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U. S. /CANADA SALMON STOCK INTERCEPTION RESEARCH
SOUTHERN SOUTHEASTERN ALASKA PINK SALMON
(Oncorhynchus gorbuscha) TAGGING STUDY, 1982

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ABSTRACT

Adult pink salmon (*Oncorhynchus gorbuscha*) were tagged in 12 stream systems in Southern Southeastern Alaska during the summer of 1982 to obtain Peterson population estimates of the total pink salmon escapement to each of the streams. The estimates were to be used in establishing a correction factor to convert the current peak escapements to total escapement estimates in Southern Southeastern for the U.S./Canada Salmon Interception Research studies. However, as a result of the high incidence of straying, most estimates were of little value. Straying was documented from 10 of the 12 tagging locations which was far more significant than was anticipated and will have an impact on the current method of regional escapement estimation.

KEY WORDS: Pink salmon, straying, Peterson population estimates, escapement estimation.

INTRODUCTION

In July 1982, the Alaska Department of Fish and Game's (ADF&G) Southeastern Alaska Region I Pink (*Oncorhynchus gorbuscha*) and Chum (*O. keta*) Salmon Project initiated a pink salmon tagging project in Southern Southeastern Alaska. The object of the tagging was to provide Peterson population estimates of the total pink salmon escapements to 12 stream systems, 6 in the Ketchikan management area and 6 in the Petersburg management area. This tagging project was part of the Joint U.S./Canada Salmon Interception Research Project which was established in 1982 to identify interception rates, migration routes, run timing, and degree of stock intermingling between U.S. and British Columbia fisheries resources.

The total population estimates were to be used to find a correction factor to convert the peak survey estimates into total escapement estimates. The method of estimating animal populations from the ratio of marked to unmarked members has been employed by many investigators. Howard (1948) and Schaefer (1951) thoroughly discuss the theory and procedures involved in an enumeration problem of this type.

The correction factor, one for the Ketchikan management area and one for the Petersburg area, was to have been used on all streams in each area to derive a reasonable estimate of the total Southern Southeastern pink salmon escapement. This correction was needed for the U.S./Canada Salmon Interception Research to make all escapement estimates comparable between work conducted in Southeastern Alaska and northern British Columbia. Current escapement estimation techniques in Southeastern Alaska involve use of peak salmon counts to derive overall district escapement indexes (Jones and Dangel 1981), while in northern British Columbia, total stream escapement estimates are calculated using several survey techniques (Cousens et al. 1982).

METHODS

Tagging started on the last day of July and was completed by late August. The location of each of the tagging streams is shown in Figure 1. This set of 12 streams was chosen on the basis of fish availability. The area management biologists in Ketchikan and Petersburg were asked to notify the project members as soon as there was significant pink salmon buildup off any of the streams in either area.

All tagging was conducted with a field crew of five. A 150-foot (45.8 m) beach seine was set using two small boats, one for towing the net and the other to free the net from rocks and snags on the bottom. Once a successful set was made and bagged, portable tagging tables were set up on the beach adjacent to the net. Dip nets were used to remove pink salmon from the seine and place them on the tagging tables. Colored Peterson disk tags were placed just in front of the dorsal fin in the backs of the fish which were released after tagging.

The Peterson disk tags were 1-1/2 in (3.8 cm) in diameter to easily distinguish them from the 3/4 in (1.9 cm) tags being used for ocean tagging. The tags were coded with a unique letter for each study stream.

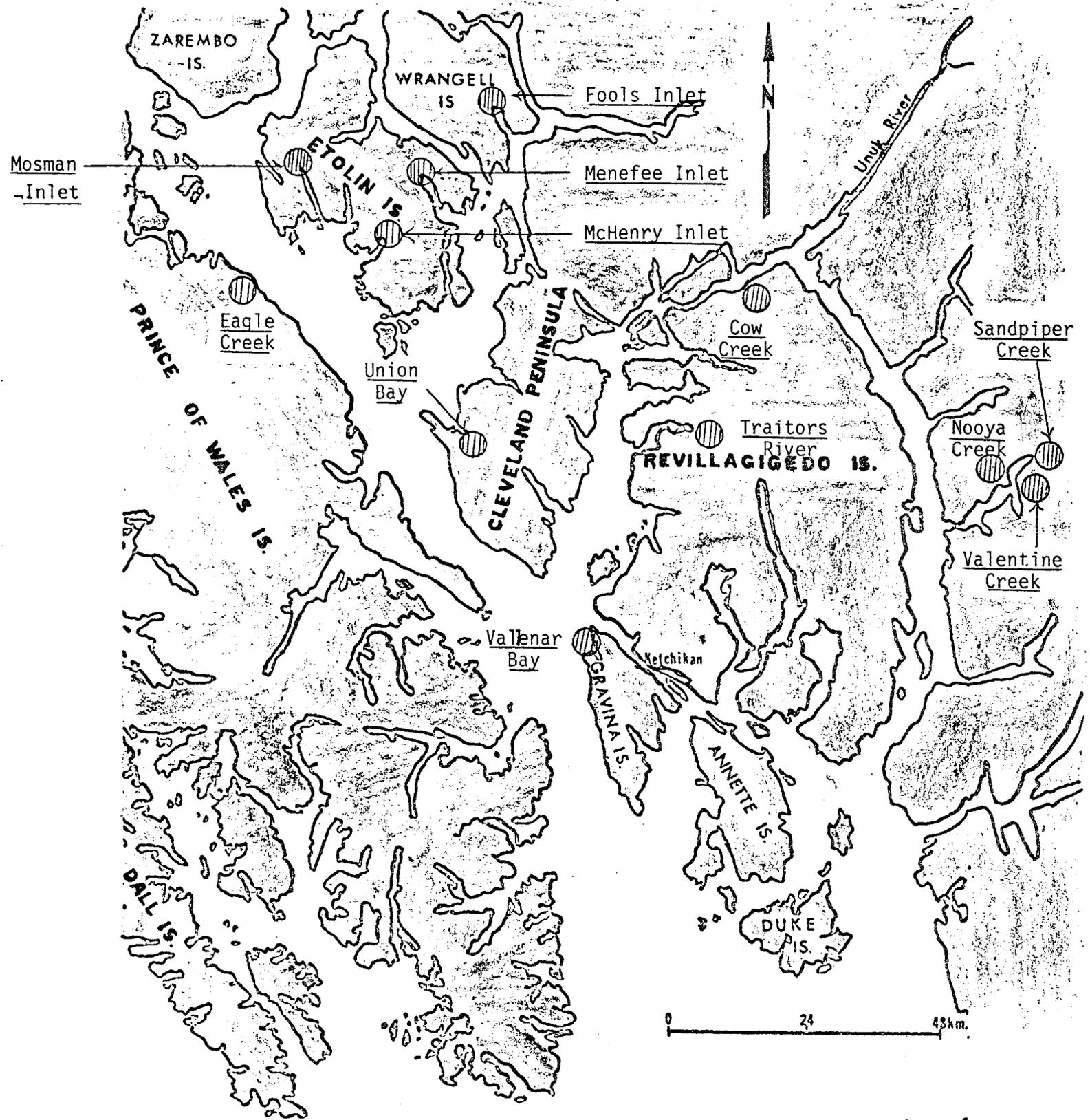


Figure 1. Location of the secondary tagging streams in Southern Southeastern Alaska.

The number of pink salmon tagged was limited to 500 per stream with most of the tagging conducted in the intertidal areas. The only exception to this was Cow Creek in District 101. In this stream 444 of the 460 total tags were placed on pink salmon captured in a pool well above the intertidal area. All of the other streams either had few fish above the intertidal area, or the stream itself was unsuitable for tagging because of an irregular bottom or snags in the stream. All tagging in the intertidal areas was conducted on schools of pink salmon near the mouth of the stream.

The number of tags placed in each stream system was determined by tag availability. Of the 14,000 tags ordered only 4,000 arrived in time for the start of the project so we were forced to cut the maximum number of tags per stream to 500 from the originally planned 1,000. Appendix Table 1 lists the tagging streams with the stream number, tag colors and letter, and the total number of pink salmon tagged.

The recovery effort was to have been handled by recovery teams from the ADF&G Stock Separation Project which was conducting ocean tagging and stream recovery for the U.S./Canada Salmon Interception Research Project in Southern Southeastern Alaska. However, it was impractical for their teams to do the recovery for both projects and provide adequate coverage for each. Subsequently, two additional seasonal employees were hired to do secondary tag recovery. They were flown to recovery streams daily from Ketchikan in late August and September.

RESULTS

Recoveries indicated that there was significant straying from the tagging locations (Appendix Table 2). For example, no tagged pink salmon were released in Big Goat Creek, Rudyerd Bay (Figure 2), but a total of 50 pink salmon with secondary tags were recovered from this system. We had tagged in three streams in the area: Valentine Creek, Nooya Creek, both about 3 to 4 mi (5 to 6 km) away; and Sandpiper Creek, about 6 mi (9.6 km) away. The majority of the tags recovered in Big Goat Creek (39) were from the tagging off the mouth of Valentine Creek, 10 were from Nooya Creek and 1 was from tagging conducted off the mouth of Sandpiper Creek. In the Rudyerd Bay area as a whole, more tags were recovered from stray pink salmon than were recovered from pink salmon that had remained in the systems in which they had been originally tagged.

Appendix Table 3 lists the Peterson estimates for each of the surveys on each tagged system. The first (total) Peterson estimate is the result of using all live and dead pink salmon in the system with all observed tags. The dead estimate uses only observed carcasses and the numbers of tagged carcasses observed during the survey. The peak estimate for each stream was provided by the area management staff. Peterson population estimates from the recoveries at each system ranged the same as the peak estimate to over a hundred times as high as the peak.

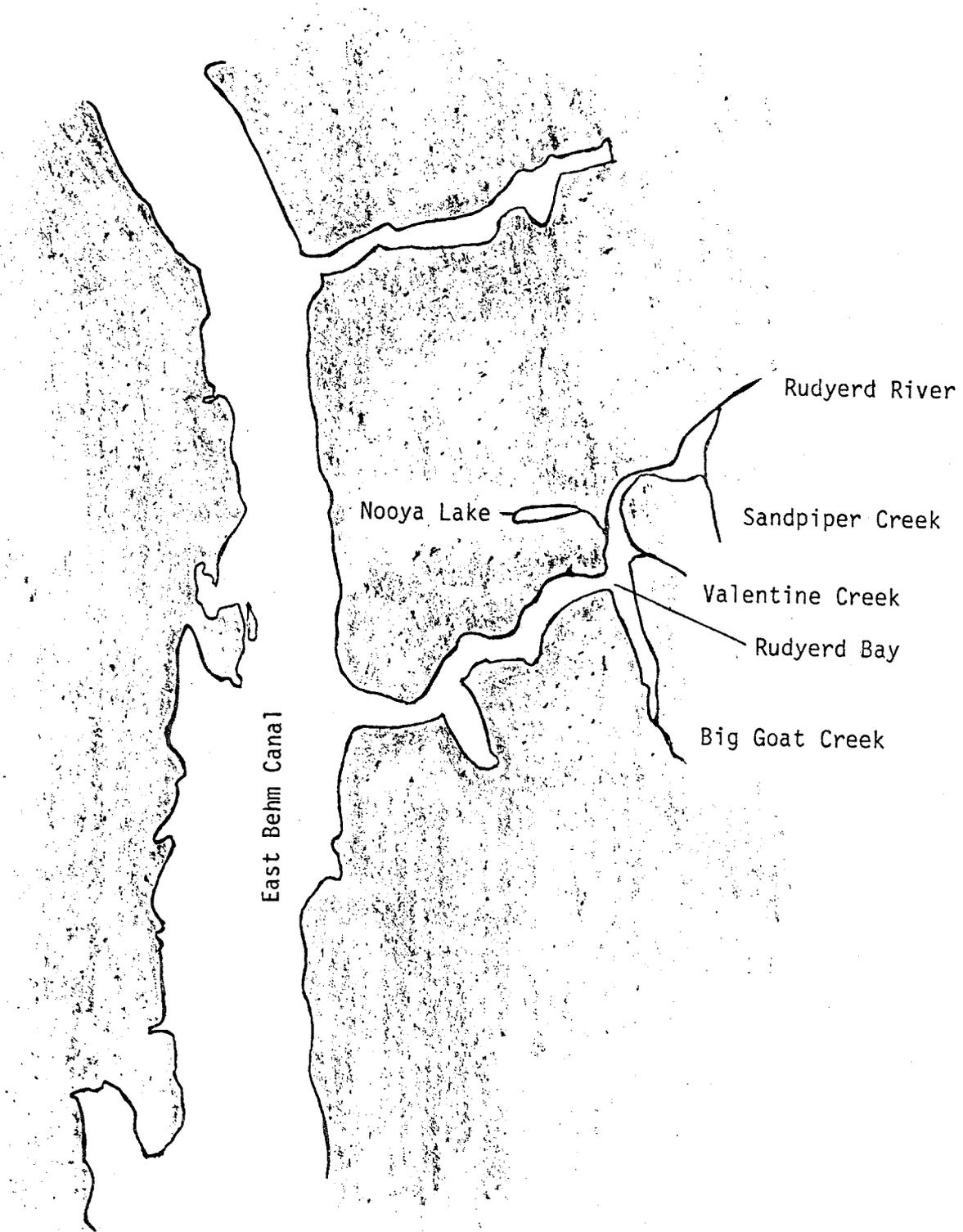


Figure 2. Rudyerd Bay secondary pink salmon tagging streams.

DISCUSSION

Peterson estimates for any of the streams are of questionable value because of the observed straying. The estimates listed in Appendix Table 3 were derived after first subtracting the number of observed strays (Appendix Table 4) from the number of tag releases for each stream. It is very doubtful, however, that we were able to recover all the strays from each of the streams. In the case of Vallenar Creek, one stray was recovered over 40 mi (64 km) to the north of the tagging location and another almost 30 mi (48 km) south, on Prince of Wales Island (Figure 3). This demonstrates that the tags were spread out over so large an area that even with the extensive tag recovery effort being applied as a result of the U.S./Canada Stock Interception Studies, it is very unlikely that we recovered all of the stray tags.

If total population estimates are necessary in the future, they should be obtained with weirs, not tag and recovery estimates. With weirs, an absolute count of all species present can be obtained. In-stream tagging was rejected as an option primarily because tagging would have had to start at least 2 weeks later to allow runs into the streams, and would thus have taken longer to conduct because of additional logistical problems. As a result, tagging would probably not have been completed until early September, thus jeopardizing recovery efforts as the weather deteriorated in the fall.

Other problems have been documented with population estimation using the tag ratio method. Studies on the Lakelse River, British Columbia, have shown that the tag ratio method of determining the size of spawning populations of pink salmon overestimated the actual runs by 41.5% in 1 year, and 26.6% in another (Fisheries Research Board of Canada 1962). Helle et al. (1964) compared the estimates by tag ratio with weirs in the upstream areas of Olsen Creek in Prince William Sound and found that the two estimates were close for one fork (the tag ratio method overestimated the minimal weir count by 5%), but the tag ratio estimate on the other fork was 41% larger than the weir count.

The current system of escapement calculation in Southeastern Alaska needs to be reevaluated in light of the results of this study. The use of mouth counts in the estimate of escapement to any system should be discontinued and current escapement estimates using mouth counts need to be recalculated. A new escapement estimation method is being developed which will not consider mouth counts as part of the escapement to any given stream system.

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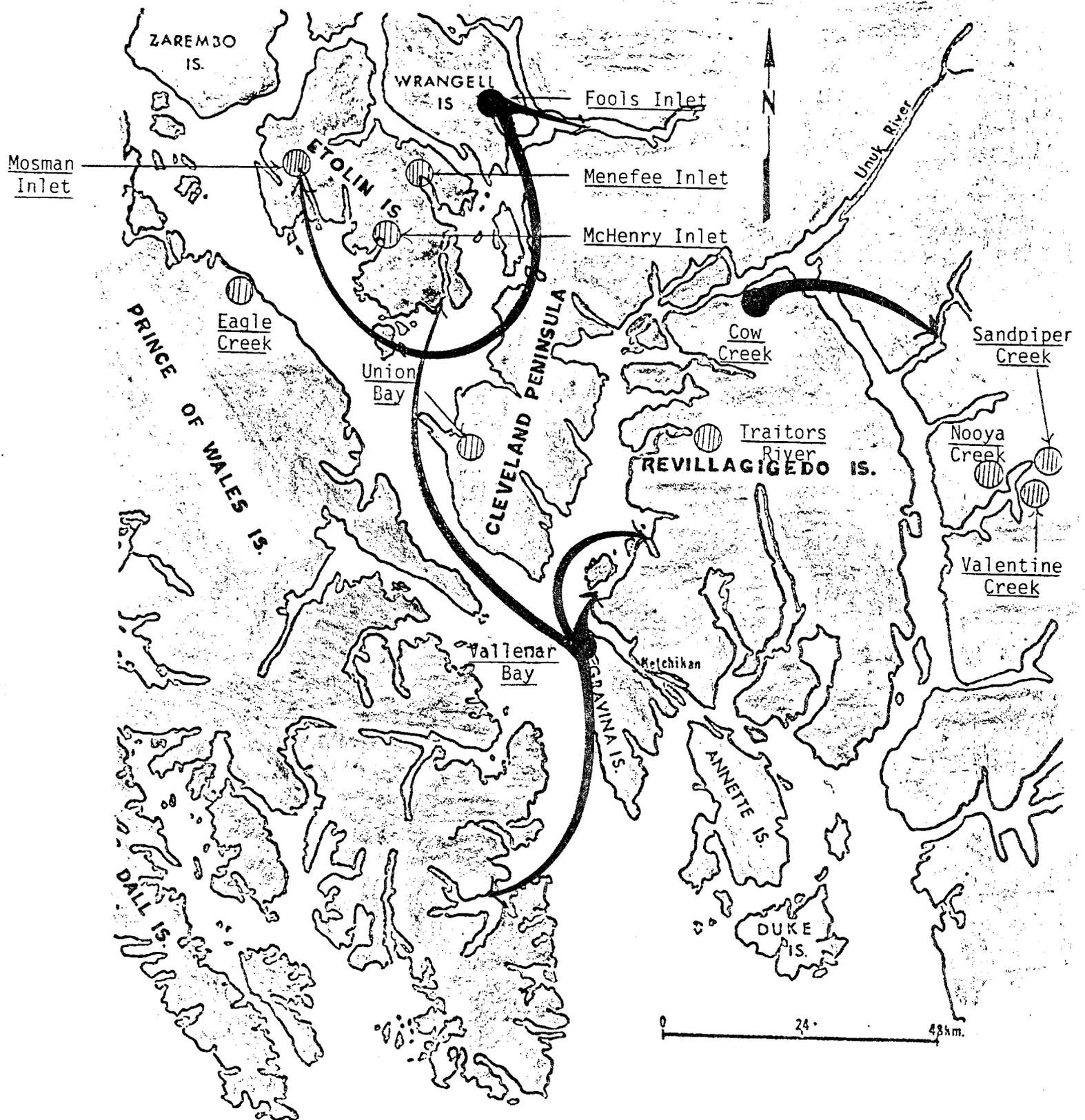


Figure 3. Three examples of pink salmon straying from the tagging locations in Vallenar Creek on Gravina Island, Cow Creek on Revillagigedo Island and Fools Inlet on Wrangell Island.

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APPENDICES

Appendix Table 1. Pink salmon secondary tagging streams, Southern Southeastern Alaska, 1982.

DATE TAGGED	STREAM NUMBER	STREAM NAME	PRIMARY TAG(1) COLOR & LETTER	BACKPLATE(2) COLOR & LETTER	NUMBER TAGGED
8/20/82	101-29- 6	VALLENAR BAY	YELLOW N	YELLOW Q	515
7/31/82	101-60-25	VALENTINE CREEK	R/Y L	RED	502
8/ 1/82	101-60- 9	NOOYA CREEK	R/Y K	RED	480
8/ 2/82	101-60-20	SANDPIPER CREEK	R/Y I	RED	501
8/ 5/82	101-80- 3	COW CREEK	R/Y J	RED	460
8/ 7/82	101-90-29	TRAITORS RIVER	R/Y K	RED	522
8/18/82	106-10-30	EAGLE CREEK	YELLOW M	YELLOW O	478
8/17/82	106-21-4&5	MCHENRY INLET	R/Y J	YELLOW P	288
8/16/82	106-22-8&10	MOSMAN INLET	YELLOW X	RED	450
		TOTAL MOSMAN	YELLOW X	YELLOW K	50
					500
8/19/82	107-10-30	UNION BAY	YELLOW J	YELLOW J	504
8/13/82	107-20-30	MENEFEE	R/Y I	RED	505
8/14/82	107-20-70	FOOLS INLET	R/Y L	RED	488

- 1 PRIMARY TAG COLORS WERE R/Y (RED/YELLOW) AND YELLOW
 2 IN THE STREAMS WHERE IT WAS NECESSARY TO USE LETTERED TAGS AS BACKPLATES, THE LETTER WAS PLACED AGAINST THE FISH (UPSIDE DOWN), SO THAT ONLY THE BLANK SIDE OF THE TAG SHOWED TO AN OBSERVER.

Appendix Table 2. Tagged pink salmon strays recovered in Southern South-eastern Alaska, 1982.

Tagging Location	Tagging Date	Recovery Location	Recovery Date	Number Recovered	Recovery Type
Eagle Creek	8/18	Coffman Cove, NE Prince of Wales Is.	8/23	14	Gillnet
Eagle Creek	8/18	Marsh Island, W Coast of Etolin Is.	8/30	1	Gillnet
Eagle Creek	8/18	Luck Point, 1 mile N. of Eagle Cr.	9/01	1	Sport Fish
McHenry Inlet	8/17	Fools Inlet, SE Wrangell Is.	9/24	1	Sport Fish
Mosman Inlet	8/16	Flat Creek, 4 ml. N of Hydaburg, lower Prince of Wales Is.	8/28	2	Stream Survey
Union Bay	8/19	Fools Inlet, SE Wrangell Is.	9/24	1	Stream Survey
Fools Inlet	8/18	East of Anan Bay, Bradfield Canal, SE of Wrangell	8/31	1	Sport Fish
Vallenar Bay	8/20	Moser Bay, Behm Canal, N of Ketchikan	9/14	1	Sport Fish
Vallenar Bay	8/20	Lunch Creek, Clover Passage, N of Ketchikan	9/02	1	Sport Fish
Vallenar Bay	8/20	Survey Point, 10 ml. NW of Ketchikan	8/25	1	Seine
Vallenar Bay	8/20	Helm Bay, SE Cleveland Peninsula, Behm Canal	8/30	1	Sport Fish
Vallenar Bay	8/20	Canoe Pass, S Etolin Is.	8/15	2	Seine
Vallenar Bay	8/20	Kegan Lake Cr., Moira Sound, SE Prince of Wales Is.	8/24	1	Stream Survey
Valentine Cr.	7/31	Nooya Creek, Rudyerd Bay, NE of Ketchikan	9/14	1	Stream Survey
Valentine Cr.	7/31	Sandpiper Cr., Rudyerd Bay, NE of Ketchikan	9/15	2	Stream Survey
Valentine Cr.	7/31	Big Goat Cr., Rudyerd Bay, NE of Ketchikan	8/13	21	Stream Survey
Valentine Cr.	7/31	Big Goat Cr., Rudyerd Bay, NE of Ketchikan	9/14	11	Stream Survey
Valentine Cr.	7/31	Big Goat Cr., Rudyerd Bay, NE of Ketchikan	9/22	7	Sport Fish
Nooya Cr.	8/01	Sandpiper Cr., Rudyerd Bay, NE of Ketchikan	9/15	1	Stream Survey
Nooya Cr.	8/01	Valentine Cr., Rudyerd Bay, NE of Ketchikan	9/14	4	Stream Survey
Nooya Cr.	8/01	Rudyerd Cr., Rudyerd Bay, NE of Ketchikan	8/16	1	Stream Survey
Nooya Cr.	8/01	Rudyerd Cr., Rudyerd Bay, NE of Ketchikan	9/15	4	Stream Survey
Nooya Cr.	8/01	Big Goat Cr., Rudyerd Bay, NE of Ketchikan	8/13	4	Stream Survey
Nooya Cr.	8/01	Big Goat Cr., Rudyerd Bay, NE of Ketchikan	9/14	3	Stream Survey
Nooya Cr.	8/01	Big Goat Cr., Rudyerd Bay, NE of Ketchikan	9/22	3	Stream Survey
Sandpiper Cr.	8/02	Rudyerd River, Rudyerd Bay, NE of Ketchikan	8/16	4	Stream Survey
Sandpiper Cr.	8/02	Rudyerd River, Rudyerd Bay, NE of Ketchikan	9/15	2	Stream Survey
Sandpiper Cr.	8/02	Big Goat Cr., Rudyerd Bay, NE of Ketchikan	8/13	1	Stream Survey
Cow Creek	8/05	Chickamin River, Ne of Behm Canal	9/09	1	Stream Survey
Unknown ¹		Chickamin River, NE of Behm Canal	8/15	1	Stream Survey
Unknown ¹		Navy Creek, SW Etolin Is.	8/29	2	Stream Survey

¹ Bicolored tags were observed in live pink salmon but the tag number could not be distinguished.

Appendix Table 3. Peterson population estimates for pink salmon using total estimates, compared with peak survey estimates, for several streams in Southern Southeastern Alaska, 1982.

Stream Number	Stream Name	Tagging DATE	Recovery Date	Total Count Population Estimate ¹	Dead Population Estimate ¹	Peak Count
101 29 06	Vallenar Bay	8/20	9/13 9/29	32,581 83,737	52,243	12,000
101 60 25	Valentine Cr.	7/31	8/13 9/14	43,386 89,742	65,243	30,000
101 60 09	Nooya Cr.	8/ 1	9/14	1,501,066	1,251,272	13,000
101 60 20	Sandpiper Cr.	8/ 2	9/15	475,857	271,488	8,000
101 80 03	Cow Cr.	8/ 5	8/18 9/17	215,383 231,826	156,082	24,003
101 90 29	Traitors River	8/ 7	8/21 9/14	624,265 237,100	252,504	96,000
106 10 30	Eagle Cr.	8/18	8/28 9/23	47,586 707,653	186,936	47,400
106 21 04&5	McHenry Inlet	8/17	8/29 9/12 9/29	79,729 210,128 523,137	333,135	12,060
106 22 8	Mosman Inlet	8/16	8/28 9/13	41,115 110,619		10,670
107 10 30	Union Bay	8/19	8/27 9/14 9/29	333,449 546,054 729,052	1,301,836	58,252
107 20 30	Menefee Inlet	8/13	8/13 9/24	1,206,026 287,525		16,190
107 20 70	Fools Inlet	8/14	8/14 9/24	168,047 499,507	257,579	10,800

¹ Total count population estimates use both live and dead estimates of pink salmon and all tags observed during the survey. Dead population estimates use only dead pink salmon and tags observed on dead pink salmon so only the later surveys, after significant die-off, could be used. The Peterson estimate uses the formula $P = m(u+r)/r$ where m is the number of marked fish, r is recaptured marked pink salmon and u is captured unmarked pink salmon.

Appendix Table 4. Stream recovery information for the secondary tagging streams in Southern Southeastern Alaska, 1982.

STREAM NUMBER	STREAM NAME	TAGGING DATE	NUMBER TAGGED	OBSERVED STRAYS	RECOVERY DATE	TOTAL PINKS	EXAMINED DEAD	TAGS OBSERVED
101 29 06	Vallenar Bay	8/20	515	8	9/13 9/29	6,769 14,282	30 5,753	107 87
101 60 25	Valentine Cr.	7/31	502	42	8/13 9/14	3,826 2,145	- 845	41 11
101 60 09	Nooya Cr.	8/ 1	480	20	9/14	12,531	2,650	4
101 60 20	Sandpiper Cr.	8/ 2	501	7	9/15	10,500	3,840	11
101 80 03	Cow Cr.	8/ 5	460	1	8/18 9/17	17,325 29,740	71 14,240	37 59
101 90 29	Traitors River	8/ 7	522	-	8/21 9/14	74,900 32,437	2,000 7,143	61 71
106 10 30	Eagle Cr.	8/18	478	16	8/28 9/23	204 81,029	- 5,519	2 53
106 21 04&5	McHenry Inlet	8/17	288	1	8/29 9/12 9/29	2,768 12,060 8,290	3 280 9,278	10 33 9
106 22 8	Mosman Inlet	8/16	500	4	8/28 9/13	8,904 9,991	4 615	122 45
107 10 30	Union Bay	8/19	504	1	8/27 9/14 9/29	58,249 40,130 63,730	139 1,230 18,110	88 38 44
107 20 30	Menefee Inlet	8/13	505	2	8/13 9/24	7,190 16,548	300 7,559	3 29
107 20 70	Fools Inlet	8/14	488	5	8/14 9/24	13,530 23,226	270 16,501	39 35

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