Chignik Management Area Salmon Escapement Sampling Operational Plan, 2010

by

Todd J. Anderson

April 2010

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

Symbols and Abbreviations

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

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

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$log_{2,}$ etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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ABSTRACT

The Alaska Department of Fish and Game (ADF&G) samples sockeye salmon *Oncorhynchus nerka* at the Chignik River weir for age, length, and sex determination to provide information for preseason run forecasts, escapement goal evaluation, and run reconstruction. Every week throughout the season, 240 sockeye salmon are sampled. Sockeye salmon scales are collected using establish protocols common to the Westward Region. This report summarizes the specific procedures for the sockeye salmon escapement sampling program.

Key words: Chignik Management Area, escapement, sockeye salmon, scale samples, ASL, 2010 management.

INTRODUCTION

The Chignik Management Area (CMA; Area L) includes all coastal waters and inland drainages on the south side of the Alaska Peninsula between Kilokak Rocks and Kupreanof Point (Figure 1). The CMA is bordered by the Alaska Peninsula Management Area (Area M) to the west and the Kodiak Management Area (Area K) to the east. The CMA is divided into five districts: the Eastern, Central, Chignik Bay, Western, and Perryville districts (Figure 2). These districts are further broken down into sections and statistical reporting areas (Figure 2). The Chignik River system is the largest sockeye salmon *Oncorhynchus nerka* producer within the CMA. The Chignik weir and field office facility is located three miles upstream from the Chignik Lagoon.

Annually, the Alaska Department of Fish and Game (ADF&G) samples sockeye salmon from the Chignik River escapement for biological characteristics (age, sex, and length; ASL). These samples provide the foundation for preseason run forecasts, escapement goal evaluation, and accurate assignment of the run to stock of origin (run reconstruction). Therefore, it is important that all data are collected following established protocols.

GOAL

The goal of this project is to provide ASL composition data from the Chignik River sockeye salmon escapement to assist with commercial fishery management.

OBJECTIVES

1. Collect a random sample of 240 sockeye salmon per statistical week for ASL data at the Chignik weir.
2. Collect a random sample of 1,200 sockeye salmon from the outlet of Black Lake for ASL data.

SUPERVISION

Finfish research biologist Matt Foster is the Westward Region scale sampling project leader and will supervise inseason progress. Todd Anderson, the Chignik Area Management Biologist, will serve as the project biologist. The project biologist will schedule and monitor Chignik weir and Black Lake sampling, review all data for quality, quantity, and timeliness, determine the age of all sockeye salmon scales, and provide feedback to the sampling crew regarding data quality. A logbook will be maintained by the project biologist tracking weekly samples.

PROCEDURES

SOCKEYE SALMON

Escapement Sampling

A fish trap incorporated into the Chignik River weir will be used to capture fish for ASL sampling. Sockeye salmon will be randomly sampled from the trap for ASL data using methods described in Appendices A1 through A7. When possible, all scales will be collected from the preferred area of each fish following procedures outlined by the International North Pacific Fisheries Commission (INPFC) (INPFC 1963). It is essential that samples be representative of the escapement and bias avoided by not pre-selecting fish based upon size, sex, condition or any other factor.

During 2010, the sampling weeks start on Monday and end the following Sunday. When possible, 80 sockeye salmon will be sampled for ASL data per sampling event on alternating days (e.g., Monday, Wednesday, Friday), totaling 240 ASL samples per statistical week (Thompson 1987). Sampling weeks and corresponding calendar dates are listed in Appendix A4. These data will be clearly marked as "Chignik weir escapement samples" (location code 071; Appendix A3).

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. The camera gates installed in the Chignik River weir may be closed during the operation of the fish trap to increase the number of fish captured in the weir's fish trap. When the trap catch at the Chignik River weir is not adequate to fulfill ASL sampling needs, additional samples may be collected from the Chignik Lagoon commercial harvest (statistical area 271-10). These data will be clearly marked as Chignik commercial catch samples (location code 072; Appendix A3).

Black Lake Sample

Adult sockeye salmon will be sampled, beginning June 20th, at the outlet of Black Lake. These samples provide a representation of the ASL composition of the early run. Sampling effort and coordination will be led by the project biologist with support from Chignik management staff. If possible, 1,200 sockeye salmon will be sampled over several days with a goal of at least 400 fish each sampling day. The fish will be collected using a beach seine, and held in an instream live box prior to sampling. The adipose fin will be clipped on all sampled fish to prevent repeat sampling. Fish will be sampled using methods outlined in Appendices A1 through A7. These samples will be clearly marked as "Black Lake escapement samples" (location code 070; Appendix A3).

SAMPLE PROCESSING

Scales will be mounted on scale "gum" cards and impressions made on acetate/diacetate cards using a heat press. The Assistant Chignik Area Management Biologist will assign sockeye salmon ages 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 ASL optical scanning (Opscan) data forms as outlined in Appendix A1 then scanned and edited for errors. All sockeye salmon scales, scale cards, and completed Opscan forms will be delivered to Matt Foster in Kodiak for

analysis and archiving. Data collected as part of this project will be reported in ADF&G reports in the fall of 2010.

REFERENCES CITED

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Koo, T. S. Y. 1962. Age designation in salmon. Pages 37-48 in T.S.Y. Koo, editor. Studies of Alaska red salmon. University of Washington Publications in Fisheries, New Series, Volume I, Seattle.

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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FIGURES

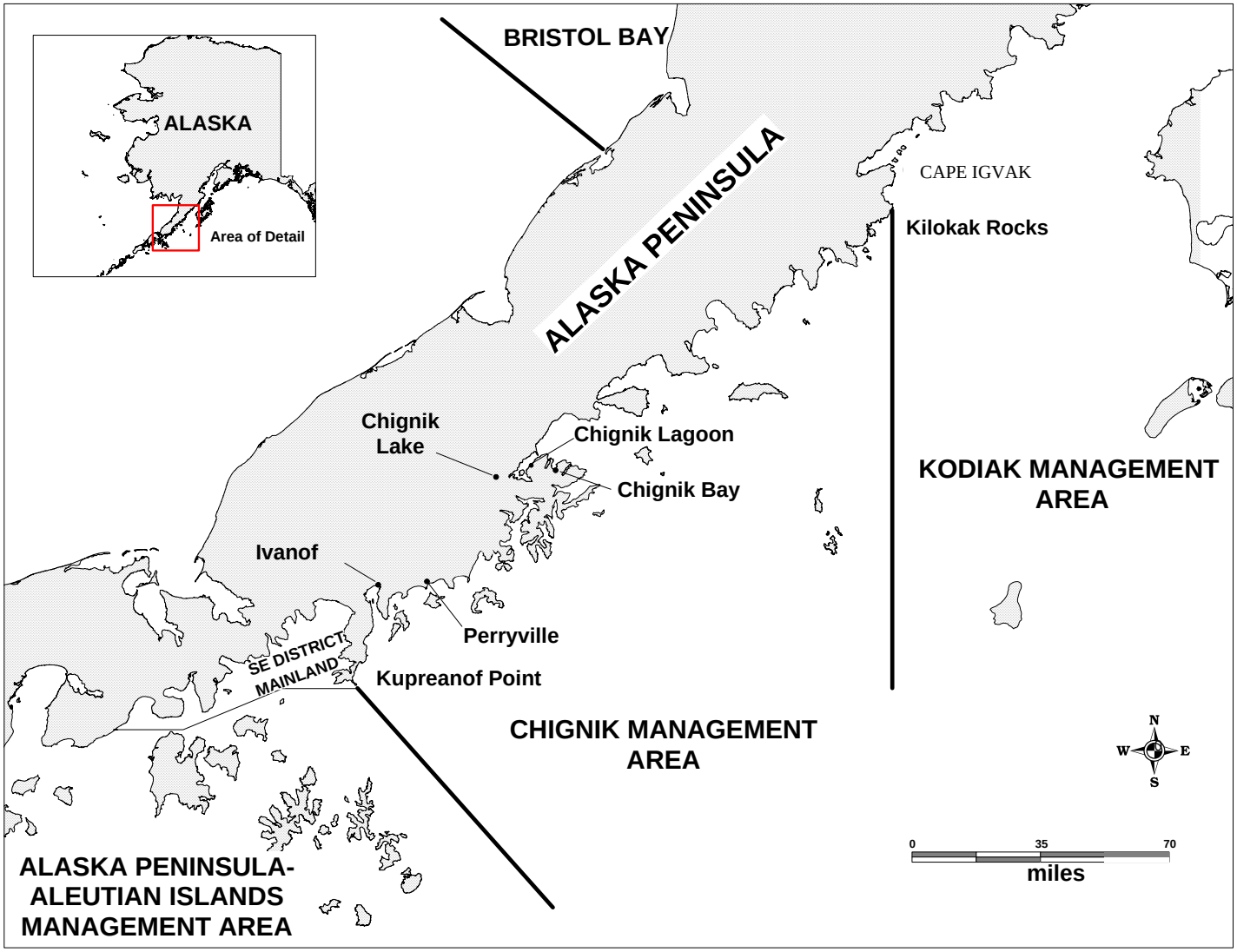


Figure 1.–Map of the Alaska Peninsula illustrating the relative locations of the Chignik, Kodiak, and Alaska Peninsula Management Areas.

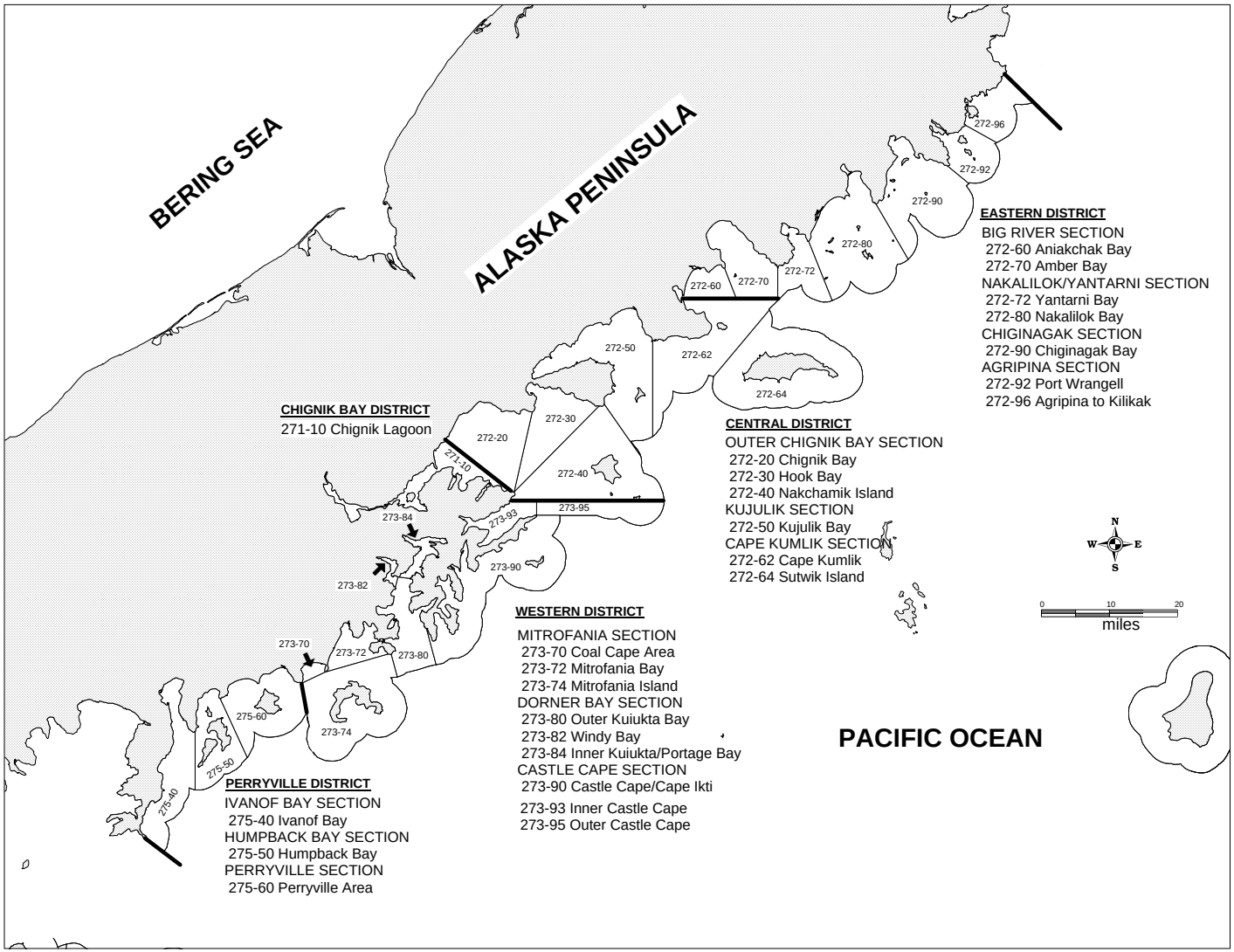


Figure 2.–Map of the Chignik Management Area illustrating commercial salmon fishing district boundaries and statistical areas.

APPENDIX A: SAMPLING PROCEDURES

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

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, sex, length (ASL) 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** colored Opscan forms have been developed which have Y2K date capabilities. Before transcribing any information, make sure the correct form is being used.

A completed Opscan form and accompanying scale gum card for sampling sockeye salmon are shown in Appendix A2.

Complete each section on the left side of the Opscan 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 Opscan 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 Opscan form. Stray marks and scuffed 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 Opscan 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 Opscan form as shown in Appendix A2.

Species

Refer to the reverse side of the Opscan 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.

Subdistrict (Section)

List all sections 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 (Figure 2).

Location

List the appropriate code associated with the area the fish were sampled as shown in Appendix A3. For example, if the fish were sampled in the Port of Kodiak, the location code would be 031.

-continued-

Period

Escapement sampling: list the sample week in which the fish were sampled (Appendix A4.).

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 Opscan 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 Opscan form for the correct code (e.g., mid eye to tail fork = 2). Refer to Appendix A.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.

# of cards

# of cards always = 1 (each Opscan form has an individual and unique "litho code").

If possible, keep the Opscan forms 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 Opscan form and accompanying gum card for sampling sockeye salmon are shown in Appendix A2. Be sure to fill out the gum cards in pencil as shown in Appendix A2.

Species

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

Locality

Escapement sampling: include the weir site followed by "escapement" (e.g., Chignik River escapement).

Catch sampling: include the area(s) where the fish were caught followed by "catch" (e.g., Chignik Bay catch).

Statistical Area Code

Fill in the appropriate digits from the Opscan 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 Opscan 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 Opscan 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 A5). Record length by blackening the appropriate column circles on the Opscan form. Column 3 on the form is used for fish with a length greater than 999 millimeters (e.g., 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 A6). 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 Opscan 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 (exposed) side up. Therefore, without turning the scale 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 A6. 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 A7).
6. Repeat steps 1 through 4 for up to 40 fish on each Opscan form.
7. When sampling at weirs you may use "Rite in the Rain"® books to record the data. Keep the Opscan 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 Opscan 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 audio tape, these tapes must be returned to Matt Foster.

SAMPLING CHECKLIST

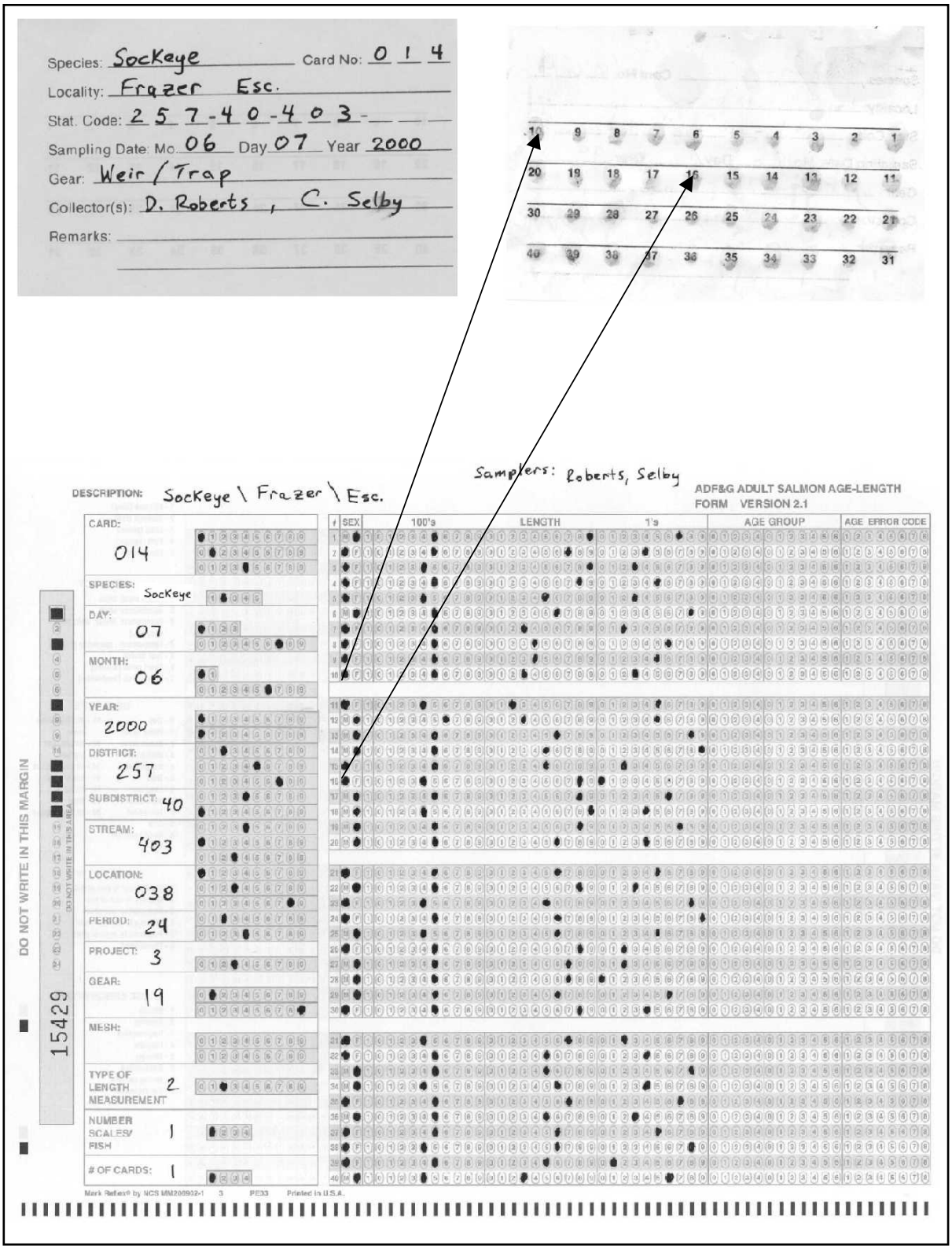
OPERATIONAL PLAN	PENCILS (NO. 2)
GUM CARDS	FORCEPS
OPSCAN FORMS (**GREEN**)	PLASTIC CARD HOLDERS
NEOPRENE WRISTERS	CLIPBOARD
MEASURING BOARD	LOG BOOK

-continued-

SOME REMINDERS

1. For greater efficiency in scale reading, mount scales with anterior end toward top of gum card.
2. Opscan forms should be carefully edited. Remember to use the new Opscan forms (green) as the old red and blue forms are outdated. Re-check header information on 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. Opscan form numbers should not be repeated; a frequent error is to begin a week's sample with the last Opscan number used the week before. This is particularly important if the data is regularly sent to town; it is easy to forget which Opscan 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 Opscan 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 Opscan form to completely explain the remarks, use a separate piece of paper.
4. Never put data from different dates on one Opscan form or one gum card. Even if only one scale is collected that day, begin a new Opscan form and gum card the next day.
5. If weights are taken, they may be noted in the right margin of the Opscan form during sampling, but be sure to transfer the weights and litho code to the appropriate columns on the reverse of the Opscan form before submitting it to your supervisor.
6. Try to keep the litho codes (located in the left margin of the Opscan 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 Opscan forms get wrinkled or smeared the data should be transcribed onto a new Opscan form prior to sending in. The optical scanning computer will misread or reject torn or wrinkled sheets. Do not use paperclips on Opscan 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 Opscan 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 Opscan forms. In previous years, there have been cases where individuals have completed several samples before transcribing the information on the Opscan forms. This may lead to an increase in errors. After a sample has been completed, try to get the Opscan 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 A2.–Completed adult salmon Opscan form (front side) and associated gum card.



Appendix A3.–Assigned port and weir location codes.

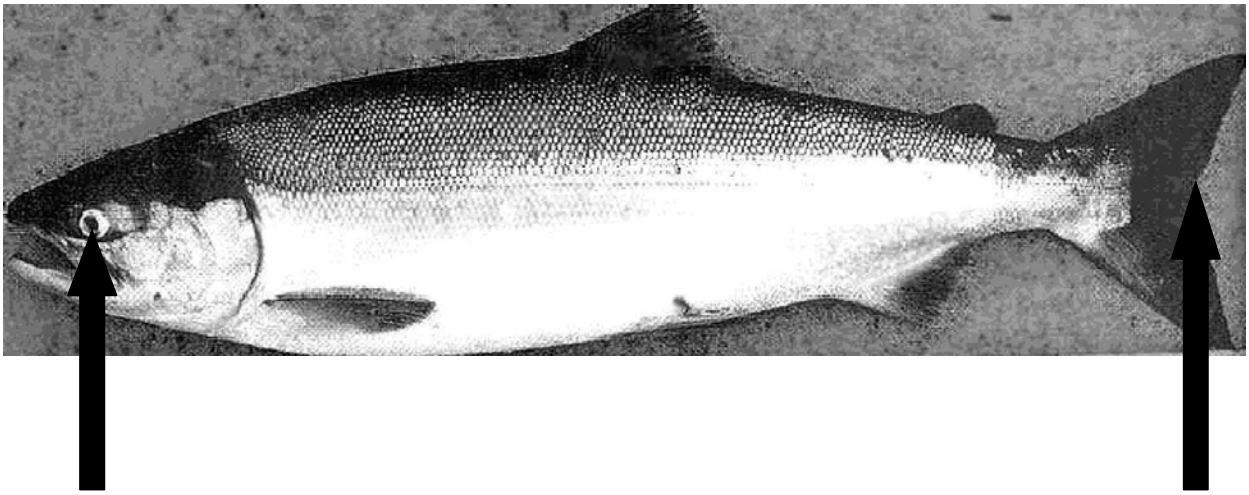
PORT AND LOCATION CODES

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

Appendix A4.–Sampling weeks and associated calendar dates, 2010.

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

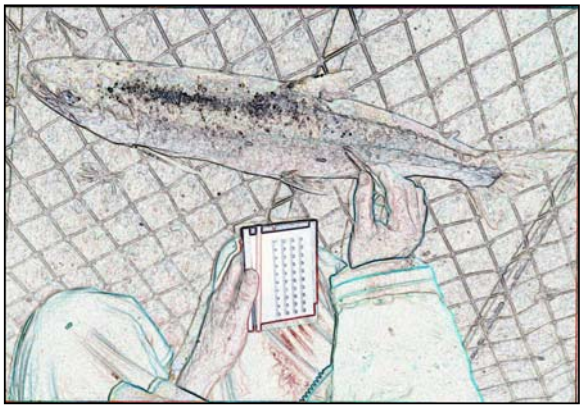
Appendix A5.–Measuring fish length from mid eye to tail fork.

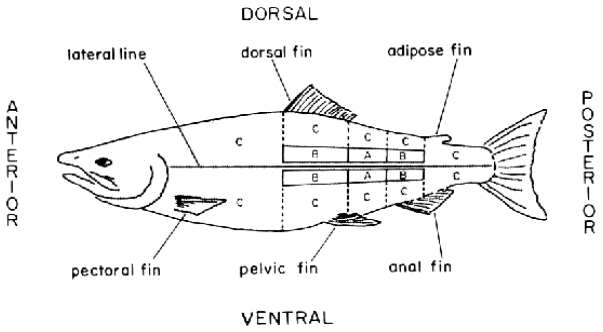


Adult salmon length is measured from mid eye to tail fork because the shape of the salmon's snout changes as it approaches sexual maturity. The procedure for measuring by this method is as follows.

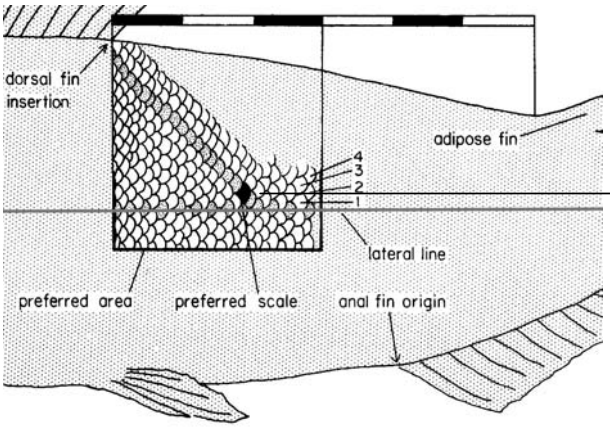
1. Place the salmon flat on its right side (on the measuring board) with its head to your left and the dorsal fin away from you.
2. Slide the fish in place so that the middle of the eye is in line with the edge of the meter stick and hold the head in place with your left hand.
3. Flatten and spread the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

Appendix A6.–Removal and mounting of the preferred salmon scale.

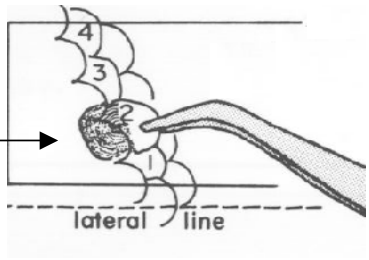


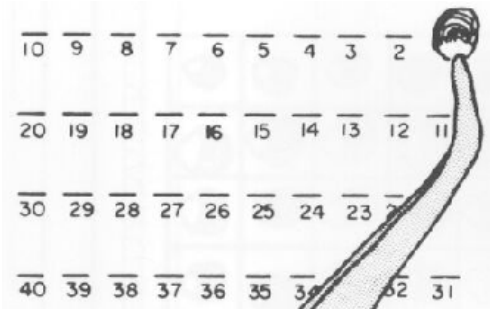


INPFC rated areas for scale removal. Area A is the preferred area. If scales on the left side are missing, try the right side. Area B is the second choice if there are no scales in area A on either side of the fish. Area C designates non preferred areas.



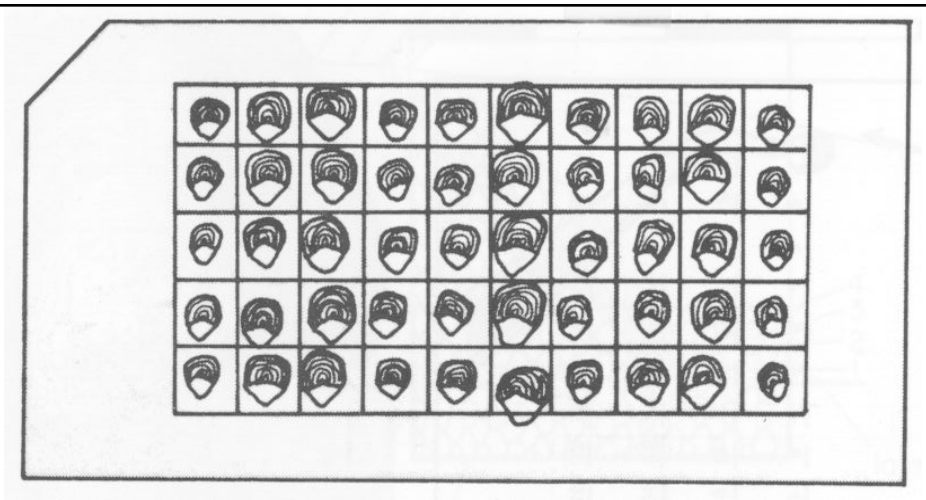
Do not turn scale over.



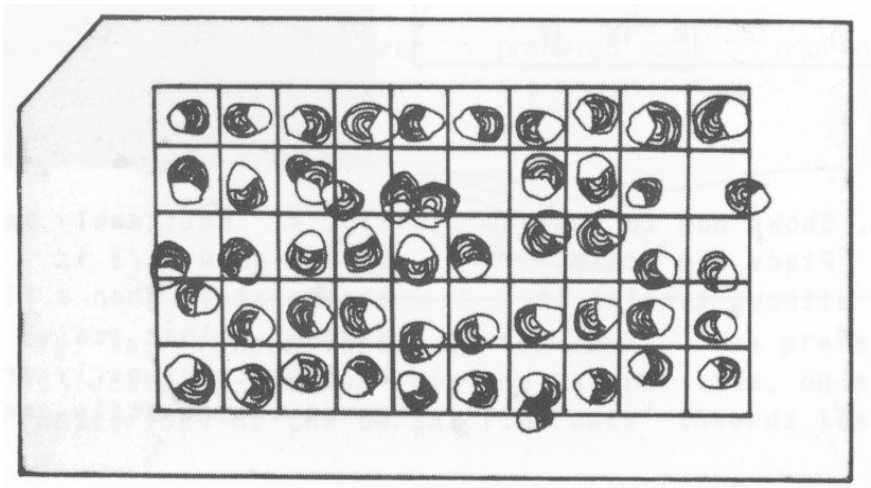


The preferred scale in this diagram is solid black. It is located 2 rows up from the lateral line, on a diagonal from the insertion (posterior) of the dorsal fin "back" toward the origin of the anal fin.

Appendix A7.–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.