

LENGTH, SEX, AND SCALE SAMPLING PROCEDURE  
FOR SAMPLING USING THE ADF&G  
ADULT SALMON AGE-LENGTH MARK-SENSE  
FORM VERSION 3.0



by

Alaska Department of Fish and Game Staff

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Length, Sex, and Scale  
Sampling Procedure for  
Sampling Using the  
ADF&G Adult Salmon  
Age-Length Mark-Sense  
Form Version 3.0

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*Region 1*  
*Commercial Fisheries*

*June 1993*

**LENGTH, SEX, AND SCALE SAMPLING PROCEDURES FOR SAMPLING:  
USING THE ADF&G ADULT SALMON AGE-LENGTH MARK SENSE FORM VERSION 3.0**

Recommended by Region I Commercial Fisheries,  
June 1993

**INTRODUCTION:**

Salmon from the catch are sampled for length, sex, and scales annually by field crews throughout the State. This data base is essential to sound management of the State's salmon resources. This information is drawn upon by management and research biologists for: (1)preseason forecasting of run strengths; (2)setting escapement goals; (3)examining the productivity of each system; (4) salmon growth analysis; (5)stock identification of catch (based upon age composition/or scale pattern analysis); (6) in-season forecasting of run strength; and (7)to gain a better understanding of the biology of each stock.

For purposes of clarity a SCALE SAMPLE and SUB-SAMPLE are defined as follows:

**SCALE SAMPLE:** A data set collected from a specific sampling location or fishery, containing scales and data from a single species, collected during a single year from fish caught using the same fishing gear. All data forms and scale cards of a single SAMPLE have the same statistical code. A-W-L's and scale cards in a sample are consecutively and chronologically numbered beginning with 001.

**SUB-SAMPLE:** Any portion of a scale sample consisting of consecutively numbered A-W-L's and scale cards. SUB-SAMPLES usually consist of one or more time segments of a sample.

To be useful, data must be recorded on the mark-sense forms neatly and accurately. The following procedures are to be adhered to when sampling for length, sex, and scales using mark-sense forms.

**COMPLETING THE MARK-SENSE FORMS:**

A completed mark-sense A-W-L form and accompanying gum card for sampling the commercial catches of sockeye and chum salmon, where one scale is sampled from each fish, is shown in Figures 1, 3, and 4. A completed A-W-L form and accompanying gum cards for sampling commercial catches of chinook and coho salmon, where four scales are sampled from each fish, is shown in Figure 2. Complete each section of the left side of the mark-sense form using a No. 1 or 2 pencil and darken the corresponding blocks as shown in the figures. Make every effort to darken the entire block as partially filled blocks are often missed by the optical scanner which reads the data from the mark-sense A-W-L forms and makes an electronic disk copy of the data. Label only one form at a time to avoid "the carbon paper effect" and resulting stray marks on the form below.

**Description:**

Write the description information above the appropriate section of the description provided.

Example for catch sampling:

Sockeye / Dist. 106-30 / Gillnet / Petersburg Catch / Wk. 26  
 SPECIES / DIST,SUB DIST,OR STREAM / GEAR/ PORT OR ESCAPEMENT SYSTEM/ WEEK

Example for escapement sampling:

Sockeye/ 107-30-030/ Thoms Lake Escapement  
 SPECIES / DISTRICT-SUBDISTRICT-STREAM CODE/ SYSTEM

Note: Write out species completely using AFS (American Fisheries Society) standards listed on the reverse side of the A-W-L form. List all sub-districts (for net fishery landing) that fish were from. Noting the vessel or tender name and processor or cold storage is often helpful.

Card:

CARD:	■	1	2	3	4	5	6	7	8	9
<b>010</b>	0	■	2	3	4	5	6	7	8	9
	■	1	2	3	4	5	6	7	8	9

The A-W-L 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, gear type, district, and geographic location. Sockeye and chum commercial catch samples ( where only one scale per fish is sampled) can have only 1 gum card per A-W-L form as shown in Figures 1 and 3. Coho and Chinook commercial catch samples ( where four scales per fish are sampled) can have up to four gum cards per A-W-L form as shown in Figure 2.

Species:

SPECIES:	<b>2</b>	1	■	3	4	5
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The code numbers for each species are listed on the reverse side of the A-W-L form.

Day, Month, Year:

DAY:	<b>23</b>	0	1	■	3						
		0	1	2	■	4	5	6	7	8	9
MONTH:	<b>06</b>	■	1								
		0	1	2	3	4	5	■	7	8	9
YEAR	<b>93</b>	0	1	2	3	4	5	6	7	8	■
		0	1	2	■	4	5	6	7	8	9

For Catch Sampling: A catch sampling A-W-L form can only include one day's samples. Use appropriate

digits for the date the fish were sampled.

For Escapement Sampling: More than one day's sample can be recorded on each A-W-L form as long as the dates sampled on each A-W-L form are in one statistical week. Record the first day of the statistical week in the Day/Month/Year blocks. Record the dates the fish were actually sampled in the far right margin of the A-W-L form as shown in Figure 4.

District:

DISTRICT:	0	1	2	3	4	5	6	7	8	9
106	0	1	2	3	4	5	6	7	8	9
	0	1	2	3	4	5	6	7	8	9

List only one district. Do not sample gillnet or seine caught fish that are delivered mixed from multiple districts. Refer to the port sampling manual and/or commercial fisheries news released for correct district and sub-district codes. Troll caught fish can be sampled from multiple districts in a single quadrant. The district codes for the mixed district quadrants are as follows (Figure 5): 171 for the Northern Outside quadrant (Districts 113,114,116,154,156,157), 172 for the Southern Outside quadrant (Districts 103,104,152), 173 for the Northern Inside quadrant (Districts 109,110,111,112,115); and 174 for the Southern Inside quadrant (Districts 101,102,105,106,107,108). List which districts were involved and the approximate proportions of each in the description on the top of the A-W-L form.

Sub-Districts:

SUB-	0	1	2	3	4	5	6	7	8	9
DISTRICT: 41	0	1	2	3	4	5	6	7	8	9

List a single sub-district if it is known that all the fish sampled were from that single sub-district. Leave blank if sub-district is unknown. Note: It is important to find out and list the sub-districts in all districts particularly in 101, 106, 108 gillnet and 101, 104, 112, 113 seine.

Stream:

STREAM:	0	1	2	3	4	5	6	7	8	9
	0	1	2	3	4	5	6	7	8	9
	0	1	2	3	4	5	6	7	8	9

Leave blank for catch sampling. Use ADF&G stream codes for escapement samples (refer to "Stream Numbers and Names" list).

Port:

PORT:	0	1	2	3	4	5	6	7	8	9
005	0	1	2	3	4	5	6	7	8	9
	0	1	2	3	4	5	6	7	8	9

For catch sampling list the port code (see page 11).

**Statistical Week:**

STAT.	26	0	1	■	3	4	5				
WEEK		0	1	2	3	4	5	■	7	8	9

List the current statistical week (see page 12).

**Project:**

PROJECT:	1	■	2	3	4	5	6	7	8	9
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The project code for sampling the commercial catch is 1. Refer to the reverse side of the A-W-L form for other codes.

**Gear:**

GEAR:	03	■	1	2	3	4	5	6	7	8	9
		0	1	2	■	4	5	6	7	8	9

Refer to the reverse side of the A-W-L form. Note: Only 5 choices exist for commercial gear types: troll, gill net, seine, set gill net, and trap. List 05 for both power and hand troll.

**Harvest Code:**

HARVEST	11	0	■	2	3	4	5	6	7	8	9
CODE:		0	■	2	3	4	5	6	7	8	9

List the appropriate harvest code from list on reverse side of the A-W-L form. Detailed definitions of harvest codes listed on page 13.

**Length Type:**

LENGTH TYPE	2	0	■	1	3	4	5	6	7	8	9
-------------	---	---	---	---	---	---	---	---	---	---	---

Use code (2) (mid-eye to fork of tail) unless instructed by supervisor to do otherwise. Refer to page 9. When sampling using the "Crabtree Method" (Figure 3) use code (0).

**Number of Cards:**

# CARDS	1	■	2	3	4
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Mark (1) when sampling sockeye and chum (Figures 1 and 3). Mark (1),(2), (3), or (4), as appropriate, when sampling chinook and coho, then write the card numbers above each block of ten samples as shown in Figure 2.

**User Code Definitions:**

USER CODE DEFINITIONS:	
0	_____
1	_____
2	_____
3	_____
4	_____
5	_____
6	phylonema positive
7	phylonema negative
8	phylonema unknown
9	phylonema non-sequential

USER CODE									
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9

To be completed when sampling for chinook or chum maturity, sockeye phylonema or to indicate a non-preferred scale was sampled. See reverse side of A-W-L for a list of designated user codes. Other user codes designations can be assigned by the port supervisor or project biologist (i.e. code 1 could be used to indicate that a head was collected for brain parasite analysis). When other user code definitions are designated it is important that the same code be used throughout the season.

When sampling write out the definition on the line of the code that will be marked in the user definition field (see example above or Figure 1).

**Sex:**

SEX
1 <input type="checkbox"/> M <input type="checkbox"/> F
2 <input type="checkbox"/> M <input type="checkbox"/> F
3 <input type="checkbox"/> M <input type="checkbox"/> F

Darken the M (males) or F (females) as appropriate. Sex gill net and seine fish. Do not sex troll caught fish.

**Length:**

Males										Females									
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Measure fish from mid-eye to the fork of the tail to the nearest millimeter (Page 9). Mark (1) in the left most field for fish over 999 mm in length

**Age (Fresh / Marine / E):**

E	FRESH					AGE	MARINE						
<input type="checkbox"/>	0	1	2	3	4	5	0	1	2	3	4	5	6
<input type="checkbox"/>	0	1	2	3	4	5	0	1	2	3	4	5	6
<input type="checkbox"/>	0	1	2	3	4	5	0	1	2	3	4	5	6

To be completed when scales are aged.

Adipose-clipped fish:

7	8	9	12345
7	8	9	
7	8	9	

For adipose-clipped fish record the cinch strap tag number in the right margin next to the corresponding row on the front of the A-W-L form (Figure 2 and 3). When time allows record the cinch strap tag number on the reverse side of the A-W-L form in the first five columns in the corresponding row.

Care and Handling of Mark-Sense A-W-L Forms:

It is important to keep the mark-sense forms flat, dry, and clean. Do not write in the far left or bottom margin or punch holes in the mark-sense forms. Fish gurry, water curling, stray marks, and holes will cause data to be misinterpreted by the optical scanning reader machine. When sampling a weired system you may use the old A-W-L forms or a Rite-n-Rain book to record the data. Keep the mark-sense forms in camp where they will be clean, dry, and flat. After sampling is done for the day transfer the data to the mark-sense forms. It is the responsibility of the data collector(s) to transcribe the data correctly before turning it over to your supervisor.

Look down the form from two angles after the data has been recorded to pick up any glaring mistakes. A common error, in placing both the 4 and 7 of a 475mm fish in the 100's column with nothing in the 10's column.

Responsibility for neatness and accuracy lies with the primary data collector(s). The port supervisor will return sloppy or incomplete data to individual collectors. After editing the form, place your initials in the upper right hand corner of the form.

If tape is used to affix gum cards to the A-W-L forms, use drafting scotch tape and be sure to remove the tape before the data is sent to Juneau. After the tape is removed, arrange the gum cards and A-W-L forms in sequential order attaching the gum cards to the A-W-L forms with a paper clip. Do not paper clip each gum card to the corresponding A-W-L form. Port Supervisors: do not send any A-W-L forms with gum cards taped to them to the Juneau office.

**LABELING OF GUM CARD(S):**

Species: Sockeye Card No: 010  
Locality: Petersburg Catch  
Stat. Code: 106 - 41 - 005  
Sampling Date: Mo. 06 Day 23 Year 93  
Gear: Gillnet  
Collector(s): Smith (PR) Jones (W)  
Remarks: FV Nerka Males 1-21  
#17 CWT 12345  
145732

Species:

Write out completely as stated on the reverse side of the A-W-L form (i.e. sockeye, chum, chinook, coho). Do not use sock or red for sockeye, chin or king for chinook, dog for chum, or silver for coho.

Card No:

Transfer appropriate digits from the A-W-L form.

Locality:

For catch sampling record the port name followed by catch (i.e. Petersburg Catch). For escapement sampling record the system name (i.e. Thoms Lake escapement).

Stat Code and Sampling Date:

Transfer the appropriate digits from the A-W-L form.

Gear:

Write out completely (i.e. gill net, seine, set net, troll)

Collectors:

Record the last name of the person(s) sampling. When sampling with more than one person initialize the fish wrestler (W), the data recorder (R), and the scale plucker (P).

Remarks:

Record any pertinent information such as: number of scales sampled per fish; record which scales were male or female (i.e. 1-16 male, 17-40 females); vessel/tender name; whether chums are bright, semi-bright or dark; or the form number (listed in top left corner above Description) from the corresponding A-W-L form if the data is to be numbered at a later time.

Refer to Figure 1 for labeling gum card(s) when sampling one scale per fish, Figure 2 when sampling four scales per fish, Figure 3 when sampling one scale per fish using the "Crabtree Method", and Figure 4 when sampling escapement scales.

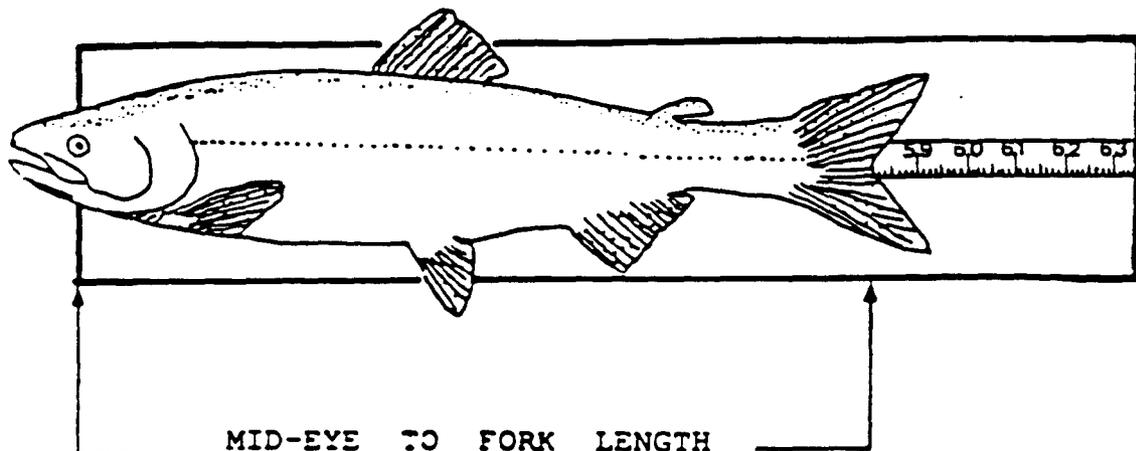
**A: SCALE SAMPLING PROCEDURES:**

1. Pluck the "preferred scale" from the fish using forceps. Remove all slime, grit, and skin from the scale by moistening and rubbing between fingers. The "preferred scale is located on the left side of the fish, two rows above the lateral line on the diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin, refer to Figure 6. If the preferred scale is missing, select a scale within the preferred area on either the left or right side of the fish. Do not sample scales out of the preferred area, disregard the fish and go onto the next fish if there are no scales available in the preferred area.
2. Clean, moisten and mount scale on the gum card directly over the appropriate scale number as shown in Figure 6. The side of the scale facing up on the gum card is the same as the side facing up when it is adhered to the fish. This outward facing side is referred to as the "sculptured" side of the scale. The ridges on this sculptured side can be felt with a fingernail or forceps. When placing the scale on the gum card, place in one uniform direction, ANTERIOR SIDE UP, SCULPTURED SIDE OUT as shown in Figure 6.
3. When taking 4 scales per fish, as with chinook and coho salmon, sample the "preferred scale" and scale #2, scale #3, and scale #4 as shown in Figure 6. Scale #2, scale #3, and scale #4 should be selected from the preferred area one inch to the right and one inch to the left of the preferred scale, all three are 2 rows above the lateral line. Mount the 4 scales from fish number 1 over 1, 11, 21, and 31 on the gum card as shown in Figure 2. Continuing, mount the 4 scales from fish #2 over 2, 12, 22, and 32 etc.
4. When sampling for sex and scale data only, use the "Crabtree method". You need only gum cards, forceps, and a pencil. Mount scales from males starting with scale number 1 and work forward and those from females starting on scale number 40 and work backward. For chinook and coho samples, where 4 scales per fish are sampled. Mount scales from the first male over scale number 1, 11, 21, and 31 and scales from the first female over 10, 20, 30, and 40. Work forward for males and backward for females. When the gum card is full, record on the back of the gum card, under remarks, where the males end and the females begin as shown in Figure 3.
5. When all the scales have been mounted on the gum card cover the gum card with a wax paper insert. When scales are sampled in wet conditions it is difficult to mount scales properly so that a good scale impression can be made. Glue often obscures scale features and scales often adhere poorly to the gum card. Scales should be remounted if the scales have been sampled in extremely wet conditions, if the scales are dirty, or if the scales are not mounted in one uniform direction (ANTERIOR SIDE UP, SCULPTURED SIDE OUT).
6. Remounting scales is the responsibility of the sampler. Completely fill out the data information on a new gum card, then place the old gum card in a plate of water for several minutes until the scales come off easily with forceps. Clean scales between fingers making sure the scale is right-side up (sculptured side out), moisten before placing on the new gum card. Place the scale on the new gum card being careful to properly position (anterior side up sculptured side out) and adhere the scale to the gum card. Let dry completely before covering with a piece of wax paper insert.

## B. LENGTH SAMPLING PROCEDURES:

1. Length measurements are needed from a predefined number of fish, not from a proportionate number of fish. Randomly sample throughout the total sample and meet the length sampling goals set forth in the operational plan.
2. Because the length and form of the snout of salmon changes as the fish approaches sexual maturity, length measurements are made from the middle of the eye to the fork of the tail. The length is always recorded to the nearest millimeter. The procedure for measuring length (mid-eye to fork) of salmon is as follows.
  - a. Place the fish flat on the board with the head to your left and the dorsal fin away from you.
  - b. Line the eye of the fish up with the edge of the board and hold the head in place with your left hand. It helps to place a finger in the fish's eye for reference.
  - c. Flatten and spread the tail against the board with your right hand.
  - d. Read the mid-eye to fork length to the nearest millimeter.

The measuring board is the preferred measuring device, but if you use a tape measure or a meter stick make sure that the fish is laying on a flat surface.



3. Length sub-sampling scenarios:
  - a. When you have enough fish to meet scale sampling goals: Have A-W-L's in a clipboard, sample first 40 fish for lengths, set aside A-W-L's, speed pluck (Crabtree method) for a couple of cards, pick up A-W-L's, sample 40 fish for lengths, continue in this manner until you have reached your length and scale sampling goals.
  - b. When you do not have enough fish to meet the total scale sampling goal you still need to meet your length sampling goal. Sample fish for lengths until you have reached your length sampling goal, then you can speed pluck until you have run out of fish.

## REMEMBER

### Do's

1. Do - Carefully and completely label each gum card and its corresponding A-W-L form.
2. Do - Number gum cards and A-W-L's sequentially throughout the season for each gear type, sampling location (port, river, lake) and for each species.
3. Do - Take the preferred scale is available. If not available go to the next fish.
4. Do - Clean the scale thoroughly before mounting.
5. Do - Mount scales anterior side up, sculptured side out.
6. Do - Carefully store and protect completed gum cards and A-W-L's.
7. Do - Remount rain-soaked, dirty, or damaged scales.
8. Do - Transcribe all A-W-L data (including comments) onto mark-sense forms.

### Don'ts

1. Don't - Turn in messy mark-sense forms. Transcribe data if necessary.
2. Don't - Put scales from different locations, dates, or species on one gum card. (exception: weirs can put more than one date on an A-W-L).
3. Don't - Take scales from other than the preferred area.
4. Don't - Mount dirty or damaged scales.

## SCALE SAMPLING CHECKLIST

Clipboard  
Gum Cards  
A-W-L's  
Pencils (No.1 or 2)  
Forceps  
Wax Paper Inserts  
Gloves  
Measuring boards, tape, or meter stick  
Sampling Manual

**Port Codes** (Use under location in filling out A-W-L's for catch sampling)

- 001 - Pelican
- 002 - Elfin Cove
- 003 - Sitka
- 004 - Juneau
- 005 - Petersburg
- 006 - Ketchikan
- 007 - Craig
- 008 - Port Alexander
- 009 - Metlakatla
- 010 - Excursion Inlet
- 011 - Hoonah
- 012 - Wrangell
- 014 - Yakutat
- 016 - Haines
- 021 - Klawock
- 026 - Hydaburg
- 027 - Kake

1993 Statistical Weeks

The numbered statistical weeks for 1993 are as follows:

<u>Week #</u>	<u>from</u>	<u>thru</u>	<u>Week #</u>	<u>from</u>	<u>thru</u>
1	Jan 1	Jan 2	28	Jul 4	Jul 10
2	Jan 3	Jan 9	29	Jul 11	Jul 17
3	Jan 10	Jan 16	30	Jul 18	Jul 24
4	Jan 17	Jan 23	31	Jul 25	Jul 31
5	Jan 24	Jan 30	32	Aug 1	Aug 7
6	Jan 31	Feb 6	33	Aug 8	Aug 14
7	Feb 7	Feb 13	34	Aug 15	Aug 21
8	Feb 14	Feb 20	35	Aug 22	Aug 28
9	Feb 21	Feb 27	36	Aug 29	Sep 4
10	Feb 28	Mar 6	37	Sep 5	Sep 11
11	Mar 7	Mar 13	38	Sep 12	Sep 18
12	Mar 14	Mar 20	39	Sep 19	Sep 25
13	Mar 21	Mar 27	40	Sep 26	Oct 2
14	Mar 28	Apr 3	41	Oct 3	Oct 9
15	Apr 4	Apr 10	42	Oct 10	Oct 16
16	Apr 11	Apr 17	43	Oct 17	Oct 23
17	Apr 18	Apr 24	44	Oct 24	Oct 30
18	Apr 25	Mar 1	45	Oct 31	Nov 6
19	May 2	May 8	46	Nov 7	Nov 13
20	May 9	May 15	47	Nov 14	Nov 20
21	May 16	May 22	48	Nov 21	Nov 27
22	May 23	May 29	49	Nov 28	Dec 4
23	May 30	Jun 5	50	Dec 5	Dec 11
24	Jun 6	Jun 12	51	Dec 12	Dec 18
25	Jun 13	Jun 19	52	Dec 19	Dec 25
26	Jun 20	Jun 26	53	Dec 26	Dec 31
27	Jun 27	Jul 3			

## **HARVEST CODES DEFINITIONS**

<b><u>Harvest Code</u></b>	<b><u>Definition</u></b>
11-Traditional Fisheries	Commerical harvest in traditional and customary common property fisheries managed by the State (i.e. commercial gillnet, seine, setnet, winter and summer troll, spring hatchery access fisheries).
12-Hatchery Terminal Area Fishery (SHA)	Commerical harvest taken in a defined hatchery Terminal Harvest area by common property fisheries under State management.
13-Experimental Area (EXP)	Commerical harvest in designated experimental fishing areas by common property fisheries under State management.
17-Annette Island	Commerical harvest taken at Annette Island by fisheries under Bureau of Indian Affairs management.
21-Private Hatchery Fishery	Hatchery managed cost recovery harvest of salmon with proceeds going to private hatchery operators.
23-State Hatchery Fishery	Hatchery managed cost recovery harvest of salmon with proceeds going to ADF&G.
25-Federal Hatchery Fishery	Hatchery managed cost recovery harvest of salmon with proceeds going to the Federal government.
31-Commerical Sale Sportfish Derby	Commerical sale of salmon harvested in State authorized sportfish derbies.
41-Test Fishery Run Assessment	Harvest by commerical gear in test fisheries conducted by the State for purposes of run strength assessment.

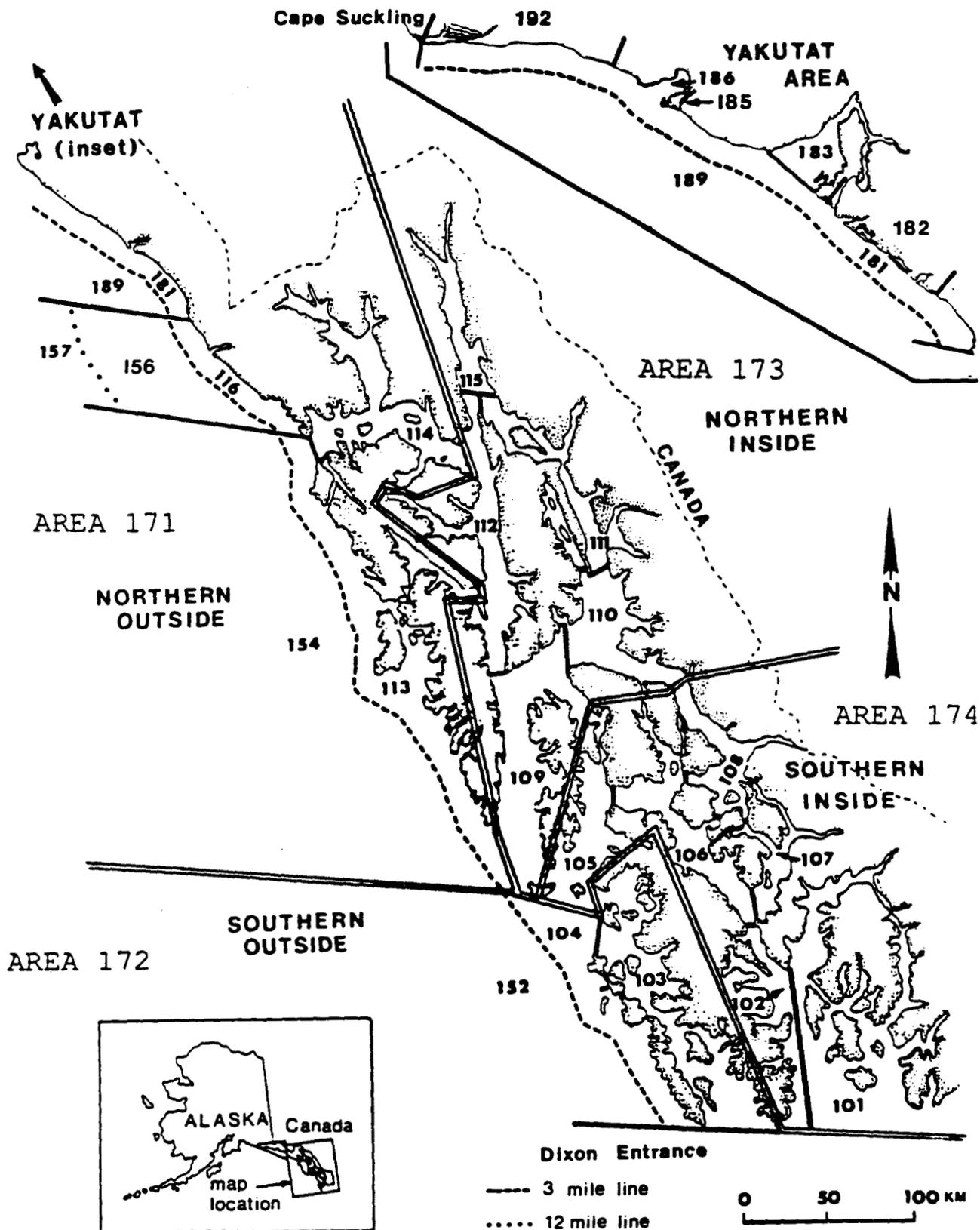








Figure 5. Map showing the 4 mixed-district troll quadrants.



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