and ¹³C.

b) *Terrestrial linkages.* We will explore linkages of MDN in terrestrial sites through several pilot studies. The ability of terrestrial vegetation to respond to MDN inputs will be assessed by sampling several plant species along transects at our river sites for both salmon and control systems. Sampling will be conducted 4 times per year for ¹⁵N and ¹³C analysis. Growth responses of streamside willows to MDN will be assessed by tree ring analysis of cores collected at these sites following the methods of Drake et al., (2002). We will also attempt to secure non-destructive samples of birds (i.e. feathers) and mammals such as bears (fur, claws) to assess the levels MDN through ¹⁵N and ¹³C analysis.

Methodological details.

Stable isotopes. Stable isotopes will be measured using standard techniques on a Finnigan Delta Plus mass spectrometer housed at UAF. Accuracy and precision of the ¹⁵N and ¹³C analyses is *within* 0.1-0.3 o./oo. Briefly, POM is scraped of combusted GF/F filters for isotopic analyses. Separated zooplankton samples, or fish muscle samples are dried and homogenized prior to analysis.

Water column sampling. Vertical gradients of temperature and conductivity will be gathered with a SBE19 SeaCat CTD equipped with a fluorometer and an *In Situ* Ultraviolet Spectrometer (ISUS) for the direct determination of nitrate. The continuous profiles will determine distributions at approximately 5 cm resolution from surface to the bottom. Underwater light intensity (foot-candles) or downward irradiance will be measured using an International Light model 1350 submersible photometer sensitive to the visible spectral range (400-700 nm) as described by Honnold et al., (1996) and Schrof et al., (2000). For each survey at each station, dissolved oxygen concentrations will be measured at 1-m increments throughout the water column or to a maximum depth of 50 m using a YSI model 57 or 53 oxygen analyzer (Honnold 1997, Schrof et al., 2000). Water samples and CTD profiles will be collected nine times each year at two pelagic stations in each lake and two river stations per lake. Water samples will be collected at between the surface and bottom at 5 m intervals and will include the past sampling depths of ADF&G of 1 m below the surface and 1 m above the bottom according to standards developed by the former Statewide Limnology Section of the ADF&G (Koenings et al., 1987). The water samples collected to parallel previous ADF&G sampling will be handled, preserved and processed according to Koenings et al., (1987) as described by Schrof et al., (2000).

Sub-samples of the water collected from 1 m and 1 m above the bottom will be processed in the laboratory for conductivity, pH (Koenings et al. 1987), and alkalinity (mg L⁻¹ as CaCO₃; AHPA

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1985). Calcium and magnesium (Golterman 1969), as well as total iron concentrations will be analyzed (Golterman 1969; Strickland and Parsons 1972). Turbidity, expressed as nephelometric turbidity units (NTU), will be measured with a calibrated HF model DRT100 turbidimeter (Koenings et al. 1987). Water color will be calculated after Koenings et al. (1987). Filterable reactive phosphorus (FRP) will be analyzed by the molybdate blue-ascorbic acid method (Murphy and Riley 1962) as modified by Eisenreich et al. (1975) and total phosphorus (TP) as described by Eisenreich et al. (1975). Nitrate + nitrite ($\text{NO}_3^- + \text{NO}_2^-$), ammonia (NH_4^+), and total Kjeldahl nitrogen (TKN) will also be analyzed (Stainton et al. 1977; Crowther et al. 1980). Soluble reactive silicon (SR-Si) concentrations will be determined using the automated ascorbic acid reduction procedure (Stainton et al., 1977). Samples for particulate organic carbon (POC) analysis will use the wet oxidation technique with dichromate (Newel 1982). Chl *a* samples will be processed, filtered, and analyzed using methods described by (Koenings et al., 1987, Honnold 1997, Schrof et al., 2000).

Lake Productivity. Six times each year dual label nitrogen and carbon productivity measurements will be obtained at the 4 lake/river locations at times focused around the sockeye returns. Nitrogen productivity will be determined at three light depths (surface, 1% light depth and 0.1% light depth) using ^{15}N -labeled nitrate and ammonium to measure uptake while carbon productivity will be determined by uptake of ^{13}C -labeled bicarbonate. The productivity samples will also provide concentrations of particulate organic carbon and nitrogen as a result of the required mass spectrometric analytical determinations of ^{15}N and ^{13}C . Chlorophyll and nutrient (nitrate, ammonium, nitrite, silicate and phosphate) concentrations will be determined at each productivity depth. All chlorophyll samples will be fractionated into $>5\mu\text{m}$ and $<5\mu\text{m}$ sizes to estimate the contribution of microplankton to the production cycle. If significant chlorophyll biomass is obtained in the $<5\mu\text{m}$ size fraction of chlorophyll, then ^{14}C -labeled bicarbonate may be utilized to measure the rate of primary productivity of both the large and small sizes of phytoplankton. A water sample of phytoplankton will also be preserved for general taxonomy, size distributions and abundance from each of the productivity stations.

Ambient nutrient concentrations. For calibration of the ISUS nitrate instrument, nutrient samples will be quick frozen in a salt-ice mixture in the field and kept frozen until analysis in the UAF chemical laboratory. The samples will be quick thawed in cold water and analyzed with an Alpkem Model 300 Rapid Flow Analyzer using methods modified for small volume glassware (Whitledge et al., 1981). Prior to analysis of field samples, calibration of the automated nutrient channels will be performed before each set of samples using five concentrations for each nutrient analyte. Detailed protocols of standards and their preparation are described by Whitledge et al., (1981) and have been used for freshwater/marine samples from 1975 through the present.

Zooplankton. Vertical zooplankton hauls will be collected using a 0.2-m diameter, 153 μm mesh, conical net (Honnold et al., 1996, Honnold 1997) using standard collection techniques (Schrof et al 2000). Net contents from each tow will be preserved (Schrof et al., 2000) and

cladocerans and copepods identified according to taxonomic keys in Pennak (1989) and Thorp and Covich (1991). Zooplankton will be enumerated and measured and the mean body length for each taxon calculated (Honnold 1997, Schrof et al., 2000). Zooplankton biomass will be estimated from specie-specific linear regression equations between length and dry weight derived by Koenings et al., (1987).

Smolt Abundance and Size at Age. The study design will include continuing smolt trapping programs at the outlet streams of Karluk (proposed for funding here) and Spiridon (will be funded by the Kodiak Regional Aquaculture Association) lakes. Site descriptions and trapping configurations are similar to other smolt enumeration and sampling projects in the Kodiak Island, Alaska Peninsula, and Aleutian Island regions (Honnold 1999, Schrof et al., 2000, ADF&G 2002, *in press*; Bouwens 2003, Bouwens and Newland 2003, Sagalkin and Honnold *in press*, Schrof and Honnold *in press*). The traps will be fished daily for the duration of the smolt outmigration (~1 May until ~31 June). The trapping system at Spiridon is designed to trap all outmigrating smolt, which are diverted around a series of stream barriers (waterfalls) through a pipeline. The Karluk Lake program only traps a portion of the outmigrating smolt. Detailed methods for trap installation, operation, and maintenance are described in ADF&G (2002, *in press*) and Sagalkin and Honnold (*in press*).

Since smolt primarily migrate at night, a single trapping (and sampling) day will be the 24-hour period from noon to noon and will be identified by the calendar date corresponding to the first noon. All fish caught in the smolt trap will be enumerated. In an event where direct enumeration is not possible (Karluk) due to high migration levels, it will be necessary to estimate trap catch using the Catch-Weight Method (ADF&G 2002, *in press*). Species identification will be determined according to Pollard et al., (1997).

A random sample of 40 sockeye salmon smolt will be collected per day for five consecutive days per statistical week and sampled for age, weight, and length (AWL) data as described in ADF&G (2002, *in press*). Age, weight, and length data will be summarized by week and condition factor will be determined for each smolt sampled (Bagenal and Tesch 1978).

In order to estimate the total sockeye salmon smolt outmigration from Karluk Lake, the trap efficiency will be determined. Mark-recapture techniques will be utilized using Bismark Brown Y dye according to Carlson et al., (1998) and ADF&G (2002, *in press*). Once a week, a sample of about 1,000 sockeye salmon smolt will be collected for marking. Data collected from mark-recapture trials will be analyzed according to Carlson et al., (1998) to generate smolt outmigration estimates by age class.

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C. Data Analysis and Statistical Methods

A number of approaches will be used in analyzing the data from this project. Multivariate statistical techniques as well as time series techniques will be employed to determine differences between control and salmon systems, and relationships to possible controlling factors. As some of the measurements and techniques we will employ are similar to those used by ADF&G in the past, our results will extend historical observations for these systems, and be compared with historical observations from other lakes in the ADF&G database. It is envisioned that these results will describe the variability in key variables, such that future studies can be designed with adequate statistical power to detect significant changes.

D. Description of Study Area

Karluk Lake is located on the southwest end of Kodiak Island, Alaska (57.40 N – 154.08 W) and has a surface area of 39.5 km², a mean depth of 49 m, and a maximum depth of 126 m (Schrof and Honnold, *in press*). The lake is considered oligotrophic and has a water residence time of about 4.8 years, and a light compensation point (euphotic zone depth) of 23 m (Koenings and Burkett, 1987b). The Karluk Lake watershed (282 km²) is surrounded by rolling hills and small mountains with predominantly shrub tundra vegetation and is located in an area with a mean annual precipitation of about 170 cm. The Karluk Lake sockeye salmon escapement was about 850,000 in 2002, which is higher than the long-term average escapement of about 650,000 sockeye salmon.

Spiridon Lake is located on the southwest side of Kodiak Island, Alaska (57.67 N– 153.65 W) about 56 km north of Karluk Lake (Schrof and Honnold, *in press*). The lake has a surface area of 9.2 km², a mean depth of 34.7 m, a maximum depth of 82 m, and is characterized as an oligotrophic system (Kyle et al., 1990). Runoff from Spiridon Lake flows in a southeasterly direction via the 2.4 km Telrod Creek emptying into Spiridon Bay at Telrod Cove located approximately 7.2 km northwest from the head of the bay (KNWR 1991). The watershed drains an area of approximately 60 km², and with a mean annual precipitation of 101.5 cm, the lake-water residence time is 7.1 years. Adult salmon cannot access Spiridon Lake due to a series of barrier falls. The lake has been stocked with juvenile sockeye salmon each year since 1990 and all returning adults are harvested in traditional fisheries and in a designated terminal harvest area (Schrof and Honnold, *in press*). The annual run, as a result of stocking, is about 270,000 adult sockeye salmon.

E. Coordination and Collaboration with Other Efforts

This project will coordinate with ongoing Kodiak Management Area (KMA) ADF&G salmon research and management projects. Specific projects include: the ongoing KRAA funded smolt

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enumeration and sampling program at Spiridon Lake (Steve Schrof, PI, ADF&G); the ADF&G weir program at Karluk River (Kevin Brennan, Area Management Biologist, ADF&G); the overall Division of Commercial Fisheries, Westward Region limnology sampling program (Patricia Nelson, Finfish Research Supervisor, ADF&G); the KMA catch sampling program (Mark Witteveen, PI, ADF&G); and the KRAA funded Frazer Lake fish pass project (Patricia Nelson, Finfish Research Supervisor, ADF&G). Collaboration will occur in terms of field logistics, personnel sharing, equipment sharing, and field sampling, where appropriate. The project will also coordinate with the managers of the ADF&G Westward Region limnology database in terms of data sharing and inclusion of the data collected throughout this project.

This project is also related to GEM research project 02649: Reconstructing Sockeye Populations in the Gulf of Alaska over the Last Several Thousand Years: The Natural Background to Future Changes. Both projects are concerned with measuring marine-related phenomena in the GEM area watersheds, though the ongoing project is a retrospective study of sockeye abundance in Prince William Sound and the Kenai River watershed using the stable isotope tracers present in the sediments of spawning lakes.

We will also synthesize our results with ongoing ADF&G research on limnological aspects of sockeye salmon productivity such as those conducted by Ken Bouwens (Chignik Lake watershed; Bouwens and Finkle 2003) and Jim Edmundson (statewide lake systems).

III. SCHEDULE

A. Project Milestones

- Milestone 1. Conduct year 1 field sampling.
To be met by October 2004
 - Milestone 2. Complete analyses of year 1 samples.
To be met by March 2005
 - Milestone 3. Preliminary data analysis and planning for year 2 sampling.
To be met by April 2005
 - Milestone 4. Conduct year 2 field sampling.
To be met by October 2005
 - Milestone 5. Complete analyses of year 2 samples.
To be met by March 2006
 - Milestone 6. Preliminary data analysis and planning for year 3 sampling.
To be met by April 2006
 - Milestone 7. Conduct year 3 field sampling.
To be met by October 2006
 - Milestone 8. Complete analyses of year 3 samples. This will result in completion of objectives 1-3, 5 and 6.
To be met by March 2007
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-Continued-

Milestone 9. Complete data analysis and begin manuscript preparation.

To be met by April 2007

Milestone 10. Complete statistical analyses to meet objectives 4, 7-10. Submit manuscript.

To be met by August 2007

B. Measurable Project Tasks

FY 04, 1st quarter (October 1, 2003-December 31, 2003)

October: Project funding approved by Trustee Council

FY 04, 2nd quarter (January 1, 2004-March 31, 2004)

January 12-16 (tentative): Annual GEM Workshop

FY 04, 3rd quarter (April 1, 2004-June 30, 2004)

April: Prepare gear for field season.

June 30: Complete 3 field samplings, begin analyses.

FY 04, 4th quarter (July 1, 2004-September 30, 2004)

September 30: Continue year 1 field work and sample analyses.

Submit annual report to Trustee Council Office.

FY 05, 1st quarter (October 1, 2004-December 31, 2004)

December 31: Finish year 1 field work, and continue lab analyses.

FY 05, 2nd quarter (January 1, 2005-March 31, 2005)

(dates not yet known) Annual GEM Workshop

March: Complete analyses of year 1 samples.

FY 05, 3rd quarter (April 1, 2005-June 30, 2005)

April: Prepare gear for field season.

June 30: Begin year 2 field samplings, begin analyses.

FY 05, 4th quarter (July 1, 2005-September 30, 2005)

September 30: Continue year 2 field work and analyses.\

Submit annual report to Trustee Council Office

FY 06, 1st quarter (October 1, 2005-December 31, 2005)

December 31: Finish year 2 field work, and continue lab analyses.

FY 06, 2nd quarter (January 1, 2006-March 31, 2006)

(dates not yet known) Annual GEM Workshop

March: Complete analyses of year 2 samples.

-Continued-

FY 06, 3rd quarter (April 1, 2006-June 30, 2006)

April: Prepare gear for field season.

June 30: Begin year 3 field sampling and analyses.

FY 06, 4th quarter (July 1, 2006-September 30, 2006)

September 30: Continue year 3 field work and sample analyses.

FY 07, 1st quarter (October 1, 2006-December 31, 2006)

December 31: Finish year 3 field work, and continue lab analyses.

FY 07, 2nd quarter (January 1, 2007-March 31, 2007)

(dates not yet known) Annual GEM Workshop

March: Complete analyses of all samples.

FY 07, 3rd quarter (April 1, 2007-June 30, 2007)

April 15 Submit final report (which will consist of draft manuscript for publication) to
Trustee Council Office

IV. RESPONSIVENESS TO KEY TRUSTEE COUNCIL STRATEGIES

A. Community Involvement and Traditional Ecological Knowledge (TEK)

The ADF&G will present the project design to the Kodiak/Aleutians Federal Subsistence Regional Advisory Council, the Kodiak National Wildlife Refuge Staff, the Kodiak Regional Salmon Planning Team, Kodiak Subsistence Councils, Kodiak Native Associations, the Kodiak Sport Fishing Association, and the U.S. Coast Guard for review and comment. The results of these consultations will be considered prior to writing any reports, finalizing operational plans, and implementing the field project. Data collected will also be shared with these groups through copies of inseason and annual reports. The ADF&G will give preference to local residents, including qualified residents of the Villages of Karluk, when hiring sampling crews. If appropriate, internships will be developed through the University of Alaska to provide career-track positions. Local employees will be trained in various biological data collection techniques and will be educated in many research applications that assist with salmon management. The study site will be located in an area of high recreational use and frequent interaction with the public will occur. Employees will be encouraged to provide accurate information to the public regarding the goals and objectives of the project, which will promote increased interaction among subsistence users, organizations, the community, and agencies.

-Continued-

B. Resource Management Applications

As stated earlier in the section “Need for the Project,” the results from this project have management implications regarding the effect to which fisheries may influence the overall productivity of watersheds. The results from this project will provide information critical in developing a monitoring program to detect annual changes in levels of marine nutrients in watersheds.

V. PUBLICATIONS AND REPORTS

We will prepare annual reports by September 1 of each fiscal year for which funding is received, and a final report upon project completion. We anticipate several publications of project results in peer-reviewed journals during the course of this project, including a major paper synthesizing key results.

VI. PROFESSIONAL CONFERENCES

We hope to present project results at professional conferences, though no funds are requested here. We will have representation at the annual GEM workshops during this project.

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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.

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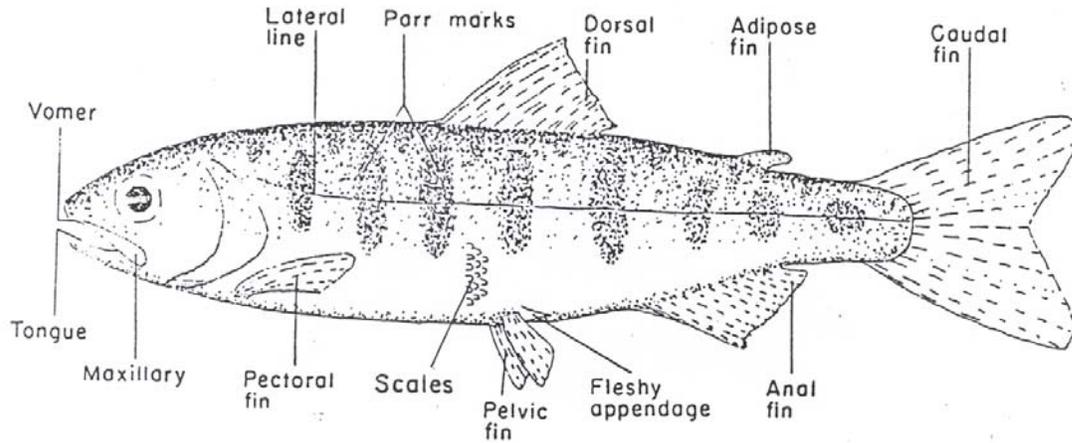


Figure 1.—A hypothetical salmonid showing external characteristics.

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

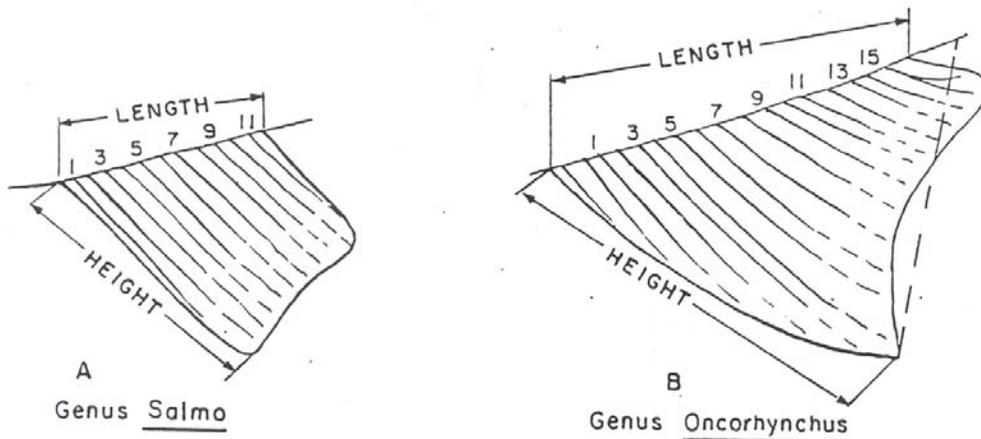


Figure 2.—Anal fins: (A) Trout, genus *Salmo*; (B) Pacific salmon, genus *Oncorhynchus*. The two drawings show differences in structure and fin ray count. (Note that the length of the anal fin is its overall basal length, and its height is that distance from the origin of the fin to the tip of the anterior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

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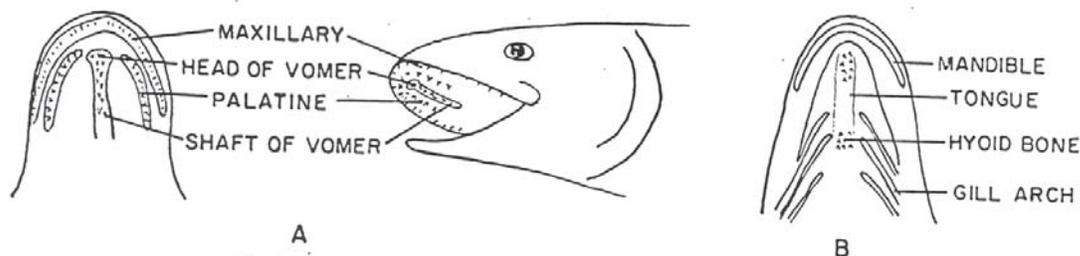
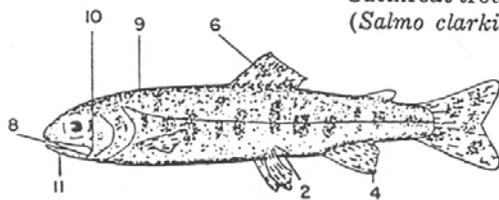


Figure 3.—Location of dentition in (A) the roof and (B) the floor of the mouth of salmonid fishes. (Presence or absence of teeth on the vomer or tongue may be determined by use of the little finger or a blunt instrument. The small hyoid teeth at the base of the tongue are located between the gill arches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

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

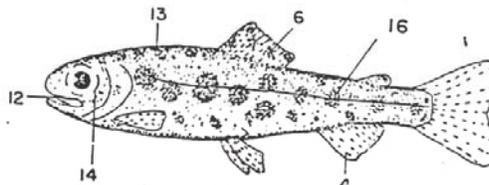
7. (53) Adipose fin not orange; no row of pale round spots along lateral line.
8. (12) *Small hyoid teeth at base of tongue. (Fig. 3B)
9. (13) Not more than five parr marks on mid-dorsal ahead of dorsal fin.
10. (14) Maxillary reaching past posterior margin of eye.
11. (15) Red or yellowish hyoid mark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

Cutthroat trout
(*Salmo clarki*)



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

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

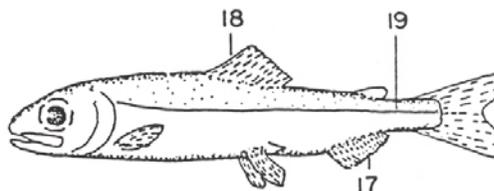


17. (4) Anal fin longer than high, with 13 or more developed rays. (Fig. 2B)
18. (6) Dorsal fin without large dark spots, may be black tipped.

Pacific salmon
Genus *Oncorhynchus*

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

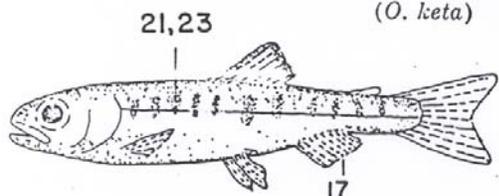
Pink salmon
(*O. gorbuscha*)



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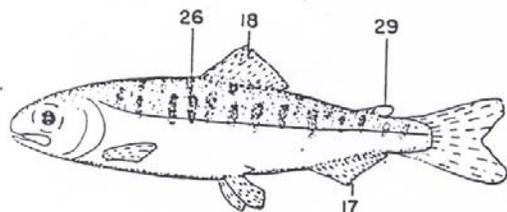
- 20. (16) Parr marks present as vertical bars or oval spots.
- 21. (30) Parr marks short, extending little, if any, below lateral line.
- 22. (25) Gill rakers on first arch, 19 to 26. ** Pyloric caeca, 140 to 186.
- 23. (26) Parr marks faint. Sides below lateral line iridescent green.
- 24. (27) Small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

Chum salmon
(*O. keta*)



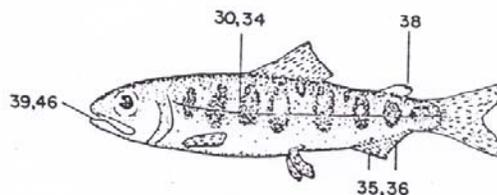
- 25. (22) Gill rakers on first arch, 30 to 40. **Pyloric caeca 60 to 115.
- 26. (23) Parr marks usually sharply defined. Sides below lateral line silvery, not iridescent green.
- 27. (24) Relatively large when migrating from fresh water, approximately 3 to 5 inches (80 to 126 mm) long.
- 28. (31) Gill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

Sockeye salmon
(*O. nerka*)



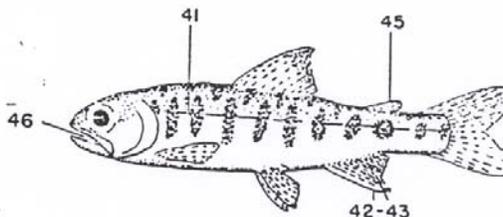
- 30. (21) Parr marks large, vertical bars centered by lateral line.
- 31. (28) **Gill rakers short and thick, fewer than 29 on first arch.
- 32. (29) Adipose fin at least partially pigmented.
- 33. (40) **Pyloric caeca more than 90.
- 34. (41) Parr marks broader than interspaces.
- 35. (42) Anterior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



-Continued-

47. (1) Adipose fin not present; scales present or lacking.
Not Salmonidae
48. (2) No fleshy appendage at base of pelvic fins.
Smelts
Family Osmeridae
49. (3) Mouth small, not reaching center of eye; teeth weak or absent.
50. (51) Depressed dorsal fin, shorter than head.
Whitefishes
Genus *Coregonus*
51. (50) Depressed dorsal fin, longer than head.
Arctic grayling
(*Thymallus arcticus*)
52. (5) **Teeth on head of vomer only.
Chars
Genus *Salvelinus*
Dolly Varden (*S. malma*)
53. (7) Adipose fin orange; row of distinct pale round spots along lateral line.
Brown trout
(*Salmo trutta*)

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Appendix C.1. Smolt age-weight-length (AWL) sampling materials and methods.

Annually, outmigrating salmon smolts are sampled for age (scales), weight, and length, by field crews throughout the Westward Region. These data are essential for sound management of the State's salmon resources.

To be useful, data must be recorded on the age, weight, length (AWL) optical scanning (opscan) forms neatly and accurately. In addition, scale samples must be collected and mounted properly to ensure accurate age determination. The following procedures are to be strictly adhered to when sampling juvenile salmon for age, weight, and length.

Complete each section on the left side of the AWL form using a No.2 pencil and darken the corresponding circles as shown in the figures. Make every effort to darken the entire circle as the optical scanner, which reads and records the data from the AWL forms, may not recognize partially filled circles. Be sure to transfer the litho code, located in the left margin on the front side of the AWL form to the back side of the form by darkening the appropriate circles (see Appendix C.3.).

Label only one form at a time to avoid a "carbon paper effect" resulting in stray marks. Special care should be used to ensure that stray marks do not occur on either side of the AWL form. Stray marks and scuffed AWL forms can severely hamper scanning. The AWL forms should be treated carefully; the scanner in the Kodiak office cannot read damaged forms. The forms should not be stapled, bent, paper-clipped or folded. Specific instructions for completing AWL forms are listed in Appendix C.2 and an example of an AWL form filled out for smolts sampled can be found in Appendix C.3.

All juvenile salmon AWL data will be recorded in a field notebook dedicated to smolt sampling. These data will then be transferred from the field notebook to the AWL forms. Each species will have its own AWL sample number series that runs sequentially throughout the season. Up to 40 individual fish per smolt day may be included in one AWL sample. If more than 40 fish are sampled in a single smolt day, then multiple AWL numbers will be used on that day. For example, if 70 sockeye salmon smolts are sampled in a single day (day 1), the AWL numbers will be AWL #001 (fish 1-40; 8 slides) and AWL #002 (fish 1-30; 6 slides). The next day will start with AWL #003. Each day's sample will start with a new AWL number.

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

Tricane Methanesulfate (MS-222) will be used to anesthetize the smolts; latex gloves will be worn to prevent direct exposure to the anesthetic. The use of this chemical will be demonstrated by experienced personnel. A small amount (approximately 1 g) of MS-222 and a

-Continued-

small amount of baking soda will be dissolved in approximately 2 L of cold water. The amount of anesthetic used will vary depending on the water temperature, freshness of the chemical, and size of the smolts. A few smolts will be placed in the anesthetic solution until subdued to a point where they can no longer flex their axial musculature but can still ventilate their gills. The concentration of the solution should be such that it immobilizes the fish in 2-3 minutes. After the fish are anesthetized, it is important to sample them quickly and place them in a recovery container to prevent mortality. No more than 80 smolts will be anesthetized with one batch of solution.

After the smolts have been immobilized, excess water will be gently removed from the fish using a paper towel or a wet sponge as a blotter. Place the fish on its right side to sample the left side. Measure smolt length, to the nearest mm, from tip-of-snout to tail fork (Appendix C.4). Record length by blackening the appropriate column circles on the front side of the AWL form. When collecting length data, take care to ensure that each length corresponds to the appropriate scale smear mounted on the slide, as length-at-age is evaluated for each sample. Weigh each smolt to the nearest 0.1 g, and record the weight by blackening the appropriate column circles on the back side of the AWL form.

On salmon species, the preferred scale is located where a straight line between the posterior insertion of the dorsal fin and the anterior insertion of the anal fin crosses the second scale row dorsal to the lateral line. In smolts, the area directly around this scale is considered the preferred area (Appendix C.4). If scales are not present in this area then scales should be taken from the secondary location, which is the same area on the right side of the fish. A scalpel will be used to remove 5-10 scales from the preferred area. These scales will be mounted on a glass slide using a probe to position the scales. Scales from five fish will be mounted on each slide. The scalpel will be wiped clean of scales and slime between each fish. A diagram of a slide with scales mounted correctly is located in Appendix C.5.

The left portion of each slide will be labeled with AWL number, sample location, species, date, and inclusive fish numbers. A diagram of a properly labeled slide is located in Appendix B.5. After sampling, fish will be held in a recovery container until they are swimming normally and then released downstream of the trapping location. When the slides are completed, return them to the box in order by AWL # and fish #. Label the slide box on top with the information listed in Appendix C.5.

Appendix C.2. Procedure for recording salmon smolt age-weight-length data on AWL forms.

Smolt length and weight will be recorded on AWL forms (Appendix C.3.). Using a No.2 pencil, complete each section of the left side of the AWL and darken the corresponding blocks.

Fill out each of the following:

Description

Record the following: species, location, year and samplers names (e.g., sockeye smolt, Frazer fish pass, 2003, Sagalkin, Schrof).

Card

The AWL forms and corresponding slides are numbered sequentially by date throughout the season starting with 001. A new, consecutively numbered AWL form is used each day even if the previous AWL form is not full. There may be a minimum of one fish and a maximum of 40 fish (8 slides) per AWL form.

Species

Refer to the reverse side of the AWL form for the correct one digit code (e.g., sockeye = 2).

Day, Month, Year

Use appropriate digits for the date the fish are sampled.

District

List the district in which the fish were sampled: Karluk = 255.

Subdistrict (Section)

List the subdistrict in which the fish were sampled: Karluk = 10.

Stream

List the stream in which the fish were sampled: Karluk = 101

Location

Leave blank

Period

List the period (sample week) in which the fish were sampled (Appendix C.6.).

-Continued-

Project and Gear

Refer to the reverse side of the AWL form for the correct code. For example, smolt samples collected in a trap would have a project code of 8 and a gear code of 00.

Mesh

Leave blank unless specifically instructed by supervisor to do otherwise.

Type of length measurement

Refer to the reverse side of the AWL form for the correct code (e.g., tip of snout to tail fork = 2).

Number of scales per fish

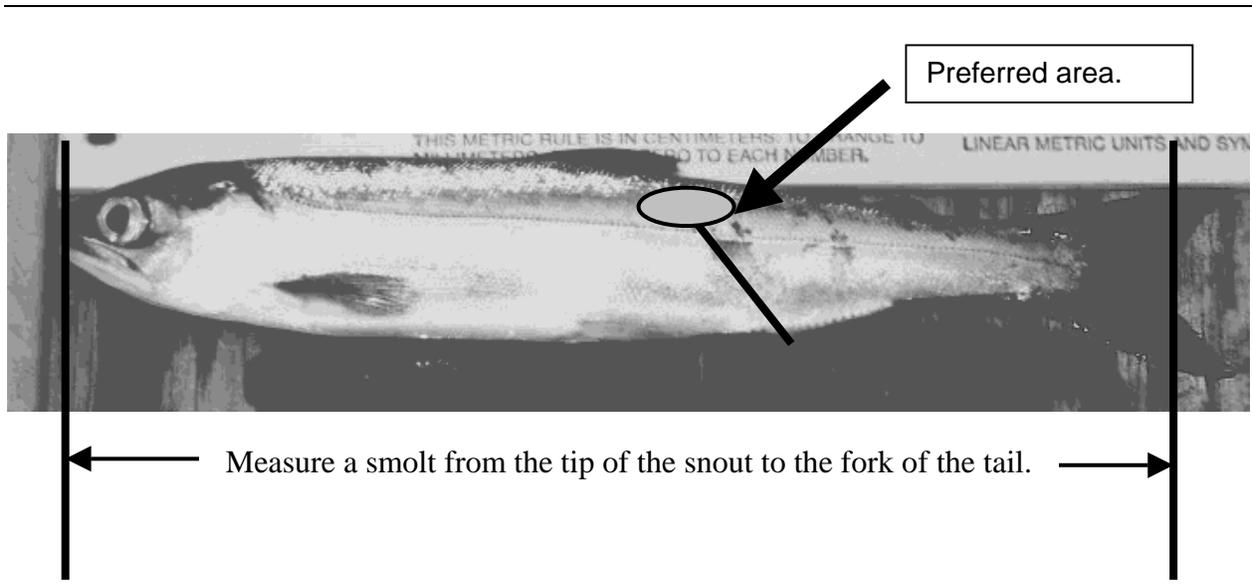
Fill in the number of scales (smears) collected per fish. For smolts, one scale smear per fish is collected.

of cards

of cards always = 1 (each AWL form is individually numbered).

If possible, keep the AWL forms in numerical order throughout the season and keep all forms flat, dry, and clean. Remember, when sampling smolt, weight data is recorded on the back side of the AWL form and the litho code, located in the left margin on the front side of the AWL form must be transferred to the back side of the form (see Appendix C.3). The litho code is the number unique to each AWL form and copying the litho code from the front to the back of the form indicates weight data was transcribed on the back of the form for the Optical scanning machine to read. Fish slime and water curling may cause data to be misinterpreted by the optical scanning machine. **It is the responsibility of the crew leader to make sure that all forms are carefully edited before returning them to their supervisor.**

Appendix C.4. Photo of a smolt with the preferred area highlighted.



Appendix C.5. An example of two correctly labeled smolt slides representing fish 1 through 10 from a sample collected on 5/11/00.

AWL 001 Sockeye Bear Lake 5/11/00 Fish 1 - 5	<table style="border: none;"> <tr> <td style="text-align: center;">1</td> <td></td> <td></td> <td></td> <td style="text-align: center;">5</td> </tr> <tr> <td>•</td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> </tr> </table>	1				5	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
1				5																																					
•	•	•	•	•																																					
•	•	•	•	•																																					
•	•	•	•	•																																					
•	•	•	•	•																																					
•	•	•	•	•																																					
•	•	•	•	•																																					
•	•	•	•	•																																					
AWL 001 Sockeye Bear Lake 5/11/00 Fish 6-10	<table style="border: none;"> <tr> <td style="text-align: center;">6</td> <td></td> <td></td> <td></td> <td style="text-align: center;">10</td> </tr> <tr> <td>•</td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> </tr> </table>	6				10	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6				10																																					
•	•	•	•	•																																					
•	•	•	•	•																																					
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•	•	•	•	•																																					
•	•	•	•	•																																					
•	•	•	•	•																																					
•	•	•	•	•																																					

When the slides are completed, return them to the box in order by AWL # and fish #, and label the slide box on top with the following information:

Location: Lake name
 AWL Number: AWL 001-003
 Beginning and end dates of sample: 6/12-7/13/00
 Sockeye Salmon Smolt

Appendix C.6. Sampling weeks and associated calendar dates, 2004.

Week	Calendar Dates	Week	Calendar Dates
10	01-Mar to 07-Mar	27	28-Jun to 04-Jul
11	08-Mar to 14-Mar	28	5-Jul to 11-Jul
12	15-Mar to 21-Mar	29	12-Jul to 18-Jul
13	22-Mar to 28-Mar	30	19-Jul to 25-Jul
14	29-Mar to 04-Apr	31	26-Jul to 1-Aug
15	05-Apr to 11-Apr	32	2-Aug to 8-Aug
16	12-Apr to 18-Apr	33	9-Aug to 15-Aug
17	19-Apr to 25-Apr	34	16-Aug to 22-Aug
18	26-Apr to 02-May	35	23-Aug to 29-Aug
19	03-May to 09-May	36	30-Aug to 5-Sept
20	10-May to 16-May	37	6-Sept to 12-Sept
21	17-May to 23-May	38	13-Sept to 19-Sept
22	24-May to 30-May	39	20-Sept to 26-Sept
23	31-May to 06-Jun	40	27-Sept to 3-Oct
24	07-Jun to 13-Jun	41	4-Oct to 10-Oct
25	14-Jun to 20-Jun	42	11-Oct to 17-Oct
26	21-Jun to 27-Jun	43	18-Oct to 24-Oct
		44	25-Oct to 31-Oct

Appendix D. Satellite Telephone and Dispatch Instructions.

The following information serves as a Policy Statement regarding the allowable uses of ADF&G satellite phones and Instructions on the proper method to successfully set up and operate the satellite phone system assigned to your camp.

These systems are not like standard telephones or cell phones, nor are they like a single side band or VHF radio. Communication is sent through the transmitter to low level satellites, then is beamed down to ground stations, either directly to another satellite phone system or to a switching station linked to standard telephone lines. As such, there is a much higher cost involved in operation than with standard telephone long distance or cell phone charges.

Under NO CIRCUMSTANCES may you use this satellite phone system for personal calls, unless, for each event, you have obtained direct and explicit permission from your supervisor. This does not mean that field crew leaders may grant permission for personal use of this phone. Only the project biologist may give you such permission. ANY DELIBERATE MISUSE OF THIS SYSTEM, SUCH AS MAKING UNAPPROVED, NON-EMERGENCY, OR PERSONAL CALLS, WILL RESULT IN DISCIPLINARY ACTION, WHICH MAY INCLUDE SUSPENSION OR DISCHARGE.

The primary purpose for having this satellite phone is for secure, reliable communications between remote field stations and ADF&G offices (Kodiak, Chignik, Cold Bay, Sand Point, or Port Moller), ADF&G research vessels (Resolution or K-Hi-C), Fish and Wildlife Protection vessels and offices, or other field camps that are similarly equipped. The secondary purpose is for your SAFETY. With these phones you are capable of directly dialing emergency services at any time of the day or night. It is essential that these phone systems are maintained in good working order, are fully charged or hooked to sufficient power at all times, and remain free for official or emergency use.

INSTRUCTIONS

The portable sat phone unit must be charged with power. There is an internal battery pack, and a 12-volt adapter is available in order to hook the phone to a larger battery bank, that may in turn be recharged by generator or solar panels.

Turn the unit on using the power switch in the lower left corner. A green light, just above the switch, should come on indicating that the unit is sufficiently powered. If no light or a red light comes on, you will need to charge the unit, or attach it to your 12-volt battery bank via the appropriate connections.

The back, or top, of the briefcase-like unit is the antenna, and it must be oriented correctly in order to access the receiving satellite. The top of the case should be open and

-Continued-

pointed in a general east-southeast direction. You must have a fairly clear line-of sight to the horizon in that direction; this unit will NOT work through walls or mountains. The angle of the antenna should be almost vertical; remember to lock the support arm that attaches the lid to the main body of the unit, along the right side.

This system has two means for calling; a telephone-like handset (for dial in or dial out phone calls), and a push-to-talk microphone (for ‘dispatch’, unit to unit, calls). All calls made with the handset are billed per minute of use, at an expensive rate. All calls on the ‘AlaskaNet’ dispatch system, using the microphone, are essentially FREE.

When first turned on, the handset and microphone should become active, with the display panels on the top of the phone handset and microphone lighting up (one LED panel, hopefully the one on the handset, should read SLEEP). The display will show, after a few moments, whether a connection has been established with the satellite, and how strong the signal is (ex. *B05 S 21*). Turn the unit slightly, and raise or lower the lid/antenna slightly until the highest possible signal strength is indicated (normally above 20 but will work down to 8). Lock the lid/antenna in place and do not turn the unit again, until your communications are finished. Once a strong signal is acquired push the “*” button for 2 seconds. Wait until there is a “beep” and the LCD screen displays ‘00:DN ??’, then dial the number.

Alaska Dispatch System

Because all calls made on the dispatch system are FREE, this is the method of choice for using the satellite phone units. There are several ADF&G offices, many field camps, and two research vessels on the AlaskaNet dispatch system, as well as Fish and Wildlife Protection/State Troopers offices and vessels, plus many canneries, fishing vessels, and tenders. You should have received a 10-12 page directory with your phone.

First, make sure the unit is turned on, and that there is sufficient power. Set the unit up so that the signal strength is at the maximum for your location. You should see the signal strength on the microphone display (ex. *B05 S 21*), and the handset display should read SLEEP. Once a strong signal is acquired push the “*” button for 2 seconds. Wait until there is a “beep”.

On the microphone display, below the signal strength, there should be a query, ‘00:DN ??’. This is asking you to ‘dial’ in the 4-digit dispatch number that you wish to call. After you have entered the 4-digit dispatch number of the unit you wish to contact, hold in the microphone key and a connection will be made with the satellite, which will then try to connect with the dispatch number you punched in. IF a connection is made you will hear two beeps (“bird chirps”) and the microphone display will read SELF. While continuing to hold in the microphone key, call the station you wish to talk to. USE ALL

-Continued-

THE SAME FORMALITIES AS WHEN CALLING ON A SSB RADIO. For example, say “Calling the ADF&G Kodiak Office, Calling the ADF&G Kodiak Office; this is Karluk Weir”. When you release the microphone key, the unit will beep again. BE PATIENT. It will take some time for the signal to go up to the satellite, down to the number you called. It may take the other party some time to get to the microphone and respond (this is especially true for calls to the ADF&G office; supervisors have to walk down to the radio room to respond). When they respond, their 4-digit dispatch number (DN) will show on the microphone display. This is a private conversation, unlike the previous dispatch service.

Just remember to be patient; wait until the other party stops speaking and you hear the unit beep (indicating that they are finished with this portion of their communication), the display should read SELF, and you may key microphone to talk. Then you must again wait for the other party to respond. If the other party is not there, they simply will not answer. If the satellite connection cannot be made, the display will read ‘Unable to Connect’ or ‘Not Available’.

Phone System

DO NOT USE THE HANDSET TO PLACE CALLS UNLESS ABSOLUTELY NECESSARY. All calls made with the handset are billed per minute of use, at an expensive rate. Calls should only be made to supervisors, either when radio or dispatch contact is not possible or when a confidential message needs to be relayed. Calls are made by dialing out, almost like a standard telephone. Punch in the area code and telephone number, then PRESS SEND (button located in the upper right corner of the handset). Because there is a satellite relay, there will be a slight delay between when you speak and when the other party hears you, so be patient.

Note EVERY call in a phone logbook. The system will show you the amount of time you’ve used on the call, on the LED panel. Note the number called, the date, approximate time, and the length of the call (minutes and seconds). When the call is completed, you MUST push the END button (top right corner of handset buttons), otherwise the system will remain active and YOU will be billed for the time (at almost a dollar a minute). Remember, PRESS END.

If someone calls in to this unit, it will ring, like a standard telephone. Press the SEND button to start the conversation, but remember to PRESS END to finish the call. ADF&G is billed for all calls made using the handset, both the calls you dial out and any calls dialed in.

-Continued-

IN CASE OF EMERGENCY:

If there is a medical emergency, or a real danger to life or health, IMMEDIATELY call the US Coast Guard Rescue Coordination Center at 800-478-5555. Be ready to tell them your name, exact location (latitude and longitude or nearby major landmark), and the exact nature of your emergency. They may question you extensively, so be prepared. There are emergency doctors on-call that can advise you. After the call is completed, immediately call your supervisor, at work or at home, and relay the details of your experience.

If there is an enforcement emergency, use the dispatch microphone to call the Kodiak office or the Alaska State Trooper, Fish and Wildlife Protection (DN 6370).

Appendix E.1. Instructions for filling out a timesheet.

All ADF&G employees must fill out a time sheet biweekly and these timesheets must be turned in to the Administrative staff in Kodiak in a timely manner. Please follow these instructions when filling out your time sheets to avoid payroll problems. When a flight comes out to drop off groceries, or for any other reason, near the end of a pay period, camp personnel need to send in their timesheets. Fill in the time sheet up to the day you send them in and attempt to project your remaining hours worked.

Fill out each of the following on the top of the timesheet:

Pay period: pay periods start on the 1st or 16th of each month and end on the 15th or end of the month (example: June 1-15 or June 16-30).

SSN: your social security number

Name: full name

Division: Commercial Fish

In the actual timesheet table fill in the following:

Day: Monday, Tuesday, etc.

Date: 6/16, 6/17, etc.

Hours worked box: start and stop time in military time

Code 1: fill in the number of hours worked for that day (see example in Appendix D.2.).

Work hours and Code 1 Totals should both equal the sum of daily hours worked. If your time sheet is sent in before the end of the pay period, project your time for the remaining days so you can total your columns.

Charge to Table located on the bottom left hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

Comments Table located on the bottom right hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

Employee's signature and date: Be sure to sign and date your timesheet.

Crew leaders are responsible for reviewing each crew member's timesheet before sending them to town to ensure that they are properly filled out.

Appendix E.2. Example of a completed timesheet.

ALASKA DEPARTMENT OF FISH AND GAME Time and Attendance Report

Pay period ending: 6/15/2003 SSN: 191-11-1111 Name: Joe Shmo Division Commercial Fisheries

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

Day	Date	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Leave Taken	Sea Duty	Standby	Hazard	Code 1	Code 2	Code 3	Code 4	Holiday / Leave	Work Hrs Total																						
Sun	6/1	8:00	12:00	13:00	16:30													7.50				0.00	7.50																						
Mon	6/2	8:00	12:00	13:00	16:30													7.50				0.00	7.50																						
Tue	6/3	8:00	12:30	14:00	18:00													8.50				0.00	8.50																						
Wed	6/4	8:00	12:00	13:00	16:30	17:00	19:00											9.50				0.00	9.50																						
Thu	6/5	8:00	12:00	13:00	16:30													7.50				0.00	7.50																						
Fri	6/6	8:00	12:00	16:00	19:00													7.00				0.00	7.00																						
Sat	6/7	8:00	12:00	13:00	16:30													7.50				0.00	7.50																						
Sun	6/8																					0.00	0.00																						
Mon	6/9	8:00	12:00	13:00	16:30													7.50				0.00	7.50																						
Tue	6/10	8:00	12:00	13:00	16:30													7.50				0.00	7.50																						
Wed	6/11	8:00	12:00	13:00	16:30													7.50				0.00	7.50																						
Thu	6/12	8:00	12:00	13:00	16:30													7.50				0.00	7.50																						
Fri	6/13																					0.00	0.00																						
Sat	6/14																					0.00	0.00																						
Sun	6/15	8:00	12:00	13:00	16:30	17:00	18:30											9.00				0.00	9.00																						
TOTALS																																						0.00	0.00	94.00	0.00	0.00	0.00	0.00	94.00

EXAMPLE

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

Comments		Comments	
6/1		6/9	
6/2		6/10	
6/3		6/11	
6/4		6/12	
6/5		6/13	
6/6		6/14	
6/7		6/15	
6/8			

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

Joe Shmo Date: 6/15/03
Employee's Signature

Supervisor's Signature

Approving Officer Signature

Leave Use Codes

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

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

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

Holiday, Leave, Overtime and Premium Pay Overrides

**Codes	Hours	CC/LC
Leave & Holiday	0.00	No code needed for Leave & Holiday

Ver. 1.9.4
Revised 2/20/99

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PERENOSA BAY MONITORING AND EVALUATION PROJECT
OPERATIONAL PLAN, 2004



By
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Alaska Department of Fish and Game
Division of Commercial Fisheries
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Kodiak, Alaska 99615

May 2004

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INTRODUCTION

The Perenosa Bay Monitoring and Evaluation Project monitors and evaluates sockeye salmon *Oncorhynchus nerka* production from the Pauls and Waterfall Lake systems. (Figure 1). These lake systems are located on the northern end of Afognak Island and drain into Perenosa Bay. The Waterfall Lake system is comprised of Big and Little Waterfall Lakes while the Pauls Lake system includes Pauls, Laura, and Gretchen Lakes and their inlet and outlet streams. This document will refer to the latter lakes and streams as Pauls Lake, except when lake or stream specific reference is required as part of the description of project operations.

Pauls Lake originally had a natural run of only a few hundred sockeye salmon which was supplemented in the 1950s and 1960s through the planting of sockeye salmon eggs into the substrate at Gretchen Creek, and the construction of fish passes at barrier falls in Laura and Gretchen Creeks (Honnold and Edmundson 1993; Schrof et al. 2000). The natural and introduced sockeye salmon stocks to this system produced runs as high as 51,653 fish to Pauls Lake in 1980 (Honnold and Edmundson 1993). However, sockeye salmon runs to Pauls Lake declined in the mid 1980s to well below the sustainable escapement goal range (20,000 - 40,000), averaging approximately 12,000 fish from 1985-1992 (Wadle and Brennan 2001). Sockeye salmon escapement dropped to a low of only 3,200 fish in 1991.

The Alaska Department of Fish and Game (ADF&G) and the Kodiak Regional Aquaculture Association (KRAA) initiated a sockeye salmon restoration program at Pauls Lake in 1993. Laura Lake was fertilized from 1993 through 2001 to increase the forage base available to rearing juvenile salmon. In addition, sockeye salmon fry were stocked into Laura Lake from 1994 to 1996, and in 1999 to supplement natural production. The sustainable escapement goal was achieved in 1996 and 1997 and from 1999 to 2003. An estimated 2,700 supplemental sockeye salmon are expected to return to Pauls Lake in 2004 in addition to the rehabilitated return. Project activities at the Pauls Lake system in 2004 will include weir operation, smolt and adult escapement sampling, commercial and subsistence fishery monitoring, and fish pass maintenance.

In 1992, the ADF&G and KRAA initiated a sockeye salmon enhancement project at the barren (does not have anadromous runs) Big and Little Waterfall Lakes (Schrof et al 2000; Schrof and Honnold 2003). Sockeye salmon juveniles have been stocked annually into Little Waterfall Lake since 1992 and Big Waterfall has also been stocked with sockeye salmon in 1992 and from 1999-2002. Little Waterfall Lake was fertilized from 1993 through 2001 to maintain a stable zooplankton population. Approximately 38,000 sockeye salmon are expected to return as adults to the Waterfall Bay Terminal Harvest Area (WBTHA) in 2004, all of which will be available for harvest. Project activities at Little Waterfall Creek in 2004 will include barrier net maintenance, smolt sampling, commercial fishery monitoring, and catch sampling.

Goals

The primary goal of the Perenosa Bay field project is to monitor the restored sockeye salmon run at Pauls Lake and the enhancement project at Little Waterfall Lake in order to evaluate production trends.

Objectives

1. Estimate the sockeye salmon harvest and effort in the commercial, sport, and subsistence fisheries in Perenosa Bay (sections 251-82, 251-83 and 251-84).
2. Estimate the age, length and sex composition of sockeye salmon harvested in Perenosa Bay.
3. Estimate the age, weight and length (AWL) composition of the sockeye salmon smolts emigrating during the peak period of the emigration from Pauls and Little Waterfall Lakes.
4. Estimate the total sockeye salmon escapement and the age, length and sex (ALS) composition of the Pauls Lake sockeye salmon escapement.
5. Provide salmon the optimum use of fish passes and access to spawning habitat at Pauls Lake.
6. Summarize all project activities in a written report.

Project Biologist: Rob Baer (FB II)

Field Staff:

Crew leader- Tyler Swanson (FT IV) - 5/24-6/30

Crew - Ryan Rankin (FT I) - 5/24-6/30

Tasks

1. Open up camp, install barrier net at Little Waterfall Creek outlet.
Target dates: 27-28 May
2. Collect and sample (AWLs) a total of 200 sockeye salmon smolts from Little Waterfall and Pauls Creeks during a three-week period. Sampling should be spread out throughout the migration period (approximately 70 smolts/ week/ system). In addition an attempt should be made to collect smolt samples from Big Waterfall Creek.
Target dates: 27 May - 15 June
3. Open Pauls Bay camp, conduct a foot survey to estimate sockeye salmon upstream of weir site (inspect fish passes on Laura Creek at this time) prior to weir installation and install Pauls Lake weir. Enumerate all salmon through the weir.
Target dates: 01 June - 30 June

4. Conduct surveys to estimate adult sockeye salmon build up at Waterfall, Pauls, and Portage Estuary/Bays.
Target dates: 27 May – as time permits through end of runs
5. Estimate the daily sockeye salmon harvest and number of boats fishing in WBTHA (initial opening 05 June) and in the remainder of Perenosa Bay (if a fishery occurs that targets Pauls or Portage sockeye salmon) including sport and subsistence harvest if time permits.
Target dates: 05 June - 30 June (whenever a fishery is open)
6. Collect 600 scales total (150 per week) from sockeye salmon commercial harvest at WBTHA for age, length and sex (ALS).
Target dates: 05 June - 30 June (whenever a fishery is open)
7. Sample 600 (150 per week) adult sockeye salmon for age, length and sex (ALS) from Pauls Lake weir.
Target dates: 09 June – 30 June
8. Collect physical data daily: air and water temperature, stream water depth, and weather observations.
Target dates: 27 May - 30 June
9. Remove fish pass doors and conduct maintenance inventory of the Laura Creek fish passes.
Target dates: 15 June
11. Remove and store Pauls weir.
Target Date: 28 June
12. Inventory and secure Pauls Bay and Waterfall camps and close down for the season.
Target Date: 29 June
14. Write Project Summary Report, specifically addressing objectives and make recommendations for changes/improvements in 2005.
Target Date: 30 June

PROCEDURES

Barrier Net and Weir Installation and Maintenance

A barrier net, approximately 7.3 x 30.5 m long, will be anchored and secured at the most terminal area of Little Waterfall Bay (the bay is actually located between Big and Little Waterfall Bays, and drains Little Waterfall Lake) to prevent sockeye salmon escaping into Little Waterfall Creek.

The net will be positioned where the bottom contour is smooth and relatively free of debris. In addition, the net will be installed and suspended from a taught line and stretched between two solid anchors on either bank, high above the top of the net. The installation and placement of the net will be similar to past years. A buoyed line will be installed ~15 m in front of the net to serve as a “no fishing zone.” Due to tidal exchange, creek current, salmon pressure, and debris build-up, the barrier seine must be monitored, cleaned, and maintained daily. Precautions must be taken to keep the lead

lines from lifting off the bottom. The webbing must be inspected for holes and repaired as needed to maintain “fish-tight” integrity.

Sockeye Salmon Smolt Collection

Little Waterfall sockeye salmon smolts will be collected by beach seining in the most downstream areas of the outlet creeks and the inner-tidal/estuarine areas near the creek’s terminus. Pauls Lake smolts will be collected at the outlet creek or by seining either on the upstream side of the Pauls Lake weir or at the terminus of Pauls Creek. Smolt collection will occur from the last week in May through the middle of June. Daily and seasonal collection efforts and catch by species will be recorded on the *Sockeye salmon smolt sampling summary form* (Figure 2).

Smolt Identification, Enumeration, and Condition

Refer to Pollard et al. (1997) *Field Identification of Coastal Juvenile Salmonids* provided in the field packet if questions arise regarding species identification. The Project Biologist should be contacted if there are any further questions regarding species identification. The number of smolts sampled and their condition will be summarized on the *Sockeye salmon smolt sampling summary form* (Figure 2). Sockeye salmon smolts are easily stressed, so it is important to handle the smolts gently. Mortality can occur with the loss of just a few scales. Observations of excessive scale loss, lacerations, and/or mortality will be noted.

Age, Weight, and Length Sampling

A minimum sample of 200 sockeye salmon smolts will be collected for AWL samples from the Little Waterfall and Pauls Lake emigrations. Specific procedures for collecting and recording the information are outlined in Appendix A.1-A.6. Every attempt should be made to collect ~70 smolts samples per week throughout the emigration period. A single sampling day is the 24-hour period from noon to noon and will be identified by the calendar date corresponding to the first noon.

Pauls Bay Weir Installation, Operation, and Maintenance

The Pauls Bay weir will be installed by 01 June. The weir consists of two sections composed of drilled angle iron and aluminum conduit material (~20’ total length). A large beam will be placed downstream of the weir and used as a catwalk. The beam will be installed first and cabled to the bank (floats during high water events). The longest weir section will be installed upstream of the beam between a large exposed rock and shore. The shorter section of weir will be installed similarly on the opposite side of the rock. The drilled angle iron will be supported by sandbags and placed at a slight downstream angle to the beam. Sandbags will also be used between and on top of the angle iron to secure the pieces once they are positioned properly. The conduit pipes will be fitted into the holes of both the upper and lower angle iron. The angle iron may need adjusting so that the pieces of

conduit slip into place easily. A rope will be secured from bank to bank to prevent the weir from being pushed into the lake during high tides. The weir will be cleaned of debris daily and will also be inspected frequently each day for holes.

Pauls Bay Weir Escapement Counts

Fish will be passed through the weir and enumerated by species using a tally whacker to ensure accuracy. Daily and cumulative counts will be recorded on the *Kodiak management area weekly salmon weir count reporting form* (Figure 3). The escapement enumeration day begins at 0000 hour (midnight) and ends the following 2359 hour. The previous days count will be relayed to Kodiak ADF&G Management staff during the 0800 hour Single Side Band (SSB) radio schedule.

Fishery Monitoring

Fishery monitoring during subsistence, sport, and commercial fishing periods will include boat surveys to assess run strength of sockeye salmon at Little Waterfall, Portage (Discoverer Bay), and Pauls Bay. The vessel names, fishing location, and estimated catch by species will be recorded on the *Terminal harvest area monitoring form* (Figure 4).

Escapement and Harvest Sampling

The sockeye salmon harvest from the WBTHA will be sampled throughout the fishery. A minimum of 600 sockeye (approximately 150 per week) will be sampled for age (scales), sex, and length. Accurate records of fish sampled will be kept on the *Terminal harvest area fishery monitoring form* (Figure 4). The sockeye salmon which escape into Pauls Lake will also be sampled. A minimum of 600 (150 per week) adult sockeye salmon scales will be collected from Pauls Lake. Age (scales), sex, and length data will be collected throughout the season. Sample data for these escapement samples will be recorded on the *Sockeye salmon adult sampling summary form* (Figure 5). Refer to Appendices A.6-A.11 for procedures on properly filling out AWL forms and how to sampling adult salmon.

Bay and Stream Surveys

Surveys will be conducted as needed at Little Waterfall, Pauls, and Portage Bays/estuaries and streams to track sockeye salmon build up and escapement. The results of these surveys will be documented on the *Salmon stream survey form* (Figure 6).

Physical Data

Physical data will be collected daily at the weir and smolt capture sites. The information will be recorded on the *Daily physical observation form* (Figure 7) and will include; water and air temperatures, stream depth, percent cloud cover, wind direction and velocity, and precipitation. A stream depth gauge will be placed at the weir site in Pauls Creek and in the creek at the Waterfall cabin.

Fish Pass Door Removal, Inventory, and Maintenance

The plywood doors on the upstream end of the Laura fish pass will be removed and stored on-site (Note: Store the fish pass door in a place where it can be located at the end of the season). This task will be conducted after the sockeye salmon smolt emigration is complete to prevent injury to smolts as a result of passage through the fish passes. An inventory of fish pass condition and needed repairs will be conducted at this time. Any damaged plywood fish pass covers will be replaced with aluminum covers. Cross braces will be tightened and replaced if damaged. The cables that secure the fish pass sections in place will be tightened and replaced if necessary. Any debris that could block fish passage will be removed from the fish passes. This can be accomplished prior to door removal when flow through the fish pass is minimal. Remove any gravel and debris that has accumulated upstream of the fish passes.

Reporting

Reporting is a crucial component of the Perenosa project. The project biologist is ultimately responsible for the data collected; however, the management and reporting of the data in an organized and understandable manner by the crew leader is essential to the success of the project. The following list details the crew leader's reporting responsibilities:

1. Daily reporting.

- Complete data forms and a field log daily using a no. 2 pencil.
- Use "Rite in the Rain"™ field log books when collecting data; transfer data on to data forms in a sheltered area (boat or cabin).

2. Weekly reporting.

- Write a one page weekly report of project activities following the format of Appendix C.

3. Season summary (project biologist will author and crew leader will assist).

- Write a report summarizing Perenosa Project activities for the season.
- Follow the format of Appendix D when writing this document.
- Include specific information on hardware installation and removal, and system operation.
- Include photographs of important and significant portions of the project (department issued cameras and film are available for project documentation).

4. Performance Appraisals.

- The crew leader will be responsible for assisting the project biologist with performance evaluations. The crew leader will provide input toward field crew's performance which will be reflected in their evaluation. In addition, the crew leader will keep the field crew apprised of their in-season performance.

Note: Send properly packaged, labeled data forms and a weekly report to Kodiak on each available charter flight.

OTHER REQUIREMENTS

Safety and Radio Schedule

Safety is the highest priority of this project. State safety regulations and Standard Operating Procedures (SOPs) must be followed at all times. On-site personnel will exercise extreme caution when considering safety issues. Employees not following state safety regulations may be subject to disciplinary action, including termination.

Employees are expected to review, understand and sign the following SOPs before beginning work:

111-700	Safety Policies and Standards;
111-710	Office/Warehouse Safety;
111-720	Field Camp Safety;
111-730	Aircraft Safety for Passengers;
111-740	Boating Safety;
111-750	Vehicle Safety;
111-760	Laboratory Safety;
111-780	Firearm/Bear Safety.

In addition, all employees are expected to hold a current American Red Cross First Aid/CPR certification. First Aid/CPR classes will be held in Kodiak prior to the field deployment.

An approved personal flotation device will be worn at all times while boating. A survival kit including matches, VHF radio, flare gun, GPS unit, spare motor parts, and a first aid kit will be in the boat at all times.

Ultimately, each employee is responsible for his/her own safety.

Field camps will be contacted daily by Kodiak office personnel on the SSB radio. The frequency for Fish and Game contact is 3230 kHz. The morning radio schedule with the Kodiak Area Management Biologist will be from 0800 - 0830 hours seven days a week, and the afternoon

radio schedule with the Project Biologist will be from 1300 - 1315 hours Monday through Friday and on Saturday and Sunday evenings from 1950 - 2000 hours. If contact is necessary, information can be relayed to the Kodiak office personnel at 0800 and 2000 hours seven days a week via SSB 3230. Emergency contact should be attempted with ADF&G office staff. If there is a medical emergency after hours or office personnel cannot be contacted, contact the US Coast Guard on SSB 4125 or VHF channel 16. In addition to the SSB a satellite telephone will be available. Medical emergencies can also be handled by contacting the U.S. Coast Guard rescue coordination office at 800-478-5555. Additional satellite telephone procedures can be reviewed in Appendix B. **ALL FIELD PERSONNEL WILL BE AWARE OF EMERGENCY CONTACT PROCEDURES POSTED ON EACH RADIO AND THE LATITUDE AND LONGITUDE COORDINATES OF THE CAMP LOCATION.**

Air Charters

All air charters will be set up through the Kodiak staff. Logistical information will be communicated through daily radio contact. It is important to contact office personnel when any data, equipment, or other freight is "back hauled" to Kodiak. It is important to clearly label these items: ADF&G Attn: Rob Baer 486-1835.

Equipment Storage and Inventory

The crew leader is responsible for the proper maintenance, storage, and inventory of all project equipment. When the project is completed, the crew leader will inventory and document all project equipment, and a list of items needed for the 2005 season. Secure cabins and out-buildings prior to leaving field site and document the combinations of all the locks.

Timesheets

All timesheets are to be in the Kodiak office by the 15th and 30th of each month. Employee's receiving hazard pay, should write the location of the field camp in the "Comments" column on the time sheet. A brief description of how to properly fill out a timesheet and an example of a properly filled out timesheet can be seen in Appendices E.1-E.2. Work activities should be scheduled to be completed in a 7.5 hour day. There are times in the field (high water events, etc.) when personnel need to work beyond the normal work-day to ensure project objectives are being met. However, the project biologist in advance to discuss the need to work additional hours.

LITERATURE CITED

- Honnold, S.G. and J.A. Edmundson. 1993. Limnological and fisheries assessment of sockeye salmon (*Oncorhynchus nerka*) production in the Laura Lake system. Alaska Dept. of Fish and Game, Fisheries Enhancement, Rehabilitation, and Development Division, FRED Report No. 130, Juneau.
- Pollard, W.R., C.F. Hartman, C. Groot, and P. Edgell. 1997. Field identification of coastal juvenile salmonids. Harbour Publishing. Maderia Park, B.C. Canada. 31p.
- Schrof, S., S.G. Honnold, C.J. Hicks, and J.A. Wadle. 2000. A summary of salmon enhancement, rehabilitation, evaluation, and monitoring efforts conducted in the Kodiak Management Area through 1998. Alaska Department of Fish and Game RIR No. 4K00-57, Kodiak.
- Wadle, J.A. and K. Brennan. 2001. Kodiak Area commercial salmon annual management report, 1999. Alaska Department of Fish and Game, Division of Commercial Fisheries, RIR No. 4K01-5, Kodiak.
- Schrof, S., and S.G. Honnold 2003. Salmon enhancement, rehabilitation, evaluation, and monitoring efforts conducted in the Kodiak Management Area through 2001. Alaska Department of Fish and Game RIR No. 4K03-41, Kodiak.

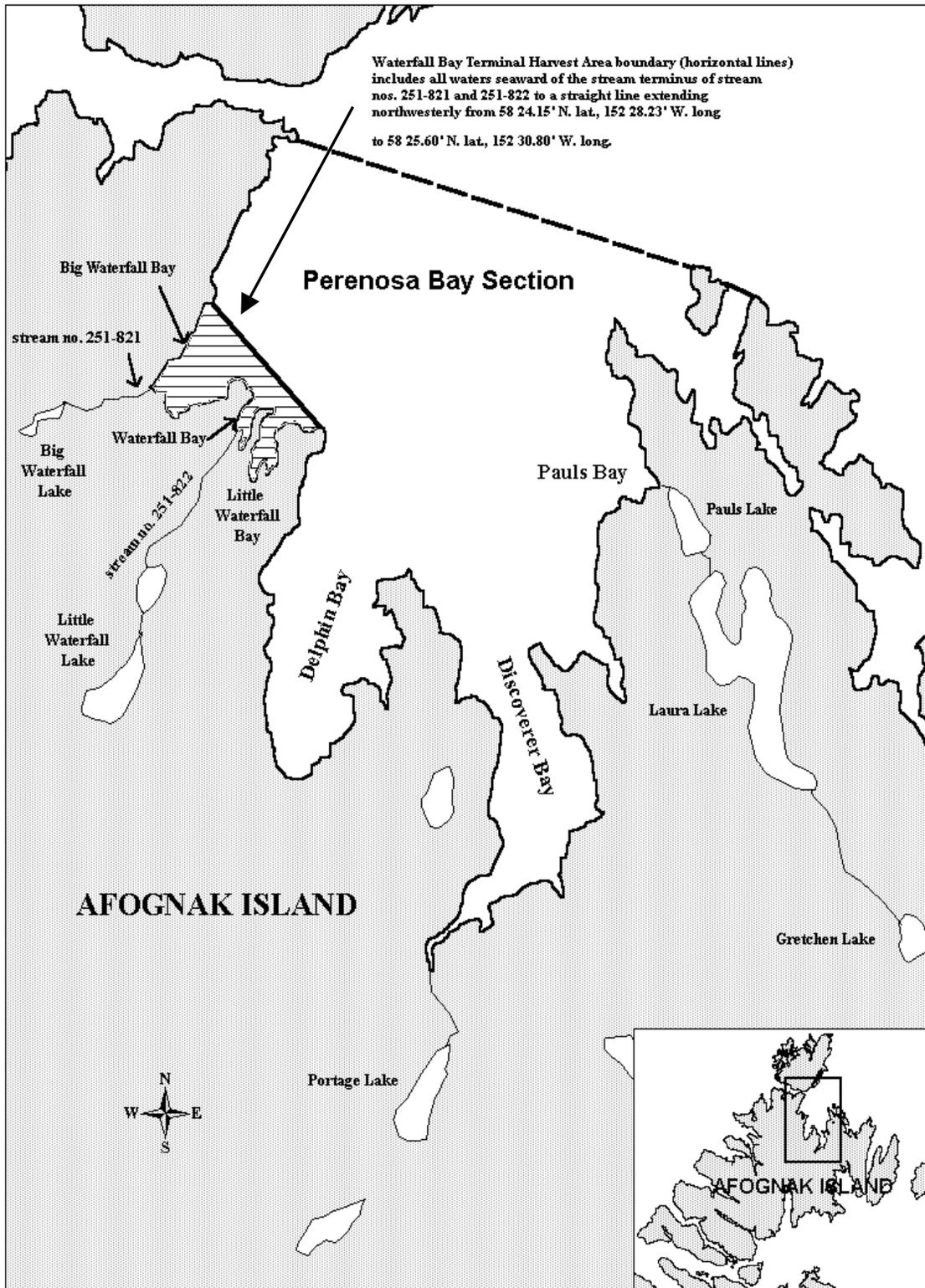


Figure 1. Perenosa Bay area enhancement and rehabilitation systems evaluated by the Alaska Department of Fish and Game.

ALASKA DEPARTMENT OF FISH AND GAME
 KODIAK MANAGEMENT AREA
 WEEKLY SALMON WEIR COUNT REPORT FOR YEAR:

WEIR CAMP

NAME: _____

PERSONNEL: _____

PAGE: _____ OF _____

WEEKLY REPORT

FOR WEEK ENDING (SATURDAY) _____

DATE	DAILY TOTAL ESCAPEMENT							STEELHEAD DOWN	REDS SAMPLED	JACK NO.	JACK %	GILLNET REDS	INJURED REDS	H ₂ O LEVEL		H ₂ O TEMP	WEATHER		
	REDS	L. REDS	KINGS	PINKS	COHOS	CHUMS	DOLLY V.							UP	DOWN		CEIL.	VIS.	WIND DIR/SPD.
SUN	D																		
	A																		
MON	D																		
	A																		
TUE	D																		
	A																		
WED	D																		
	A																		
THU	D																		
	A																		
FRI	D																		
	A																		
SAT	D																		
	A																		
WEEK TOTAL																			
AWL WEEK																			
AWL CUM																			

ADDITIONAL COMMENTS: BEAR AND PEOPLE PROBLEMS; SMOLT MIGRATION; WEIR PROBLEMS; CABIN REPAIR; NOTE AIRCRAFT TRAFFIC

Figure 3. Kodiak Management Area weekly salmon weir count reporting form.

**SALMON STREAM SURVEY
MANAGEMENT AREA K**

Year	Stream Name	Stream Number

<u>Type of Survey</u>	<u>Visibility</u>
Aerial	E=Excellent
Foot	G=Good
Other	F=Fair
	P=Poor

NUMBERS OF FISH

Date/Time	Observer(s)	Type of Survey	Weather & Tide	Dist. Surveyed	Visibility	Kings	Reds	Coho	Pink	Chum
						Bay				
						Mouth				
						Stream				
Comments:						Total				

NUMBERS OF FISH

Date/Time	Observer(s)	Type of Survey	Weather & Tide	Dist. Surveyed	Visibility	Kings	Reds	Coho	Pink	Chum
						Bay				
						Mouth				
						Stream				
Comments:						Total				

NUMBERS OF FISH

Date/Time	Observer(s)	Type of Survey	Weather & Tide	Dist. Surveyed	Visibility	Kings	Reds	Coho	Pink	Chum
						Bay				
						Mouth				
						Stream				
Comments:						Total				

Figure 6. Salmon stream survey form.

APPENDIX

Appendix A.1. Smolt age-weight-length (AWL) sampling materials and methods.

Annually, outmigrating salmon smolts are sampled for age (scales), weight, and length, by field crews throughout the Westward Region. These data are essential for sound management of the State's salmon resources.

To be useful, data must be recorded on the age, weight, length (AWL) optical scanning (opscan) forms neatly and accurately. In addition, scale samples must be collected and mounted properly to ensure accurate age determination. The following procedures are to be strictly adhered to when sampling juvenile salmon for age, weight, and length.

Complete each section on the left side of the AWL form using a No.2 pencil and darken the corresponding circles as shown in the figures. Make every effort to darken the entire circle as the optical scanner, which reads and records the data from the AWL forms, may not recognize partially filled circles. Be sure to transfer the litho code, located in the left margin on the front side of the AWL form to the back side of the form by darkening the appropriate circles (see Appendix A.3.).

Label only one form at a time to avoid a "carbon paper effect" resulting in stray marks. Special care should be used to ensure that stray marks do not occur on either side of the AWL form. Stray marks and scuffed AWL forms can severely hamper scanning. The AWL forms should be treated carefully; the scanner in the Kodiak office cannot read damaged forms. The forms should not be stapled, bent, paper-clipped or folded. Specific instructions for completing AWL forms are listed in Appendix A.2 and an example of an AWL form filled out for smolt sampled can be found in Appendix A.3.

All juvenile salmon AWL data will be recorded in a field notebook dedicated to smolt sampling. These data will then be transferred from the field notebook to the AWL forms. Each species will have its own AWL sample number series that runs sequentially throughout the season. Up to 40 individual fish per smolt day may be included in one AWL sample. If more than 40 fish are sampled in a single smolt day, then multiple AWL numbers will be used on that day. For example, if 70 sockeye salmon smolts are sampled in a single day (day 1), the AWL numbers will be AWL #001 (fish 1-40; 8 slides) and AWL #002 (fish 1-30; 6 slides). The next day will start with AWL #003. Each day's sample will start with a new AWL number.

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

-Continued-

Tricane Methanesulfate (MS-222) will be used to anesthetize the smolts; latex gloves will be worn to prevent direct exposure to the anesthetic. The use of this chemical will be demonstrated by experienced personnel. A small amount (approximately 1 g) of MS-222 and a small amount of baking soda will be dissolved in approximately 2 L of cold water. The amount of anesthetic used will vary depending on the water temperature, freshness of the chemical, and size of the smolts. A few smolts will be placed in the anesthetic solution until subdued to a point where they can no longer flex their axial musculature but can still ventilate their gills. The concentration of the solution should be such that it immobilizes the fish in 2-3 minutes. After the fish are anesthetized, it is important to sample them quickly and place them in a recovery container to prevent mortality. No more than 80 smolts will be anesthetized with one batch of solution.

After the smolts have been immobilized, excess water will be gently removed from the fish using a paper towel or a wet sponge as a blotter. Place the fish on its right side to sample the left side. Measure smolts length, to the nearest mm, from tip-of-snout to tail fork (Appendix A.4). Record length by blackening the appropriate column circles on the front side of the AWL form. When collecting length data, take care to ensure that each length corresponds to the appropriate scale smear mounted on the slide, as length-at-age is evaluated for each sample. Weigh each smolt to the nearest 0.1 g, and record the weight by blackening the appropriate column circles on the back side of the AWL form.

On salmon species, the preferred scale is located where a straight line between the posterior insertion of the dorsal fin and the anterior insertion of the anal fin crosses the second scale row dorsal to the lateral line. In smolt, the area directly around this scale is considered the preferred area (Appendix A.4). If scales are not present in this area then scales should be taken from the secondary location, which is the same area on the right side of the fish. A scalpel will be used to remove 5-10 scales from the preferred area. These scales will be mounted on a glass slide using a probe to position the scales. Scales from five fish will be mounted on each slide. The scalpel will be wiped clean of scales and slime between each fish sampled. A diagram of a slide with scales mounted correctly is located in Appendix A.5.

The left portion of each slide will be labeled with AWL number, sample location, species, date, and inclusive fish numbers. A diagram of a properly labeled slide is located in Appendix A.5. After sampling, fish will be held in a recovery container until they are swimming normally and then released downstream of the trapping location. When the slides are completed, return them to the box in order by AWL # and fish #. Label the slide box on top with the information listed in Appendix A.5.

Appendix A.2. Procedure for recording salmon smolt age-weight-length data on AWL forms.

Smolt length and weight will be recorded on AWL forms (Appendix A.3.). Using a No.2 pencil, complete each section of the left side of the AWL and darken the corresponding blocks.

Fill out each of the following:

Description

Record the following: species, location, year and samplers names (e.g., sockeye smolt, Waterfall Creek, 2003, Sagalkin, Schrof).

Card

The AWL forms and corresponding slides are numbered sequentially by date throughout the season starting with 001. A new, consecutively numbered AWL form is used each day even if the previous AWL form is not full. There may be a minimum of one fish and a maximum of 40 fish (8 slides) per AWL form.

Species

Refer to the reverse side of the AWL form for the correct one digit code (e.g., sockeye = 2).

Day, Month, Year

Use appropriate digits for the date the fish are sampled.

District

List the district in which the fish were sampled. Consult your area statistical map or project leader for the appropriate district. (Waterfall and Pauls= **251**)

Subdistrict (Section)

List the subdistrict in which the fish were sampled. Consult your area statistical map or project leader for the appropriate subdistrict. (Pauls = **83** Waterfall = **84**)

Stream

List the stream in which the fish were sampled. Consult your area statistical map or project leader for the appropriate stream number. (Pauls = **831** Waterfall = **822**)

Location

Leave blank

Period

List the period (sample week) in which the fish were sampled (Appendix A.6.).

-Continued-

Project and Gear

Refer to the reverse side of the AWL form for the correct code. For example, smolt samples collected in a beach seine would have a project code of **2** and a gear code of **02**.

Mesh

Leave blank unless specifically instructed by supervisor to do otherwise.

Type of length measurement

Refer to the reverse side of the AWL form for the correct code (e.g., tip of snout to tail fork = 2). Refer to Appendix A.2.

Number of scales per fish

Fill in the number of scales (smears) collected per fish. For smolt, one scale smear per fish is collected.

of cards

of cards always = 1 (each AWL form is individually numbered).

If possible, keep the AWL form litho codes in numerical order throughout the season and keep all forms flat, dry, and clean. Remember that when sampling smolts, weight data is recorded on the back side of the AWL form and the litho code, located in the left margin on the front side of the AWL form must be transferred to the back side of the form (see Appendix A.3.). The litho code is the number unique to each AWL form and copying the litho code from the front to the back of the form indicates weight data was transcribed on the back of the form for the Optical scanning machine to read. Fish slime and water curling may cause data to be misinterpreted by the optical scanning machine. **It is the responsibility of the crew leader to make sure that all forms are carefully edited before returning them to their supervisor.**

Appendix A.3. Example of an AWL form filled out for smolt sampled (Note: Project code should be 8 not 4).

DESCRIPTION: *Pentucky/Thomas 1999*
Sockeye Smolt / Hidden Creek / Dip Net

ADF&G ADULT SALMON AGE-LENGTH FORM VERSION 2.1 *TAC*

CARD: 001

SPECIES: 2

DAY: 04

MONTH: 06

YEAR: 99

DISTRICT: 251

SUBDISTRICT: 40

STREAM: 406

LOCATION:

PERIOD: 23

PROJECT: 4

GEAR: 13

MESH:

TYPE OF LENGTH MEASUREMENT: 1

NUMBER SCALES/FISH: 1

OF CARDS: 1

#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
1	M	0	0	0	0	0
2	F	0	0	0	0	0
3	M	0	0	0	0	0
4	F	0	0	0	0	0
5	M	0	0	0	0	0
6	F	0	0	0	0	0
7	M	0	0	0	0	0
8	F	0	0	0	0	0
9	M	0	0	0	0	0
10	F	0	0	0	0	0
11	M	0	0	0	0	0
12	F	0	0	0	0	0
13	M	0	0	0	0	0
14	F	0	0	0	0	0
15	M	0	0	0	0	0
16	F	0	0	0	0	0
17	M	0	0	0	0	0
18	F	0	0	0	0	0
19	M	0	0	0	0	0
20	F	0	0	0	0	0
21	M	0	0	0	0	0
22	F	0	0	0	0	0
23	M	0	0	0	0	0
24	F	0	0	0	0	0
25	M	0	0	0	0	0
26	F	0	0	0	0	0
27	M	0	0	0	0	0
28	F	0	0	0	0	0
29	M	0	0	0	0	0
30	F	0	0	0	0	0
31	M	0	0	0	0	0
32	F	0	0	0	0	0
33	M	0	0	0	0	0
34	F	0	0	0	0	0
35	M	0	0	0	0	0
36	F	0	0	0	0	0
37	M	0	0	0	0	0
38	F	0	0	0	0	0
39	M	0	0	0	0	0
40	F	0	0	0	0	0

Mark Refill by NCS MMD0002-1 3 PEG3 Printed in U.S.A.

DO NOT MARK IN THIS MARGIN

TRANSFER RESPONSES EXACTLY AS PRINTED ON FRONT TO THIS GRID

#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
1	M	0	0	0	0	0
2	F	0	0	0	0	0
3	M	0	0	0	0	0
4	F	0	0	0	0	0
5	M	0	0	0	0	0
6	F	0	0	0	0	0
7	M	0	0	0	0	0
8	F	0	0	0	0	0
9	M	0	0	0	0	0
10	F	0	0	0	0	0
11	M	0	0	0	0	0
12	F	0	0	0	0	0
13	M	0	0	0	0	0
14	F	0	0	0	0	0
15	M	0	0	0	0	0
16	F	0	0	0	0	0
17	M	0	0	0	0	0
18	F	0	0	0	0	0
19	M	0	0	0	0	0
20	F	0	0	0	0	0
21	M	0	0	0	0	0
22	F	0	0	0	0	0
23	M	0	0	0	0	0
24	F	0	0	0	0	0
25	M	0	0	0	0	0
26	F	0	0	0	0	0
27	M	0	0	0	0	0
28	F	0	0	0	0	0
29	M	0	0	0	0	0
30	F	0	0	0	0	0
31	M	0	0	0	0	0
32	F	0	0	0	0	0
33	M	0	0	0	0	0
34	F	0	0	0	0	0
35	M	0	0	0	0	0
36	F	0	0	0	0	0
37	M	0	0	0	0	0
38	F	0	0	0	0	0
39	M	0	0	0	0	0
40	F	0	0	0	0	0

SPESIES

- 1 - Chinook (king)
- 2 - Sockeye (red)
- 3 - Coho (silver)
- 4 - Pink (humpy)
- 5 - Chum (dog)

PROJECT

- 1 - Commercial catch
- 2 - Subsistence catch
- 3 - Escapment (lower, weir, gear etc., etc.)
- 4 - Escapment - spawning grounds
- 5 - Test fishing
- 6 - Sport catch (marine)
- 7 - Sport catch (freshwater)

GEAR TYPE

- 0 - Trap
- 1 - Purse seine
- 2 - Beach seine
- 3 - Dred gillnet
- 4 - Set gillnet
- 5 - Troll
- 6 - Long line
- 7 - Other trawl
- 8 - Fishwheel
- 9 - Pole
- 10 - Sport hook and line
- 11 - Herring gurnet
- 12 - Handpiked
- 13 - Dip net
- 14 - 18 Unassigned
- 17 - Beam trawl
- 18 - Shovel
- 19 - Weir
- 20 - 99 Unassigned

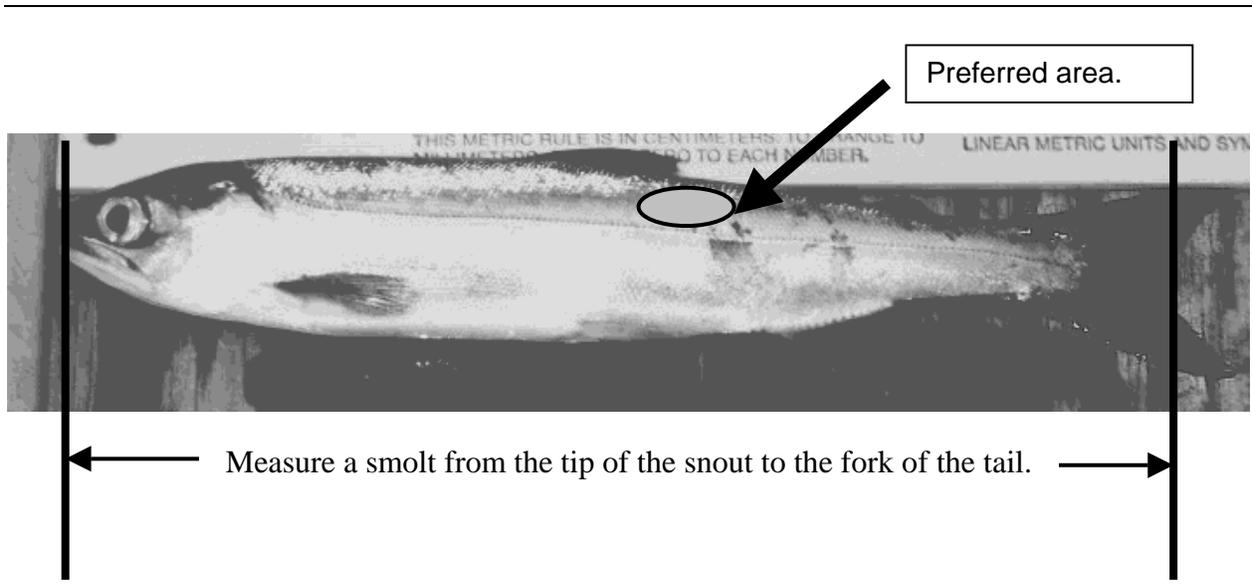
LENGTH TYPE

- 1 - Tip of snout to fork of tail
- 2 - Mid-eye to fork of tail
- 3 - Post orbit to fork of tail
- 4 - Mid-eye to hypural plate
- 5 - Post orbit to hypural plate
- 6 - Unassigned

AGE ERROR CODES

- 1 - Death
- 2 - Inverted
- 3 - Reversed
- 4 - Slough
- 5 - Missing
- 6 - Reabsorbed
- 7 - Wrong species
- 8 - Not preferred

Appendix A.4. Photo of a smolt with the preferred area highlighted.



Appendix A.5. An example of two correctly labeled smolt slides representing fish 1 through 10 from a sample collected on 5/11/00.

AWL 001 Sockeye Bear Lake 5/11/00 Fish 1 - 5	<table border="0"> <tr> <td style="text-align: center;">1</td> <td></td> <td></td> <td></td> <td style="text-align: center;">5</td> </tr> <tr> <td>•</td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> </tr> </table>	1				5	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
1				5																																					
•	•	•	•	•																																					
•	•	•	•	•																																					
•	•	•	•	•																																					
•	•	•	•	•																																					
•	•	•	•	•																																					
•	•	•	•	•																																					
•	•	•	•	•																																					
AWL 001 Sockeye Bear Lake 5/11/00 Fish 6-10	<table border="0"> <tr> <td style="text-align: center;">6</td> <td></td> <td></td> <td></td> <td style="text-align: center;">10</td> </tr> <tr> <td>•</td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> </tr> </table>	6				10	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6				10																																					
•	•	•	•	•																																					
•	•	•	•	•																																					
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•	•	•	•	•																																					

When the slides are completed, return them to the box in order by AWL # and fish #, and label the slide box on top with the following information:

Location: Bear Lake
 AWL Number: AWL 001-003
 Beginning and end dates: 6/12-7/13/00
 Sockeye Salmon Smolt

Appendix A.6. Sampling weeks and associated calendar dates, 2004.

Week	Calendar Dates	Week	Calendar Dates
10	1-Mar - 7-Mar	28	5-Jul - 11-Jul
11	8-Mar - 14-Mar	29	12-Jul - 18-Jul
12	15-Mar - 21-Mar	30	19-Jul - 25-Jul
13	22-Mar - 28-Mar	31	26-Jul - 1-Aug
14	29-Mar - 4-Apr	32	2-Aug - 8-Aug
15	5-Apr - 11-Apr	33	9-Aug - 15-Aug
16	12-Apr - 18-Apr	34	16-Aug - 22-Aug
17	19-Apr - 25-Apr	35	23-Aug - 29-Aug
18	26-Apr - 2-May	36	30-Aug - 5-Sep
19	3-May - 9-May	37	6-Sep - 12-Sep
20	10-May - 16-May	38	13-Sep - 19-Sep
21	17-May - 23-May	39	20-Sep - 26-Sep
22	24-May - 30-May	40	27-Sep - 3-Oct
23	31-May - 6-Jun	41	4-Oct - 10-Oct
24	7-Jun - 13-Jun	42	11-Oct - 17-Oct
25	14-Jun - 20-Jun	43	18-Oct - 24-Oct
26	21-Jun - 27-Jun	44	25-Oct - 31-Oct
27	28-Jun - 4-Jul	45	1-Nov - 7-Nov

Appendix A.7. Procedure for sampling adult salmon for age, length, and sex.

Annually, salmon escapements and catches are sampled for age (scales), length, and sex by field crews throughout the state. 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 (AWL) optical scanning (opscan) forms neatly and accurately. In addition, scale samples must be collected and mounted properly to ensure accurate age determination. The following procedures are to be strictly adhered to when sampling adult salmon for age, length, and sex.

Procedures

COMPLETING THE OPSCAN AWL FORMS:

New **green** AWL forms have been developed which have Y2K date capabilities. Before transcribing any information, make sure the correct form is being used. The department no longer uses the outdated red or blue forms.

A completed AWL form and accompanying scale gum card for sampling sockeye salmon are shown in Appendix A.8.

Complete each section on the left side of the AWL form using a No.2 pencil and darken the corresponding circles as shown in the figures. Make every effort to darken the entire circle as the optical scanner, which reads and records the data from the AWL forms, may not recognize partially filled circles. Label only one form at a time to avoid a "carbon paper effect" resulting in stray marks. Special care should be used to ensure that stray marks do not occur on either side of the AWL form. Stray marks and scuffed AWL forms can severely hamper scanning.

Fill out each of the following:

Description

Record the following: species/area/catch or escapement/gear type (if applicable)/samplers.

Card

The AWL forms and corresponding gum card(s) are numbered sequentially by date throughout the season starting with 001. A separate numbering sequence will be used for each species, district, and geographic location. Consult your crew leader for the current card number. Sockeye salmon scale samples will have only one gum card per AWL form as shown in Appendix A.8.

Species

Refer to the reverse side of the AWL form for the correct one-digit code (e.g., sockeye = 2).

-Continued-

Day, Month, Year

Escapement sampling: Use appropriate digits for the date the fish are sampled.

Catch sampling: Use the date the fish were caught. If this differs from the sample date, note the sample date in the top margin.

District

List all districts in which the fish were caught. Consult your area statistical map or project leader for the appropriate district. If more than one district is represented, darken the corresponding circles of the district representing most of the catch and note the other catch areas in the top margin. (Pauls and Waterfall = **251**)

Subdistrict (Section)

List all subdistricts in which the fish were caught. If the catch represents more than one section, list each section but do not darken the corresponding circles. Leave blank if the section is unknown. (Pauls = **85** and Waterfall THA = **84**)

Stream

Consult area statistical map for the appropriate stream number when collecting escapement samples. (Pauls = **831** and Waterfall THA = **822**).

Location

List the appropriate code associated with the area the fish were sampled. For example; (Pauls = **032** and Waterfall = **048**)

Period

Escapement sampling: List the sample week in which the fish were sampled (Appendix A.5.).

Catch sampling: List the sample week in which the fish were caught. If this differs from the week the fish were sampled, note this in the top margin.

Project and Gear

Refer to the reverse side of the AWL form for the correct code. For example, escapement samples collected at a weir would have a project code of 3 and a gear code of 19.

Mesh

Leave blank unless specifically instructed by supervisor to do otherwise.

Type of length measurement

Refer to the reverse side of the AWL form for the correct code (e.g., mid eye to tail fork = 2). Refer to Appendix A.6.

Number of scales per fish

Fill in the number of scales collected per fish. For sockeye, one scale per fish is collected unless otherwise instructed by your supervisor.

-Continued-

of cards

of cards always = 1 (each AWL form is individually numbered).

If possible, keep the AWL form litho codes in numerical order throughout the season and keep all forms flat, dry, and clean. Fish gurry and water curling may cause data to be misinterpreted by the optical scanning machine. **It is the responsibility of the crew leader to make sure that all forms are carefully edited before returning them to their supervisor.**

SCALE GUM CARDS

A completed AWL form and accompanying gum card for sampling sockeye salmon are shown in Appendix A.2. When collecting two scales per fish, as with coho salmon sampling, follow the procedure illustrated in Appendix A.3. Be sure to fill out the gum cards in pencil as shown in Appendix A.2 and A.3.

Species

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

Locality

Escapement sampling: Include the weir site followed by “escapement” (e.g., Karluk River escapement).

Catch sampling: Include the area(s) where the fish were caught followed by “catch” (e.g., Uganik Bay catch).

Statistical Area Code

Fill in the appropriate digits from the AWL form. If catch samples are from a variety of statistical areas be sure to list each statistical area and approximate percentage from each (if available).

Sampling date

Escapement sampling: Fill in the date the fish were sampled.

Catch sampling: Fill in the date the fish were caught. The sample date, if different from the catch date, may be noted in “remarks”.

Gear

Write out completely. If catch samples include multiple gear types, be sure to list each gear and approximate percentage from each (if available).

Collector(s)

Record the last names of each person collecting the sample.

Remarks

Record any pertinent information such as the number of scales per fish sampled, processing facility where the sampling took place, vessel/tender name, etc. **Be sure to transfer this information to the top margin of the AWL form.**

-Continued-

SAMPLING PROCEDURE

1. Place the fish on its right side to sample the left side.
2. Determine the sex of the fish (escapement sampling only) and darken M (male) or F (female) in the sex columns. If any difficulty is encountered with this procedure, write "I had trouble sexing these fish" on the top margin of the AWL form and ask your supervisor for help as soon as possible before sexing additional fish.
3. Measure fish length in millimeters from mid eye to tail fork (escapement sampling only; Appendix A.6). Record length by blackening the appropriate column circles on the AWL form. Column 3 on the AWL form is used for fish with a length greater than 999 millimeters (Chinook). Measure all species of salmon to the nearest mm. When collecting length data, take care to ensure that each length corresponds to the appropriate scale mounted on the gum card, as length-at-age is evaluated for each sample.
4. Remove the "preferred scale" from the fish by grasping the scale's exposed posterior edge with forceps and pulling free (Appendix A.7). Remove all slime, grit, and skin from the scale (neoprene wristers work well for this). 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. If the preferred scale is missing, select a scale within the preferred area on the other side of the fish. If no scales are present in the preferred area on either side 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. Do not select a scale located on the lateral line.
5. It is important to take care that scales adhere to the gum card, rough side up. Therefore, without turning the forceps over, clean, moisten, and mount the scale on the gum card with your thumb or forefinger. Exert just enough pressure to spread and smooth the scales directly over the number as shown in Appendix A.7. The ridges on the sculptured side can be felt with a fingernail or forceps. Mount the scale with the anterior end oriented toward top of gum card. All scales should be correctly oriented on the card in the same direction (Appendix A.8.).
6. Repeat steps 1 through 4 for up to 40 fish on each AWL form.
7. When sampling at weirs you may use "Rite in the Rain"® books to record the data. Keep the AWL forms in camp where they will be clean, dry, and flat. After sampling is done for the day, transfer the data to the AWL forms. Each length, sex, and scale must correspond to each individual fish sampled! It is the responsibility of the crew leader to be sure the data has been transcribed correctly and the AWL forms filled out completely. Log books containing length and sex data should be returned to Rob Baer at the end of the season. These are considered raw data and need to be archived. If you choose to record raw data on tape, these tapes must be returned to Matt Foster.

-Continued-

SAMPLING CHECKLIST

OPERATIONAL PLAN	PENCILS (NO. 2)
GUM CARDS	FORCEPS
AWL FORMS (GREEN)	PLASTIC CARD HOLDERS
NEOPRENE WRISTERS	CLIPBOARD
MEASURING BOARD	LOG BOOK

SOME REMINDERS

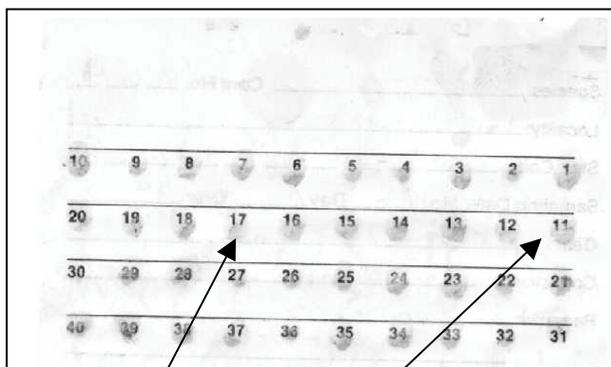
1. For greater efficiency in scale reading, mount scales with anterior end toward top of gum card.
2. AWL forms should be carefully edited. Remember to use the new AWL forms (green) as the red and blue forms are outdated. Re-check header information on AWL forms; make sure all available information is filled in. Take extra care to use the correct period code (sampling week) for the sampling or catch date. AWL form numbers should not be repeated; a frequent error is to begin a week's sample with the last AWL number used the week before. This is particularly important if the data is regularly sent to town; it is easy to forget which AWL form numbers were used. Crew leaders should take time to ensure that the circles are being blackened correctly. If the circles are sloppily marked, the optical scanner records the information incorrectly or misses it entirely.
3. Transfer important comments from the gum cards to the AWL forms. After pressing scales, the cards are seldom referred to again, and important remarks can be lost. Write comments in the top right margin. If there is not room on the AWL form to completely explain the remarks, use a separate piece of paper.
4. Never put data from different dates on one AWL form or one gum card. Even if only one scale is collected that day, begin a new AWL form and gum card the next day.
5. If weights are taken, they may be noted in the right margin of the AWL form during sampling, but be sure to transfer the weights and litho code to the appropriate columns on the reverse of the AWL form before submitting it to your supervisor.
6. Try to keep the litho codes (located in the left margin of the AWL form) in numerical order. This should not be hard to do if they are arranged that way before page numbering. When sampling different areas throughout the season, arrange the litho codes in order before each sample is taken.

-Continued-

7. If AWL forms get wrinkled or splotted the data should be transcribed onto a new AWL form prior to sending in. The optical scanning computer will misread or reject torn or wrinkled sheets. Do not use paperclips on AWL forms.
 8. Be careful when collecting and mounting scales in wet conditions (rain, high humidity, etc.). If glue dries on top of the scale, it often obscures scale features, resulting in an unreadable scale. In addition, scales frequently adhere poorly to a wet gum card. Protect the cards and keep them dry to avoid having to remount the scales on a new card. If the cards get wet, try to dry them in a protected area or remount if necessary. Remember, use a pencil when filling out gum cards, because ink will come off during pressing.
 9. Visually scan all AWL forms for mistakes. A common error occurs, for instance, in placing both the 4 and 7 of a 475mm fish in the 100s column with nothing in the 10s column.
 10. Avoid accumulation of incomplete AWL forms. In previous years, there have been cases where individuals have completed several samples before transcribing the information on the AWL forms. This may lead to an increase in errors. After a sample has been completed, try to get the AWL forms filled out as soon as possible. This will ensure more accurate information, as any problems or abnormalities concerning the sample (e.g., many jacks in sample, many fish lacking preferred scale, number of scales do not match number of lengths recorded, etc.) will be fresh in your mind.
 11. Responsibility for accuracy lies first with the primary data collector(s) and finally with the crew leader. Sloppy or incomplete data forms or gum cards will be returned to individual collectors for correction.
-

Appendix A.8. Completed adult salmon AWL form (front side) and associated gum card.

Species: Sockeye Card No: 014
 Locality: Frazer Esc.
 Stat. Code: 257-40-403-
 Sampling Date: Mo. 06 Day 07 Year 2000
 Gear: Weir/Trap
 Collector(s): D. Roberts, C. Selby
 Remarks: _____



Samplers: Roberts, Selby

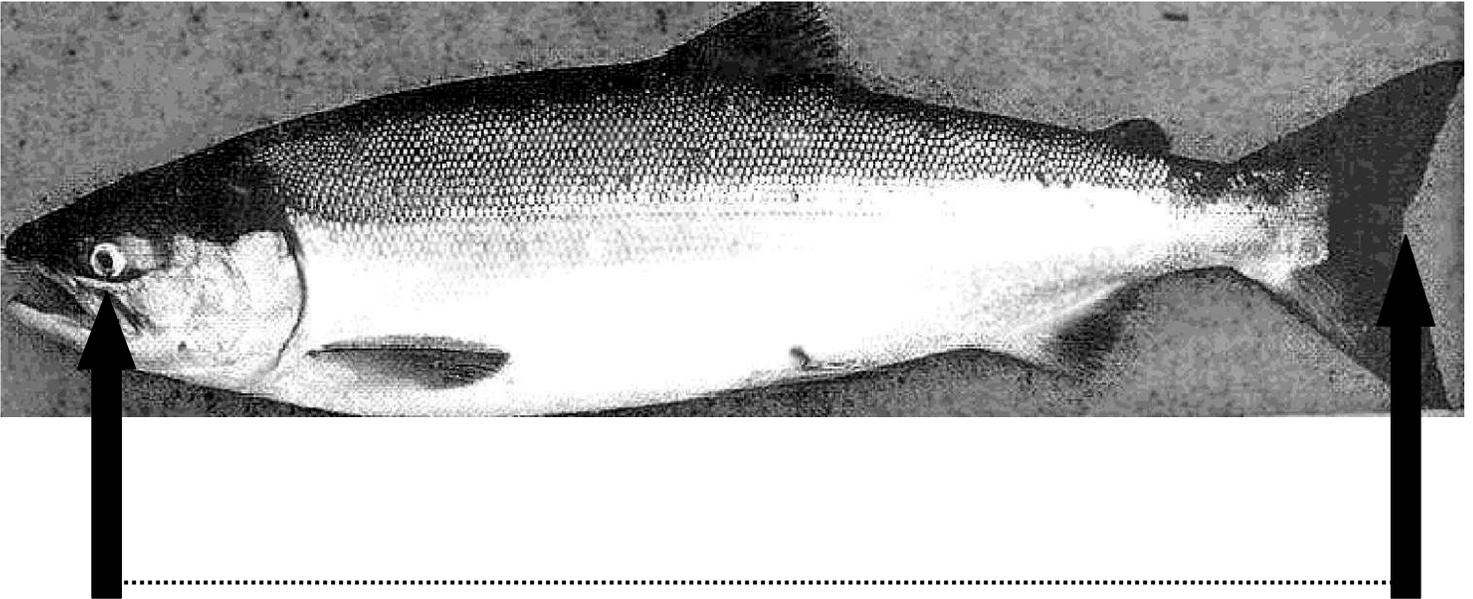
DESCRIPTION: Sockeye \ Frazer \ Esc. ADF&G ADULT SALMON AGE-LENGTH FORM VERSION 2.1

CARD:	#	SEX	LENGTH		AGE GROUP	AGE ERROR CODE
			100's	1's		
014	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
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	38					
	39					
	40					

Species: Sockeye
 DAY: 07
 MONTH: 06
 YEAR: 2000
 DISTRICT: 257
 SUBDISTRICT: 40
 STREAM: 403
 LOCATION: 038
 PERIOD: 24
 PROJECT: 3
 GEAR: 19
 MESH: _____
 TYPE OF LENGTH MEASUREMENT: 2
 NUMBER SCALES/ FISH: 1
 # OF CARDS: 1

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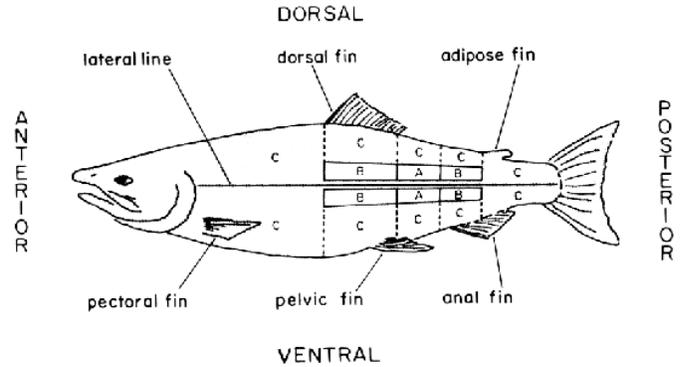
Appendix A.9. Measuring fish length from mid eye to tail fork.



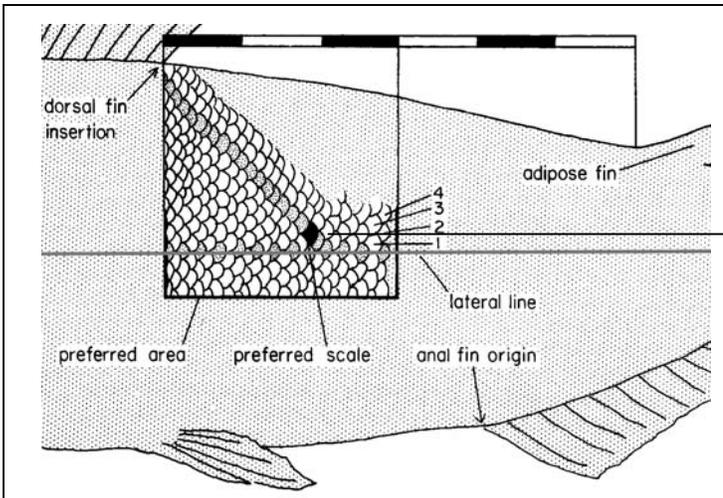
Adult salmon length is measured from mid eye to tail fork because the shape of the salmon's snout changes as it approaches sexual maturity. The procedure for measuring by this method is as follows.

- 1) Place the salmon flat on its right side (on the measuring board) with its head to your left and the dorsal fin away from you.
- 2) Slide the fish in place so that the middle of the eye is in line with the edge of the meter stick and hold the head in place with your left hand.
- 3) Flatten and spread the tail against the board with your right hand.
- 4) Read and record the mid eye to tail fork length to the nearest millimeter.

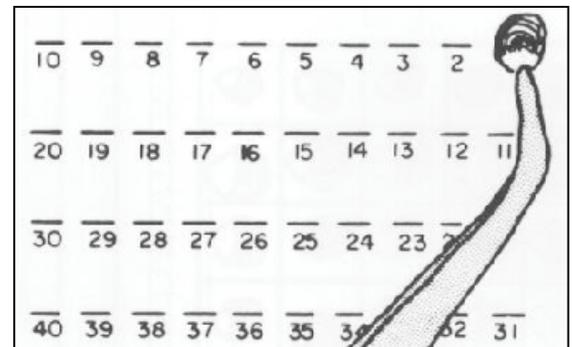
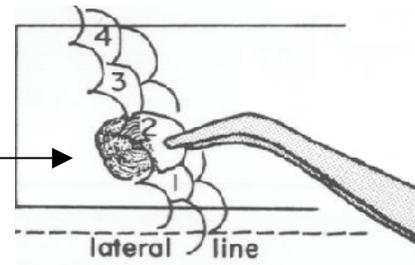
Appendix A.10. Removal and mounting of the preferred salmon scale.



INPFC rated areas for scale removal. Area A is the preferred area. If scales on the left side are missing, try the right side. Area B is the second choice if there are no scales in area A on either side of the fish. Area C designates non preferred areas.

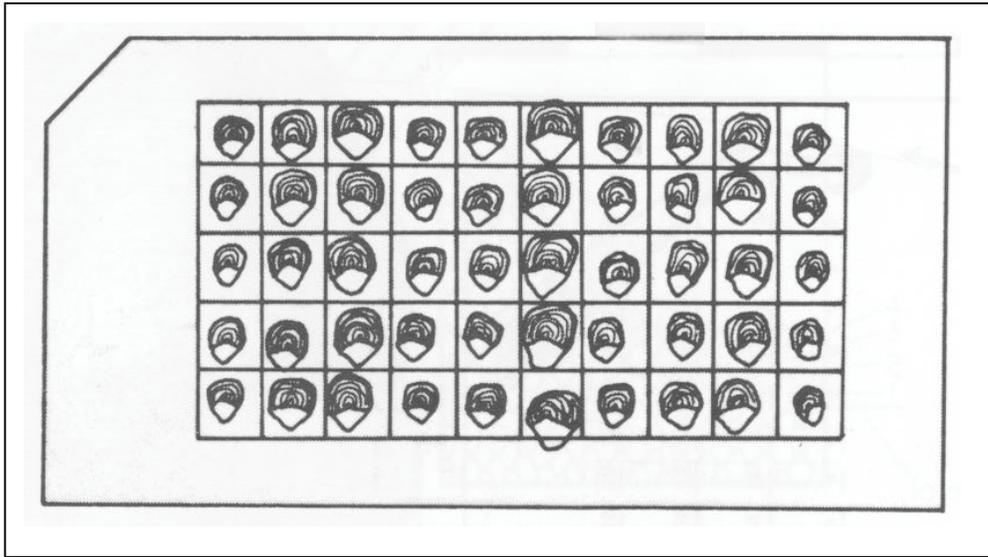


Do not turn scale over.

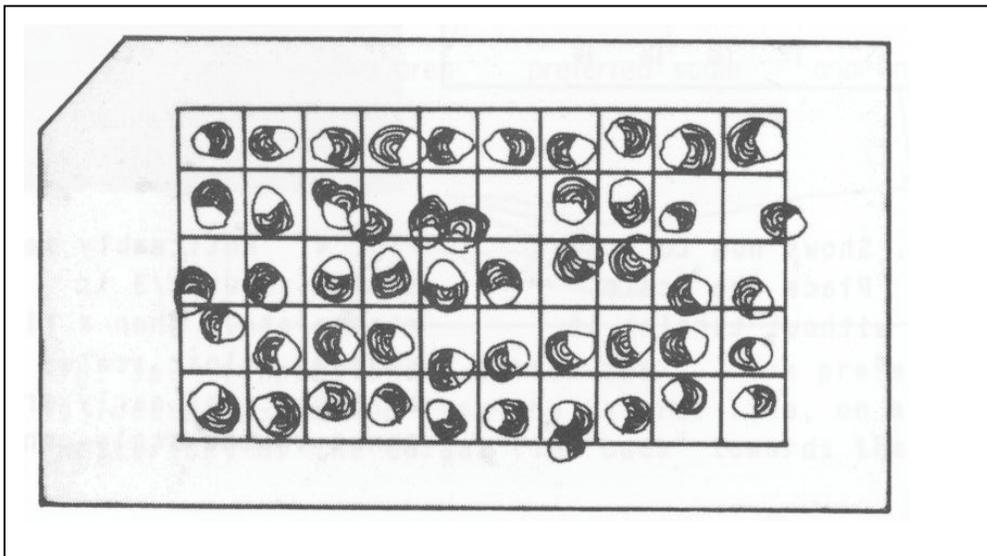


The preferred scale in this diagram is solid black. It is located 2 rows up from the lateral line, on a diagonal from the insertion (posterior) of the dorsal fin “back” toward the origin of the anal fin.

Appendix A.11. Scale orientation on the salmon scale gum card.



The scales are all correctly oriented on the card in the same direction, with the anterior portion of the scale pointed toward the top of the card and the posterior portion (which is that portion of the scale held in the forceps) pointed toward the bottom of the card.



The scales are incorrectly oriented in different directions. This increases the time spent to age samples.

Appendix B. Satellite telephone and dispatch instructions.

The following information serves as a Policy Statement regarding the allowable uses of ADF&G satellite phones and Instructions on the proper method to successfully set up and operate the satellite phone system assigned to your camp.

These systems are not like standard telephones or cell phones, nor are they like a single side band or VHF radio. Communication is sent through the transmitter to low level satellites, then is beamed down to ground stations, either directly to another satellite phone system or to a switching station linked to standard telephone lines. As such, there is a much higher cost involved in operation than with standard telephone long distance or cell phone charges.

Under NO CIRCUMSTANCES may you use this satellite phone system for personal calls, unless, for each event, you have obtained direct and explicit permission from your supervisor. This does not mean that field crew leaders may grant permission for personal use of this phone. Only the project biologist may give you such permission. ANY DELIBERATE MISUSE OF THIS SYSTEM, SUCH AS MAKING UNAPPROVED, NON-EMERGENCY, OR PERSONAL CALLS, WILL RESULT IN DISCIPLINARY ACTION, WHICH MAY INCLUDE SUSPENSION OR DISCHARGE.

The primary purpose for having this satellite phone is for secure, reliable communications between remote field stations and ADF&G offices (Kodiak, Chignik, Cold Bay, Sand Point, or Port Moller), ADF&G research vessels (Resolution or K-Hi-C), Fish and Wildlife Protection vessels and offices, or other field camps that are similarly equipped. The secondary purpose is for your SAFETY. With these phones you are capable of directly dialing emergency services at any time of the day or night. It is essential that these phone systems are maintained in good working order, are fully charged or hooked to sufficient power at all times, and remain free for official or emergency use.

INSTRUCTIONS

The portable sat phone unit must be charged with power. There is an internal battery pack, and a 12-volt adapter is available in order to hook the phone to a larger battery bank, that may in turn be recharged by generator or solar panels.

Turn the unit on using the power switch in the lower left corner. A green light, just above the switch, should come on indicating that the unit is sufficiently powered. If no light or a red light comes on, you will need to charge the unit, or attach it to your 12-volt battery bank via the appropriate connections.

The back, or top, of the briefcase-like unit is the antenna, and it must be oriented correctly in order to access the receiving satellite. The top of the case should be open and pointed in a

-Continued-

east-southeast direction. You must have a fairly clear line-of sight to the horizon in that direction; this unit will NOT work through walls or mountains. The angle of the antenna should be almost vertical; remember to lock the support arm that attaches the lid to the main body of the unit, along the right side.

This system has two means for calling; a telephone-like handset (for dial in or dial out phone calls), and a push-to-talk microphone (for 'dispatch', unit to unit, calls). All calls made with the handset are billed per minute of use, at an expensive rate. All calls on the 'AlaskaNet' dispatch system, using the microphone, are essentially FREE.

When first turned on, the handset and microphone should become active, with the display panels on the top of the phone handset and microphone lighting up (one LED panel, hopefully the one on the handset, should read SLEEP). The display will show, after a few moments, whether a connection has been established with the satellite, and how strong the signal is (ex. *B05 S 21*). Turn the unit slightly, and raise or lower the lid/antenna slightly until the highest possible signal strength is indicated (normally above 20 but will work down to 8). Lock the lid/antenna in place and do not turn the unit again, until your communications are finished. Once a strong signal is acquired push the "*" button for 2 seconds. Wait until there is a "beep" and the LCD screen displays '00:DN ??', then dial the number.

Alaska Dispatch System

Because all calls made on the dispatch system are FREE, this is the method of choice for using the satellite phone units. There are several ADF&G offices, many field camps, and two research vessels on the AlaskaNet dispatch system, as well as Fish and Wildlife Protection/State Troopers offices and vessels, plus many canneries, fishing vessels, and tenders. You should have received a 10-12 page directory with your phone.

First, make sure the unit is turned on, and that there is sufficient power. Set the unit up so that the signal strength is at the maximum for your location. You should see the signal strength on the microphone display (ex. *B05 S 21*), and the handset display should read SLEEP. Once a strong signal is acquired push the "*" button for 2 seconds. Wait until there is a "beep".

On the microphone display, below the signal strength, there should be a query, '00:DN ??'. This is asking you to 'dial' in the 4-digit dispatch number that you wish to call. After you have entered the 4-digit dispatch number of the unit you wish to contact, hold in the microphone key and a connection will be made with the satellite, which will then try to connect with the dispatch number you punched in. IF a connection is made you will hear two beeps ("bird chirps") and the microphone display will read SELF. While continuing to hold in the microphone key, call the station you wish to talk to. USE ALL THE SAME FORMALITIES AS WHEN CALLING ON A

-Continued-

SSB RADIO. For example, say “Calling the ADF&G Kodiak Office, Calling the ADF&G Kodiak Office; this is Karluk Weir”. When you release the microphone key, the unit will beep again BE PATIENT. It will take some time for the signal to go up to the satellite, down to the number you called. It may take the other party some time to get to the microphone and respond (this is especially true for calls to the ADF&G office; supervisors have to walk down to the radio room to respond). When they respond, their 4-digit dispatch number (DN) will show on the microphone display. This is a private conversation, unlike the previous dispatch service.

Just remember to be patient; wait until the other party stops speaking and you hear the unit beep (indicating that they are finished with this portion of their communication), the display should read SELF, and you may key microphone to talk. Then you must again wait for the other party to respond. If the other party is not there, they simply will not answer. If the satellite connection cannot be made, the display will read ‘Unable to Connect’ or ‘Not Available’.

Phone System

DO NOT USE THE HANDSET TO PLACE CALLS UNLESS ABSOLUTELY NECESSARY. All calls made with the handset are billed per minute of use, at an expensive rate. Calls should only be made to supervisors, either when radio or dispatch contact is not possible or when a confidential message needs to be relayed. Calls are made by dialing out, almost like a standard telephone. Punch in the area code and telephone number, then PRESS SEND (button located in the upper right corner of the handset). Because there is a satellite relay, there will be a slight delay between when you speak and when the other party hears you, so be patient.

Note EVERY call in a phone logbook. The system will show you the amount of time you’ve used on the call, on the LED panel. Note the number called, the date, approximate time, and the length of the call (minutes and seconds). When the call is completed, you MUST push the END button (top right corner of handset buttons), otherwise the system will remain active and YOU will be billed for the time (at almost a dollar a minute). Remember, PRESS END.

If someone calls in to this unit, it will ring, like a standard telephone. Press the SEND button to start the conversation, but remember to PRESS END to finish the call. ADF&G is billed for all calls made using the handset, both the calls you dial out and any calls dialed in.

-Continued-

IN CASE OF EMERGENCY:

If there is a medical emergency, or a real danger to life or health, IMMEDIATELY call the US Coast Guard Rescue Coordination Center at 800-478-5555. Be ready to tell them your name, exact location (latitude and longitude or nearby major landmark), and the exact nature of your emergency. They may question you extensively, so be prepared. There are emergency doctors on-call that can advise you. After the call is completed, immediately call your supervisor, at work or at home, and relay the details of your experience.

If there is an enforcement emergency, use the dispatch microphone to call the Kodiak office or the Alaska State Trooper, Fish and Wildlife Protection (DN 6370).

To: Steve Schrof
Kodiak Finfish Research Biologist

Date: 5/30/00

From: Rob Baer
Perenosa Finfish Research Biologist

Subject: Perenosa Weekly
Field Report

Initial Trip & General Information

Nathan Stephan and I departed Kodiak for Perenosa Bay at 10:00 AM May 25th 2000. The trip took 4 hours and burned approx. 40 Gallons of fuel. There was a NW breeze at 15 knots, 2-3' swell out of the N.E., visibility unlimited. Hit Tonki Cape within ½ hour of slack tide but it still had 4-6' swells and rips. Upon arrival into Perenosa Bay we inspected both the Pauls and Waterfall systems. Other than a missing anchor and mooring line at Waterfall everything appeared as it was left in 1999. Established camp at Waterfall on the 25th and began setting up camp at Pauls Bay on the 28th.

Waterfall Bay

The barrier seine was installed and fish tight at 3:45pm on 5/27. The barrier seine was strung ~60 yards upstream from its traditional location. The new location was chosen due to water depth, current, and access to clean the seine. The bottom skirting will not be fully rocked down until larger negative tides arrive (6/1 & 6/2). Sockeye were first spotted in the bay on the 27th (only about 20 further out in the jaws of the bay). There were no adults spotted anywhere upstream of the barrier seine. On the 29th there were ~100 adult sockeye observed at the barrier seine and ~150 on the 30th. There have not been any sockeye smolt sampled or observed to date.

Pauls Bay

We installed the Pauls Bay weir on 5/29, fish tight at 2:00 PM. Inspected the Pauls Lake and Laura Lake outlet, no sign of adults in Pauls Lake or Laura Creek as of 5/30. Approximately 1000 adult sockeye in the bay on the 30th. Many coho smolt were observed at Pauls Lake outlet and in the Bay but no sockeye smolt sampled or observed to date.

Portage Creek

We inspected Portage Creek for the first time on 5/30. Approximately 500 adult sockeye observed in the bay (inside the comm. Fish markers). We did not observe any adults in the creek. We began hauling weir material up to the weir site on the 30th. No sockeye smolt sampled or observed to date, only coho smolt observed in the creek.

Anticipated Activities

Continue construction of Portage weir and camp site. Maintain barrier seine and Pauls bay weir. Collect and sample sockeye smolt from Waterfall, Portage, and Pauls.

I. INTRODUCTION

Description of project location.

Include a general and specific description of the location. For example, “located on the northeast portion of Afognak Island” and “Pauls creek is long by wide with average depth of...”

History of project

Give a brief history of the project (see Introduction of this plan and regional reports for examples)

Purpose of project.

Objectives

Purpose of report.

II. METHODS AND MATERIALS

Precisely describe all components of your fieldwork that produced the results reported.

Employees

List the employees on site and what periods worked, job classes, and previous time spent on the project.

Weir/traps

Discuss the type of weirs and traps used, installation procedures, dates of use, maintenance schedule, enumeration techniques, estimation techniques, AWL technique, etc.

Monitoring

Describe fishery-monitoring duties, such as regulatory marker placement, enforcement, catch estimates, surveys, etc.

Fish pass maintenance

Discuss the seasonal maintenance schedule, removing doors, repairs, performance and fish usage, etc.

-Continued-

Other duties and misc.

Describe the collection of physical data, safety, bear avoidance, etc.

This section should follow the operational plan objectives, tasks, and procedures as a guide. Also, include maps, photographs and diagrams if appropriate.

III. RESULTS

Base this section on the objectives and what was accomplished: Be specific with dates, numbers, and trends. Address each category listed in the methods section. Simple tables and graphs that summarize the data should be included - include all years if possible for comparison.

IV. DISCUSSION AND RECOMMENDATIONS

Include a discussion of each area of data collection, based on the objectives. Elaborate and assess the results with the focus on assisting with future development and refinement of the project. Include recommendations for modifications such as improving trap locations, weir operations, sampling techniques, logistics, and camp improvements. Also include equipment/gear lists that will assist with the following years work.

Note: The project biologist is responsible for the completion of this report. However, the crew leader and crew members should be included in drafting the document. The report should be started in season with a rough draft of some form submitted to the Project Biologist for comment one week prior to the end of fieldwork. Upon completion of fieldwork, time will be provided to finalize the report. The final version of the report will be written using Word software, with tables and graphs constructed in Excel.

Appendix E.1. Instructions for filling out a timesheet.

All ADF&G employees must fill out a time sheet biweekly and these timesheets must be turned in to the Administrative staff in Kodiak in a timely manner. Please follow these instructions when filling out your time sheets to avoid payroll problems. When a flight comes out to drop off groceries, or for any other reason, near the end of a pay period, camp personnel need to send in their timesheets. Fill in the time sheet up to the day you send them in and attempt to project your remaining hours worked.

Fill out each of the following on the top of the timesheet:

Pay period: pay periods start on the 1st or 16th of each month and end on the 15th or end of the month (example: June 1-15 or June 16-30).

SSN: your social security number

Name: full name

Division: Commercial Fish

In the actual timesheet table fill in the following:

Day: Monday, Tuesday, etc.

Date: 6/16, 6/17, etc.

Hours worked box: start and stop time in military time

Code 1: fill in the number of hours worked for that day (see example in Appendix E.2.).

Work hours and Code 1 Totals should both equal the sum of daily hours worked. If your time sheet is sent in before the end of the pay period, project your time for the remaining days so you can total your columns.

Charge to Table located on the bottom left hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

Comments Table located on the bottom right hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

Employee's signature and date: Be sure to sign and date your timesheet.

Crew leaders are responsible for reviewing each crew member's timesheet before sending them to town to ensure that they are properly filled out.

Appendix E.2. Example of a completed timesheet.

ALASKA DEPARTMENT OF FISH AND GAME Time and Attendance Report

Pay period ending: 6/15/2003 SSN: 191-11-1111 Name: Joe Shmo Division: Commercial Fisheries

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

Day	Date	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Leave Taken	Sea Duty	Standby	Hazard	Code 1	Code 2	Code 3	Code 4	Holiday / Leave	Work Hrs Total			
Sun	6/1	8:00	12:00	13:00	16:30													7.50				0.00	7.50			
Mon	6/2	8:00	12:00	13:00	16:30													7.50				0.00	7.50			
Tue	6/3	8:00	12:30	14:00	18:00													8.50				0.00	8.50			
Wed	6/4	8:00	12:00	13:00	16:30	17:00	19:00											9.50				0.00	9.50			
Thu	6/5	8:00	12:00	13:00	16:30													7.50				0.00	7.50			
Fri	6/6	8:00	12:00	16:00	19:00													7.00				0.00	7.00			
Sat	6/7	8:00	12:00	13:00	16:30													7.50				0.00	7.50			
Sun	6/8																					0.00	0.00			
Mon	6/9	8:00	12:00	13:00	16:30													7.50				0.00	7.50			
Tue	6/10	8:00	12:00	13:00	16:30													7.50				0.00	7.50			
Wed	6/11	8:00	12:00	13:00	16:30													7.50				0.00	7.50			
Thu	6/12	8:00	12:00	13:00	16:30													7.50				0.00	7.50			
Fri	6/13																					0.00	0.00			
Sat	6/14																					0.00	0.00			
Sun	6/15	8:00	12:00	13:00	16:30	17:00	18:30											9.00				0.00	9.00			
TOTALS																	0.00	0.00	94.00	0.00	0.00	0.00	0.00	0.00	0.00	94.00

EXAMPLE

Charge to:			Comments		Comments	
Notation	CC/LC	%				
1		100%	6/1		6/9	
2			6/2		6/10	
3			6/3		6/11	
4			6/4		6/12	
			6/5		6/13	
			6/6		6/14	
			6/7		6/15	
			6/8			
Total		100%				

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

Joe Shmo Date: 6/15/03
Employee's Signature

Supervisor's Signature Date: _____

Approving Officer Signature Date: _____

Leave Use Codes

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

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

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

Holiday, Leave, Overtime and Premium Pay Overrides		
**Codes	Hours	CC/LC
Leave & Holiday	0.00	No code needed for Leave & Holiday

Ver. 1.9.4
Revised 2/20/99

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If you believe you have been discriminated against in any program, activity, or facility, or if you desire further information please write to ADF&G, P.O. Box 25526, Juneau, AK 99802-5526; U.S. Fish and Wildlife Service, 4040 N. Fairfax Drive, Suite 300 Webb, Arlington, VA 22203 or O.E.O., U.S. Department of the Interior, Washington DC 20240.

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MALINA LAKE MONITORING PROJECT

OPERATIONAL PLAN, 2004



By
Robert Baer

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

May 2004

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INTRODUCTION

Upper and Lower Malina Lakes (58° 10' N lat., 153° 05' W long.) are located on the southwest side of Afognak Island, approximately 65 kilometers (km) northwest of the city of Kodiak (Figure 1). The sockeye salmon *Oncorhynchus nerka* sustainable escapement goal (SEG) to the lake system is 15,000 fish with a range of 10,000 to 20,000 (Nelson and Lloyd 2001). Prior to rehabilitation efforts, the 10-year average escapement of 6,700 sockeye salmon was well below the SEG (escapements were based on aerial surveys from 1981-1990). Rehabilitation efforts were initiated by the Alaska Department of Fish and Game (ADF&G) and the Kodiak Regional Aquaculture Association (KRAA) in 1991 to increase sockeye salmon production through lake fertilization and supplemental fry stockings, using the Malina sockeye salmon stock (Kyle and Honnold 1990). In 1998 approximately 15,000 sockeye salmon escaped into Malina Lakes, meeting the desired goal for the first time since rehabilitation efforts started at the Malina Lakes. In following years (1999-2001) the escapements continued to meet and exceed the escapement goal range. The sockeye salmon run to the Malina Lakes was considered rehabilitated after 2001 and a post project evaluation period began in 2002. The project was also scheduled to operate in 2003 but due to personnel complications it was canceled. The post monitoring of the Malina Lakes project is scheduled in 2004 to operate from May 28th to June 25th.

An adult enumeration weir was installed at the outlet of Lower Malina Lake in 1992 to monitor rehabilitation efforts. In addition, sockeye salmon smolts were sampled for age and size data beginning in 1992. These projects have continued on an annual basis until 2002. Beginning in 1997, the smolt project was expanded to estimate the total smolt emigration using mark-recapture methods. In addition, size and age data of individual smolt were collected.

Assessment of sockeye salmon production at Malina will continue in 2004. Adult salmon escapement will be enumerated, and biological size and age data will be collected from both smolt and adult life history stages and summarized in a field summary report.

Goal

The project goal is to evaluate the restoration of the Malina Lake sockeye salmon stock using smolt survival and adult escapement production trends.

Objectives

- Estimate the average age, weight, length (AWL), and condition of sockeye salmon smolt outmigrants from the Malina Lakes.
- Enumerate the adult sockeye salmon escapement into the Malina Lakes.

- Estimate the average age, length, and sex (ALS) ratio of the adult sockeye salmon escapement.
- Summarize project activities and report data collection results.

Tasks

1. Erect a weatherport and setup camp.
Target completion date: 27-28 May.
2. Install and operate an incline-plane smolt trap to capture a portion of sockeye salmon smolt emigrants.
Target date: 29 May until the end of the smolt emigration.
3. Enumerate the daily smolt trap catch of fish by species.
4. Collect AWL data from weekly samples of 200 sockeye salmon smolt (40 smolt per day five days per week).
5. Collect physical data daily: air temperature, water temperature, water height, cloud coverage, wind direction and velocity, and precipitation.
7. Install an adult weir.
Target completion date: 29 May.
8. Enumerate adult salmonids, dolly varden and steelhead by species passing through the weir on a daily basis.
9. Sample a minimum of 400 adult sockeye salmon from the total escapement for ALS data. Sampling should occur proportionally throughout the adult run.
10. Monitor the commercial fishery effort in the Malina Creek Terminal Harvest Area (THA) by recording the number and names of fishing boats and estimating catches by species, if possible.
11. Inventory, winterize and store equipment and close camp.
Target date: 28 June.
12. Write a brief project summary report.
Final report due date: 30 June.

SUPERVISION

Project Biologist: Rob Baer

The project biologist will provide project oversight, logistical and technical support and ultimately responsible for the success of the project.

Field Staff: Pat Tomco - crew leader
William Gregory - crew member

The crew leader will be responsible for implementation of ADF&G safety guidelines, schedule daily tasks and oversee field operations. The crewmember will assist the crew leader in all assigned tasks and field operations.

PROCEDURES

Smolt Trap Installation, Monitoring, and Maintenance

An incline-plane smolt trap will be located on Malina Creek approximately 400 meters upstream from saltwater (Figure 2). The trap will be installed so that the water velocity is sufficient to minimize fish avoidance. Perforated (1/8") aluminum sheeting (perf-plate; 4' x 8'), supported by a rackmaster-type pipe frame, will be placed at the entrance of the trap in a "V" configuration to increase trap efficiency. If necessary, the perf-plate "wings" may be lined with plastic sheeting to increase water velocity in the trap and avoid smolt de-scaling.

The trap and wings will:

1. Be kept free of debris daily to maintain trap efficiency and minimize smolt mortality.
2. Require frequent monitoring and maintenance to ensure optimal trap efficiency. The trap should be checked every 2-3 hours or made inoperable when it can not be checked on a regular basis.

Migration patterns change with significant weather changes (i.e., rain may trigger a large outmigration). The trap will be fished continuously for the duration of the smolt outmigration (~29 May until ~26 June).

If unforeseen conditions occur and the smolt trapping must temporarily cease, the trap will be modified or the wings removed to safely allow smolt to pass downstream uninhibited. Any modifications to the trapping system will be discussed with the project biologist before implementation. If immediate modifications are necessary to avoid major mortality or loss of equipment, the project biologist will be notified as soon as possible.

Smolt Trap Catch and Species Enumeration

Since smolts primarily migrate at night, a single trapping or sampling day will be the 24-hour period from noon to noon and will be identified by the calendar date corresponding to the first noon. All fish caught in the smolt trap will be counted. A hand tally counter will be used to count the smolts to ensure an accurate count. A dip net will be used to remove and release the fish as they are counted. Smolts will be held for sampling in a covered live box. Smolts will be handled with care, as sockeye salmon smolts are very sensitive to any stress and mortality can occur with the loss of just a few

scales. All data, including mortalities, will be entered on the *Daily Smolt Trap Catch Reporting form* (Figure 3) each time the trap is checked. Daily trapping data will be summarized on the *Sockeye Salmon Smolt Summary form* (Figure 4).

Pollard et al. (1997) provides color pictures and explanations in the *Field Identification of Coastal Juvenile Salmonids* key for species identification. This field guide is available for use by field personnel. The project biologist should be contacted if any questions regarding identification cannot be answered by reading the field guide.

Smolt Age, Weight and Length Sampling

A sample of 40 sockeye salmon smolt will be collected for AWL data per day for five (5) days per statistical week. Specific procedures for collecting and recording the information are outlined in Appendix A.1.-A.6. Every attempt should be made to collect 200 smolt samples per week throughout the migration period.

Physical Data

Physical data will be collected at 0800 hours daily. Information will be recorded on the *Daily Physical Observation Form* (Figure 5) and will include water temperature, air temperatures, stream height, percent cloud cover, wind direction and velocity, and precipitation. A depth gauge will be placed upstream of the weir to provide relative water level data.

Weir Installation

The adult weir will be installed at Malina Creek a few hundred meters from Malina Bay by 29 May. Wooden tripods attached with 4x4 stringers will be placed across Malina Creek, and aluminum conduit panels will be placed on the upstream side of the tripods. Sandbags will be placed (on the upstream side) at the base of the panels to seal the weir. Two gates will be integrated into the weir. A “Scott” six panel salmon trap for collecting fish for sampling will be installed upstream of the counting gates. Upstream of the other gate (tally gate), a white board or “flash panel” will be placed on the substrate to help identify fish as they are counted into the lake.

Escapement Counts and Weir Maintenance

When a sufficient number of fish build up behind the weir, the tally gate will be opened and fish will be counted. A tally counter will be used to ensure accurate counts. Sockeye salmon “jacks” and net marked fish will be tallied as sub-categories. During the field season sockeye salmon judged to be \leq 400 mm will be designated as jacks. Steelhead trout *Oncorhynchus mykiss* migrating from the lake will be passed downstream as soon as possible and enumerated. Daily and cumulative counts will be recorded on the *Weekly Salmon Weir Count Report Form* (Figure 6). The previous days’ counts will

be relayed to the Kodiak ADF&G management office during the 0800 hour Single Side Band (SSB) radio check. All debris will be removed from the weir in a timely manner. The weir will be checked frequently throughout the day to ensure it is fish tight. Any modifications or work done to the weir will be documented in the daily camp log.

Adult Salmon Age, Length and Sex Sampling

When sufficient numbers (200 or more a day) of adult sockeye salmon begin to enter the creek, they will be sampled for age (scale), length and sex data. A minimum goal of 100 individuals per week should be collected to acquire a minimum total of 400 adult sockeye salmon scales for the season. Sampling will be distributed throughout the escapement period proportional to approximate run strength (i.e., sampling will be increased when peak escapements occur). If an increase in sample size is required, the project biologist will notify the crew leader with the appropriate changes. Adult salmon sampling instructions and procedures for properly filling out ALS forms are located in Appendix A.7.-A.11.

Fishery Monitoring

In the event that the sockeye salmon escapement goal to Malina Lake has been achieved, a commercial fishery will be conducted to harvest the surplus in the Malina Creek THA (Figure 2). Assessments of sockeye salmon run strength will be relayed to the Kodiak Area Management Biologists at the 0800 hour radio schedule (see Safety and Radio Schedule Section). Throughout the fishery, the number of vessels fishing and tender vessel names, and estimated catch by species each day will be recorded on the *Malina Creek Terminal Harvest Area Fishery Monitoring Reporting Form* (Figure 7).

OTHER REQUIREMENTS

Safety

Each employee will receive CPR-First Aid Certification as required by the ADF&G Standard Operating Procedure (SOP), prior to assignment to the Malina project. In addition, each employee will read each of the following sections of the ADF&G guidelines.

Specific SOP guidelines to review include:

- Safety Policy/ Standards
- Building Safety
- Field Camp Safety
- Aircraft Safety/ Passenger
- Emergency/ Survival Equipment Required in Aircraft
- Boating Safety

- Vehicle Safety
- Laboratory Safety
- Small Tool Handling
- Firearm/ Bear Safety

A copy of these SOPs will also be available for further review in the field. **Each employee is responsible for reviewing the safety training materials and signing the verification acknowledging that the employee read the SOP manual.**

Training

In addition to mandatory CPR and First Aid training, each crew member will also receive training on salmon sampling protocols in the field. Personnel will also be trained on proper use of firearms before departing from town or in the field camp.

Radio Schedule

Kodiak office personnel will contact field camps by SSB radio. The Division of Commercial Fishery Management office holds two radio schedules per day. The morning schedule is from 0800 - 0845 hours and the afternoon schedule is from 1630 – 1645 hours daily. In addition to the management office radio schedule we (Research office personnel) will contact the field crews at 1300-1315 hours Monday through Friday and at 1950 hours on Saturday and Sunday. The frequency for Fish and Game contact is 3.230 MHz. **ALL FIELD PERSONNEL WILL BE AWARE OF EMERGENCY CONTACT PROCEDURES POSTED ON EACH RADIO.** The emergency Coast Guard frequency is **4.125 MHz**. Also, as an added communication link between field camps and the Kodiak office, satellite phones will be used to relay data information and as a more reliable connection for emergency contact. Life or limb medical emergencies can be handled by contacting the U.S. Coast Guard rescue coordination office at 800-478-5555. The Malina weir camp is located at **58°9.7' N, 153° 9.0' W**. Further instructions on the operation and transmission on the satellite phone is provided in Appendix B. Crew leaders must train all crew members in the proper use of the SSB radio and the satellite phone.

Air Charters

All air charters will be scheduled through the Kodiak office staff. Information regarding charters will be relayed through daily radio contact. It is important to contact office personnel when any data, equipment, or other freight will be "back hauled" to Kodiak. It is also important to clearly label "back hauled" items; ADF&G Attn; Rob Baer 486-1835.

Reporting

Reporting is a crucial component of the Malina project. The project biologist is ultimately responsible for the data collected; however, managing and reporting of the data in an organized, understandable manner by the crew leader and crewmember is essential to the success of the project. The following list details the crew leader's reporting responsibilities:

1. Daily reporting.

- Complete data forms and a field log documenting daily activities using a no. 2 pencil.
- Use "rite in the rain" field log books when collecting data in inclement weather; transfer data on to data forms in a sheltered area (boat or cabin).

2. Weekly reporting.

- Write a one page weekly report summarizing project activities following the format of Appendix C.

3. Season summary (project biologist will author this summary and the crew leader will assist).

- Author a seasonal report summarizing the Malina Project activities.
- Follow the format of Appendix D when writing this document.
- Include specific information on hardware installation, removal, and system operation.
- Include photographs of important and significant portions of the project (State cameras and film are available for project documentation).

4. Performance Appraisals.

- The project crew leader will be responsible for assisting the project biologist with performance evaluations. However, the crew leader will provide input toward field crew's performance which will be reflected in their evaluation. In addition, the crew leader will keep the field crew apprised of their inseason performance.

Note: Send properly packaged, labeled data forms and a weekly report to Kodiak on each available charter flight.

Camp Inventory and Close Up

The Malina Lakes project equipment will be inventoried prior to camp close up. Inventory forms will be provided. Items of high value will be returned to Kodiak and a list will of the equipment needed for the 2005 field season will be made. The weatherport platform and out buildings will be secured prior to leaving the field.

Timesheets

Forward timesheets to THE KODIAK OFFICE BY THE 15TH AND LAST DAY OF EACH MONTH! Plan ahead to ensure that timesheets arrive in town on time. To ensure that timesheets are properly filled out, instructions on filling out a timesheet are contained in Appendix D.1 and an example of a properly filled out timesheet is provided (Appendix.D.2). Plan work activities to be completed in a 7.5 hour day; work overtime only if pre-authorized by the project biologist. If changes must be made to a timesheet which has already been submitted then an amended timesheet can be turned in.

Crew leaders should take time to review the timesheets and ensure they are properly filled out before they are sent into town.

Purchasing

During the field season, field crews will need additional items (e.g., groceries, fuel, or tools). Small lists can be read over the radio during the radio schedule; however, these lists should be limited to just a few items. Remember that radio time is limited and there are other camps region-wide that use the same frequency. Blank grocery lists will be sent to the field and the crew leader should remember to send orders in advance to ensure the correct grocery order for the next supply flight. It should also be remembered that the Afognak Lake budget allocates \$20/day/person for food and this allocation will not be exceeded. Crew leaders should track grocery expenses and limit the number of requested specialty items. Plan ahead when requesting fuel for heating the camp. In the past camps have left stoves on during the day while the crew was working outside. This practice is not acceptable and heating units will need to be turned off.

LITERATURE CITED

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- Nelson, P.A. and D.S. Lloyd. 2001. Escapement goals for Pacific salmon in the Kodiak, Chignik, and Alaska Peninsula/ Aleutian Islands Areas of Alaska. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4K01-66, Kodiak.
- Pollard, W.R., C.F. Hartman, C. Groot, and P. Edgell. 1997. Field identification of coastal juvenile salmonids. Harbour Publishing. Maderia Park, B.C. Canada. 31p.

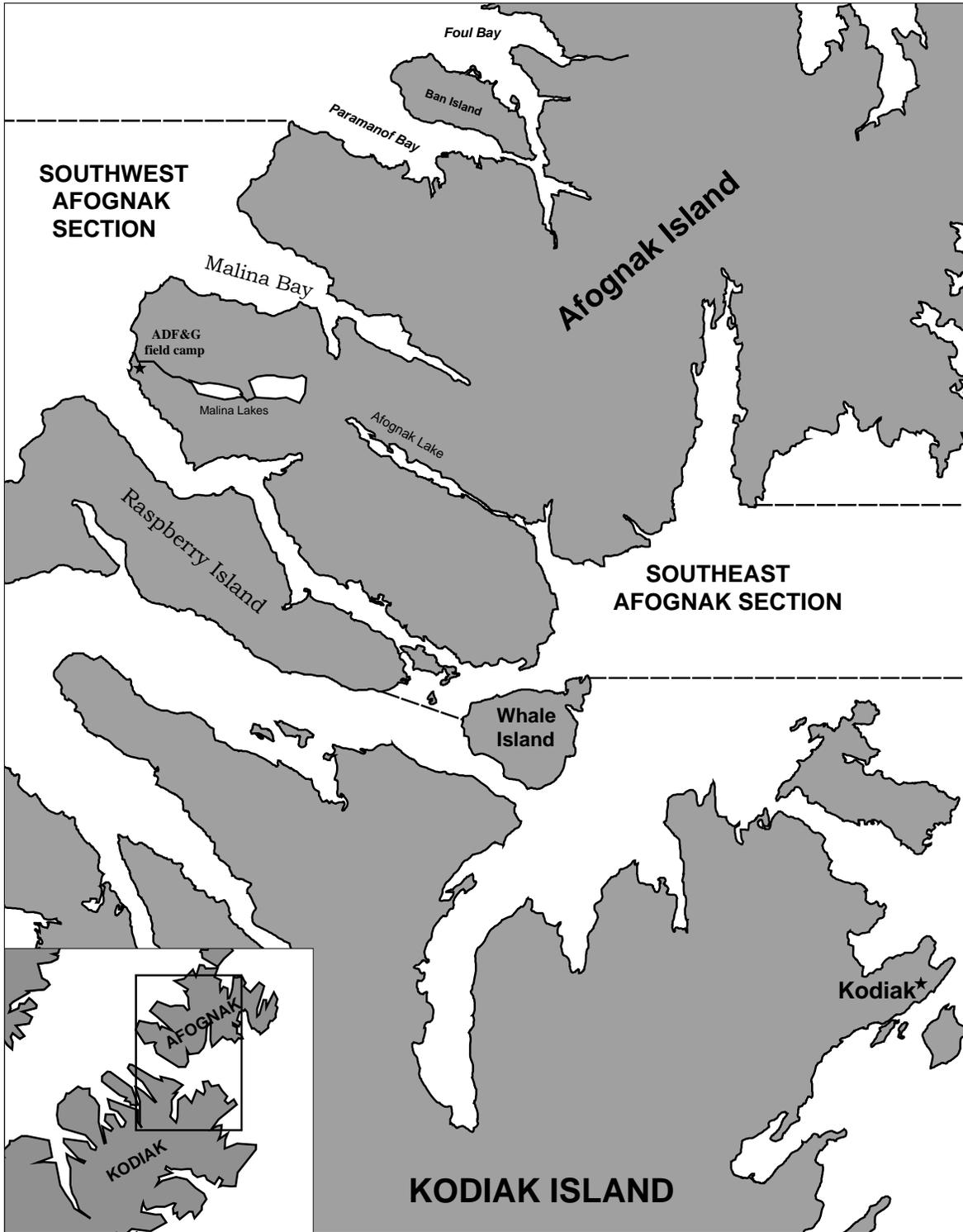


Figure 1. Location of the Malina Lakes on Afognak Island.

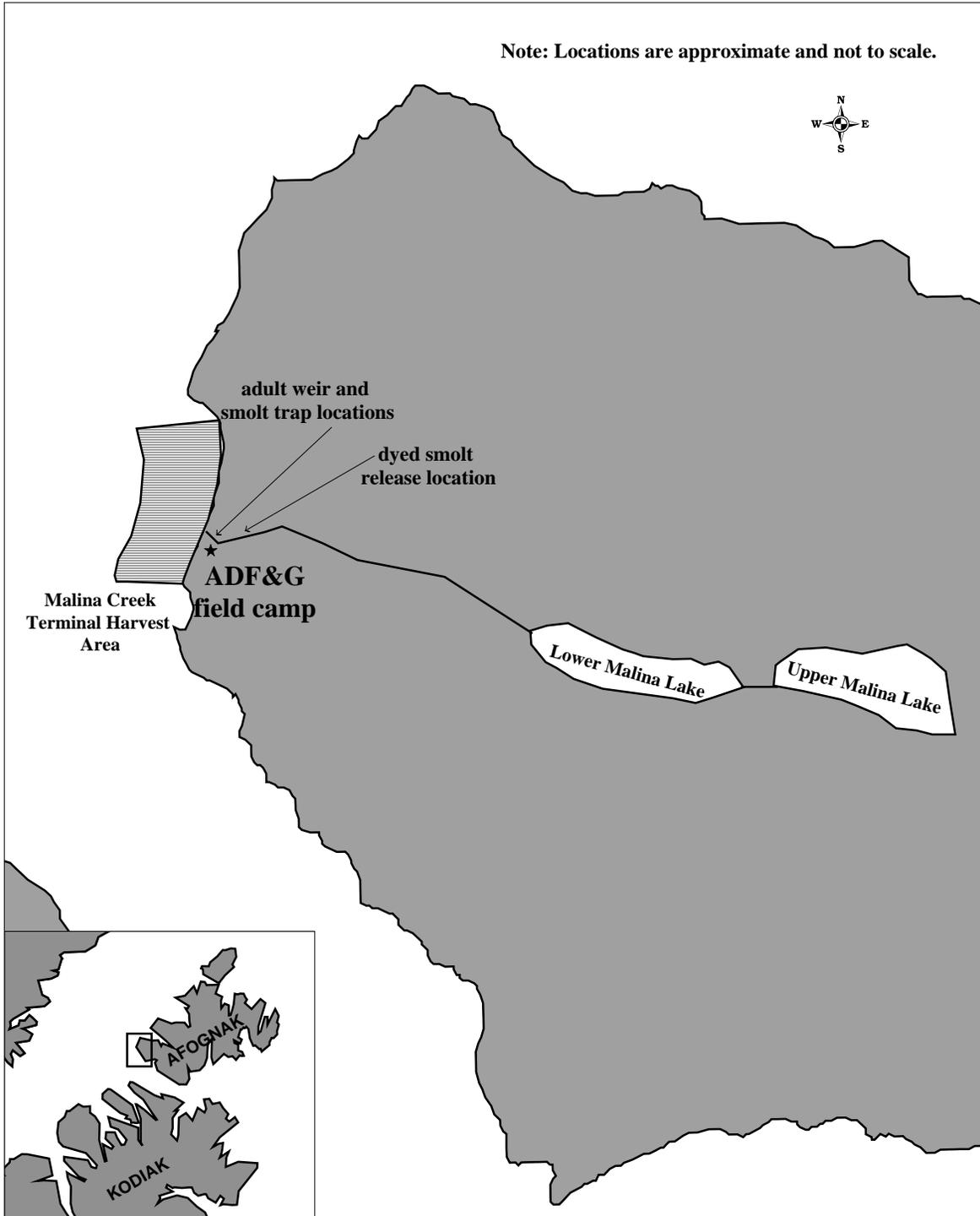


Figure 2. Location of the ADF&G field camp, adult and smolt enumeration and sampling sites, and the terminal harvest area for the Malina Lakes rehabilitation project on Afognak Island.

ALASKA DEPARTMENT OF FISH AND GAME
 KODIAK MANAGEMENT AREA
 WEEKLY SALMON WEIR COUNT REPORT FOR YEAR: 2004

WEIR CAMP
 NAME: MALINA

PERSONNEL: _____

PAGE: _____ OF _____

WEEKLY REPORT
 FOR WEEK ENDING (SATURDAY) _____

DATE	DAILY TOTAL ESCAPEMENT							STEELHEAD DOWN	REDS SAMPLED	JACK NO.	JACK %	NET MARKED	INJURED REDS	WATER LEVEL (cm)	H ₂ O TEMP	WEATHER		
	REDS	L. REDS	KINGS	PINKS	COHOS	CHUMS	DOLLY V.									CEIL.	VIS.	WIND DIR/SPD.
SUN D																		
SUN A																		
MON D																		
MON A																		
TUE D																		
TUE A																		
WED D																		
WED A																		
THU D																		
THU A																		
FRI D																		
FRI A																		
SAT D																		
SAT A																		
WEEK TOTAL																COMMENTS:		
																COMMENTS:		
AWL WEEK																COMMENTS:		
AWL ACCUM																COMMENTS:		

ADDITIONAL COMMENTS: BEAR AND PEOPLE PROBLEMS; SMOLT MIGRATION; WEIR PROBLEMS; CABIN REPAIR; NOTE AIRCRAFT TRAFFIC

Figure 6. Weekly salmon weir count reporting form.

APPENDIX

Appendix A.1. Smolt age-weight-length (AWL) sampling materials and methods.

Annually, outmigrating salmon smolt are sampled for age (scales), weight, and length, by field crews throughout the Westward Region. These data are essential for sound management of the State's salmon resources.

To be useful, data must be recorded on the age, weight, length (AWL) optical scanning (opscan) forms neatly and accurately. In addition, scale samples must be collected and mounted properly to ensure accurate age determination. The following procedures are to be strictly adhered to when sampling juvenile salmon for age, weight, and length.

Complete each section on the left side of the AWL form using a No.2 pencil and darken the corresponding circles as shown in the figures. Make every effort to darken the entire circle as the optical scanner, which reads and records the data from the AWL forms, may not recognize partially filled circles. Be sure to transfer the litho code, located in the left margin on the front side of the AWL form to the back side of the form by darkening the appropriate circles (see Appendix A.3.).

Label only one form at a time to avoid a "carbon paper effect" resulting in stray marks. Special care should be used to ensure that stray marks do not occur on either side of the AWL form. Stray marks and scuffed AWL forms can severely hamper scanning. The AWL forms should be treated carefully; the scanner in the Kodiak office cannot read damaged forms. The forms should not be stapled, bent, paper-clipped or folded. Specific instructions for completing AWL forms are listed in Appendix A.2 and an example of an AWL form filled out for smolt sampled can be found in Appendix A.3.

All juvenile salmon AWL data will be recorded in a field notebook dedicated to smolt sampling. These data will then be transferred from the field notebook to the AWL forms. Each species will have its own AWL sample number series that runs sequentially throughout the season. Up to 40 individual fish per smolt day may be included in one AWL sample. If more than 40 fish are sampled in a single smolt day, then multiple AWL numbers will be used on that day. For example, if 70 sockeye salmon smolt are sampled in a single day (day 1), the AWL numbers will be AWL #001 (fish 1-40; 8 slides) and AWL #002 (fish 1-30; 6 slides). The next day will start with AWL #003. Each day's sample will start with a new AWL number.

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

Tricane Methanesulfate (MS-222) will be used to anesthetize the smolt; latex gloves will be worn to prevent direct exposure to the anesthetic. The use of this chemical will be demonstrated by experienced personnel. A small amount (approximately 1 g) of MS-222 and a

-Continued-

small amount of baking soda will be dissolved in approximately 2 L of cold water. The amount of anesthetic used will vary depending on the water temperature, freshness of the chemical, and size of the smolt. A few smolt will be placed in the anesthetic solution until subdued to a point where they can no longer flex their axial musculature but can still ventilate their gills. The concentration of the solution should be such that it immobilizes the fish in 2-3 minutes. After the fish are anesthetized, it is important to sample them quickly and place them in a recovery container to prevent mortality. No more than 80 smolt will be anesthetized with one batch of solution.

After the smolts have been immobilized, excess water will be gently removed from the fish using a paper towel or a wet sponge as a blotter. Place the fish on its right side to sample the left side. Measure smolt length, to the nearest mm, from tip-of-snout to tail fork (Appendix A.4). Record length by blackening the appropriate column circles on the front side of the AWL form. When collecting length data, take care to ensure that each length corresponds to the appropriate scale smear mounted on the slide, as length-at-age is evaluated for each sample. Weigh each smolt to the nearest 0.1 g, and record the weight by blackening the appropriate column circles on the back side of the AWL form.

On salmon species, the preferred scale is located where a straight line between the posterior insertion of the dorsal fin and the anterior insertion of the anal fin crosses the second scale row dorsal to the lateral line. In smolt, the area directly around this scale is considered the preferred area (Appendix A.4). If scales are not present in this area then scales should be taken from the secondary location, which is the same area on the right side of the fish. A scalpel will be used to remove 5-10 scales from the preferred area. These scales will be mounted on a glass slide using a probe to position the scales. Scales from five fish will be mounted on each slide. The scalpel will be wiped clean of scales and slime between each fish. A diagram of a slide with scales mounted correctly is located in Appendix A.5.

The left portion of each slide will be labeled with AWL number, sample location, species, date, and inclusive fish numbers. A diagram of a properly labeled slide is located in Appendix A.5. After sampling, fish will be held in a recovery container until they are swimming normally and then released downstream of the trapping location. When the slides are completed, return them to the box in order by AWL # and fish #. Label the slide box on top with the information listed in Appendix A.5.

Appendix A.2. Procedure for recording salmon smolt age-weight-length data on AWL forms.

Smolt length and weight will be recorded on AWL forms (Appendix A.3.). Using a No.2 pencil, complete each section of the left side of the AWL and darken the corresponding blocks.

Fill out each of the following:

Description

Record the following: species, location, year and samplers names (e.g., sockeye smolt, Malina Creek, 2004, Tomco & Gregory).

Card

The AWL forms and corresponding slides are numbered sequentially by date throughout the season starting with 001. A new, consecutively numbered AWL form is used each day even if the previous AWL form is not full. There may be a minimum of one fish and a maximum of 40 fish (8 slides) per AWL form.

Species

Refer to the reverse side of the AWL form for the correct one digit code (e.g., sockeye = 2).

Day, Month, Year

Use appropriate digits for the date the fish are sampled.

District

List the district in which the fish were sampled. Consult your area statistical map or project leader for the appropriate district. (Malina = **251**)

Subdistrict (Section)

List the subdistrict in which the fish were sampled. Consult your area statistical map or project leader for the appropriate subdistrict. (Malina = **10**)

Stream

List the stream in which the fish were sampled. Consult your area statistical map or project leader for the appropriate stream number. (Malina = **042**)

Location

Leave blank

Period

List the period (sample week) in which the fish were sampled (Appendix A.6.).

-Continued-

Project and Gear

Refer to the reverse side of the AWL form for the correct code. For example, smolt samples collected in a beach seine would have a project code of **2** and a gear code of **02**.

Mesh

Leave blank unless specifically instructed by supervisor to do otherwise.

Type of length measurement

Refer to the reverse side of the AWL form for the correct code (e.g., tip of snout to tail fork = 2). Refer to Appendix A.2.

Number of scales per fish

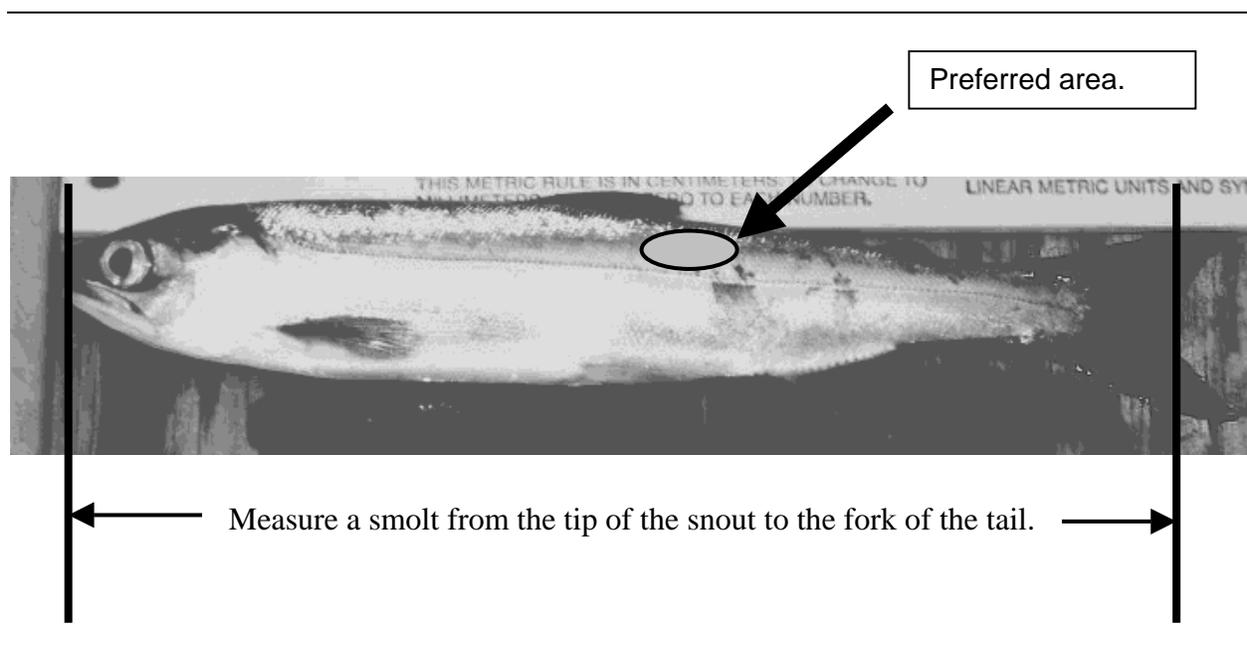
Fill in the number of scales (smears) collected per fish. For smolt, one scale smear per fish is collected.

of cards

of cards always = 1 (each AWL form is individually numbered).

If possible, keep the AWL form litho codes in numerical order throughout the season and keep all forms flat, dry, and clean. Remember that when sampling smolt, weight data is recorded on the back side of the AWL form and the litho code, located in the left margin on the front side of the AWL form must be transferred to the back side of the form (see Appendix A.3.). The litho code is the number unique to each AWL form and copying the litho code from the front to the back of the form indicates weight data was transcribed on the back of the form for the Optical scanning machine to read. Fish slime and water curling may cause data to be misinterpreted by the optical scanning machine. **It is the responsibility of the crew leader to make sure that all forms are carefully edited before returning them to their supervisor.**

Appendix A.4. Photo of a smolt with the preferred area highlighted.



Appendix A.5. An example of 2 correctly labeled smolt slides representing fish 1 through 10 from a sample collected on 5/11/00.

AWL 001 Sockeye Bear Lake 5/11/00 Fish 1 - 5	<table style="border: none;"> <tr> <td style="text-align: center; vertical-align: top;">1</td> <td style="text-align: center; vertical-align: top;">•</td> <td style="text-align: center; vertical-align: top;">5</td> </tr> <tr> <td></td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> </tr> </table>	1	•	•	•	•	5		•	•	•	•	•		•	•	•	•	•		•	•	•	•	•		•	•	•	•	•		•	•	•	•	•		•	•	•	•	•
1	•	•	•	•	5																																						
	•	•	•	•	•																																						
	•	•	•	•	•																																						
	•	•	•	•	•																																						
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	•	•	•	•	•																																						
	•	•	•	•	•																																						
AWL 001 Sockeye Bear Lake 5/11/00 Fish 6-10	<table style="border: none;"> <tr> <td style="text-align: center; vertical-align: top;">6</td> <td style="text-align: center; vertical-align: top;">•</td> <td style="text-align: center; vertical-align: top;">10</td> </tr> <tr> <td></td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> </tr> </table>	6	•	•	•	•	10		•	•	•	•	•		•	•	•	•	•		•	•	•	•	•		•	•	•	•	•		•	•	•	•	•		•	•	•	•	•
6	•	•	•	•	10																																						
	•	•	•	•	•																																						
	•	•	•	•	•																																						
	•	•	•	•	•																																						
	•	•	•	•	•																																						
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When the slides are completed, return them to the box in order by AWL # and fish #, and label the slide box on top with the following information:

Location: Bear Lake

AWL Number: AWL 001-003

Beginning and end dates: 6/12-7/13/00

Sockeye Salmon Smolt

Appendix A.6. Sampling weeks and associated calendar dates, 2003.

Week	Calendar Dates	Week	Calendar Dates
10	1-Mar - 7-Mar	28	5-Jul - 11-Jul
11	8-Mar - 14-Mar	29	12-Jul - 18-Jul
12	15-Mar - 21-Mar	30	19-Jul - 25-Jul
13	22-Mar - 28-Mar	31	26-Jul - 1-Aug
14	29-Mar - 4-Apr	32	2-Aug - 8-Aug
15	5-Apr - 11-Apr	33	9-Aug - 15-Aug
16	12-Apr - 18-Apr	34	16-Aug - 22-Aug
17	19-Apr - 25-Apr	35	23-Aug - 29-Aug
18	26-Apr - 2-May	36	30-Aug - 5-Sep
19	3-May - 9-May	37	6-Sep - 12-Sep
20	10-May - 16-May	38	13-Sep - 19-Sep
21	17-May - 23-May	39	20-Sep - 26-Sep
22	24-May - 30-May	40	27-Sep - 3-Oct
23	31-May - 6-Jun	41	4-Oct - 10-Oct
24	7-Jun - 13-Jun	42	11-Oct - 17-Oct
25	14-Jun - 20-Jun	43	18-Oct - 24-Oct
26	21-Jun - 27-Jun	44	25-Oct - 31-Oct
27	28-Jun - 4-Jul	45	1-Nov - 7-Nov

Appendix A.7. Procedure for sampling adult salmon for age, length, and sex.

Annually, salmon escapements and catches are sampled for age (scales), length, and sex by field crews throughout the state. 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 (AWL) optical scanning (opscan) forms neatly and accurately. In addition, scale samples must be collected and mounted properly to ensure accurate age determination. The following procedures are to be strictly adhered to when sampling adult salmon for age, length, and sex.

Procedures

COMPLETING THE OPSCAN AWL FORMS:

New **green** AWL forms have been developed which have Y2K date capabilities. Before transcribing any information, make sure the correct form is being used. The department no longer uses the outdated red or blue forms.

A completed AWL form and accompanying scale gum card for sampling sockeye salmon are shown in Appendix A.8.

Complete each section on the left side of the AWL form using a No.2 pencil and darken the corresponding circles as shown in the figures. Make every effort to darken the entire circle as the optical scanner, which reads and records the data from the AWL forms, may not recognize partially filled circles. Label only one form at a time to avoid a "carbon paper effect" resulting in stray marks. Special care should be used to ensure that stray marks do not occur on either side of the AWL form. Stray marks and scuffed AWL forms can severely hamper scanning.

Fill out each of the following:

Description

Record the following: species/area/catch or escapement/gear type (if applicable)/samplers.

Card

The AWL forms and corresponding gum card(s) are numbered sequentially by date throughout the season starting with 001. A separate numbering sequence will be used for each species, district, and geographic location. Consult your crew leader for the current card number. Sockeye salmon scale samples will have only one gum card per AWL form as shown in Appendix A.8.

Species

Refer to the reverse side of the AWL form for the correct one-digit code (e.g., sockeye = 2).

Day, Month, Year

Escapement sampling: Use appropriate digits for the date the fish are sampled.

Catch sampling: Use the date the fish were caught. If this differs from the sample date, note the sample date in the top margin.

District

List all districts in which the fish were caught. Consult your area statistical map or project leader for the appropriate district. If more than one district is represented, darken the corresponding circles of the district representing most of the catch and note the other catch areas in the top margin. (Malina = **251**)

Subdistrict (Section)

List all subdistricts in which the fish were caught. If the catch represents more than one section, list each section but do not darken the corresponding circles. Leave blank if the section is unknown. (Malina Weir = **10**, Malina THA = **12**)

Stream

Consult area statistical map for the appropriate stream number when collecting escapement samples. (Malina weir = **105**)

Location

List the appropriate code associated with the area the fish were sampled. For example; (Malina = **042**)

Period

Escapement sampling: List the sample week in which the fish were sampled (Appendix A.5.).

Catch sampling: List the sample week in which the fish were caught. If this differs from the week the fish were sampled, note this in the top margin.

Project and Gear

Refer to the reverse side of the AWL form for the correct code. For example, escapement samples collected at a weir would have a project code of 3 and a gear code of 19.

Mesh

Leave blank unless specifically instructed by supervisor to do otherwise.

Type of length measurement

Refer to the reverse side of the AWL form for the correct code (e.g., mid eye to tail fork = 2). Refer to Appendix A.6.

Number of scales per fish

Fill in the number of scales collected per fish. For sockeye, one scale per fish is collected unless otherwise instructed by your supervisor.

-Continued-

of cards

of cards always = 1 (each AWL form is individually numbered).

If possible, keep the AWL form litho codes in numerical order throughout the season and keep all forms flat, dry, and clean. Fish gurry and water curling may cause data to be misinterpreted by the optical scanning machine. **It is the responsibility of the crew leader to make sure that all forms are carefully edited before returning them to their supervisor.**

SCALE GUM CARDS

A completed AWL form and accompanying gum card for sampling sockeye salmon are shown in Appendix A.2. When collecting two scales per fish, as with coho salmon sampling, follow the procedure illustrated in Appendix A.3. Be sure to fill out the gum cards in pencil as shown in Appendix A.2 and A.3.

Species

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

Locality

Escapement sampling: Include the weir site followed by “escapement” (e.g., Karluk River escapement).

Catch sampling: Include the area(s) where the fish were caught followed by “catch” (e.g., Uganik Bay catch).

Statistical Area Code

Fill in the appropriate digits from the AWL form. If catch samples are from a variety of statistical areas be sure to list each statistical area and approximate percentage from each (if available).

Sampling date

Escapement sampling: Fill in the date the fish were sampled.

Catch sampling: Fill in the date the fish were caught. The sample date, if different from the catch date, may be noted in “remarks”.

Gear

Write out completely. If catch samples include multiple gear types, be sure to list each gear and approximate percentage from each (if available).

Collector(s)

Record the last names of each person collecting the sample.

Remarks

Record any pertinent information such as the number of scales per fish sampled, processing facility where the sampling took place, vessel/tender name, etc. Be sure to transfer this information to the top margin of the AWL form.

-Continued-

SAMPLING PROCEDURE

1. Place the fish on its right side to sample the left side.
2. Determine the sex of the fish (escapement sampling only) and darken M (male) or F (female) in the sex columns. If any difficulty is encountered with this procedure, write "I had trouble sexing these fish" on the top margin of the AWL form and ask your supervisor for help as soon as possible before sexing additional fish.
3. Measure fish length in millimeters from mid eye to tail fork (escapement sampling only; Appendix A.6). Record length by blackening the appropriate column circles on the AWL form. Column 3 on the AWL form is used for fish with a length greater than 999 millimeters (Chinook). Measure all species of salmon to the nearest mm. When collecting length data, take care to ensure that each length corresponds to the appropriate scale mounted on the gum card, as length-at-age is evaluated for each sample.
4. Remove the "preferred scale" from the fish by grasping the scale's exposed posterior edge with forceps and pulling free (Appendix A.7). Remove all slime, grit, and skin from the scale (neoprene wristers work well for this). 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. If the preferred scale is missing, select a scale within the preferred area on the other side of the fish. If no scales are present in the preferred area on either side 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. Do not select a scale located on the lateral line.
5. It is important to take care that scales adhere to the gum card, rough side up. Therefore, without turning the forceps over, clean, moisten, and mount the scale on the gum card with your thumb or forefinger. Exert just enough pressure to spread and smooth the scales directly over the number as shown in Appendix A.7. The ridges on the sculptured side can be felt with a fingernail or forceps. Mount the scale with the anterior end oriented toward top of gum card. All scales should be correctly oriented on the card in the same direction (Appendix A.8.).
6. Repeat steps 1 through 4 for up to 40 fish on each AWL form.
6. When sampling at weirs you may use "Rite in the Rain"[®] books to record the data. Keep the AWL forms in camp where they will be clean, dry, and flat. After sampling is done for the day, transfer the data to the AWL forms. **Each length, sex, and scale must correspond to each individual fish sampled! It is the responsibility of the crew leader to be sure the data has been transcribed correctly and the AWL forms filled out completely. Log books containing length and sex data should be returned to Rob Baer at the end of the season.** These are considered raw data and need to be archived. If you choose to record raw data on tape, these tapes must be returned to Matt Foster.

-Continued-

SAMPLING CHECKLIST

OPERATIONAL PLAN	PENCILS (NO. 2)
GUM CARDS	FORCEPS
AWL FORMS (GREEN)	PLASTIC CARD HOLDERS
NEOPRENE WRISTERS	CLIPBOARD
MEASURING BOARD	LOG BOOK

SOME REMINDERS

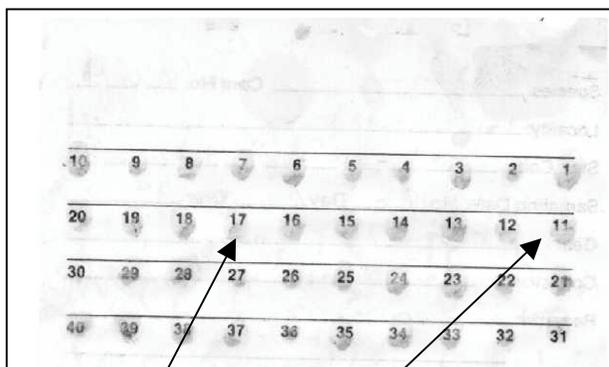
1. For greater efficiency in scale reading, mount scales with anterior end toward top of gum card.
2. AWL forms should be carefully edited. Remember to use the new AWL forms (green) as the red and blue forms are outdated. Re-check header information on AWL forms; make sure all available information is filled in. Take extra care to use the correct period code (sampling week) for the sampling or catch date. AWL form numbers should not be repeated; a frequent error is to begin a week's sample with the last AWL number used the week before. This is particularly important if the data is regularly sent to town; it is easy to forget which AWL form numbers were used. Crew leaders should take time to ensure that the circles are being blackened correctly. If the circles are sloppily marked, the optical scanner records the information incorrectly or misses it entirely.
3. Transfer important comments from the gum cards to the AWL forms. After pressing scales, the cards are seldom referred to again, and important remarks can be lost. Write comments in the top right margin. If there is not room on the AWL form to completely explain the remarks, use a separate piece of paper.
4. Never put data from different dates on one AWL form or one gum card. Even if only one scale is collected that day, begin a new AWL form and gum card the next day.
5. If weights are taken, they may be noted in the right margin of the AWL form during sampling, but be sure to transfer the weights and litho code to the appropriate columns on the reverse of the AWL form before submitting it to your supervisor.
6. Try to keep the litho codes (located in the left margin of the AWL form) in numerical order. This should not be hard to do if they are arranged that way before page numbering. When sampling different areas throughout the season, arrange the litho codes in order before each sample is taken.

-Continued-

7. If AWL forms get wrinkled or splotted the data should be transcribed onto a new AWL form prior to sending in. The optical scanning computer will misread or reject torn or wrinkled sheets. Do not use paperclips on AWL forms.
 8. Be careful when collecting and mounting scales in wet conditions (rain, high humidity, etc.). If glue dries on top of the scale, it often obscures scale features, resulting in an unreadable scale. In addition, scales frequently adhere poorly to a wet gum card. Protect the cards and keep them dry to avoid having to remount the scales on a new card. If the cards get wet, try to dry them in a protected area or remount if necessary. Remember, use a pencil when filling out gum cards, because ink will come off during pressing.
 9. Visually scan all AWL forms for mistakes. A common error occurs, for instance, in placing both the 4 and 7 of a 475mm fish in the 100s column with nothing in the 10s column.
 10. Avoid accumulation of incomplete AWL forms. In previous years, there have been cases where individuals have completed several samples before transcribing the information on the AWL forms. This may lead to an increase in errors. After a sample has been completed, try to get the AWL forms filled out as soon as possible. This will ensure more accurate information, as any problems or abnormalities concerning the sample (e.g., many jacks in sample, many fish lacking preferred scale, number of scales do not match number of lengths recorded, etc.) will be fresh in your mind.
 11. Responsibility for accuracy lies first with the primary data collector(s) and finally with the crew leader. Sloppy or incomplete data forms or gum cards will be returned to individual collectors for correction.
-

Appendix A.8. Completed adult salmon AWL form (front side) and associated gum card.

Species: Sockeye Card No: 014
 Locality: Frazer Esc.
 Stat. Code: 257-40-403-
 Sampling Date: Mo. 06 Day 07 Year 2000
 Gear: Weir/Trap
 Collector(s): D. Roberts, C. Selby
 Remarks: _____



Samplers: Roberts, Selby

DESCRIPTION: Sockeye \ Frazer \ Esc. ADF&G ADULT SALMON AGE-LENGTH FORM VERSION 2.1

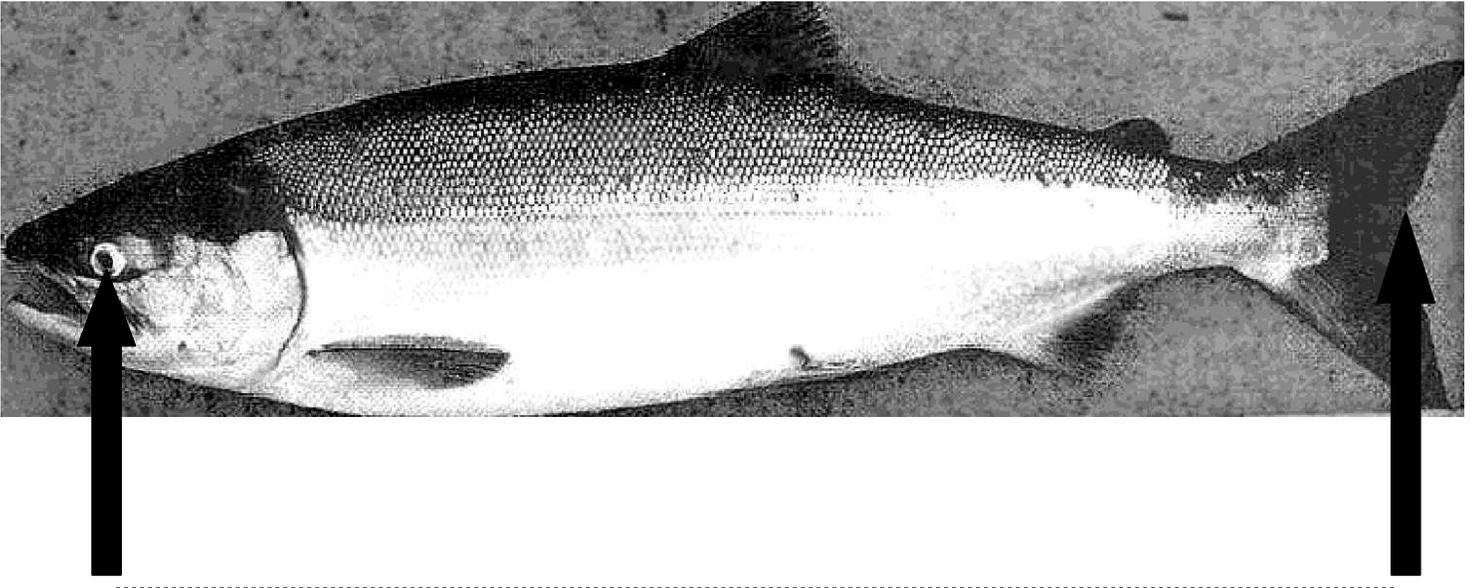
CARD:	#	SEX	LENGTH		AGE GROUP	AGE ERROR CODE
			100's	1's		
014	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
	13					
	14					
	15					
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	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					

CARD: 014
 SPECIES: Sockeye
 DAY: 07
 MONTH: 06
 YEAR: 2000
 DISTRICT: 257
 SUBDISTRICT: 40
 STREAM: 403
 LOCATION: 038
 PERIOD: 24
 PROJECT: 3
 GEAR: 19
 MESH:
 TYPE OF LENGTH MEASUREMENT: 2
 NUMBER SCALES/ FISH: 1
 # OF CARDS: 1

15429

Mark Refers to by NCS MM20092-1 3 PE33 Printed in U.S.A.

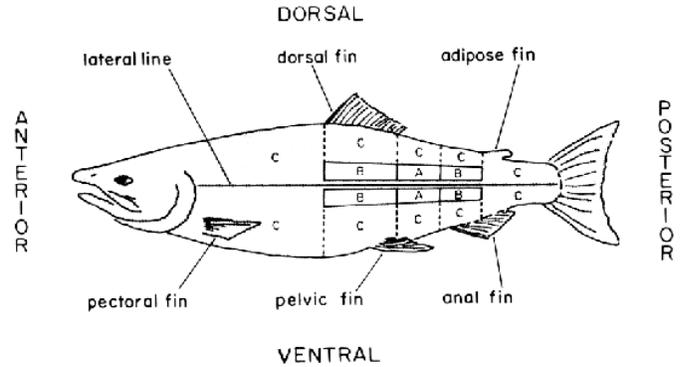
Appendix A.9. Measuring fish length from mid eye to tail fork.



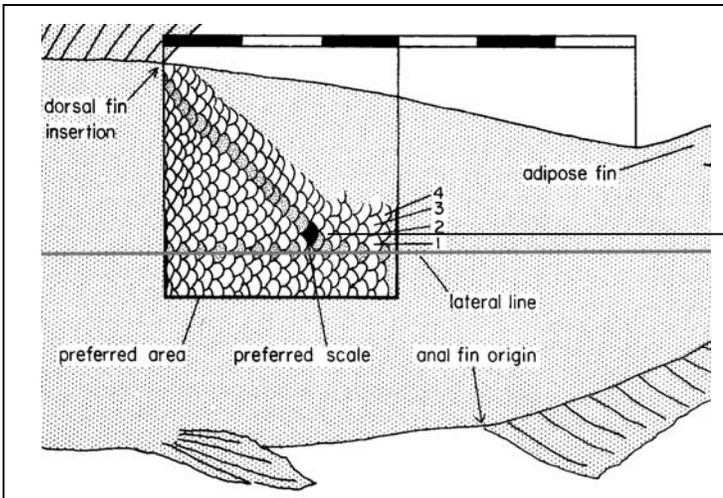
Adult salmon length is measured from mid eye to tail fork because the shape of the salmon's snout changes as it approaches sexual maturity. The procedure for measuring by this method is as follows.

- 1) Place the salmon flat on its right side (on the measuring board) with its head to your left and the dorsal fin away from you.
- 2) Slide the fish in place so that the middle of the eye is in line with the edge of the meter stick and hold the head in place with your left hand.
- 3) Flatten and spread the tail against the board with your right hand.
- 4) Read and record the mid eye to tail fork length to the nearest millimeter.

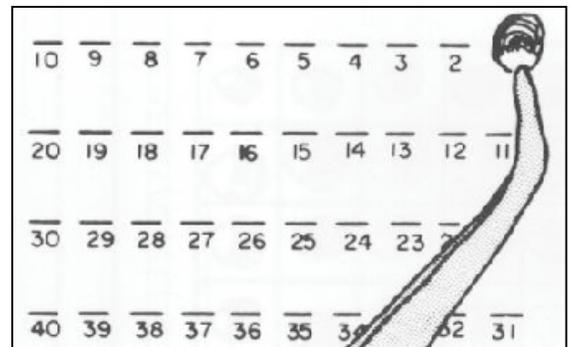
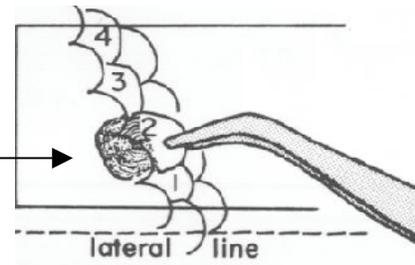
Appendix A.10. Removal and mounting of the preferred salmon scale.



INPFC rated areas for scale removal. Area A is the preferred area. If scales on the left side are missing, try the right side. Area B is the second choice if there are no scales in area A on either side of the fish. Area C designates non preferred areas.

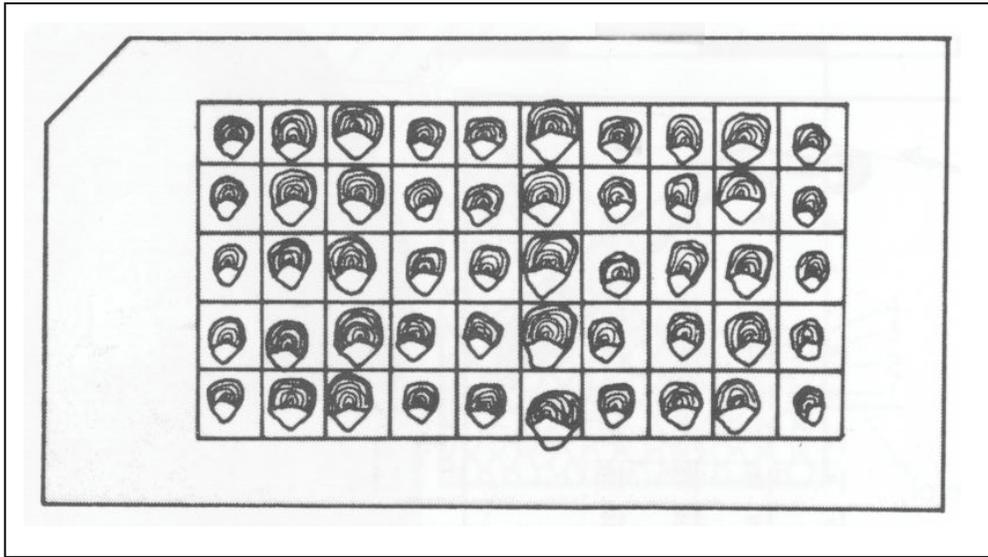


Do not turn scale over.

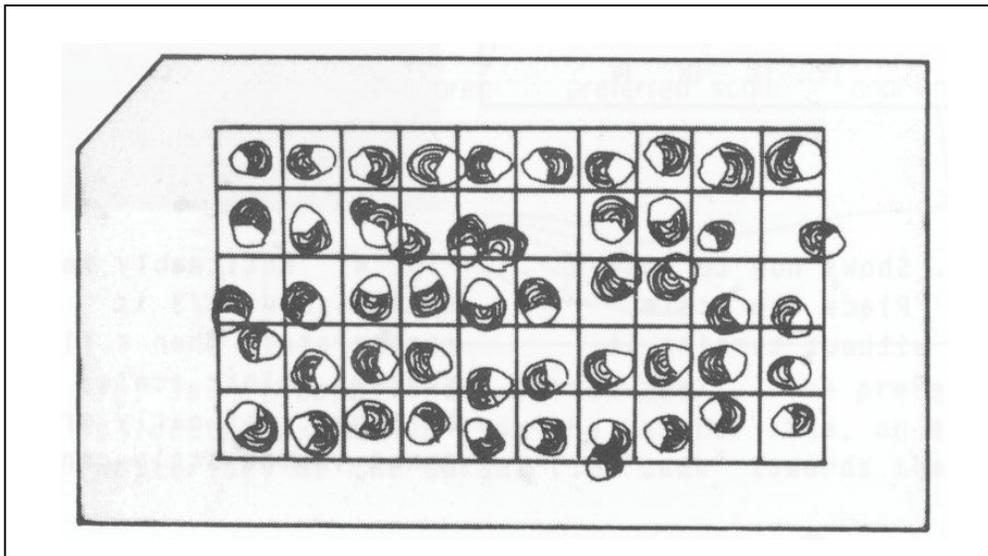


The preferred scale in this diagram is solid black. It is located 2 rows up from the lateral line, on a diagonal from the insertion (posterior) of the dorsal fin “back” toward the origin of the anal fin.

Appendix A.11. Scale orientation on the salmon scale gum card.



The scales are all correctly oriented on the card in the same direction, with the anterior portion of the scale pointed toward the top of the card and the posterior portion (which is that portion of the scale held in the forceps) pointed toward the bottom of the card.



The scales are incorrectly oriented in different directions. This increases the time spent to age samples.

Appendix B. Satellite Telephone and Dispatch Instructions.

The following information serves as a Policy Statement regarding the allowable uses of ADF&G satellite phones and Instructions on the proper method to successfully set up and operate the satellite phone system assigned to your camp.

These systems are not like standard telephones or cell phones, nor are they like a single side band or VHF radio. Communication is sent through the transmitter to low level satellites, then is beamed down to ground stations, either directly to another satellite phone system or to a switching station linked to standard telephone lines. As such, there is a much higher cost involved in operation than with standard telephone long distance or cell phone charges.

Under NO CIRCUMSTANCES may you use this satellite phone system for personal calls, unless, for each event, you have obtained direct and explicit permission from your supervisor. This does not mean that field crew leaders may grant permission for personal use of this phone. Only the project biologist may give you such permission. ANY DELIBERATE MISUSE OF THIS SYSTEM, SUCH AS MAKING UNAPPROVED, NON-EMERGENCY, OR PERSONAL CALLS, WILL RESULT IN DISCIPLINARY ACTION, WHICH MAY INCLUDE SUSPENSION OR DISCHARGE.

The primary purpose for having this satellite phone is for secure, reliable communications between remote field stations and ADF&G offices (Kodiak, Chignik, Cold Bay, Sand Point, or Port Moller), ADF&G research vessels (Resolution or K-Hi-C), Fish and Wildlife Protection vessels and offices, or other field camps that are similarly equipped. The secondary purpose is for your SAFETY. With these phones you are capable of directly dialing emergency services at any time of the day or night. It is essential that these phone systems are maintained in good working order, are fully charged or hooked to sufficient power at all times, and remain free for official or emergency use.

INSTRUCTIONS

The portable sat phone unit must be charged with power. There is an internal battery pack, and a 12-volt adapter is available in order to hook the phone to a larger battery bank, that may in turn be recharged by generator or solar panels.

Turn the unit on using the power switch in the lower left corner. A green light, just above the switch, should come on indicating that the unit is sufficiently powered. If no light or a red light comes on, you will need to charge the unit, or attach it to your 12-volt battery bank via the appropriate connections.

The back, or top, of the briefcase-like unit is the antenna, and it must be oriented correctly in order to access the receiving satellite. The top of the case should be open and

-Continued-

pointed in a general east-southeast direction. You must have a fairly clear line-of sight to the horizon in that direction; this unit will NOT work through walls or mountains. The angle of the antenna should be almost vertical; remember to lock the support arm that attaches the lid to the main body of the unit, along the right side.

This system has two means for calling; a telephone-like handset (for dial in or dial out phone calls), and a push-to-talk microphone (for 'dispatch', unit to unit, calls). All calls made with the handset are billed per minute of use, at an expensive rate. All calls on the 'AlaskaNet' dispatch system, using the microphone, are essentially FREE.

When first turned on, the handset and microphone should become active, with the display panels on the top of the phone handset and microphone lighting up (one LED panel, hopefully the one on the handset, should read SLEEP). The display will show, after a few moments, whether a connection has been established with the satellite, and how strong the signal is (ex. *B05 S 21*). Turn the unit slightly, and raise or lower the lid/antenna slightly until the highest possible signal strength is indicated (normally above 20 but will work down to 8). Lock the lid/antenna in place and do not turn the unit again, until your communications are finished. Once a strong signal is acquired push the "*" button for 2 seconds. Wait until there is a "beep" and the LCD screen displays '00:DN ??', then dial the number.

Alaska Dispatch System

Because all calls made on the dispatch system are FREE, this is the method of choice for using the satellite phone units. There are several ADF&G offices, many field camps, and two research vessels on the AlaskaNet dispatch system, as well as Fish and Wildlife Protection/State Troopers offices and vessels, plus many canneries, fishing vessels, and tenders. You should have received a 10-12 page directory with your phone.

First, make sure the unit is turned on, and that there is sufficient power. Set the unit up so that the signal strength is at the maximum for your location. You should see the signal strength on the microphone display (ex. *B05 S 21*), and the handset display should read SLEEP. Once a strong signal is acquired push the "*" button for 2 seconds. Wait until there is a "beep".

On the microphone display, below the signal strength, there should be a query, '00:DN ??'. This is asking you to 'dial' in the 4-digit dispatch number that you wish to call. After you have entered the 4-digit dispatch number of the unit you wish to contact, hold in the microphone key and a connection will be made with the satellite, which will then try to connect with the dispatch number you punched in. IF a connection is made you will hear two beeps ("bird chirps") and the microphone display will read SELF. While continuing to hold in the microphone key, call the station you wish to talk to. USE ALL

-Continued-

THE SAME FORMALITIES AS WHEN CALLING ON A SSB RADIO. For example, say “Calling the ADF&G Kodiak Office, Calling the ADF&G Kodiak Office; this is Karluk Weir”. When you release the microphone key, the unit will beep again.

BE PATIENT. It will take some time for the signal to go up to the satellite, down to the number you called. It may take the other party some time to get to the microphone and respond (this is especially true for calls to the ADF&G office; supervisors have to walk down to the radio room to respond). When they respond, their 4-digit dispatch number (DN) will show on the microphone display. This is a private conversation, unlike the previous dispatch service.

Just remember to be patient; wait until the other party stops speaking and you hear the unit beep (indicating that they are finished with this portion of their communication), the display should read SELF, and you may key microphone to talk. Then you must again wait for the other party to respond. If the other party is not there, they simply will not answer. If the satellite connection cannot be made, the display will read ‘Unable to Connect’ or ‘Not Available’.

Phone System

DO NOT USE THE HANDSET TO PLACE CALLS UNLESS ABSOLUTELY NECESSARY. All calls made with the handset are billed per minute of use, at an expensive rate. Calls should only be made to supervisors, either when radio or dispatch contact is not possible or when a confidential message needs to be relayed. Calls are made by dialing out, almost like a standard telephone. Punch in the area code and telephone number, then PRESS SEND (button located in the upper right corner of the handset). Because there is a satellite relay, there will be a slight delay between when you speak and when the other party hears you, so be patient.

Note EVERY call in a phone logbook. The system will show you the amount of time you’ve used on the call, on the LED panel. Note the number called, the date, approximate time, and the length of the call (minutes and seconds). When the call is completed, you MUST push the END button (top right corner of handset buttons), otherwise the system will remain active and YOU will be billed for the time (at almost a dollar a minute). Remember, PRESS END.

If someone calls in to this unit, it will ring, like a standard telephone. Press the SEND button to start the conversation, but remember to PRESS END to finish the call. ADF&G is billed for all calls made using the handset, both the calls you dial out and any calls dialed in.

-Continued-

IN CASE OF EMERGENCY:

If there is a medical emergency, or a real danger to life or health, IMMEDIATELY call the US Coast Guard Rescue Coordination Center at 800-478-5555. Be ready to tell them your name, exact location (latitude and longitude or nearby major landmark), and the exact nature of your emergency. They may question you extensively, so be prepared. There are emergency doctors on-call that can advise you. After the call is completed, immediately call your supervisor, at work or at home, and relay the details of your experience.

If there is an enforcement emergency, use the dispatch microphone to call the Kodiak office or the Alaska State Trooper, Fish and Wildlife Protection (DN 6370).

To: Steve Schrof
Kodiak Finfish Research Biologist

Date: 5/30/00

From: Rob Baer
Perenosa Finfish Research Biologist

Subject: Perenosa Weekly
Field Report

Initial Trip & General Information

Nathan Stephan and I departed Kodiak for Perenosa Bay at 10:00 AM May 25th 2000. The trip took 4 hours and burned approx. 40 Gallons of fuel. There was a NW breeze at 15 knots, 2-3' swell out of the N.E., visibility unlimited. Hit Tonki Cape within ½ hour of slack tide but it still had 4-6' swells and rips. Upon arrival into Perenosa Bay we inspected both the Pauls and Waterfall systems. Other than a missing anchor and mooring line at Waterfall everything appeared as it was left in 1999. Established camp at Waterfall on the 25th and began setting up camp at Pauls Bay on the 28th.

Waterfall Bay

The barrier seine was installed and fish tight at 3:45pm on 5/27. The barrier seine was strung ~60 yards upstream from its traditional location. The new location was chosen due to water depth, current, and access to clean the seine. The bottom skirting will not be fully rocked down until larger negative tides arrive (6/1 & 6/2). Sockeye were first spotted in the bay on the 27th (only about 20 further out in the jaws of the bay). There were no adults spotted anywhere upstream of the barrier seine. On the 29th there were ~100 adult sockeye observed at the barrier seine and ~150 on the 30th. There have not been any sockeye smolt sampled or observed to date.

Pauls Bay

We installed the Pauls Bay weir on 5/29, fish tight at 2:00 PM. Inspected the Pauls Lake and Laura Lake outlet, no sign of adults in Pauls Lake or Laura Creek as of 5/30. Approximately 1000 adult sockeye in the bay on the 30th. Many coho smolt were observed at Pauls Lake outlet and in the Bay but no sockeye smolt sampled or observed to date.

Portage Creek

We inspected Portage Creek for the first time on 5/30. Approximately 500 adult sockeye observed in the bay (inside the comm. Fish markers). We did not observe any adults in the creek. We began hauling weir material up to the weir site on the 30th. No sockeye smolt sampled or observed to date, only coho smolt observed in the creek.

Anticipated Activities

Continue construction of Portage weir and camp site. Maintain barrier seine and Pauls bay weir. Collect and sample sockeye smolt from Waterfall, Portage, and Pauls.

I. INTRODUCTION

Description of project location.

Include a general and specific description of the location. For example, “located on the northeast portion of Afognak Island” and “Pauls creek is long by wide with average depth of....”

History of project

Give a brief history of the project (see Introduction of this plan and regional reports for examples)

Purpose of project.

Objectives

Purpose of report.

II. METHODS AND MATERIALS

Precisely describe all components of your fieldwork that produced the results reported.

Employees

List the employees on site and what periods worked, job classes, and previous time spent on the project.

Weir/traps

Discuss the type of weirs and traps used, installation procedures, dates of use, maintenance schedule, enumeration techniques, estimation techniques, AWL technique, etc.

Monitoring

Describe fishery-monitoring duties, such as regulatory marker placement, enforcement, catch estimates, surveys, etc.

Fish pass maintenance

Discuss the seasonal maintenance schedule, removing doors, repairs, performance and fish usage, etc.

-Continued-

Other duties and misc.

Describe the collection of physical data, safety, bear avoidance, etc.

This section should follow the operational plan objectives, tasks, and procedures as a guide. Also, include maps, photographs and diagrams if appropriate.

III. RESULTS

Base this section on the objectives and what was accomplished: Be specific with dates, numbers, and trends. Address each category listed in the methods section. Simple tables and graphs that summarize the data should be included - include all years if possible for comparison.

IV. DISCUSSION AND RECOMMENDATIONS

Include a discussion of each area of data collection, based on the objectives. Elaborate and assess the results with the focus on assisting with future development and refinement of the project. Include recommendations for modifications such as improving trap locations, weir operations, sampling techniques, logistics, and camp improvements. Also include equipment/gear lists that will assist with the following years work.

Note: The project biologist is responsible for the completion of this report. However, the crew leader and crew members should be included in drafting the document. The report should be started in season with a rough draft of some form submitted to the Project Biologist for comment one week prior to the end of fieldwork. Upon completion of fieldwork, time will be provided to finalize the report. The final version of the report will be written using Word software, with tables and graphs constructed in Excel.

Appendix E.1. Instructions for filling out a timesheet.

All ADF&G employees must fill out a time sheet biweekly and these timesheets must be turned in to the Administrative staff in Kodiak in a timely manner. Please follow these instructions when filling out your time sheets to avoid payroll problems. When a flight comes out to drop off groceries, or for any other reason, near the end of a pay period, camp personnel need to send in their timesheets. Fill in the time sheet up to the day you send them in and attempt to project your remaining hours worked.

Fill out each of the following on the top of the timesheet:

Pay period: pay periods start on the 1st or 16th of each month and end on the 15th or end of the month (example: June 1-15 or June 16-30).

SSN: your social security number

Name: full name

Division: Commercial Fish

In the actual timesheet table fill in the following:

Day: Monday, Tuesday, etc.

Date: 6/16, 6/17, etc.

Hours worked box: start and stop time in military time

Code 1: fill in the number of hours worked for that day (see example in Appendix X.2.).

Work hours and Code 1 Totals should both equal the sum of daily hours worked. If your time sheet is sent in before the end of the pay period, project your time for the remaining days so you can total your columns.

Charge to Table located on the bottom left hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

Comments Table located on the bottom right hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

Employee's signature and date: Be sure to sign and date your timesheet.

Crew leaders are responsible for reviewing each crew member's timesheet before sending them to town to ensure that they are properly filled out.

Appendix E.2. Example of a completed timesheet.

ALASKA DEPARTMENT OF FISH AND GAME Time and Attendance Report

Pay period ending: 6/15/2003 SSN: 191-11-1111 Name: Joe Shmo Division: Commercial Fisheries

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

Day	Date	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Leave Taken	Sea Duty	Standby	Hazard	Code 1	Code 2	Code 3	Code 4	Holiday / Leave	Work Hrs Total	
Sun	6/1	8:00	12:00	13:00	16:30											7.50				0.00	7.50	
Mon	6/2	8:00	12:00	13:00	16:30											7.50				0.00	7.50	
Tue	6/3	8:00	12:30	14:00	18:00											8.50				0.00	8.50	
Wed	6/4	8:00	12:00	13:00	16:30	17:00	19:00									9.50				0.00	9.50	
Thu	6/5	8:00	12:00	13:00	16:30											7.50				0.00	7.50	
Fri	6/6	8:00	12:00	16:00	19:00											7.00				0.00	7.00	
Sat	6/7	8:00	12:00	13:00	16:30											7.50				0.00	7.50	
Sun	6/8																			0.00	0.00	
Mon	6/9	8:00	12:00	13:00	16:30											7.50				0.00	7.50	
Tue	6/10	8:00	12:00	13:00	16:30											7.50				0.00	7.50	
Wed	6/11	8:00	12:00	13:00	16:30											7.50				0.00	7.50	
Thu	6/12	8:00	12:00	13:00	16:30											7.50				0.00	7.50	
Fri	6/13																			0.00	0.00	
Sat	6/14																			0.00	0.00	
Sun	6/15	8:00	12:00	13:00	16:30	17:00	18:30									9.00				0.00	9.00	
TOTALS															0.00	0.00	94.00	0.00	0.00	0.00	0.00	94.00

EXAMPLE

Charge to:			Comments		Comments	
Notation	CC/LC	%				
1		100%	6/1		6/9	
2			6/2		6/10	
3			6/3		6/11	
4			6/4		6/12	
			6/5		6/13	
			6/6		6/14	
			6/7		6/15	
			6/8			
Total		100%				

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

Joe Shmo Date: 6/15/03
Employee's Signature

Supervisor's Signature

Approving Officer Signature

Leave Use Codes

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

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

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

Holiday, Leave, Overtime and Premium Pay Overrides		
**Codes	Hours	CC/LC
Leave & Holiday	0.00	No code needed for Leave & Holiday

Ver. 1.9.4
Revised 2/20/99

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AFOGNAK LAKE SOCKEYE SALMON SMOLT PROJECT
OPERATIONAL PLAN, 2004



By
Stephen T. Schrof

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

May 2004

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INTRODUCTION

The Afognak Lake drainage is located on the southeast side of Afognak Island approximately 50 kilometers (km) northwest of the city of Kodiak (Figure 1). Afognak Lake (58° 07' N lat., 152° 55' W long.) lies about 21 m above sea level, is 8.8 km long, up to 0.8 km wide, and has a surface area of 5.3 km² (Schrof et al. 2000). Runoff from Afognak Lake flows in an easterly direction via the 3.2 km Afognak River, emptying into Afognak Bay. The Afognak Lake system was the most productive sockeye salmon *Oncorhynchus nerka* system on Afognak Island in the 1990s. Total estimated sockeye salmon runs from the Afognak Lake system averaged 130,630 fish from 1990 through 1999 peaking at 219,126 in 1996 (Honnold and Schrof 2004).

The current sockeye salmon sustainable escapement goal (SEG) for Afognak Lake is 40,000 to 60,000 fish (Nelson and Lloyd 2001). Sockeye salmon escapements during the 1990s ranged from 66,869 (1998) to 132,050 (1997) and averaged 90,464 fish, well above the upper range of the SEG (Honnold and Schrof 2004). In 2000, the sockeye salmon escapement of 54,064 was below the recent 10-year average but still fell within the SEG range. Low escapement levels experienced during the 2001 season resulted in commercial salmon fishing closures in the Afognak area until July and season long sockeye salmon sport fishery restrictions. Despite these restrictions, the total sockeye salmon escapement was 24,271 in 2001, far below the lower end of the SEG. The Afognak Lake sockeye salmon runs were also very weak in 2002 with 19,520 salmon counted at the Litnik (Afognak) weir and 27,766 counted at the weir in 2003. The commercial salmon fishery in Afognak Bay was closed throughout the 2002 and 2003 seasons and sport fishing for sockeye salmon was also restricted during both years. The Alaska Department of Fish and Game (ADF&G) and Federal Subsistence Board jointly closed much of Afognak Bay to subsistence fishing for sockeye salmon in 2002 and 2003.

Prior to 2003, sockeye salmon production had been assessed by adult escapement and harvest estimates; juvenile production (smolt) of the Afognak Lake sockeye salmon stock had not been reliably assessed. In 2003, a sockeye salmon smolt project was initiated at Afognak Lake to estimate the number, age, size and condition of the smolt emigration. These data are essential in determining future Afognak Lake sockeye salmon stock production, as well as the future outlook for subsistence, commercial and sport harvesters. Additionally, smolt abundance data will assist in the development of appropriate strategies to improve returns.

Annual assessment of the adult sockeye salmon escapement into Afognak Lake will continue in 2004. ADF&G management personnel are responsible for monitoring the adult salmon escapements through the weir. ADF&G research personnel will estimate the sockeye salmon smolt population using mark-recapture techniques, and collect age and size data to assess the health of the smolts emigrating to the ocean. ADF&G management and research personnel will be working cooperatively on-site to achieve the project objectives.

Goal

The project goal is to estimate the sockeye salmon smolt population emigrating from Afognak Lake and evaluate the general health of the smolts through age, weight and length (AWL) data.

Objectives

1. Estimate the sockeye salmon smolt population emigration.
2. Estimate the average age, weight, length, and condition of sockeye salmon smolt emigrants from Afognak Lake.
3. Summarize project activities and data collection into a report that will be submitted to the Federal Office of Subsistence Management.

Tasks

1. Set up camp.
Target completion date: 7-9 May.
2. Install and operate a Canadian fan trap to capture a portion of sockeye salmon smolt emigrants.
Target date: 10 May until the end of the smolt emigration.
3. Enumerate the daily smolt trap catch of fish by species.
4. Collect AWL data from 40 sockeye salmon smolts per day, for five consecutive days each week, for scales, weight and lengths (200 samples/week).
5. Mark approximately 650 sockeye salmon smolts weekly, using Bismark Brown Y (BBY) dye, to estimate trap efficiency which is necessary to estimate the total smolt emigration. If changes are made to the smolt trap that may alter the trap efficiency before the next weekly dye test, an additional dye test will be performed. Of the 650 dyed sockeye salmon smolts, 100 smolts will be held for a delayed mortality experiment.
6. Collect physical data daily: air temperature, water temperature, water height in the creek, cloud coverage, wind direction and velocity, and precipitation.

SUPERVISION

Project Biologist: Steve Schrof (FB II)

Field Staff: Geoff Spalinger - crew leader (tech. III)
Dayna Brockman - crew member (tech. II)

The project biologist will oversee the project, provide logistical and technical assistance, and write an annual report. The crew leader will implement the ADF&G safety guidelines, schedule

daily tasks and oversee operations at the field camp. The crewmember will assist the crew leader in all assigned tasks and field operations.

PROCEDURES

Smolt Trap Installation, Monitoring, and Maintenance

A Canadian fan trap will be located approximately 32 m upstream from the stream terminus of Afognak River in Afognak Bay. The trap will be installed so the water velocity is sufficient to force smolts into the catch box while ensuring that smolts are not injured (scale loss, pinned against the perforated sheeting, etc.). Perforated (1/8") aluminum sheeting (4' x 8' perf-plate), supported by a rackmaster supported pipe frame, will be placed at the entrance of the trap in a "V" configuration to increase trap efficiency. If necessary, the perf-plate 'wings' may be lined with plastic sheeting to increase water velocity in the trap and avoid smolt scale loss.

The trap and wings will:

1. Be kept free of debris to maintain trap efficiency and minimize smolt mortality.
2. Require frequent monitoring and maintenance to ensure that the trap is working properly. The trap should be checked every 2-3 hours during the day and every 0.5-1.0 hour at night.

Migration patterns change with significant weather changes (i.e., rain may trigger a large emigration). The trap will be fished continuously for the duration of the smolt emigration (~10 May until ~30 June).

If unforeseen conditions occur and smolt trapping must temporarily cease, the trap will be modified or the wings pulled from the water to allow smolts to pass safely. If possible, any modifications to the trapping system will be discussed with the project biologist before implementation. If immediate modifications are necessary to avoid major mortality or loss of equipment, the project biologist will be notified as soon as possible.

Smolt Trap Catch and Species Enumeration

Since smolts primarily migrate at night, a single trapping or sampling day will be the 24-hour period from noon of the first day to noon the following day and will correspond with the first day. All fish caught in the smolt trap will be counted. A dip net will be used to remove and release the fish as they are counted. Smolts needed for sampling will be held in a covered live-box. Smolts will be handled with care, as sockeye salmon smolt are very sensitive to any stress, and mortality can occur through the loss of just a few scales. A tally counter will be used to enumerate the smolts to assure an accurate count. All data, including smolt mortality will be entered on the *DAILY SMOLT TRAP CATCH REPORTING FORM* (Figure 2) each time the trap is checked. Daily trapping data will be summarized on the *SOCKEYE SALMON SMOLT SUMMARY FORM* (Figure 3).

Pollard et al. (1997) provides color pictures and explanations in the *Field Identification of Coastal Juvenile Salmonids* key for species identification. Contact the project biologist if any questions regarding identification occur.

Smolt Age, Weight, and Length Sampling

Collect a sample of 40 sockeye salmon smolts per day for five (5) consecutive days per sample week to obtain AWL data. A sample week begins on Monday and runs through the following Sunday (Appendix A.1). All smolt sample data will reflect the sampling day when the fish were captured. Each sample will be comprised of a single day's catch and samples will not be mixed between days. If less than 40 fish are caught in a sampling day, the sample size for that day will be the number of fish caught on that day. Dyed smolts used to estimate trap efficiency will not be sampled.

The daily smolt sample will be taken randomly. Collect smolts hourly and place them in the live box. Use a small dip net to remove a sub-sample of 40 sockeye salmon smolts from the live box to be sampled. All remaining smolts will be counted and released.

Smolts will be sampled on the day of capture. Smolts will be transported in a clean 5-gallon bucket to the sampling area. Another bucket will be used as a recovery bucket. Both buckets will be aerated with battery powered aerators at all times. Use Tricaine Methanesulfonate (MS-222) to anesthetize the fish. MS-222 is a chemical that requires latex gloves to be worn to prevent direct exposure to the anesthetic. A small amount (size of a sugar cube) of MS-222 will be dissolved in approximately 2 L of water along with an equal amount of baking soda to buffer against the acidity of the MS-222. Place a few smolts in the anesthetic solution until subdued to a point where they can no longer flex their axial musculature but can still ventilate their gills. Ideally, the anesthetic solution should immobilize the smolt in approximately 2 to 3 minutes.

Smolt lengths will be measured to the nearest millimeter (mm), from the tip of the snout to the tail fork (Appendix A.2). Excess water will be removed from the smolt before weighing by using a paper towel as a blotter. Individual smolt weights will be measured to the nearest 0.1 g. A scalpel will be used to remove 5-10 scales from the preferred area of the fish (Appendix A.2). The scales will be mounted on a glass slide as shown in Appendix A.3. Scales from five fish will be mounted on each slide. The left portion of each slide will be labeled with AWL number, sample location, species, date, and inclusive fish numbers that correspond with their place on the AWL form (Appendix A.3). After sampling, the fish will be moved to the aerated recovery bucket and held until all smolt are swimming normally. Both the recovery and pre-sampling holding buckets will be covered to minimize stress on the fish.

AWL data will be collected and recorded in a notebook dedicated to smolt sampling. Data will then be transferred to AWL forms. Personnel collecting the data will record their names on the AWL form. Instructions for filling out AWL forms can be found in Appendices A.4 and A.5.

All data (slides, forms) will be forwarded to the Kodiak area office and reviewed throughout the field season. Keep data and samples updated daily in the event that data must be sent to town on short notice. The crewleader will be responsible for editing all AWL forms for errors prior to sending forms to the Kodiak office.

Common mistakes to avoid include:

- 1) Poorly mounted scales - Too many scales in a smear or slime and debris present when mounting. The next row of scales should not be too close together to avoid mistaking scales from two smolts.
- 2) Numbering AWL form improperly. For example, if 40 smolt are sampled in one day (day 1), the AWL numbers should be started at AWL 001 for the first 40 smolt sampled (fish 1-40; 8 slides). The next day will start with AWL 002 (fish 1-40) and so on. If there are not 40 smolts to be sampled for that day, smolt sampled the next day will be started on a new AWL form.
- 3) "# of cards" mislabeled; enter "1" even if there are two or more slides.
- 4) Damaged AWL forms; do not bend, fold, tape, staple, etc. these forms. Otherwise, the computer will not read them correctly.
- 5) Scales from one fish contaminating the smear of the next fish; wipe the scalpel blade off between each fish.

Smolt Trap Efficiency and Mark-Recapture

Trap efficiency estimates determined from mark-recapture trials are necessary to estimate the total sockeye salmon smolts emigrating from Afognak Lake. Mark-recapture trials will be conducted using Bismark Brown Y (BBY) dye. The dyeing process can be very stressful to smolts, so every effort should be made to minimize and avoid unnecessary handling to the smolt during the process. Excessive handling (netting), increased water temperatures, and exposure to the dye are the primary stresses. Individually, these can induce mortality. In combination, significant mortality may occur.

The following methods will be used for marking and releasing smolt:

1. All data will be recorded on the *Smolt Dye Release Form* (Figure 4).
2. Once a week, 650 sockeye salmon smolts will be collected for marking. If the emigrating run strength is not sufficient to capture 650 smolts in one night, smolts will be collected and held in a live-box for up to three days to obtain 650 smolts to be dyed. Approximately, 550 smolts will be dyed and released, while 100 dyed smolts will be retained to monitor delayed mortalities of dyed smolts. Do not use smolts sampled for AWL in the dye test.
3. Marking will take place at the release site, located approximately 1,240 m upstream from the trapping site. The smolts will be transported to the mark/release site by four-wheeler and a trailer. A garbage can is used as a holding container and secured to the trailer with sufficient water added to the can to minimize over-crowding. Water temperatures will be recorded. Supplemental oxygen will be added continuously throughout transport and a lid secured to prevent water from spilling over. Any mortality will be recorded upon arrival at the release site.
4. Water temperatures will be taken from both the transport container and the recovery container in the stream. If the temperatures differ by more than 1-2 degrees, river water will be added to the appropriate container to stabilize the temperature. The smolts will be allowed to rest in a live box in the river for at least 30 minutes after the transport to the marking site. The live box holding the smolts will be covered to minimize stress.

5. 1.9 g of BBY dye will be dissolved in 15 gallons of water in a 30-gallon plastic garbage can. The smolts will be placed in the dye for 30 minutes and the garbage can will be covered and oxygenated continuously (but gently - do not roll them) during the dyeing process.
6. Following dyeing, all dyed smolts will be held in the live-box for a minimum of 60 minutes. Smolts displaying “abnormal” behavior will NOT be released. A fish with “abnormal” behavior would be swimming on its side, upside down, puffing or flaring gills continuously.
7. Dyed smolts displaying “normal” behavior will be counted (up to 550) and released evenly across the creek. The process should be timed such that smolts will be released at ~2200 hrs. or under the cover of darkness. The remaining 100 smolts that were dyed will be held in a live box for five days to evaluate the effects of the dye on the smolts health.
8. Monitor the smolt trap for marked smolts daily from the day of the release and continue until the next dye test. The number of dyed smolts observed will be recorded on the *Daily Smolt Catch Reporting Form* (Figure 3) and the *Sockeye Salmon Smolt Summary Form* (Figure 4). The number of smolts examined in a day equals the marked and unmarked smolts caught that day. The daily smolt catch will not include marked smolts, since they were previously counted at the trap site. The trap efficiency from this dye test will be a percentage of the dyed fish recovered divided by the dyed smolts that were released.

Delayed Mortality Experiment

To test for potential bias in the mark-recapture estimates of the Afognak Lake sockeye salmon smolts emigration, delayed mortality of dyed smolts will be measured for each dye test. During each dye test, 100 additional smolts for the mortality experiment will be dyed simultaneously with the 550 smolts dyed that are released to test the trap efficiency. Smolts used for the mortality experiment will be handled the same way as the smolts being released, except they will not be released. Smolts dyed for the mortality experiment will be held in a covered instream live box and checked daily for mortality over a 5 day period.

Physical Data

Physical data will be collected daily between 1100 and 1200 hours. Information will be recorded on the *DAILY PHYSICAL OBSERVATION FORM* (Figure 5) and will include water temperature, air temperature, water depth, percent cloud cover, wind direction and velocity, and precipitation. A depth gauge will be placed upstream of the weir to determine the water level on a daily basis.

OTHER REQUIREMENTS

Safety

Each employee will receive CPR and First Aid Certifications as required by the ADF&G Standard Operating Procedures (SOP), prior to assignment to the Afognak project. In addition, each employee will review the required sections of the ADF&G guidelines.

Specific guidelines to review include:

- Safety Policy Standards
- Building Safety
- Field Camp Safety
- Aircraft Passenger Safety
- Emergency Survival Equipment Required in Aircraft
- Boating Safety
- Vehicle Safety
- Laboratory Safety
- Small Tool Handling
- Firearm and Bear Safety

Project crew leaders will be responsible for providing the necessary equipment and information to field technicians. The ADF&G's field safety policy will need to be reviewed by each field crewmember prior to field assignment. **Each employee is responsible for reviewing the safety training materials.**

Training

In addition to mandatory CPR and First Aid training, all field personnel will also receive training on Salmon Sampling Protocols in the field. Also, personnel will be trained on proper use of firearms before departing from town or at the field camp.

Radio Schedule

Kodiak office personnel will contact field camps by Single Side Band (SSB) radio. The Commercial Fishery Division morning radio schedule is from 0800 - 0845 hours daily and camp personnel will need to be prepared with weir escapement counts for radio schedule. During the smolt season, office personnel will contact the crew leaders at 1300-1330 hours Monday through Friday and at 1950 hours on Saturday and Sunday. If contact is necessary at other times, information can be relayed via the Commercial Fish Management Section schedule at 0800 and 2000 hours. The frequency for Fish and Game contact is 3.230 kHz. **ALL FIELD PERSONNEL WILL BE AWARE OF EMERGENCY CONTACT PROCEDURES POSTED ON EACH RADIO.** The emergency Coast Guard frequency is **4.125 kHz**. Also, as an added communication link between field camps

and the Kodiak office, satellite phones will be used to relay information on data and as a more reliable connection for emergency contact. Instructions on the operation and transmission of the satellite phone is provided in Appendix B. Crew leaders must train crew members in proper SSB radio communication skills. In order for crewmembers to become more familiar with operating the radio, the crew will need to talk with the Management biologist during 2000 hr. radio schedule. The Afognak camp is located in the southeastern corner of Afognak Island and the coordinates for the site will be determined with a GPS when personnel arrive on-site.

Air Charters

All air charters will be set up through Kodiak staff. Appropriate information in regard to charters will be relayed through daily radio contact. It is important to contact office personnel when any data, equipment or other freight will be "back hauled" to Kodiak.

Reporting

Crew leaders will be responsible for recording all of the job activities and compiling biological data. Data forms and a field log will be completed daily. "Rite in the rain" logbooks will be used while collecting data and data will be transferred to data forms after returning to the cabin. Use a number 2 pencil when filling in the AWL forms. Data will be reported to Kodiak staff via SSB radio. Completed data forms will be sent to Kodiak as planes permit. Data that is sent to Kodiak will be properly packaged and labeled. **Data forms (not AWL forms) will be duplicated in case originals are misplaced in transit.**

A one-page report of project activities will be sent to town weekly, or on the next available plane (Appendix C).

Camp Inventory and Close Up

The Afognak Lake project smolt equipment will be inventoried prior to camp close up. Inventory forms will be provided. Items of high value will be returned to Kodiak and a list will be made of the equipment needed for the 2005 field season. The cabin and out buildings will be secured prior to leaving the field.

Photo Documentation

Crew leaders will be responsible for photo documenting project activities. Specific aspects such as trap installations, weir construction, and other detailed tasks are important to photograph. When possible, ADF&G cameras and film will be used. If, however, State cameras are not available, film will be provided for use with personal cameras. The use of personal cameras is suggested in this case, but not required. The ADF&G will pay for developing film.

Timesheets

Forward timesheets to the KODIAK OFFICE by the 15th and last day of each month! Plan ahead to ensure that timesheets arrive in town on time. To ensure that timesheets are properly filled out, instructions are contained in Appendix D.1 and an example of a properly filled out timesheet is provided (Appendix D.2). Plan work activities to be completed in a 7.5-hour day; work overtime only if pre-authorized by the project biologist.

Crew leaders should take the time to look over each crewmember timesheet before sending them to town to ensure that they are properly filled out. The crew leader should plan work activities to be completed in a 7.5-hour day. All overtime worked must be pre-authorized by the project biologist.

Purchasing

During the field season, field crews will need additional items (e.g., groceries, fuel, or tools). Small lists can be read over the radio during the radio schedule; however, these lists should be limited to just a few items. Remember that radio time is limited and there is other camps region-wide that use the same frequency. Blank grocery lists will be sent to the field and the crew leader should remember to send orders in advance to ensure the correct grocery order for the next supply flight. It should also be remembered that the Afognak Lake budget allocates \$20/day/person and this allocation will not be exceeded. Crew leaders should track grocery expenses and limit the number of requested specialty items. Plan ahead when requesting fuel for heating the camp. In the past camps have left stoves on during the day while the crew was working outside. This practice is not acceptable and heating units will need to be turned off, when the cabin is unoccupied.

LITERATURE CITED

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- Pollard, W.R., C.F. Hartman, C. Groot, and P. Edgell. 1997. Field Identification of Coastal Juvenile Salmonids. Harbour Publishing. Maderia Park, B.C. Canada. 31p.
- Schrof, S.T., S.G. Honnold, C.J. Hicks and J.A. Wadle. 2000. A summary of salmon enhancement, rehabilitation, evaluation, and monitoring efforts conducted in the Kodiak management area through 1998. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4K00-57, Kodiak.

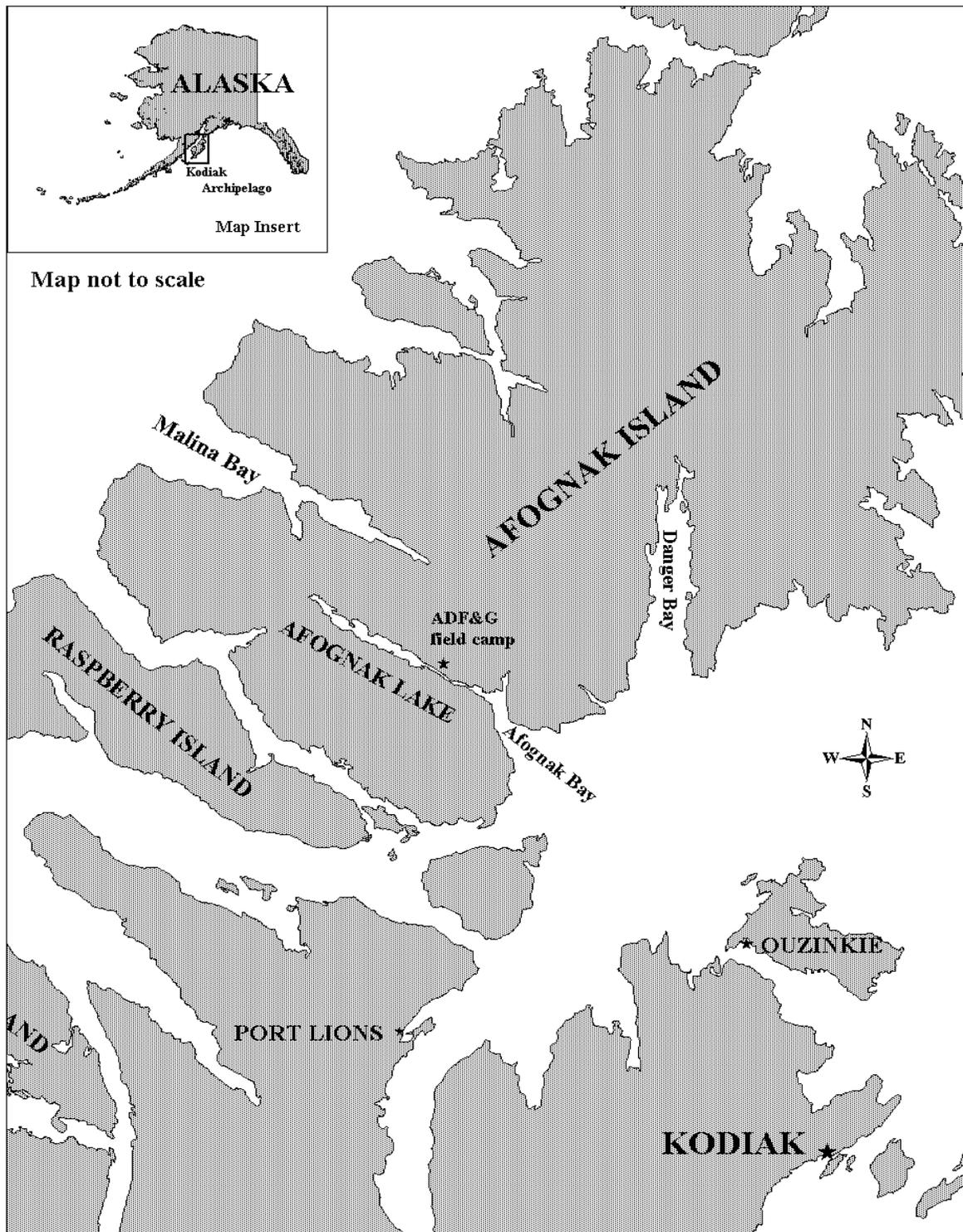


Figure 1. Location of the ADF&G camp along the Afognak River and Afognak Lake on Afognak Island.

SMOLT DYE RELEASE FORM

page _____ of _____

DATE (actual): _____

CREW NAMES (Print) _____

PROJECT LOCATION: **AFOGNAK** _____

NUMBER OF FISH COLLECTED: _____
(from live box)

CREW LEADER _____
(signature)

	COLLECTION LIVE BOX	DYE TUB	RECOVERY CONTAINER	TRANSPORT BUCKET	STREAM RELEASE
START TIME (military)					
START TEMP (degree celsius)					
END MORTALITY (number of fish)					
OXYGEN SUPPLEMENT O ₂ or aerator(A)					

DYE SOLUTION (mixture): _____ DYE (grams); _____ WATER (gallons)

RELEASE SITE LOCATION (distance upstream of trap site, in meters): _____

TOTAL NUMBER OF DYED FISH RELEASED: _____

COMMENTS:

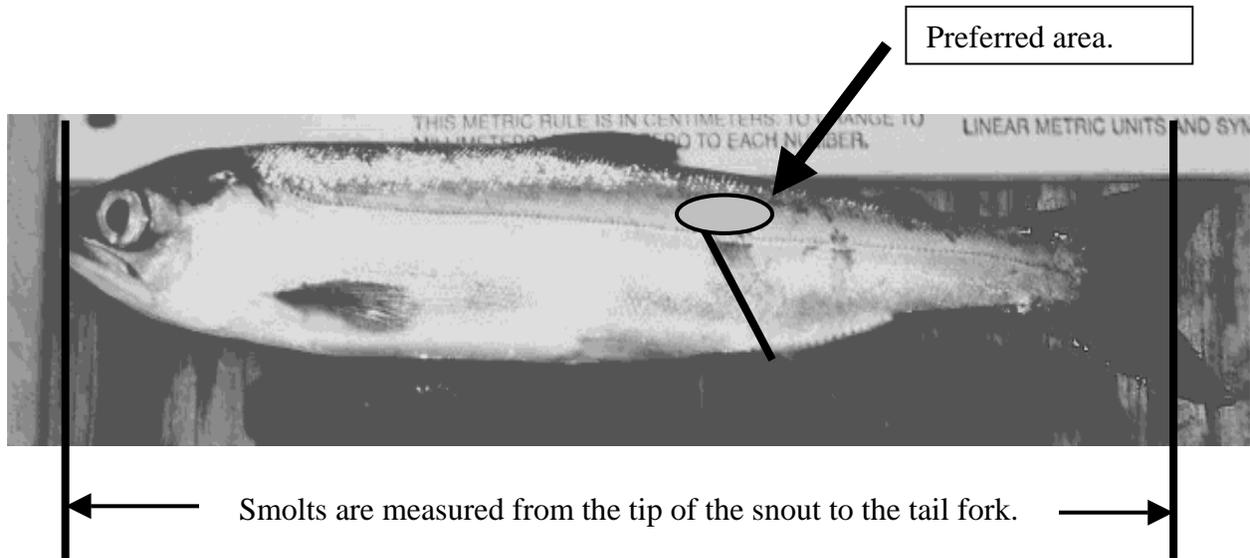
Figure 4. Smolt dye release form.

APPENDIX

Appendix A.1. Sampling weeks and associated calendar dates, 2004.

Week	Calendar Dates	Week	Calendar Dates
10	1-Mar - 7-Mar	28	5-Jul - 11-Jul
11	8-Mar - 14-Mar	29	12-Jul - 18-Jul
12	15-Mar - 21-Mar	30	19-Jul - 25-Jul
13	22-Mar - 28-Mar	31	26-Jul - 1-Aug
14	29-Mar - 4-Apr	32	2-Aug - 8-Aug
15	5-Apr - 11-Apr	33	9-Aug - 15-Aug
16	12-Apr - 18-Apr	34	16-Aug - 22-Aug
17	19-Apr - 25-Apr	35	23-Aug - 29-Aug
18	26-Apr - 2-May	36	30-Aug - 5-Sep
19	3-May - 9-May	37	6-Sep - 12-Sep
20	10-May - 16-May	38	13-Sep - 19-Sep
21	17-May - 23-May	39	20-Sep - 26-Sep
22	24-May - 30-May	40	27-Sep - 3-Oct
23	31-May - 6-Jun	41	4-Oct - 10-Oct
24	7-Jun - 13-Jun	42	11-Oct - 17-Oct
25	14-Jun - 20-Jun	43	18-Oct - 24-Oct
26	21-Jun - 27-Jun	44	25-Oct - 31-Oct
27	28-Jun - 4-Jul	45	1-Nov - 7-Nov

Appendix A.2. Photo of a smolt with the preferred area highlighted and measurement from tip of the snout to tail fork.



Appendix A.3. Example of two correctly labeled smolt slides representing fish 1 through 10 from a sample collected on 5/11/00.

AWL 001 Sockeye Bear Lake 5/11/00 Fish 1 - 5	<table style="border: none;"> <tr> <td style="text-align: center;">1</td> <td></td> <td></td> <td></td> <td style="text-align: center;">5</td> </tr> <tr> <td>•</td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> </tr> </table>	1				5	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
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AWL 001 Sockeye Bear Lake 5/11/00 Fish 6-10	<table style="border: none;"> <tr> <td style="text-align: center;">6</td> <td></td> <td></td> <td></td> <td style="text-align: center;">10</td> </tr> <tr> <td>•</td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> </tr> </table>	6				10	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6				10																																
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When the slides are completed, return them to the box in order by AWL # and fish #, and label the slide box on top with the following information:

Location: Bear Lake

AWL Number: AWL 001-003

Beginning and end dates: 6/12-7/13/00

Sockeye Salmon Smolt

Appendix A.4. Procedures for recording salmon smolt for age-weight-length data on AWL forms.

Smolt length and weight will be recorded on AWL forms (Appendix A.5). Using a No.2 pencil, complete each section of the left side of the AWL and darken the corresponding ovals.

Fill out each of the following:

Description

Record the following: species, location, year and samplers names (e.g., sockeye smolt, Frazer fish pass, 2003, Sagalkin, Schrof).

Card

The AWL forms and corresponding slides are numbered sequentially date throughout the season starting with 001. A new, consecutively numbered AWL form is used each day even if the previous AWL form is not full. There may be a minimum of one fish and a maximum of 40 fish (8 slides) per AWL form.

Species

Refer to the reverse side of the AWL form for the correct one digit code (e.g., sockeye = 2).

Day, Month, Year

Use appropriate digits for the date the fish are sampled. If a month or day signified by a single digit is used, then a zero will be applied first to fill out the two ovals for the day and month sections (example: June 4 would be 06/04).

District

List the district in which the fish were sampled. Consult your area statistical map or project leader for the appropriate district (**district is 252**).

Subdistrict (Section)

List the subdistrict in which the fish were sampled (**subdistrict is 34**).

Stream

List the stream in which the fish were sampled. Consult your area statistical map or project leader for the appropriate stream number (**stream is 342**).

Location

(**location is 034**).

-Continued-

Period

List the period (sample week) in which the fish were sampled (Appendix A.5).

Project and Gear

Refer to the reverse side of the AWL form for the correct code. For example, smolt samples collected in a trap would have a project code of 8 and a gear code of 00.

Mesh

Leave blank unless specifically instructed by supervisor to do otherwise.

Type of length measurement

Refer to the reverse side of the AWL form for the correct code (e.g., tip of snout to tail fork = 2). Refer to Appendix A.1.

Number of scales per fish

Fill in the number of scales (smears) collected per fish. For smolt, one scale smear per fish is collected.

of cards

of cards always = 1 (each AWL form is individually numbered).

If possible, keep the AWL forms in numerical order throughout the season and keep all forms flat, dry, and clean. Remember, when sampling smolt, weight data is recorded on the back side of the AWL form and the litho code, located in the left margin on the front side of the AWL form must be transferred to the back side of the form (see Appendix A.4). The litho code is the number unique to each AWL form and copying the litho code from the front to the back of the form indicates weight data was transcribed on the back of the form for the Optical scanning machine to read. Fish slime and water curling may cause data to be misinterpreted by the optical scanning machine. **It is the responsibility of the crew leader to make sure that all forms are carefully edited before returning them to their supervisor.**

Appendix A.5. Example of a completed smolt AWL form. (Note: Project code should be 8 not 4).

DESCRIPTION: *Pentuck/Thomas 1999*
Sockeye Smolt/Hidden Creek/DipNet

ADF&G ADULT SALMON AGE-LENGTH FORM VERSION 2.1 *TAG*

CARD: 001

SPECIES: 2

DAY: 04

MONTH: 06

YEAR: 99

DISTRICT: 251

SUBDISTRICT: 40

STREAM: 406

LOCATION:

PERIOD: 23

PROJECT: 4

GEAR: 13

MESH:

TYPE OF LENGTH MEASUREMENT

NUMBER SCALES/FISH

OF CARDS: 1

#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
1	M	1	0	1	0	0
2	F	1	0	1	0	0
3	M	1	0	1	0	0
4	M	1	0	1	0	0
5	M	1	0	1	0	0
6	M	1	0	1	0	0
7	M	1	0	1	0	0
8	M	1	0	1	0	0
9	M	1	0	1	0	0
10	M	1	0	1	0	0
11	M	1	0	1	0	0
12	M	1	0	1	0	0
13	M	1	0	1	0	0
14	M	1	0	1	0	0
15	M	1	0	1	0	0
16	M	1	0	1	0	0
17	M	1	0	1	0	0
18	M	1	0	1	0	0
19	M	1	0	1	0	0
20	M	1	0	1	0	0
21	M	1	0	1	0	0
22	M	1	0	1	0	0
23	M	1	0	1	0	0
24	M	1	0	1	0	0
25	M	1	0	1	0	0
26	M	1	0	1	0	0
27	M	1	0	1	0	0
28	M	1	0	1	0	0
29	M	1	0	1	0	0
30	M	1	0	1	0	0
31	M	1	0	1	0	0
32	M	1	0	1	0	0
33	M	1	0	1	0	0
34	M	1	0	1	0	0
35	M	1	0	1	0	0
36	M	1	0	1	0	0
37	M	1	0	1	0	0
38	M	1	0	1	0	0
39	M	1	0	1	0	0
40	M	1	0	1	0	0

Mark Refill by NCS MMD0002-1 3 PE30 Printed in U.S.A.

DO NOT MARK IN THIS MARGIN

TRANSFER RESPONSES EXACTLY AS PRINTED ON FRONT TO THIS GRID

#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
1	M	1	0	1	0	0
2	F	1	0	1	0	0
3	M	1	0	1	0	0
4	M	1	0	1	0	0
5	M	1	0	1	0	0
6	M	1	0	1	0	0
7	M	1	0	1	0	0
8	M	1	0	1	0	0
9	M	1	0	1	0	0
10	M	1	0	1	0	0
11	M	1	0	1	0	0
12	M	1	0	1	0	0
13	M	1	0	1	0	0
14	M	1	0	1	0	0
15	M	1	0	1	0	0
16	M	1	0	1	0	0
17	M	1	0	1	0	0
18	M	1	0	1	0	0
19	M	1	0	1	0	0
20	M	1	0	1	0	0
21	M	1	0	1	0	0
22	M	1	0	1	0	0
23	M	1	0	1	0	0
24	M	1	0	1	0	0
25	M	1	0	1	0	0
26	M	1	0	1	0	0
27	M	1	0	1	0	0
28	M	1	0	1	0	0
29	M	1	0	1	0	0
30	M	1	0	1	0	0
31	M	1	0	1	0	0
32	M	1	0	1	0	0
33	M	1	0	1	0	0
34	M	1	0	1	0	0
35	M	1	0	1	0	0
36	M	1	0	1	0	0
37	M	1	0	1	0	0
38	M	1	0	1	0	0
39	M	1	0	1	0	0
40	M	1	0	1	0	0

SPESIES

- 1 - Chinook (king)
- 2 - Sockeye (red)
- 3 - Coho (silver)
- 4 - Pink (bumpy)
- 5 - Chum (dog)

PROJECT

- 1 - Commercial catch
- 2 - Subsistence catch
- 3 - Escapement (lower, web, sear, etc.)
- 4 - Escapement - spawning grounds
- 5 - Net fishing
- 6 - Sport catch (marine)
- 7 - Sport catch (freshwater)

GEAR TYPE

- 1 - Trap
- 2 - Beach seine
- 3 - Dip net
- 4 - Gull net
- 5 - Trawl
- 6 - Long line
- 7 - Other trawl
- 8 - Fishhook
- 9 - Poth
- 10 - Sport hook and line
- 11 - Inerting gear
- 12 - Handpicked
- 13 - Dip net
- 14 - 18 Unassigned
- 15 - Beam trawl
- 16 - Shovel
- 17 - Weir
- 18 - 99 Unassigned

LENGTH TYPE

- 1 - Tip of snout to fork of tail
- 2 - Mid-eye to fork of tail
- 3 - Post orbit to fork of tail
- 4 - Mid-eye to hypural plate
- 5 - Post orbit to hypural plate
- 6 - Unassigned

AGE ERROR CODES

- 1 - Death
- 2 - Inverted
- 3 - Age corrected
- 4 - Marginal
- 5 - Missing
- 6 - Reabsorbed
- 7 - Wrong species
- 8 - Not preferred

Appendix B. Procedures to operate the Satellite Telephone and Dispatch.

The following information serves as a Policy Statement regarding the allowable uses of ADF&G satellite phones and Instructions on the proper method to successfully set up and operate the satellite phone system assigned to your camp.

These systems are not like standard telephones or cell phones, nor are they like a single side band or VHF radio. Communication is sent through the transmitter to low level satellites, then is beamed down to ground stations, either directly to another satellite phone system or to a switching station linked to standard telephone lines. As such, there is a much higher cost involved in operation than with standard telephone long distance or cell phone charges.

Under NO CIRCUMSTANCES may you use this satellite phone system for personal calls, unless, for each event, you have obtained direct and explicit permission from your supervisor. This does not mean that field crew leaders may grant permission for personal use of this phone. Only the project biologist may give you such permission. ANY DELIBERATE MISUSE OF THIS SYSTEM, SUCH AS MAKING UNAPPROVED, NON-EMERGENCY, OR PERSONAL CALLS, WILL RESULT IN DISCIPLINARY ACTION, WHICH MAY INCLUDE SUSPENSION OR DISCHARGE.

The primary purpose for having this satellite phone is for a secure, reliable communication link between the remote field stations and ADF&G offices (Kodiak, Chignik, Cold Bay, Sand Point, or Port Moller), ADF&G research vessels (Resolution or K-Hi-C), Fish and Wildlife Protection vessels and offices, or other field camps that are similarly equipped. The secondary purpose is for your SAFETY. With these phones you are capable of directly dialing emergency services at any time of the day or night. It is essential that these phone systems are maintained in good working order, are fully charged or hooked to sufficient power at all times, and remain free for official or emergency use.

INSTRUCTIONS

The portable sat phone unit must be charged with power. There is an internal battery pack, and a 12-volt adapter is available in order to hook the phone to a larger battery bank, that may in turn be recharged by generator or solar panels.

Turn the unit on using the power switch in the lower left corner. A green light, just above the switch, should come on indicating that the unit is sufficiently powered. If no light or a red light comes on, you will need to charge the unit, or attach it to your 12-volt battery bank via the appropriate connections.

The back, or top, of the briefcase-like unit is the antenna, and it must be oriented correctly in order to access the receiving satellite. The top of the case should be open and pointed in a general east-southeast direction. You must have a fairly clear line-of sight to the horizon in that direction; this

-Continued-

unit will NOT work through walls or mountains. The angle of the antenna should be almost vertical; remember to lock the support arm that attaches the lid to the main body of the unit, along the right side.

This system has two means for calling; a telephone-like handset (for dial in or dial out phone calls), and a push-to-talk microphone (for ‘dispatch’, unit to unit, calls). All calls made with the handset are billed per minute of use, at an expensive rate. All calls on the ‘AlaskaNet’ dispatch system, using the microphone, are essentially FREE.

When first turned on, the handset and microphone should become active, with the display panels on the top of the phone handset and microphone lighting up (one LED panel, hopefully the one on the handset, should read SLEEP). The display will show, after a few moments, whether a connection has been established with the satellite, and how strong the signal is (ex. *B05 S 21*). Turn the unit slightly, and raise or lower the lid/antenna slightly until the highest possible signal strength is indicated (normally above 20). Lock the lid/antenna in place and do not turn the unit again, until your communications are finished.

Alaska Dispatch System

Because all calls made on the dispatch system are FREE, this is the method of choice for using the satellite phone units. There are several ADF&G offices, many field camps, and two research vessels on the AlaskaNet dispatch system, as well as Fish and Wildlife Protection/State Troopers offices and vessels, plus many canneries, fishing vessels, and tenders. You should have received a 10-12 page directory with your phone.

First, make sure the unit is turned on, and that there is sufficient power. Set the unit up so that the signal strength is at the maximum for your location. You should see the signal strength on the microphone display (ex. *B05 S 21*), and the handset display should read SLEEP.

On the microphone display, below the signal strength, there should be a query, ‘00:DN ??’. This is asking you to ‘dial’ in the 4-digit dispatch number that you wish to call. After you have entered the 4-digit dispatch number of the unit you wish to contact, hold in the microphone key and a connection will be made with the satellite, which will then try to connect with the dispatch number you punched in. IF a connection is made you will hear two beeps (“bird chirps”) and the microphone display will read SELF. While continuing to hold in the microphone key, call the station you wish to talk to. USE ALL THE SAME FORMALITIES AS WHEN CALLING ON A SSB RADIO. For example, say “Calling the ADF&G Kodiak Office, Calling the ADF&G Kodiak Office; this is Karluk Weir”. When you release the microphone key, the unit will beep again.

-Continued-

BE PATIENT. It will take some time for the signal to go up to the satellite, down to the number you called. It may take the other party some time to get to the microphone and respond (this is especially true for calls to the ADF&G office; supervisors have to walk down to the radio room to respond). When they respond, their 4-digit dispatch number (DN) will show on the microphone display.

Just remember to be patient; wait until the other party stops speaking and you hear the unit beep (indicating that they are finished with this portion of their communication), the display should read SELF, and you may key microphone to talk. Then you must again wait for the other party to respond. If the other party is not there, they simply will not answer. If the satellite connection cannot be made, the display will read 'Unable to Connect' or 'Not Available'.

Phone System

DO NOT USE THE HANDSET TO PLACE CALLS UNLESS ABSOLUTELY NECESSARY. All calls made with the handset are billed per minute of use, at an expensive rate. Calls should only be made to supervisors, either when radio or dispatch contact is not possible or when a confidential message needs to be relayed. Calls are made by dialing out, almost like a standard telephone. Punch in the area code and telephone number, then PRESS SEND (button located in the upper right corner of the handset). Because there is a satellite relay, there will be a slight delay between when you speak and when the other party hears you, so be patient.

Note EVERY call in a phone logbook. The system will show you the amount of time you've used on the call, on the LED panel. Note the number called, the date, approximate time, and the length of the call (minutes and seconds). When the call is completed, you MUST push the END button (top right corner of handset buttons), otherwise the system will remain active and YOU will be billed for the time (at almost a dollar a minute). Remember, PRESS END.

If someone calls in to this unit, it will ring, like a standard telephone. Press the SEND button to start the conversation, but remember to PRESS END to finish the call. ADF&G is billed for all calls made using the handset, both the calls you dial out and any calls dialed in.

IN CASE OF EMERGENCY:

If there is a medical emergency, or a real danger to life or health, IMMEDIATELY call the US Coast Guard Rescue Coordination Center at **800-478-5555**. Be ready to tell them your name, exact location (latitude and longitude or nearby major landmark), and the exact nature of your emergency. They may question you extensively, so be prepared. There are emergency doctors on-call that can advise you. After the call is completed, immediately call your supervisor, at work or at home, and relay the details of your experience.

If there is an enforcement emergency, use the dispatch microphone to call the Kodiak office or the Alaska State Trooper, Fish and Wildlife Protection (DN 6370).

Appendix C. Example of a weekly report.

To: Steve Honnold
ADF&G, Area Development Biologist
Kodiak, Alaska

Date: August 1, 2001

From: Millie Gray
ADF&G, FT-III
Kitoi Hatchery

Subject: Weekly Report

Little Kitoi Smolt Enumeration & Sampling

Pulled the fyke net trap today (8-1-96) ending the count for July 31, 1996. For the last five days there have been only sticklebacks passing through the counter. As to date this brings our estimated sockeye total to 88,925. The total sampled have been 1,116 (AWL 001 to 044). Total clips found were 515 of which 201 were right ventral, 313 were adipose/ right ventral and 1 was left ventral clip.

Little Kitoi Adult Enumeration & Sampling

Adult numbers have continued to slow down through out the week with the jack ratio remaining about the same. The overall percent of jacks is at 52%. Thus far I have found 70 marked fish. Most have been jacks, with 69 being RV and 1 LV. Lots of pinks milling around in Little Kitoi Bay with very few sockeye seen today.

Commercial Fisheries

7-29-96 Fisheries opened in Kitoi Bay at noon and closed at 6 p.m. There was 1 tender and 2 boats fishing. A total of approximately 55,000 lbs of fish were harvested. Of those approximately 250 lbs were sockeye salmon and 50 lbs were coho salmon. I was able to collect 7 lengths and scales off sockeye.

Miscellaneous

7-31-96 Did a survey of Little Kitoi Lake to try and locate any of the sockeye. I saw 1 small jack by the outlet of the creek behind the island. I also started a survey of the middle basin (station #3) to determine at what depth the hydrogen sulfide chemocline exists.

Anticipated Activities

Monitor smolt counter at Little Kitoi.
Monitor and enumerate adult weir at Little Kitoi.
Sample adult sockeye at Little Kitoi.
Monitor the commercial fishery when opened in Kitoi Bay.
Continue with mapping of hydrogen sulfide in Little Kitoi Lake.

Appendix D.1. Procedures for properly filling out a timesheet.

All ADF&G employees must fill out a time sheet biweekly and these timesheets must be turned in to the Administrative staff in Kodiak in a timely manner. Please follow these instructions when filling out your time sheets to avoid payroll problems. When a flight comes out to drop off groceries, or for any other reason, near the end of a pay period, camp personnel need to send in their timesheets. Fill in the time sheet up to the day you send them in and attempt to project your remaining hours worked.

Fill out each of the following on the top of the timesheet:

Pay period: pay periods start on the 1st or 16th of each month and end on the 15th or end of the month (example: June 1-15 or June 16-30).

SSN: your social security number

Name: full name

Division: Commercial Fish

In the actual timesheet table fill in the following:

Day: Monday, Tuesday, etc.

Date: 6/16, 6/17, etc.

Hours worked box: start and stop time in military time

Code 1: fill in the number of hours worked for that day (see example in Appendix X.2.).

Work hours and Code 1 Totals should both equal the sum of daily hours worked. If your time sheet is sent in before the end of the pay period, project your time for the remaining days so you can total your columns.

Charge to Table located on the bottom left hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

Comments Table located on the bottom right hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

Employee's signature and date: Be sure to sign and date your timesheet.

Crew leaders are responsible for reviewing each crew member's timesheet before sending them to town to ensure that they are properly filled out.

Appendix D.2. Example of a completed timesheet.

ALASKA DEPARTMENT OF FISH AND GAME Time and Attendance Report

Pay period ending: 6/15/2003 SSN: 191-11-1111 Name: Joe Shmo Division: Commercial Fisheries

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

Day	Date	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Leave Taken	Sea Duty	Standby	Hazard	Code 1	Code 2	Code 3	Code 4	Holiday / Leave	Work Hrs Total																				
Sun	6/1	8:00	12:00	13:00	16:30													7.50				0.00	7.50																				
Mon	6/2	8:00	12:00	13:00	16:30													7.50				0.00	7.50																				
Tue	6/3	8:00	12:30	14:00	18:00													8.50				0.00	8.50																				
Wed	6/4	8:00	12:00	13:00	16:30	17:00	19:00											9.50				0.00	9.50																				
Thu	6/5	8:00	12:00	13:00	16:30													7.50				0.00	7.50																				
Fri	6/6	8:00	12:00	16:00	19:00													7.00				0.00	7.00																				
Sat	6/7	8:00	12:00	13:00	16:30													7.50				0.00	7.50																				
Sun	6/8																					0.00	0.00																				
Mon	6/9	8:00	12:00	13:00	16:30													7.50				0.00	7.50																				
Tue	6/10	8:00	12:00	13:00	16:30													7.50				0.00	7.50																				
Wed	6/11	8:00	12:00	13:00	16:30													7.50				0.00	7.50																				
Thu	6/12	8:00	12:00	13:00	16:30													7.50				0.00	7.50																				
Fri	6/13																					0.00	0.00																				
Sat	6/14																					0.00	0.00																				
Sun	6/15	8:00	12:00	13:00	16:30	17:00	18:30											9.00				0.00	9.00																				
TOTALS																						0.00	0.00	94.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.00

EXAMPLE

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

Comments		Comments	
6/1		6/9	
6/2		6/10	
6/3		6/11	
6/4		6/12	
6/5		6/13	
6/6		6/14	
6/7		6/15	
6/8			

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

Joe Shmo Date: 6/15/03
Employee's Signature

Supervisor's Signature

Approving Officer Signature

Leave Use Codes

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

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

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

Holiday, Leave, Overtime and Premium Pay Overrides		
**Codes	Hours	CC/LC
Leave & Holiday	0.00	No code needed for Leave & Holiday

Ver. 1.9.4
Revised 2/20/99

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If you believe you have been discriminated against in any program, activity, or facility, or if you desire further information please write to ADF&G, P.O. Box 25526, Juneau, AK 99802-5526; U.S. Fish and Wildlife Service, 4040 N. Fairfax Drive, Suite 300 Webb, Arlington, VA 22203 or O.E.O., U.S. Department of the Interior, Washington DC 20240.

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SPIRIDON LAKE SOCKEYE SALMON SMOLT AND COMMERCIAL FISHERY
MONITORING PROJECT OPERATIONAL PLAN, 2004



By

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Division of Commercial Fisheries
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April 2004

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INTRODUCTION

Spiridon Lake is located on the west side of Kodiak Island (approximately 74 km southwest of the city of Kodiak) within the Kodiak National Wildlife Refuge (KNWR; Figure 1). It is the third largest lake on Kodiak Island and drains into Telrod Cove and Spiridon Bay by way of Telrod Creek. Spiridon Lake does not support anadromous salmon runs due to a series of impassable falls on Telrod Creek.

The Alaska Department of Fish and Game (ADF&G) and the Kodiak Regional Aquaculture Association (KRAA) have stocked Spiridon Lake with juvenile sockeye salmon *Oncorhynchus nerka* from 1990 through 2003 (Honnold 1997; Honnold and Schrof 2001). A pipeline was installed on the outlet of Spiridon Lake in 1991 to allow annual smolt emigrations to bypass a series of barrier falls.

Annual sockeye salmon smolt emigrations from Spiridon Lake are enumerated and sampled for age and size to assess growth, fry to smolt survival and smolt to adult survival. These efforts include operation and maintenance of a bypass system (diversion weir, traps, dewatering tanks, and pipeline) in May and June.

Returning adult sockeye salmon are harvested in the Northwest Kodiak District with a large portion caught in the Spiridon Lake Terminal Harvest Area (SLTHA). The 2004 sockeye salmon run is forecast to range from 178,000 to 421,000 adults (Witteveen et al. *in press*). In addition to operating the bypass system, the fishery within the SLTHA will be monitored. Monitoring duties include estimating the build-up of returning sockeye salmon, estimating and sampling of the sockeye salmon harvest, and estimating the incidental harvest of chinook *O. tshawytscha*, chum *O. keta*, pink *O. gorbuscha*, and coho *O. kisutch* salmon.

Goals

1. Evaluate the growth and survival of juvenile sockeye salmon stocked into Spiridon Lake.
2. Ensure that smolt survive when emigrating to the marine environment from Spiridon Lake.
3. Monitor the commercial fishery in the SLTHA and evaluate the magnitude and biological attributes of the adult run to the SLTHA.
4. Comply with the monitoring requirements of the Spiridon Lake Management Plan in agreement with the KNWR.

Objectives

1. Prevent emigrating smolt from passing over the series of barrier falls to minimize injury and/or mortality.
2. Estimate the number and timing of sockeye salmon smolt emigrating from Spiridon Lake.
3. Estimate the average size-at-age of the sockeye salmon smolt emigration.
4. Estimate the daily commercial salmon harvest in the SLTHA (at Telrod Cove) by species.
5. Estimate the SLTHA (Telrod Cove) and Telrod Creek pink and sockeye salmon runs.
6. Estimate the age composition of the SLTHA (Telrod Cove) adult sockeye salmon run.

Primary Tasks

1. Install, operate, and maintain a smolt trapping and pipeline system throughout the sockeye salmon smolt emigration.
2. Estimate the daily emigration of sockeye salmon smolt by actual and timed counts.
3. Sample 40 sockeye salmon smolt per day, five days per week, for scales, weight, and length data.
4. Collect physical observation data daily.
5. Conduct weekly foot surveys to estimate adult salmon escaping into Telrod Creek from late June through the end of the sockeye salmon fishery (first week in August).
6. Estimate and report the SLTHA salmon build-up and vessel activity, and estimate salmon harvest by species and day throughout the fishery.
7. Sample 80 adult sockeye salmon, every other day for three days per week (240/week; 1,680 total), for age, sex, and length from the commercial fishery at SLTHA (Telrod Cove). During the peak return of sockeye salmon to the SLTHA (July 1-30), sampling should be intensified to collect an additional 80 ALS samples per week.
8. Provide KNWR with a brief written synopsis of the 2004 project results by March 1, 2005.

SUPERVISION

Project Biologists: Steve Schrof (primary) - Fishery Biologist II (FB II)
Greg Watchers (secondary) - Fishery Biologist I (FB I)

Smolt Crew: Amy Brodersen – crew leader
William Gregory – crew member (3-23 May)
Dawn Bragg – crewmember (24 May – 30 June)

SLTHA Fishery Crew: Amy Brodersen – crew leader
William Gregory – crewmember

The Project Biologists will oversee the project and provide logistical and technical support. The crew leader will schedule daily tasks and oversee field operations and safety during the project. The crewmembers will assist the crew leader in all assigned tasks and field operations.

PROCEDURES

Trap Installation

1. Install two Canadian fan traps in Telrod Creek (mid channel) as indicated by permanent bank markers (Figure 2A,B).
2. Anchor the traps with cable to turnbuckles permanently attached to the previously anchored duckbills on the stream bank.
3. Use 3.0 to 3.2-meter (10 - 12 foot) sections of 5.1-centimeter (two-inch) diameter pipe joined by NU-RAIL fittings as a frame to secure and support the traps (Figure 2A,B).
4. Use come-a-longs, secured to the overhead steel pipe cross members, to elevate the downstream ends of the traps (Figure 2C).
5. Secure additional cable supports from the traps to the overhead pipes.

Attachment of De-watering Tanks

1. Place de-watering tanks downstream of each trap and secure the tanks by cable to previously positioned duckbill anchors on the stream banks (Figure 3A,B).
2. Connect each trap to the de-watering tanks with sections of aluminum trough; secure the upstream ends of the troughs with threaded rod inserted through previously drilled holes (Figures 2C and 3A).
3. Use rubber and foam pipe insulation material to ensure a tight fit between the ends of troughs and the tanks and traps.

Diversion Weir Installation

1. Construct a diversion weir upstream of the traps using a frame made from 1.6-meter (5-foot; legs), and 2.8-meter (8-foot; cross members), 5.1-centimeter (two-inch) diameter pipe and NU-RAIL fittings (Figure 3C).
2. Attach 1.3 by 2.5-meter (4 by 8-foot) sheets of aluminum perforated plate to the frame starting at the traps and working upstream (Figure 3C).
3. The first sheet of perforated plate is secured to the side of each trap with screws where the plate and the side of the trap are joined. The trap and perforated plate should rest on the streambed; continue placing sheets of perforated plate on the frame with each upstream piece overlapping the previous downstream piece by approximately six inches and securing the plates together with bailing wire.
4. Install a “dam” where the weir meets the stream banks to make the weir “fish tight” near shore; use boards, sandbags and Lortex (plastic sheeting) for the dam (Figure 3C).
5. Place a 1.5-meter (~2 feet) wide piece of Lortex along the entire base of each side of the weir to further seal the weir: place half of the width of sheeting on the substrate and half of the width on the base of the weir. Place sandbags along the base of the weir to hold the sheeting in place.
6. Also place Lortex over the seams of the perforated plate and any other areas with protruding edges that may be hazardous to smolt.
7. Install a “V” type center de-water plate between the traps to direct additional flow toward the traps, which eliminates any “pooling” effect in front of the traps and reduces smolt pinning (Figure 4A). Use bailing wire to secure the “V” to the rest of the trap.
8. Once the “V” is installed and screwed to the traps, line the inside walls and bottom of each trap with a blue tarp and/or lortex as needed to reduce smolts from pinning against the perforated plate and increase water velocity into the de-watering tanks (Figure 4A).

Connecting the Pipeline

1. Connect a pipeline section with camlock fitting end to each of the downstream ends of the de-watering tanks (Figure 4B).
2. Make sure the open-ended pipeline sections are resting on the lip of the counting tank (Figure 4C).
3. The water level in the counting tank is adjusted with the standpipe located on the downstream end of the tank. A come-a-long attached to the cod end of the trap is used to adjust the volume of water flowing into the de-watering tanks (Figure 2C).

Bypass System Monitoring

1. The traps will be operated to maintain efficiency and minimize smolt mortality. This requires frequent monitoring and maintenance since significant mortality can occur in a short period of

time. Fish tend to hold in the tanks and pipeline during the day and any loss of flow through the system may result in mortality. Some mortality may also occur due to high water pressure, which results in smolt being pinned on perforated plate. Plastic sheeting may need to be added to the perforated plates to reduce pinning.

2. An accurate account of mortality will be recorded on the *Spiridon Smolt Daily Reporting Form* (Figure 5).

Smolt Emigration Estimates (Timed Counts)

Daily estimates of the sockeye salmon smolt emigration from Spiridon Lake will be made at the counting tank (most downstream tank) using timed counts, every half-hour (30 minutes) from 2300 hours through 0500 hours. A 24-hour period from noon to noon, identified by the calendar date corresponding to the first noon, is used as a single enumeration day (smolt migrate primarily at night). Half-hour counts are from 1.0 minutes (minimum) to 8.0 minutes (maximum) in duration. The duration is dependent on the rate of smolt movement (e.g., the minimum time is used during large migrations and the maximum time during slower smolt movements).

1. At the beginning of a count, move the entrance pipes to allow smolts to drop into a catch basket submerged in the tank; use a stop-watch to time the collection of smolts in the catch basket.
2. After the count is over, record the count-time and enumerate the smolts from the catch basket and release them down the pipeline or into the counting tank.
3. Use the same procedures if large smolts movement occur during the day (0500 to 2300 hours).
4. If smolts are spilling out from the pipes at a slow rate, hand counting of smolts would be more appropriate.
5. Move and secure the entrance pipes over the catch basket in the morning after each counting shift ends (~0500 hours); cover the catch basket to prevent smolts from jumping out.
6. Check the catch basket at 0700 hours; enumerate and release smolts collected. Repeat this step just prior to noon when the counting day ends.

Smolt Enumeration Data Management

1. Estimate the daily smolt emigration by calculating timed count estimates for each half-hour (30 minutes) counting period as follows: multiply the number of smolt counted per time period (1 to 8 minutes) by 30 minutes divided by the time period (30/1 to 30/8).
2. Record timed or hand counts (include “hand count” in “Remarks” section), migration estimates, and remarks on the *Spiridon Smolt Daily Reporting Form* (Figure 5).
3. Summarize daily trapping data on the *Spiridon Sockeye Salmon Smolt Summary Reporting Form* (Figure 6).

Age, Weight and Length Sampling

Fourty (40) sockeye salmon smolt from the daily emigrations will be sampled each day, five days per week, for age, weight, and length (AWL) data. Smolts will be collected while they are counted as described in the previous section of this operation plan; they are selected without known bias from each half hour timed count and placed into a “sampling container” submerged in the counting tank. The smolts from each timed count will be held in the container until sampled. AWL data are typically collected from the smolts after the last count of the enumeration day. Note: the 24-hour enumeration day is equivalent to the sampling day. Proper AWL sampling methods will be demonstrated to each crewmember by a biologist (crew leader) prior to field deployment or sampling in the field. General procedures are as follows:

1. Prepare all equipment prior to sampling, including: a digital scale, a small dipnet, two buckets with aerators, a basin for anesthetizing the smolt, thermometer, Tricaine Methanesulfonate (MS-222), baking soda, latex gloves, slide holder, labeled slides, scalpel, dissecting probe, measuring board, and a rite-in-the-rain logbook.
2. Anesthetize the smolt with MS-222 as instructed by the Project Biologist(s). Latex gloves will be worn to prevent direct exposure to the MS-222.
3. Measure each smolt from the tip of the snout to the tail fork. Record the smolt length, to the nearest millimeter in the rite-in-the-rain logbook (Appendix A.1).
4. Use a knife or scalpel to remove 5-10 scales from the preferred area (Appendix A.1).
5. Mount the scales on a glass slide with five fish per slide (Appendix A.2).
6. Label the left portion of each slide with the AWL number, location, species, date, and fish number (Appendix A.2).
7. Remove excess water from the smolts using a moist paper towel as a blotter prior to placing the smolt on the scale to obtain a weight. Record individual smolt weights in the rite-in-the-rain logbook to the nearest 0.1 gram.

AWL Data Management

1. Transcribe the AWL data to the AWL form as described in Appendix A.3.
2. Record up to 40 samples per AWL form (Appendix A.4).
3. Record names of personnel collecting the data at the top of each AWL form (Appendix A.4).

Physical Observation Data

Water and air temperatures, stream height, percent cloud cover, wind direction and velocity, and precipitation data will be collected at the smolt site at approximately 1100 and 2300 hours each day. Install a stream gauge (meter stick) upstream of the smolt diversion weir once the trap/bypass system is operational (preferably prior to the smolt emigration).

1. Use a standard thermometer to record water and air temperatures (°C).
2. Measure stream height at the stream gauge (cm).
3. Estimate percent cloud cover, wind direction, and wind velocity by direct observation.
4. Record information on the *Daily Physical Observation Form* (Figure 7).

Stream Surveys

Foot surveys will be conducted in lower Telrod Creek (to first barrier falls) once a week beginning 25 June and will continue throughout the fishery monitoring period.

1. Enumerate the number of live and dead adult salmon by species.
2. Enumerate jack sockeye salmon separately from the overall sockeye salmon observed.
3. Estimate the number of pink salmon in Telrod Creek from the large ‘plunge pool’ to the estuary.
4. Record survey data on the *Telrod Creek Escapement Surveys Reporting Form* (Figure 8).

Fishery Monitoring

The commercial salmon fishery in the SLTHA (Telrod Cove; Figure 1) will be monitored prior to the initial opening until the final closure (about 20 June - 10 August).

1. Conduct daily surveys by skiff in Telrod Cove and Spiridon Bay to assess sockeye salmon run strength. Observations include, the number of jumpers in a certain time period and an estimate of schooling salmon in Telrod Cove.
2. Relay fish abundance estimates, based on size of aggregations and “jumpers,” to the commercial fishery managers at 0800 and 1600 hour SSB radio schedules (3.230 MHZ).
3. Interview some of the vessel skippers and tender operators to determine an index of catch abundance by species. Total catch data will be obtained through the ADF&G fish ticket database.
4. Log vessel names, fishing locations, and estimated catch by species during each day’s fishery on the *Spiridon Lake Terminal Harvest Area (Telrod Cove) Fishery Monitoring Reporting Form* (Figure 9).

Harvest Sampling

A portion of the commercial sockeye salmon catch from the SLTHA will be sampled for age, sex, and length data. The minimum sampling goal of 1,680 fish total (about 280 fish weekly) will be necessary to assess the age composition of the SLTHA run. During the peak of the run, when commercial catches increase dramatically, the crew will increase sampling to collect an

additional 80 ALS samples per week. A Project Biologist will notify the crew, when a change in the sample size is necessary.

In addition to the THA samples, 300 sockeye salmon will be sampled from catches at the set net site near Hook Point (Figure 1). These fish will be sampled as time and weather permits. If possible, 100 fish samples should be collected on three separate occasions throughout the fishery.

Adult sampling methods are described in Appendix B. If further training in adult sampling techniques is necessary, an experienced sampler will demonstrate the proper techniques in the field.

Safety

Each employee is responsible for attending safety courses that may be offered and perform his/her duties in the field in a safe manner (e.g., wearing a PFD whenever riding in or operating a skiff or vessel). Crew leaders are responsible for ensuring that all the necessary safety equipment and resource materials are available to field technicians. All employees are required to:

1. Attend and pass a certified CPR/First Aid training course prior to field deployment.
2. Review specific sections of the ADF&G Safety standard operating procedures (SOP) manual that apply to the situations possibly encountered at your job site, prior to field deployment. Focus on the following sections of the manual: Policy/Standards, Building Safety, Field Camp Safety, Aircraft/Passenger Safety, Emergency/Survival Equipment Required in Aircraft, Boating Safety, Vehicle Safety, Small Tool Handling, Firearm/Bear Safety. After reviewing the above sections in the manual, sign the Employee Safety SOP verification form that acknowledges that you have read the material.

Radio Schedule and Air Charters

Communication between personnel in the field and project biologists stationed at the Kodiak ADF&G office is facilitated by single side band (SSB) radio at frequency 3.230 MHz. During the smolt season, daily contact will be from 1300 to 1315 hours Monday through Friday and at 1950 hours on Saturday and Sunday. Once smolt work ends and field personnel are working daytime hours, the radio schedule will be from 0800 and 0830 hours each day and at 1950 hours on Saturday and Sunday. Also, as an added communication link between field camps and the Kodiak office, satellite phones will be used to relay information on data and as a more reliable connection for emergency contact. Instructions on the operation and transmission on the satellite phone is provided in Appendix C. Instructions on satellite phone use will be updated throughout the season and the new instructions will be provided to the field crews as soon as possible.

Field personnel can contact the Kodiak ADF&G office from 0800 to 1630 hours if needed; however, contact during the specified times is required. **BE AWARE OF EMERGENCY**

CONTACT PROCEDURES POSTED ON EACH RADIO AND AT WHICH LONGITUDE AND LATITUDE COORDINATES YOUR CAMP IS LOCATED.

Be prepared during daily radio contact to provide project biologists with the following information:

1. General weather conditions (e.g., “1,000 foot broken ceiling, visibility 5 miles, winds are calm, and its raining”).
2. Smolt Data
 - Daily and cumulative smolt counts
 - Daily and cumulative average smolt weight and length
 - Stream depth and water temperature
 - Other pertinent information regarding the bypass system, smolt movements, etc.
3. Fishery Monitoring Data
 - Daily and cumulative catch per species using the standard code (defined inseason)
 - Daily and cumulative number of samples collected
 - Other information as requested
4. Logistics
 - Grocery and supply needs and approximate delivery dates (evening or weekend radio contact)
 - Expected time of arrival of returning air charters and a description of items (e.g., equipment, data forms, empty fuel containers) returning to Kodiak on the flight.

Reporting

Reporting is a critical component of the Spiridon Lake project. Project Biologists are ultimately responsible for the data collected; however, the managing and reporting of the accurate data in an organized, understandable manner by crew leaders and crewmembers is essential to the success of the project.

Crew leaders are responsible for reporting the following:

1. Daily work activities and biological data
 - Complete data forms and a field journal of daily events using a no. 2 pencil.
 - Write in "rite-in-the-rain" field logbooks when collecting data in inclement weather and then transfer data on to data forms in a sheltered area (sampling shed and/or cabin).
2. Summarize weekly work activities and biological data collected in a one-page weekly report of project activities following the format found in Appendix D.
3. Write a season summary report (crew leader will assist Project Biologist with report writing)
 - Write a report summarizing Spiridon Project activities for the season.
 - Follow the format of Appendix E when writing this document.

- Include specific information on installation and removal of the smolt trap, and system operation.
- Include photographs of important and significant portions of the project (State cameras and film are available for project documentation).

Equipment Storage and Inventory

Confer with the Project Biologist(s) for the protocol to follow regarding equipment tracking, and storage. Upon completion of the project, complete a thorough inventory of all project equipment and provide a list of additional items needed for the 2005 season. Note the final location of each inventoried item (e.g., at Spiridon, warehouse bin, etc.) and attach the final list as an appendix table to the project summary report.

Timesheets

Forward timesheets to the KODIAK OFFICE by the 15th and last day of each month! Be prepared to send timesheets into town when flights may stop at your field site. To ensure that timesheets are properly filled out, instructions on filling out a timesheet are contained in Appendix F.1 and an example of a properly filled out timesheet is provided (Appendix F.2). Plan work activities to be completed in a 7.5-hour day; work overtime only if pre-authorized by the Project Biologist.

LITERATURE CITED

- Honnold, S.G. 1997. The results of sockeye salmon (*Oncorhynchus nerka*) stocking into Spiridon Lake on the Kodiak National Wildlife Refuge: juvenile and adult production, commercial harvest, and ecosystem effects, 1987-1996. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 4K97-47, Kodiak.
- Honnold, S.G. and S.T. Schrof. 2001. A summary of salmon enhancement and restoration in the Kodiak Management Area through 2001: a report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4K01-65, Kodiak.
- Witteveen, M. W., N. S. Sagalkin, M. B. Foster, K. A. Bouwens, S. T. Schrof, and R. T. Baer. *In press*. Westward Region Salmon Run Reconstruction for the 2003 season and Forecasting for the 2004 season. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak.

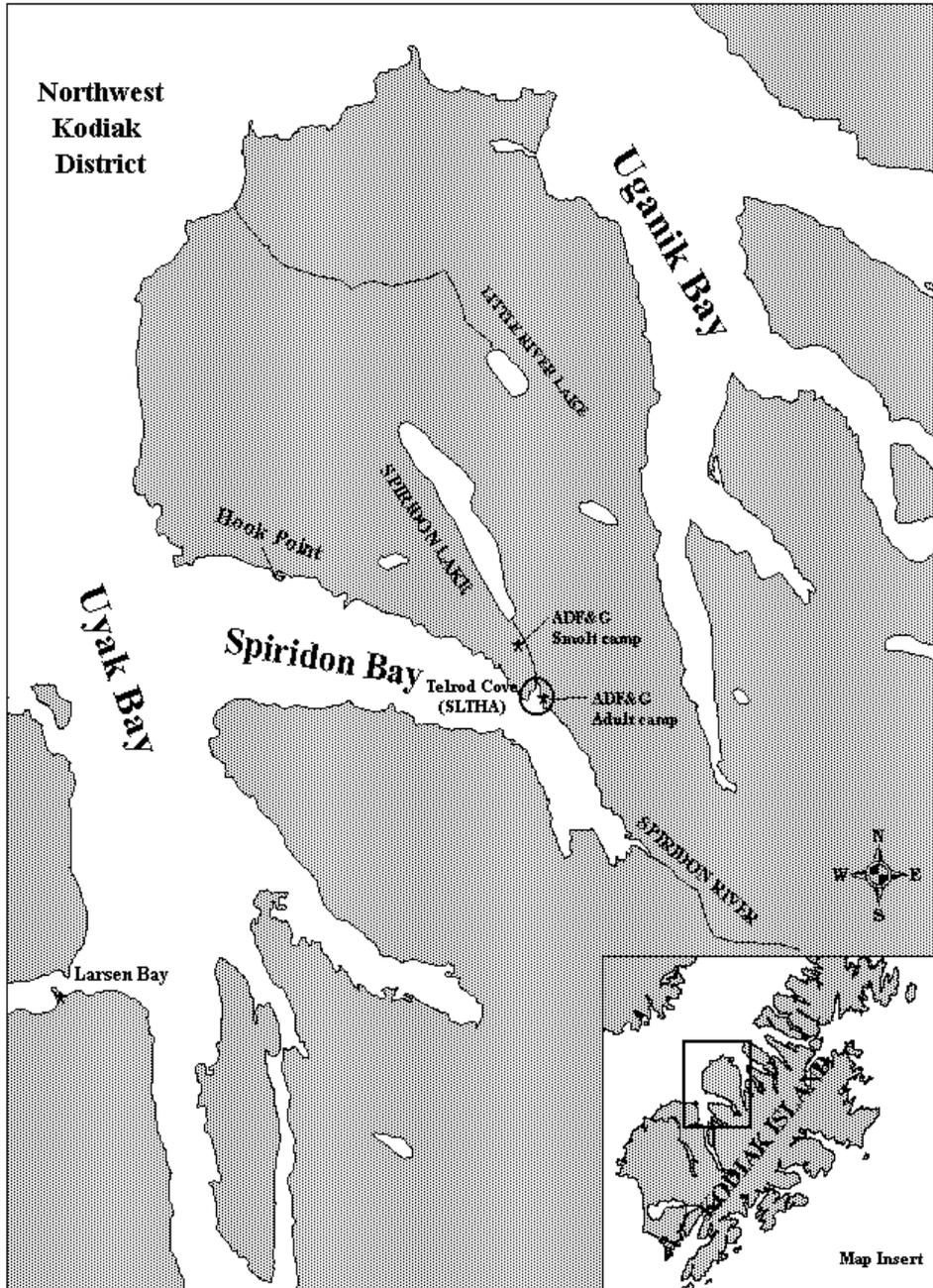


Figure 1. Locations of the ADF&G smolt and adult salmon field camps, Spiridon Lake, Telrod Cove, and Spiridon Bay in the Northwest Kodiak Commercial Salmon Fishing District.

A.



B.



C.

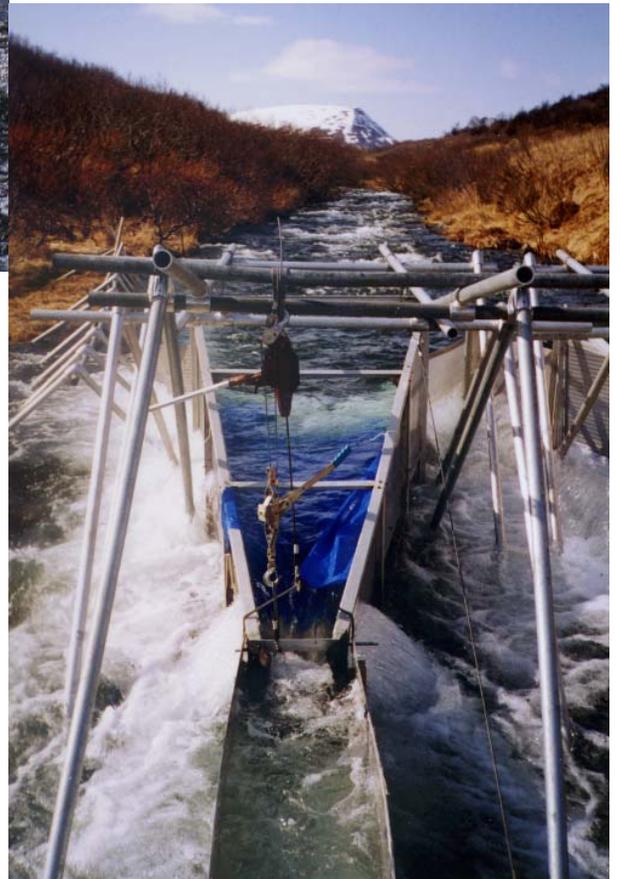


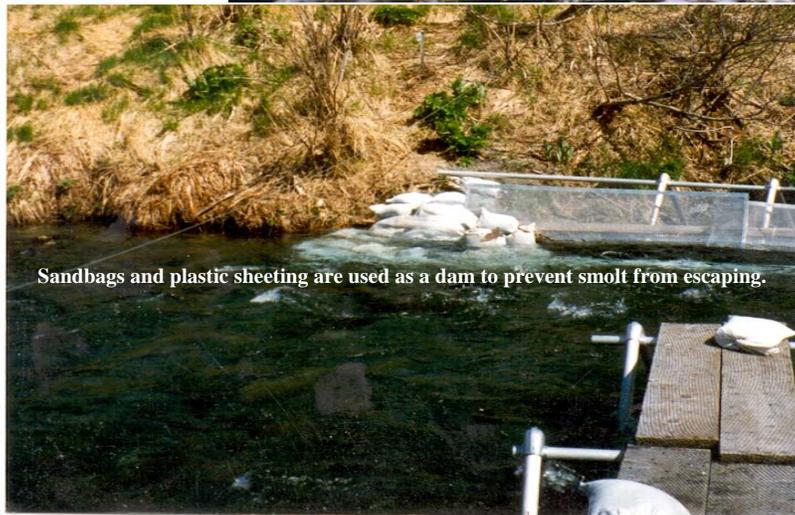
Figure 2. Installation of smolt trapping hardware (A-C).



A.



B.



C.

Sandbags and plastic sheeting are used as a dam to prevent smolt from escaping.

Figure 3. Troughs (A), tanks (B), and a dam of sandbags and plastic sheeting at the end of the perforated plate (C).

A.



B.

C.



Figure 4. Smolt traps with 'V' connector (A), pipeline (B and C), and tanks (B and C).

SPIRIDON SMOLT DAILY REPORTING FORM, 2003

Date: 5/10/2003

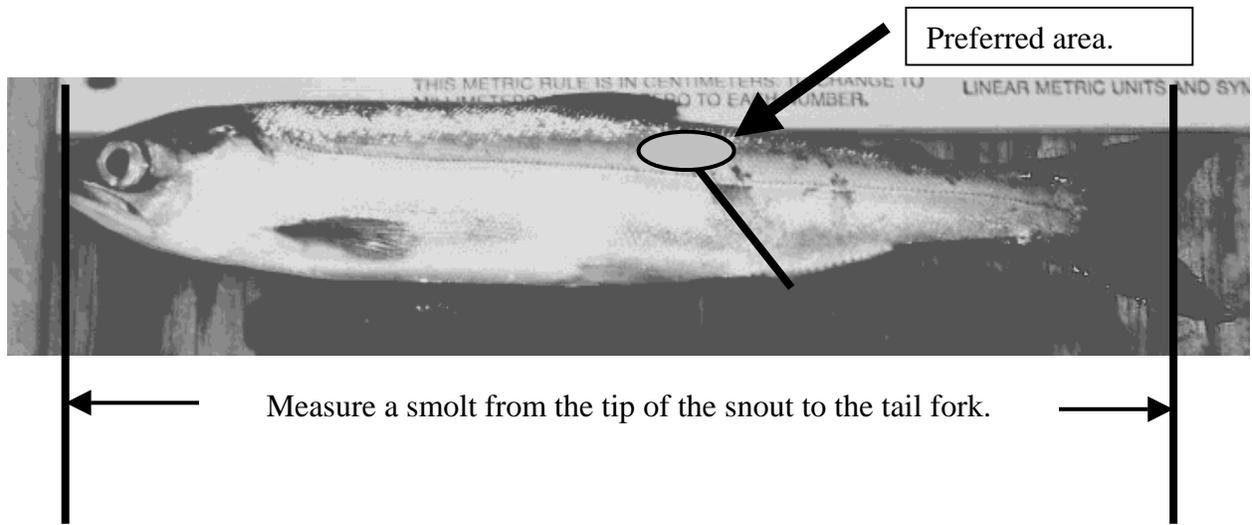
EXAMPLE

Counting		Muple (30 Min. /Time)	Live		Dead		Total Estimate Live and Dead	Remarks
Period (Military hrs)	Time (Min:Sec)		Count	Count x Multiple	Count	Count x Multiple		
2300-2330			352		2		354	hand count
2330-0000	8:00	3.75	653	2,449	3	11	2,460	
0000-0030	8:00	3.75	988	3,705	0	0	3,705	
0030-0100	6:00	5.00	875	4,375	4	20	4,395	
0100-0130	2:00	15.00	888	13,320	3	45	13,365	
0130-0200	1:00	30.00	900	27,000	0	0	27,000	
0200-0230	1:00	30.00	955	28,650	0	0	28,650	
0230-0300	3:00	10.00	1,104	11,040	1	10	11,050	
0300-0330	8:00	3.75	777	2,914	0	0	2,914	
0330-0400	8:00	3.75	479	1,796	0	0	1,796	
0400-0430			401		7		408	hand count
0430-0500			345		4		349	hand count
0500-0700			1,678		24		1,702	hand count
0700-12:00			99		0		99	hand count
Totals:			Timed Live:	95,249	Timed Dead:	86	Timed Live&Dead:	95,335
			Other Live:	2,875	Other Dead:	37	Other Live&Dead:	2,912
			Total Live:	98,124	Total Dead:	123	Grand Total:	98,247

Figure 5. An example of a Spiridon Lake sockeye salmon smolt daily reporting form.

APPENDIX

Appendix A.1. Photo of a smolt with the preferred area highlighted and measurement from tip of snout to tail fork.



Appendix A.2. An example of 2 correctly labeled smolt slides representing fish 1 through 10 from a sample collected on 5/11/00.

AWL 001 Sockeye Bear Lake 5/11/00 Fish 1 - 5	<table border="0"> <tr> <td style="text-align: center;">1</td> <td></td> <td></td> <td></td> <td style="text-align: center;">5</td> </tr> <tr> <td>•</td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> </tr> </table>	1				5	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
1				5																																					
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AWL 001 Sockeye Bear Lake 5/11/00 Fish 6-10	<table border="0"> <tr> <td style="text-align: center;">6</td> <td></td> <td></td> <td></td> <td style="text-align: center;">10</td> </tr> <tr> <td>•</td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> </tr> </table>	6				10	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6				10																																					
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When the slides are completed, return them to the box in order by AWL # and fish #, and label the slide box on top with the following information:

Location: Bear Lake
 AWL Number: AWL 001-003
 Beginning and end dates: 6/12-7/13/00
 Sockeye Salmon Smolt

Appendix A.3. Procedure for recording salmon smolt age-weight-length data on AWL forms.

Smolt length and weight will be recorded on AWL forms (Appendix A.4.). Using a No.2 pencil, complete each section of the left side of the AWL and darken the corresponding blocks.

Fill out each of the following data fields:

Description

Record the following: species, location, year and samplers names (e.g., sockeye smolt, Frazer fish pass, 2003, Sagalkin, Schrof).

Card

The AWL forms and corresponding slides are numbered sequentially by date throughout the season starting with 001. A new, consecutively numbered AWL form is used each day even if the previous AWL form is not full. There may be a minimum of one fish and a maximum of 40 fish (8 slides) per AWL form.

Species

Refer to the reverse side of the AWL form for the correct one digit code (e.g., sockeye = 2).

Day, Month, Year

Use appropriate digits for the date the fish are sampled.

District

List the district in which the fish were sampled. Consult your area statistical map or project leader for the appropriate district (**district is 254**).

Subdistrict (Section)

List the subdistrict in which the fish were sampled. Consult your area statistical map or project leader for the appropriate subdistrict (**subdistrict is 40**).

Stream

List the stream in which the fish were sampled. Consult your area statistical map or project leader for the appropriate stream number (**stream is 403**).

Location

Leave blank

Period

List the period (sample week) in which the fish were sampled (Appendix A.5).

-Continued-

Project and Gear

Refer to the reverse side of the AWL form for the correct code. For example, smolt samples collected in a trap would have a project code of 8 and a gear code of 00.

Mesh

Leave blank unless specifically instructed by supervisor to do otherwise.

Type of length measurement

Refer to the reverse side of the AWL form for the correct code (e.g., tip of snout to tail fork = 2). Refer to Appendix A.1.

Number of scales per fish

Fill in the number of scales (smears) collected per fish. For smolt, one scale smear per fish is collected.

of cards

of cards always = 1 (each AWL form is individually numbered).

If possible, keep the AWL forms in numerical order throughout the season and keep all forms flat, dry, and clean. Remember, when sampling smolt, weight data is recorded on the back side of the AWL form and the litho code, located in the left margin on the front side of the AWL form must be transferred to the back side of the form (see Appendix A.4). The litho code is the number unique to each AWL form and copying the litho code from the front to the back of the form indicates weight data was transcribed on the back of the form for the Optical scanning machine to read. Fish slime and water curling may cause data to be misinterpreted by the optical scanning machine. **It is the responsibility of the crew leader to make sure that all forms are carefully edited before returning them to their supervisor.**

Appendix A.4. Example of an AWL form filled out for smolt sampled. Note: Project code should be 8 not 4

DESCRIPTION: *Pentakty/Thomas 1999*
Sockeye Smolt/Hidden Creek/Dip Net

ADF&G ADULT SALMON AGE-LENGTH FORM VERSION 2.1 *TAG*

CARD: 001

SPECIES: 2

DAY: 04

MONTH: 06

YEAR: 99

DISTRICT: 251

SUBDISTRICT: 40

STREAM: 406

LOCATION:

PERIOD: 23

PROJECT: 4

GEAR: 13

MESH:

TYPE OF LENGTH MEASUREMENT: 1

NUMBER SCALES/FISH: 1

OF CARDS: 1

Mark Refill by NCS MMD00002-1 3 PEG3 Printed in U.S.A.

#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
1	M	0	0	0	0	0
2	F	0	0	0	0	0
3	M	0	0	0	0	0
4	F	0	0	0	0	0
5	M	0	0	0	0	0
6	F	0	0	0	0	0
7	M	0	0	0	0	0
8	F	0	0	0	0	0
9	M	0	0	0	0	0
10	F	0	0	0	0	0
11	M	0	0	0	0	0
12	F	0	0	0	0	0
13	M	0	0	0	0	0
14	F	0	0	0	0	0
15	M	0	0	0	0	0
16	F	0	0	0	0	0
17	M	0	0	0	0	0
18	F	0	0	0	0	0
19	M	0	0	0	0	0
20	F	0	0	0	0	0
21	M	0	0	0	0	0
22	F	0	0	0	0	0
23	M	0	0	0	0	0
24	F	0	0	0	0	0
25	M	0	0	0	0	0
26	F	0	0	0	0	0
27	M	0	0	0	0	0
28	F	0	0	0	0	0
29	M	0	0	0	0	0
30	F	0	0	0	0	0
31	M	0	0	0	0	0
32	F	0	0	0	0	0
33	M	0	0	0	0	0
34	F	0	0	0	0	0
35	M	0	0	0	0	0
36	F	0	0	0	0	0
37	M	0	0	0	0	0
38	F	0	0	0	0	0
39	M	0	0	0	0	0
40	F	0	0	0	0	0

DO NOT WRITE IN THIS MARGIN

TRANSFER RESPONSES EXACTLY AS PRINTED ON FRONT TO THIS GRID

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS MARGIN

SPESIES

- 1 - Chinook (king)
- 2 - Sockeye (red)
- 3 - Coho (silver)
- 4 - Pink (humpy)
- 5 - Chum (dog)

PROJECT

- 1 - Commercial catch
- 2 - Subsistence catch
- 3 - Escapement (lower, weir, gear etc., etc.)
- 4 - Escapement - spawning grounds
- 5 - Test fishing
- 6 - Sport catch (marine)
- 7 - Sport catch (freshwater)

GEAR TYPE

- 1 - Trap
- 2 - Beach seine
- 3 - Dip net
- 4 - Set gillnet
- 5 - Troll
- 6 - Long line
- 7 - Other trawl
- 8 - Fishwheel
- 9 - Weir
- 10 - Sport hook and line
- 11 - Herring gurnet seine
- 12 - Handpiked
- 13 - Dip net
- 14 - 18 Unassigned
- 17 - Beam trawl
- 18 - Shovel
- 19 - Weir
- 20 - 99 Unassigned
- 99 - Fish

LENGTH TYPE

- 1 - Tip of snout to fork of tail
- 2 - Mid-eye to fork of tail
- 3 - Post orbit to fork of tail
- 4 - Mid-eye to hypural plate
- 5 - Post orbit to hypural plate
- 6 - Unassigned

AGE ERROR CODES

- 1 - Death
- 2 - Inverted
- 3 - Misrecorded
- 4 - Marginal
- 5 - Missing
- 6 - Reabsorbed
- 7 - Wrong species
- 8 - Not preferred

Appendix A.5. Sampling weeks and associated calendar dates, 2004.

Week	Calendar Dates	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-Aug
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.1. Procedure for sampling adult salmon for age, length, and sex.

Annually, salmon escapements and catches are sampled for age (scales), length, and sex by field crews throughout the state. 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 (AWL) optical scanning (opscan) forms neatly and accurately. In addition, scale samples must be collected and mounted properly to ensure accurate age determination. The following procedures are to be strictly adhered to when sampling adult salmon for age, length, and sex.

Procedures

COMPLETING THE OPSCAN AWL FORMS:

New **green** AWL forms have been developed which have Y2K date capabilities. Before transcribing any information, make sure the correct form is being used. The department no longer uses the outdated red or blue forms.

A completed AWL form and accompanying scale gum card for sampling sockeye salmon are shown in Appendix B.2.

Complete each section on the left side of the AWL form using a No.2 pencil and darken the corresponding circles as shown in the figures. Make every effort to darken the entire circle as the optical scanner, which reads and records the data from the AWL forms, may not recognize partially filled circles. Label only one form at a time to avoid a "carbon paper effect" resulting in stray marks. Special care should be used to ensure that stray marks do not occur on either side of the AWL form. Stray marks and scuffed AWL forms can severely hamper scanning.

Fill out each of the following:

Description

Record the following: species/area/catch or escapement/gear type (if applicable)/samplers.

Card

The AWL forms and corresponding gum card(s) are numbered sequentially by date throughout the season starting with 001. A separate numbering sequence will be used for each species, district, and geographic location. Consult your crew leader for the current card number. Sockeye salmon scale samples will have only one gum card per AWL form as shown in Appendix B.2.

Species

Refer to the reverse side of the AWL form for the correct one-digit code (e.g., sockeye = 2).

-Continued-

Day, Month, Year

Escapement sampling: Use appropriate digits for the date the fish are sampled.

Catch sampling: Use the date the fish were caught. If this differs from the sample date, note the sample date in the top margin.

District

List all districts in which the fish were caught. Consult your area statistical map or project leader for the appropriate district. If more than one district is represented, darken the corresponding circles of the district representing most of the catch and note the other catch areas in the top margin (district is 254).

Subdistrict (Section)

List all subdistricts in which the fish were caught. If the catch represents more than one section, list each section but do not darken the corresponding circles. Leave blank if the section is unknown (**subdistrict is 50**).

Stream

Leave blank for catch sampling;

Consult area statistical map for the appropriate stream number when collecting escapement samples.

Location

List the appropriate code associated with the area the fish were sampled as shown in Appendix B.3. For example, if the fish were sampled in the Port of Kodiak, the location code would be 031.

Period

Escapement sampling: List the sample week in which the fish were sampled (Appendix A.5).

Catch sampling: List the sample week in which the fish were caught. If this differs from the week the fish were sampled, note this in the top margin.

Project and Gear

Refer to the reverse side of the AWL form for the correct code. For example, escapement samples collected at a weir would have a project code of 3 and a gear code of 19.

Mesh

Leave blank unless specifically instructed by supervisor to do otherwise.

Type of length measurement

Refer to the reverse side of the AWL form for the correct code (e.g., mid eye to tail fork = 2). Refer to Appendix B.4.

-Continued-

Number of scales per fish

Fill in the number of scales collected per fish. For sockeye, one scale per fish is collected unless otherwise instructed by supervisor.

of cards

of cards always = 1 (each AWL form is individually numbered).

If possible, keep the AWL form litho codes in numerical order throughout the season and keep all forms flat, dry, and clean. Fish gurry and water curling may cause data to be misinterpreted by the optical scanning machine. **It is the responsibility of the crew leader to make sure that all forms are carefully edited before returning them to their supervisor.**

SCALE GUM CARDS

A completed AWL form and accompanying gum card for sampling sockeye salmon are shown in Appendix B.2. Be sure to fill out the gum cards in pencil as shown in Appendix B.2.

Species

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

Locality

Escapement sampling: Include the weir site followed by “escapement” (e.g., Karluk River escapement).

Catch sampling: Include the area(s) where the fish were caught followed by “catch” (e.g., Uganik Bay catch).

Statistical Area Code

Fill in the appropriate digits from the AWL form. If catch samples are from a variety of statistical areas be sure to list each statistical area and approximate percentage from each (if available).

Sampling date

Escapement sampling: Fill in the date the fish were sampled.

Catch sampling: Fill in the date the fish were caught. The sample date, if different from the catch date, may be noted in “remarks”.

Gear

Write out completely. If catch samples include multiple gear types, be sure to list each gear and approximate percentage from each (if available).

-Continued-

Collector(s)

Record the last names of each person collecting the sample.

Remarks

Record any pertinent information such as the number of scales per fish sampled, processing facility where the sampling took place, vessel/tender name, etc. Be sure to transfer this information to the top margin of the AWL form.

SAMPLING PROCEDURE

1. Place the fish on its right side to sample the left side.
2. Determine the sex of the fish (escapement sampling only) and darken M or F in the sex columns. If any difficulty is encountered with this procedure, write "I had trouble sexing these fish" on the top margin of the AWL form and ask your supervisor for help as soon as possible before sexing additional fish.
3. Measure fish length in millimeters from mid eye to tail fork (escapement sampling only; Appendix B.4). Record length by blackening the appropriate column circles on the AWL form. Column 3 on the AWL form is used for fish with a length greater than 999 millimeters (Chinook). Measure all species of salmon to the nearest mm. When collecting length data, take care to ensure that each length corresponds to the appropriate scale mounted on the gum card, as length-at-age is evaluated for each sample.
4. Remove the "preferred scale" from the fish by grasping the scale's exposed posterior edge with forceps and pulling free (Appendix B.5). Remove all slime, grit, and skin from the scale (neoprene wristers work well for this). 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. If the preferred scale is missing, select a scale within the preferred area on the other side of the fish. If no scales are present in the preferred area on either side 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. Do not select a scale located on the lateral line.
5. It is important to take care that scales adhere to the gum card, rough side up. Therefore, without turning the forceps over, clean, moisten, and mount the scale on the gum card with your thumb or forefinger. Exert just enough pressure to spread and smooth the scales directly over the number as shown in Appendix B.5. The ridges on the sculptured side can be felt with a fingernail or forceps. Mount the scale with the anterior end oriented toward top of gum card. All scales should be correctly oriented on the card in the same direction (Appendix B.6).

-Continued-

6. Repeat steps 1 through 4 for up to 40 fish on each AWL form.
7. When sampling at weirs you may use “Rite in the Rain”® books to record the data. Keep the AWL forms in camp where they will be clean, dry, and flat. After sampling is done for the day, transfer the data to the AWL forms. **Each length, sex, and scale must correspond to a single fish! It is the responsibility of the crew leader to be sure the data has been transcribed correctly and the AWL forms filled out completely. Log books containing length and sex data should be returned to Matt Foster at the end of the season.** These are considered raw data and need to be archived. If you choose to record raw data on tape, these tapes must be returned to Matt Foster.

SAMPLING CHECKLIST

OPERATIONAL PLAN	PENCILS (NO. 2)
GUM CARDS	FORCEPS
AWL FORMS (GREEN)	PLASTIC CARD HOLDERS
NEOPRENE WRISTERS	CLIPBOARD
MEASURING BOARD	LOG BOOK

SOME REMINDERS

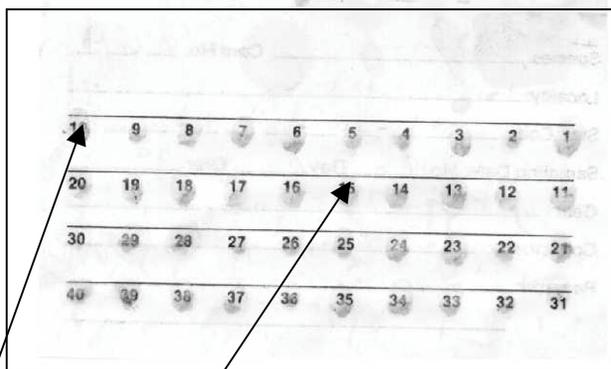
1. For greater efficiency in scale reading, mount scales with anterior end toward top of gum card.
2. AWL forms should be carefully edited. Remember to use the new AWL forms (green) as the red and blue forms are outdated. Re-check header information on AWL forms; make sure all available information is filled in. Take extra care to use the correct period code (sampling week) for the sampling or catch date. AWL form numbers should not be repeated; a frequent error is to begin a week's sample with the last AWL number used the week before. This is particularly important if the data is regularly sent to town; it is easy to forget which AWL form numbers were used. Crew leaders should take time to ensure that the circles are being blackened correctly. If the circles are sloppily marked, the optical scanner records the information incorrectly or misses it entirely.
3. Transfer important comments from the gum cards to the AWL forms. After pressing scales,

-Continued-

- the cards are seldom referred to again, and important remarks can be lost. Write comments in the top right margin. If there is not room on the AWL form to completely explain the remarks, use a separate piece of paper.
4. Never put data from different dates on one AWL form or one gum card. Even if only one scale is collected that day, begin a new AWL form and gum card the next day.
 5. If weights are taken, they may be noted in the right margin of the AWL form during sampling, but be sure to transfer the weights and litho code to the appropriate columns on the reverse of the AWL form before submitting it to your supervisor.
 6. Try to keep the litho codes (located in the left margin of the AWL form) in numerical order. This should not be hard to do if they are arranged that way before page numbering. When sampling different areas throughout the season, arrange the litho codes in order before each sample is taken.
 7. If AWL forms get wrinkled or splotted the data should be transcribed onto a new AWL form prior to sending in. The optical scanning computer will misread or reject torn or wrinkled sheets. Do not use paperclips on AWL forms.
 8. Be careful when collecting and mounting scales in wet conditions (rain, high humidity, etc.). If glue dries on top of the scale, it often obscures scale features, resulting in an unreadable scale. In addition, scales frequently adhere poorly to a wet gum card. Protect the cards and keep them dry to avoid having to remount the scales on a new card. If the cards get wet, try to dry them in a protected area or remount if necessary. Remember, use a pencil when filling out gum cards, because ink will come off during pressing.
 9. Visually scan all AWL forms for mistakes. A common error occurs, for instance, in placing both the 4 and 7 of a 475mm fish in the 100s column with nothing in the 10s column.
 10. Avoid accumulating a large amount of incomplete AWL forms. In previous years, there have been cases where individuals have completed several samples before transcribing the information on the AWL forms. This may lead to an increase in errors. After a sample has been completed, try to get the AWL forms filled out as soon as possible. This will ensure more accurate information, as any problems or abnormalities concerning the sample (e.g., many jacks in sample, many fish lacking preferred scale, number of scales do not match number of lengths recorded, etc.) will be fresh in your mind.
 11. Responsibility for accuracy lies first with the primary data collector(s) and finally with the crew leader. Sloppy or incomplete data forms or gum cards will be returned to individual collectors for correction.
-

Appendix B.2. Completed adult salmon AWL form (front side) and associated gum card.

Species: Sockeye Card No: 014
 Locality: Frazer Esc.
 Stat. Code: 257-40-403-
 Sampling Date: Mo. 06 Day 07 Year 2000
 Gear: Weir/Trap
 Collector(s): D. Roberts, C. Selby
 Remarks:



DESCRIPTION: Sockeye \ Frazer \ Esc. ADF&G ADULT SALMON AGE-LENGTH FORM VERSION 2.1

Samplers: Roberts, Selby

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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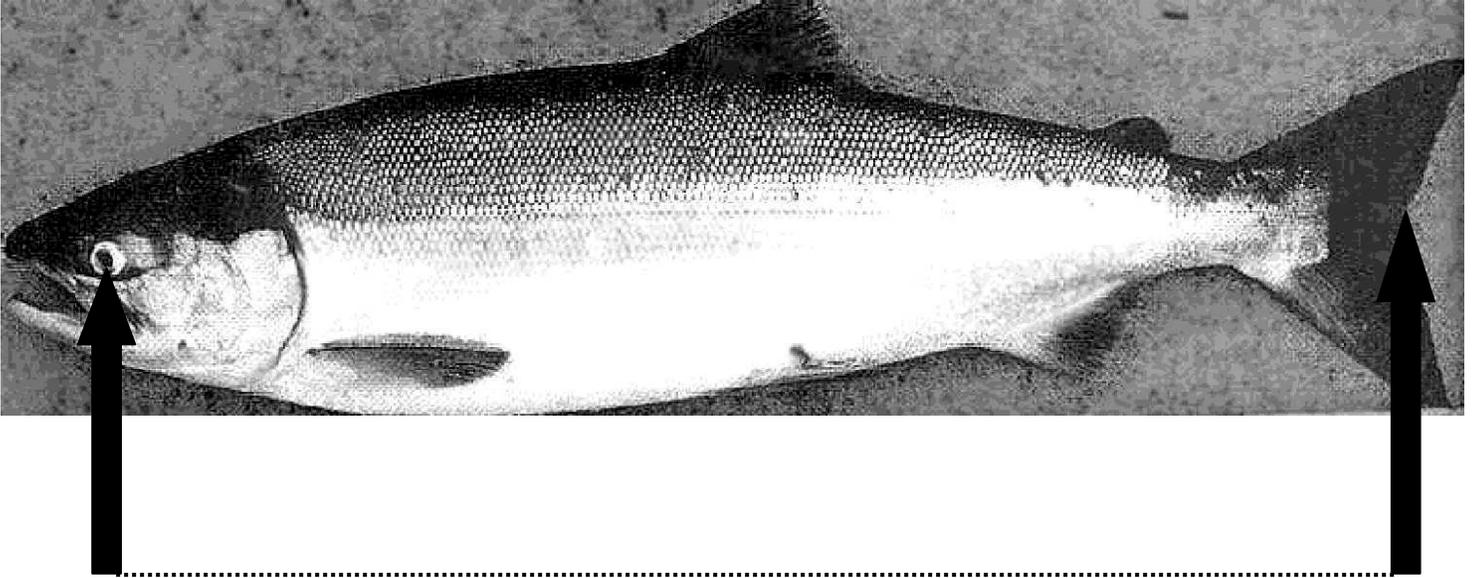
Mark Reflex® by NCS MM20092-1 5 PE33 Printed in U.S.A.

Appendix B.3. Assigned port and weir location codes.

Port and Location Codes

029	Uganik
030	Lazy Bay
031	Port of Kodiak
032	Pauls Lake
033	Thorsheim
034	Afognak River
035	Karluk River
036	Ayakulik (Red River)
037	Upper Station
038	Frazer Lake
039	Dog Salmon
040	Akalura River
041	Uganik River
042	Malina Creek
043	Portage Lake
044	Foul Bay (FBTHA)
045	Larsen Bay
046	Spiridon (SLTHA)
047	Little Kitoi
048	Waterfall Bay (WBTHA)
049	Little River
050	King Cove
051	Port Moller
052	Dutch Harbor
053	Akutan
054	Sand Point
055	Bear River
056	Nelson River
057	Canoe Bay
058	Ilnik Lagoon
059	Orzinski River
060	Sandy River
061	Thin Point Lagoon
062	Middle Lagoon
070	Black Lake
071	Chignik Weir
072	Chignik (Processing facilities)

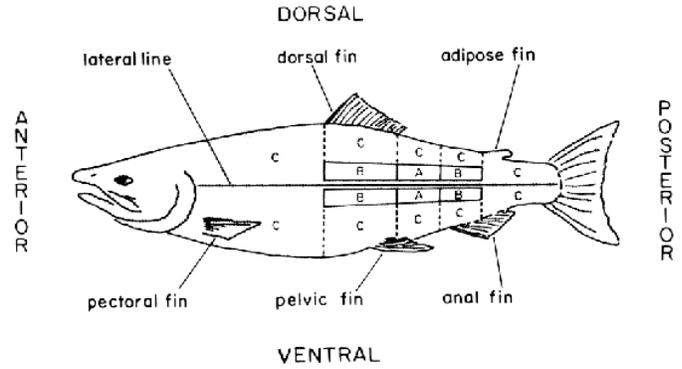
Appendix B.4. Measuring fish length from mid eye to tail fork.



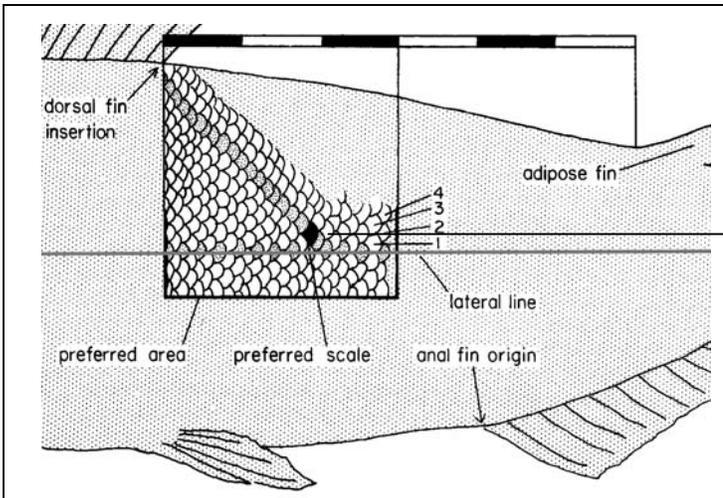
Adult salmon length is measured from mid eye to tail fork because the shape of the salmon's snout changes as it approaches sexual maturity. The procedure for measuring by this method is as follows.

- 1) Place the salmon flat on its right side (on the measuring board) with its head to your left and the dorsal fin away from you.
- 2) Slide the fish in place so that the middle of the eye is in line with the edge of the meter stick and hold the head in place with your left hand.
- 3) Flatten and spread the tail against the board with your right hand.
- 4) Read and record the mid eye to tail fork length to the nearest millimeter.

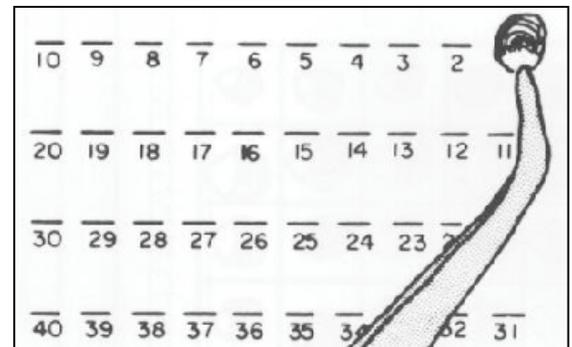
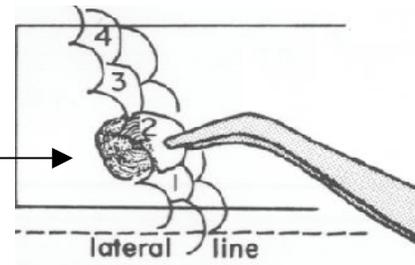
Appendix B.5. Removal and mounting of the preferred salmon scale.



INPFC rated areas for scale removal. Area A is the preferred area. If scales on the left side are missing, try the right side. Area B is the second choice if there are no scales in area A on either side of the fish. Area C designates non preferred areas.

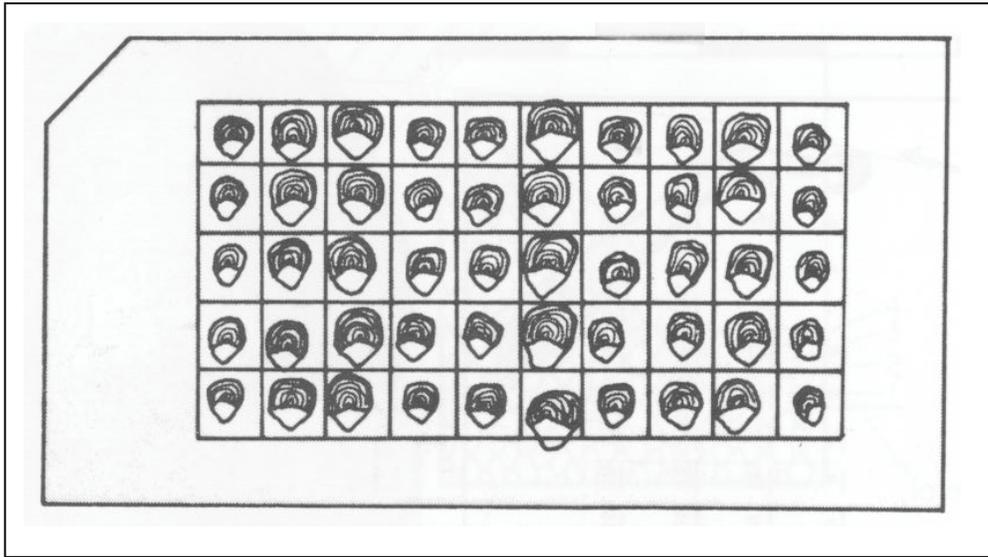


Do not turn scale over.

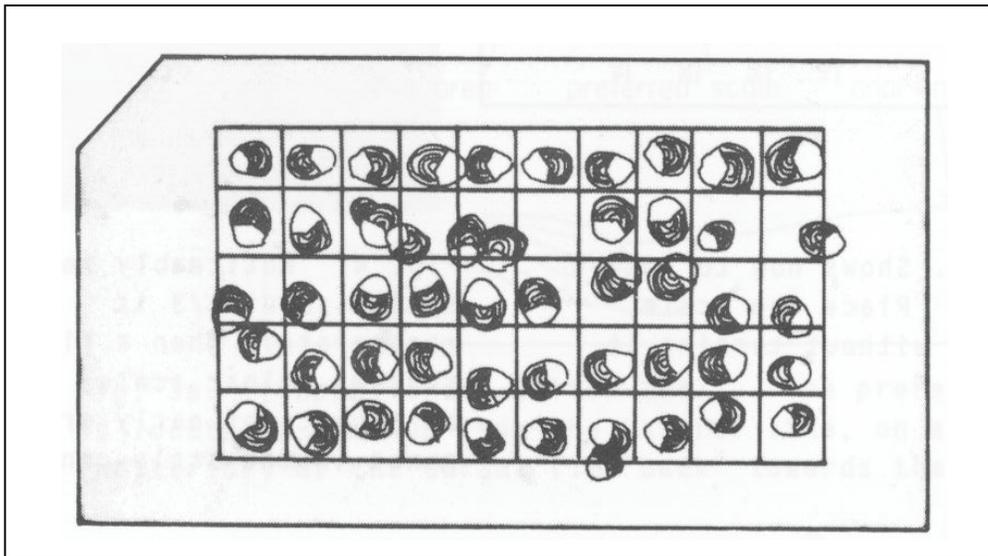


The preferred scale in this diagram is solid black. It is located 2 rows up from the lateral line, on a diagonal from the insertion (posterior) of the dorsal fin “back” toward the origin of the anal fin.

Appendix B.6. Scale orientation on the salmon scale gum card.



The scales are all correctly oriented on the card in the same direction, with the anterior portion of the scale pointed toward the top of the card and the posterior portion (which is that portion of the scale held in the forceps) pointed toward the bottom of the card.



The scales are incorrectly oriented in different directions. This increases the time spent to age samples.

Appendix C. Satellite Telephone and Dispatch Instructions.

The following information serves as a Policy Statement regarding the allowable uses of ADF&G satellite phones and Instructions on the proper method to successfully set up and operate the satellite phone system assigned to your camp.

These systems are not like standard telephones or cell phones, nor are they like a single side band or VHF radio. Communication is sent through the transmitter to low level satellites, then is beamed down to ground stations, either directly to another satellite phone system or to a switching station linked to standard telephone lines. As such, there is a much higher cost involved in operation than with standard telephone long distance or cell phone charges.

Under NO CIRCUMSTANCES may you use this satellite phone system for personal calls, unless, for each event, you have obtained direct and explicit permission from your supervisor. This does not mean that field crew leaders may grant permission for personal use of this phone. Only the project biologist may give you such permission. **ANY DELIBERATE MISUSE OF THIS SYSTEM, SUCH AS MAKING UNAPPROVED, NON-EMERGENCY, OR PERSONAL CALLS, WILL RESULT IN DISCIPLINARY ACTION, WHICH MAY INCLUDE SUSPENSION OR DISCHARGE.**

The primary purpose for having this satellite phone is for secure, reliable communications between remote field stations and ADF&G offices (Kodiak, Chignik, Cold Bay, Sand Point, or Port Moller), ADF&G research vessels (Resolution or K-Hi-C), Fish and Wildlife Protection vessels and offices, or other field camps that are similarly equipped. The secondary purpose is for your SAFETY. With these phones you are capable of directly dialing emergency services at any time of the day or night. It is essential that these phone systems are maintained in good working order, are fully charged or hooked to sufficient power at all times, and remain free for official or emergency use.

INSTRUCTIONS

The portable sat phone unit must be charged with power. There is an internal battery pack, and a 12-volt adapter is available in order to hook the phone to a larger battery bank, that may in turn be recharged by generator or solar panels.

Turn the unit on using the power switch in the lower left corner. A green light, just above the switch, should come on indicating that the unit is sufficiently powered. If no light or a red light comes on, you will need to charge the unit, or attach it to your 12-volt battery bank via the appropriate connections.

The back, or top, of the briefcase-like unit is the antenna, and it must be oriented correctly in order to access the receiving satellite. The top of the case should be open and

-Continued-

pointed in a general east-southeast direction. You must have a fairly clear line-of sight to the horizon in that direction; this unit will NOT work through walls or mountains. The angle of the antenna should be almost vertical; remember to lock the support arm that attaches the lid to the main body of the unit, along the right side.

This system has two means for calling; a telephone-like handset (for dial in or dial out phone calls), and a push-to-talk microphone (for 'dispatch', unit to unit, calls). All calls made with the handset are billed per minute of use, at an expensive rate. All calls on the 'AlaskaNet' dispatch system, using the microphone, are essentially FREE.

When first turned on, the handset and microphone should become active, with the display panels on the top of the phone handset and microphone lighting up (one LED panel, hopefully the one on the handset, should read SLEEP). The display will show, after a few moments, whether a connection has been established with the satellite, and how strong the signal is (ex. *B05 S 21*). Turn the unit slightly, and raise or lower the lid/antenna slightly until the highest possible signal strength is indicated (normally above 20). Lock the lid/antenna in place and do not turn the unit again, until your communications are finished.

Alaska Dispatch System

Because all calls made on the dispatch system are FREE, this is the method of choice for using the satellite phone units. There are several ADF&G offices, many field camps, and two research vessels on the AlaskaNet dispatch system, as well as Fish and Wildlife Protection/State Troopers offices and vessels, plus many canneries, fishing vessels, and tenders. You should have received a 10-12 page directory with your phone.

First, make sure the unit is turned on, and that there is sufficient power. Set the unit up so that the signal strength is at the maximum for your location. You should see the signal strength on the microphone display (ex. *B05 S 21*), and the handset display should read SLEEP.

On the microphone display, below the signal strength, there should be a query, '00:DN ??'. This is asking you to 'dial' in the 4-digit dispatch number that you wish to call. After you have entered the 4-digit dispatch number of the unit you wish to contact, hold in the microphone key and a connection will be made with the satellite, which will then try to connect with the dispatch number you punched in. IF a connection is made you will hear two beeps ("bird chirps") and the microphone display will read SELF. While continuing to hold in the microphone key, call the station you wish to talk to. USE ALL THE SAME FORMALITIES AS WHEN CALLING ON A SSB RADIO. For example, say "Calling the ADF&G Kodiak Office, Calling the ADF&G Kodiak Office; this is Karluk Weir". When you release the microphone key, the unit will beep again.

-Continued-

BE PATIENT. It will take some time for the signal to go up to the satellite, down to the number you called. It may take the other party some time to get to the microphone and respond (this is especially true for calls to the ADF&G office; supervisors have to walk down to the radio room to respond). When they respond, their 4-digit dispatch number (DN) will show on the microphone display. This is a private conversation, unlike the previous dispatch service.

Just remember to be patient; wait until the other party stops speaking and you hear the unit beep (indicating that they are finished with this portion of their communication), the display should read SELF, and you may key microphone to talk. Then you must again wait for the other party to respond. If the other party is not there, they simply will not answer. If the satellite connection cannot be made, the display will read 'Unable to Connect' or 'Not Available'.

Phone System

DO NOT USE THE HANDSET TO PLACE CALLS UNLESS ABSOLUTELY NECESSARY. All calls made with the handset are billed per minute of use, at an expensive rate. Calls should only be made to supervisors, either when radio or dispatch contact is not possible or when a confidential message needs to be relayed. Calls are made by dialing out, almost like a standard telephone. Punch in the area code and telephone number, then PRESS SEND (button located in the upper right corner of the handset). Because there is a satellite relay, there will be a slight delay between when you speak and when the other party hears you, so be patient.

Note EVERY call in a phone logbook. The system will show you the amount of time you've used on the call, on the LED panel. Note the number called, the date, approximate time, and the length of the call (minutes and seconds). When the call is completed, you MUST push the END button (top right corner of handset buttons), otherwise the system will remain active and YOU will be billed for the time (at almost a dollar a minute). Remember, PRESS END.

If someone calls in to this unit, it will ring, like a standard telephone. Press the SEND button to start the conversation, but remember to PRESS END to finish the call. ADF&G is billed for all calls made using the handset, both the calls you dial out and any calls dialed in.

IN CASE OF EMERGENCY:

If there is a medical emergency, or a real danger to life or health, IMMEDIATELY call the US Coast Guard Rescue Coordination Center at **800-478-5555**. Be ready to tell them your name, exact location (latitude and longitude or nearby major landmark), and the exact nature of your emergency. They may question you extensively, so be prepared. There are emergency doctors on-call that can advise you. After the call is completed, immediately call your supervisor, at work or at home, and relay the details of your experience.

If there is an enforcement emergency, use the dispatch microphone to call the Kodiak office or the Alaska State Trooper, Fish and Wildlife Protection (DN 6370).

Appendix D. Example of a weekly report.

To: Steve Honnold
A.D.F.&G., Fisheries Biologist
Kodiak, Alaska

Date: 5/30/01

From: Greg Watchers
A.D.F.&G., Fisheries Biologist

Subject: Weekly Report Spiridon Lake Smolt Project

Smolt Outmigration

As of 5/29/01, a total count of 1,092,959 live and 4372 dead smolt have passed through the waterfall bypass system. Averaging over 100,000 smolt/night for the past six nights.

Cumulative mortality is 0.4%.

Some smolt holding in the de-watering tanks.

The water temperature has climbed up to 7.0 degrees. Water level has increased to 26 cm.

A.W.L sampling

A total of 949 A.W.L. samples have been collected. On 5/29/00, a sample of 70 smolt had an average weight of 10.0 grams and a length of 108mm.

Safety

The crew checked the trauma kit inventorying supplies and checked expiration dates on medicines.

Anticipated Activities

Continue counting smolt
Conduct more delayed mortality test and variability test.

I. INTRODUCTION

Description of project location.

For example, “ Spiridon Lake is located on the westside of Kodiak Island” and “ Telrod Creek is long by wide with average depth of....”

History of project

Give a brief history of the project (see Introduction of this plan and regional reports for examples)

Purpose of project

Objectives

Purpose of report

II. METHODS AND MATERIALS

Precisely describe all components of your work that produced the results reported:

Employees

List the employees on site and what periods worked, job classes, and previous time spent on the project.

Weir/traps

Discuss the type of weirs and traps used, installation procedures, dates of use, maintenance schedule, enumeration techniques, estimation techniques, AWL technique, etc.

Monitoring

Describe fishery monitoring duties, such as regulatory marker placement, enforcement, catch estimates, surveys, etc.

Other duties and misc.

Describe the collection of physical data, safety, bear avoidance, camp duties, close up, etc.

This section should follow the operational plan objectives, tasks, and procedures as a guide. Also, include maps, photographs and diagrams if appropriate.

-Continued-

III. RESULTS

Base your results on the objectives and what was accomplished: be specific with dates, numbers, and trends. Address each category listed in the methods section. Simple tables and graphs that summarize the data should be included - include all years for comparison.

IV. DISCUSSION AND RECOMMENDATIONS

Include a discussion of each area of data collection, based on the objectives. Elaborate and assess the results with the focus on assisting with future development and refinement of the project. Include recommendations for modifications such as improving trap locations, weir operations, sampling techniques, camp and support improvements. Also include inventory and equipment/gear lists that will assist with the following years work.

Note: The project biologist is ultimately responsible for the completion of this report. However, the crew leader and crewmembers should draft the initial document. The report should be started in season with a rough draft of some form submitted to the Project Biologist for comment one week prior to the end of field work. Upon completion of field work, time will be provided to finalize the report. The final version of the report will be written using Word software, with tables and graphs constructed in Excel.

Appendix F.1. Instructions for filling out a timesheet.

All ADF&G employees must fill out a time sheet twice a month and these timesheets must be turned in to the Administrative staff in Kodiak in a timely manner. Please follow these instructions when filling out your time sheets to avoid payroll problems. When a flight comes out to drop off groceries, or for any other reason, near the end of a pay period, camp personnel need to send in their timesheets. Fill in the time sheet up to the day you send them in and attempt to project your remaining hours worked.

Fill out each of the following on the top of the timesheet:

Pay period: pay periods start on the 1st or 16th of each month and end on the 15th or end of the month (example: June 1-15 or June 16-30).

SSN: your social security number

Name: full name

Division: Commercial Fish

In the actual timesheet table fill in the following:

Day: Monday, Tuesday, etc.

Date: 6/16, 6/17, etc.

Hours worked box: start and stop time in military time

Code 1: fill in the number of hours worked for that day (see example in Appendix X.2.).

Work hours and Code 1 Totals should both equal the sum of daily hours worked. If your time sheet is sent in before the end of the pay period, project your time for the remaining days so you can total your columns.

Charge to Table located on the bottom left hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

Comments Table located on the bottom right hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

Employee's signature and date: Be sure to sign and date your timesheet.

Crew leaders are responsible for reviewing each crew member's timesheet before sending them to town to ensure that they are properly filled out.

Appendix F.2. Example of a completed timesheet.

ALASKA DEPARTMENT OF FISH AND GAME Time and Attendance Report

Pay period ending: 6/15/2003 SSN: 191-11-1111 Name: Joe Shmo Division Commercial Fisheries

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

Day	Date	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Leave Taken	Sea Duty	Standby	Hazard	Code 1	Code 2	Code 3	Code 4	Holiday / Leave	Work Hrs Total
Sun	6/1	8:00	12:00	13:00	16:30											7.50				0.00	7.50
Mon	6/2	8:00	12:00	13:00	16:30											7.50				0.00	7.50
Tue	6/3	8:00	12:30	14:00	18:00											8.50				0.00	8.50
Wed	6/4	8:00	12:00	13:00	16:30	17:00	19:00									9.50				0.00	9.50
Thu	6/5	8:00	12:00	13:00	16:30											7.50				0.00	7.50
Fri	6/6	8:00	12:00	16:00	19:00											7.00				0.00	7.00
Sat	6/7	8:00	12:00	13:00	16:30											7.50				0.00	7.50
Sun	6/8																			0.00	0.00
Mon	6/9	8:00	12:00	13:00	16:30											7.50				0.00	7.50
Tue	6/10	8:00	12:00	13:00	16:30											7.50				0.00	7.50
Wed	6/11	8:00	12:00	13:00	16:30											7.50				0.00	7.50
Thu	6/12	8:00	12:00	13:00	16:30											7.50				0.00	7.50
Fri	6/13																			0.00	0.00
Sat	6/14																			0.00	0.00
Sun	6/15	8:00	12:00	13:00	16:30	17:00	18:30									9.00				0.00	9.00
TOTALS														0.00	0.00	94.00	0.00	0.00	0.00	0.00	94.00

EXAMPLE

Charge to:			Comments		Comments	
Notation	CC/LC	%	6/1	6/9	6/10	6/11
1		100%	6/2	6/12	6/13	6/14
2			6/3	6/13	6/14	6/15
3			6/4	6/14		
4			6/5	6/15		
Total		100%	6/6			
			6/7			
			6/8			

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

Joe Shmo Date: 6/15/03
Employee's Signature

Supervisor's Signature

Approving Officer Signature

Leave Use Codes

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

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

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

Holiday, Leave, Overtime and Premium Pay Overrides

**Codes	Hours	CC/LC
Leave & Holiday	0.00	No code needed for Leave & Holiday

Ver. 1.9.4
Revised 2/20/99

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ALASKA DEPARTMENT OF FISH AND GAME

DIVISION OF COMMERCIAL FISHERIES

MEMORANDUM

TO: Nick Sagalkin
Fisheries Biologist II
Division of Commercial Fisheries
Region IV - Kodiak

DATE: April 26, 2004

PHONE: (907) 486-1848

FROM: Steven Thomsen
Fisheries Biologist I
Division of Commercial Fisheries
Region IV - Kodiak

SUBJECT: 2004 Operational Plan

Kodiak Island Lake Assessment/Limnology Project Operational Plan, 2004

Introduction

The Lake Assessment Project consists of limnology field sampling, laboratory processing, and analyses of lake trophic-level dynamics for 14 Kodiak and Afognak Island lakes in 2004 (Table 1, Figure 1). Chignik ADF&G personnel will conduct field sampling of Chignik, Black, and Bear lakes. Limnology samples from Chignik, Black, and Bear lakes will also be processed and analyzed in the Alaska Department of Fish and Game (ADF&G) Near Island Laboratory. Extensive monitoring for Karluk and Spiridon lakes will be conducted under an Exxon Valdez Oil Spill Council (EVOS) Gulf of Alaska Ecosystem Monitoring (GEM) grant in cooperation with ADF&G and University of Alaska, Fairbanks (UAF) personnel. The GEM/EVOS project goals, objectives, and methods are comprehensively covered in the project proposal included in the appendix of the Karluk Lake smolt project operational plan (ADF&G, *in press*).

Goals

1. To assess the primary and secondary production of selected sockeye salmon nursery lakes in the Kodiak Archipelago.
2. To monitor rearing habitat of selected salmon systems to maintain productive juvenile rearing and subsequent adult production.

Objectives

1. Estimate the seasonal mean water chemistry, nutrient, and chlorophyll *a* concentrations by unit volume.
2. Estimate the seasonal mean density, biomass, and size of each of the species of macrozooplankton.
3. Estimate the compensation depth (EZD) for algal photosynthesis.
4. Determine the temperature and dissolved oxygen regimes.

Tasks

1. Collect lake water at 1 m depth from Afognak (two stations) and Hidden Lakes at six week intervals.
2. Collect lake water at 1 m depth from Karluk (stations five and six) and Spiridon Lakes (stations five and six) at three week intervals.
3. Collect lake water at 1, 5, 10, 15, 20, 25, 30, 35, and 50 m depths from Karluk (stations two and three) and Spiridon (stations one and two) Lakes at three week intervals.
4. Collect one zooplankton sample at a depth of 1 m from the bottom from Little Waterfall, Afognak (two stations), Upper Malina, Little Kitoi, Hidden, Upper and Lower Jennifer, Ruth, Saltery, Frazer (two stations), Crescent, and Big Waterfall Lakes at six week intervals using the vertical tow method.
5. Collect one zooplankton sample at a depth of 1 m from the bottom from Karluk (stations two, three, five, and six) and Spiridon (stations one, two, five, and six) Lakes at three week intervals using the vertical tow method.
6. Collect upward directed light readings (Foot-Candles) from Little Waterfall, Afognak (two stations), Upper Malina, Little Kitoi, Hidden, Upper and Lower Jennifer, Ruth, Saltery, Frazer (two stations), Crescent, and Big Waterfall Lakes at six week intervals.
7. Collect upward directed light readings (Foot-Candles) from Karluk (four stations) and Spiridon (four stations) Lakes at three week intervals.
8. Measure dissolved oxygen (mg/l) and temperatures ($^{\circ}\text{C}$) from the lake surface to the bottom from Little Waterfall, Afognak (two stations), Upper Malina, Little Kitoi, Hidden, Upper and Lower Jennifer, Ruth, Saltery, Frazer (two stations), Crescent, and Big Waterfall Lakes at six week intervals.
9. Measure dissolved oxygen (mg/l) and temperatures ($^{\circ}\text{C}$) from the lake surface to the bottom from Karluk (four stations) and Spiridon (four stations) Lakes at three week intervals.

10. Measure the water clarity from Little Waterfall, Afognak (two stations), Upper Malina, Little Kitoi, Hidden, Upper and Lower Jennifer, Ruth, Saltery, Frazer (two stations), Crescent, and Big Waterfall Lakes with a secchi disk at six week intervals.
11. Measure the water clarity from Karluk (four stations) and Spiridon (four stations) Lakes with a secchi disk at three week intervals.
12. Process and analyze the above mentioned water and zooplankton samples at the Near Island ADF&G Limnology Laboratory.
13. Process and analyze limnology samples from Chignik, Black, and Bear Lakes at the Near Island ADF&G Limnology Laboratory.

Procedures

Field sampling, laboratory processing, and analyses will follow the procedures outlined in Thomsen et. al. (2002) and Koenings et. al. (1987). Chignik area lake field sampling procedures will follow Thomsen et. al. (2002), as well as, Chignik Watershed Ecological Assessment and Black River Sonar Project Operational Plan, 2003 (ADF&G 2003).

Literature Cited

- ADF&G (Alaska Department of Fish and Game). *In press*. Salmon research operational plans for the Kodiak Area. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak.
- ADF&G (Alaska Department of Fish and Game). 2003. Chignik operational plans. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K03-28, Kodiak.
- Koenings, J.P., J.A. Edmundson, G.B. Kyle, and J.M. Edmundson. 1987. Limnology field and laboratory manual: methods for assessing aquatic production. Alaska Department of Fish and Game, FRED Division Report Series 71. Juneau.
- Thomsen, S.E., S. G. Honnold, S. T. Schrof, and K. Spallinger. 2002. Kodiak Island lake assessment/limnology project laboratory analyses operational plan. Alaska Department of Fish and Game, Commercial Fisheries Division. Kodiak.

Table 1. Limnology sampling schedule, and number of water and zooplankton samples, by lake in the Westward Region for the 2004 field season (May-June FY 04 and July-Sept FY 05).

Lake	Number of Stations	Sampling Months							Sampling Interval	Times to Sample in 2004	Number of Samples	
		April	May	June	July	August	September	October			Water	Zooplankton
Little Waterfall	1		Z	Z		Z	Z		6 weeks	4	0	4
Afognak	2		W, Z	W, Z		W, Z	W, Z		6 weeks	4	4	8
Upper Malina	1		Z	Z		Z	Z		6 weeks	4	0	4
Spiridon	4	W, Z	W, Z	W, Z	W, Z	W, Z	W, Z	W, Z	3 weeks	9	198	36
Hidden	1		W, Z	W, Z		W, Z	W, Z		6 weeks	4	4	4
Ruth	1		Z	Z		Z	Z		6 weeks	4	0	4
Lower Jennifer	1		Z	Z		Z	Z		6 weeks	4	0	4
Upper Jennifer	1		Z	Z		Z	Z		6 weeks	4	0	4
Little Kitoi	1		Z	Z		Z	Z		6 weeks	4	0	4
Crescent	1		Z	Z		Z	Z		6 weeks	4	0	4
Big Waterfall	1		Z	Z		Z	Z		6 weeks	4	0	4
Frazer	2		Z	Z		Z	Z		6 weeks	4	0	8
Saltery	1		Z	Z		Z	Z		6 weeks	4	0	4
Karluk	4	W, Z	W, Z	W, Z	W, Z	W, Z	W, Z	W, Z	3 weeks	9	198	36
Totals Kodiak:											404	128
Chignik	4		W, Z	W, Z	W, Z	W, Z	W, Z		3 weeks	5	20	20
Black	1		W, Z	W, Z	W, Z	W, Z	W, Z		3 weeks	5	5	5
Bear	4		W, Z	W, Z	W, Z	W, Z			6 weeks	4	8	8
Totals Chignik/AKPen:											33	33
Totals All:											437	161

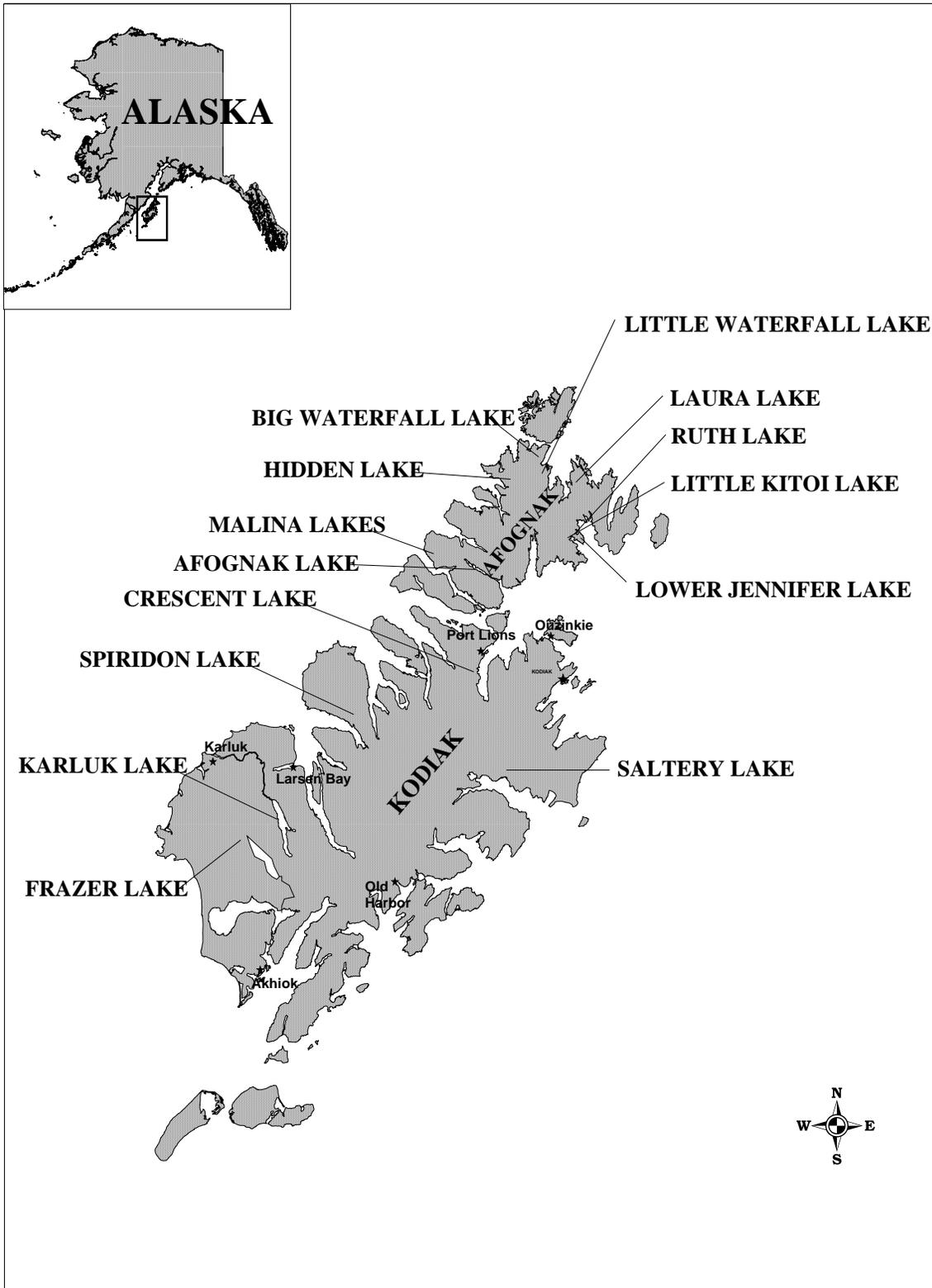


Figure 1. Location of lakes on Kodiak and Afognak Islands scheduled for limnology sampling in 2004.

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