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SOUTHEASTERN ALASKA PINK SALMON FORECAST

STUDIES PRE-EMERGENT FRY PROGRAM, 1965

By:

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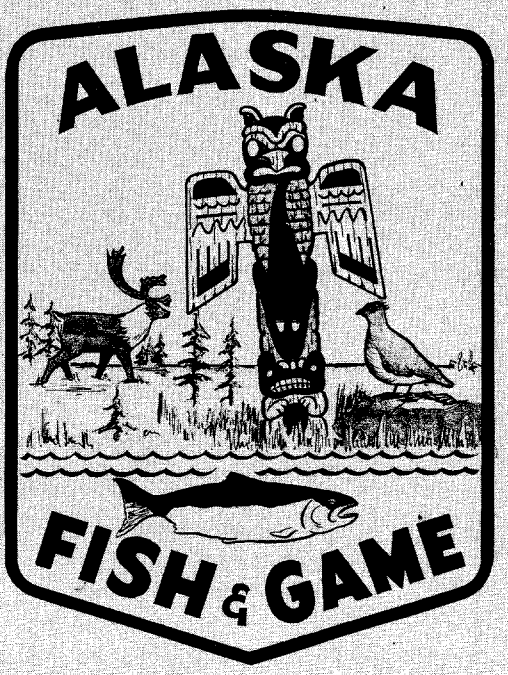

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INTRODUCTION

The Southeastern Alaska pink salmon forecast studies were initiated on a pilot basis in the spring of 1963. In that year selected areas in 10 streams were sampled to determine the abundance of pre-emerged fry.

Additional stream survey activities undertaken in the summers of 1963 and 1964 were aimed at increasing the area to be included in the sampling program with special attention given to improving the coverage in 1965. Pre-emergent fry sampling was accomplished in one or more areas of 53 streams in 1964 and in 54 streams in 1965. Data for 1963, 1964 and 1965 are presented in this report for comparative purposes.

The objective of these studies is to develop a pre-emergent fry index method for predicting the abundance and distribution of pink salmon returning to spawning areas in Southeastern Alaska. Such return predictions are not necessarily confined to a natal stream but rather to a general geographic area. The effect of local commercial fisheries will likely disrupt returns to a given stream, but may permit close agreement with returns to a larger geographic area when the commercial catch for that area is included.

To provide background information, levels of escapement for 1963, 1964, and 1965 are presented by each management district. This information was provided by the area management biologists and is based on observations of a type that have been standard practice since 1960.

Relative escapement levels for each management area are shown in the figures listed below. Escapements for 1965 occurred after sampling but prior to report writing and are therefore included in this report.

Juneau District:	Figures 1A, 1B and 1C.
Sitka District:	Figures 2A, 2B, and 2C.
Petersburg District:	Figures 3A, 3B, and 3C.
Ketchikan District:	Figures 4A, 4B, and 4C.

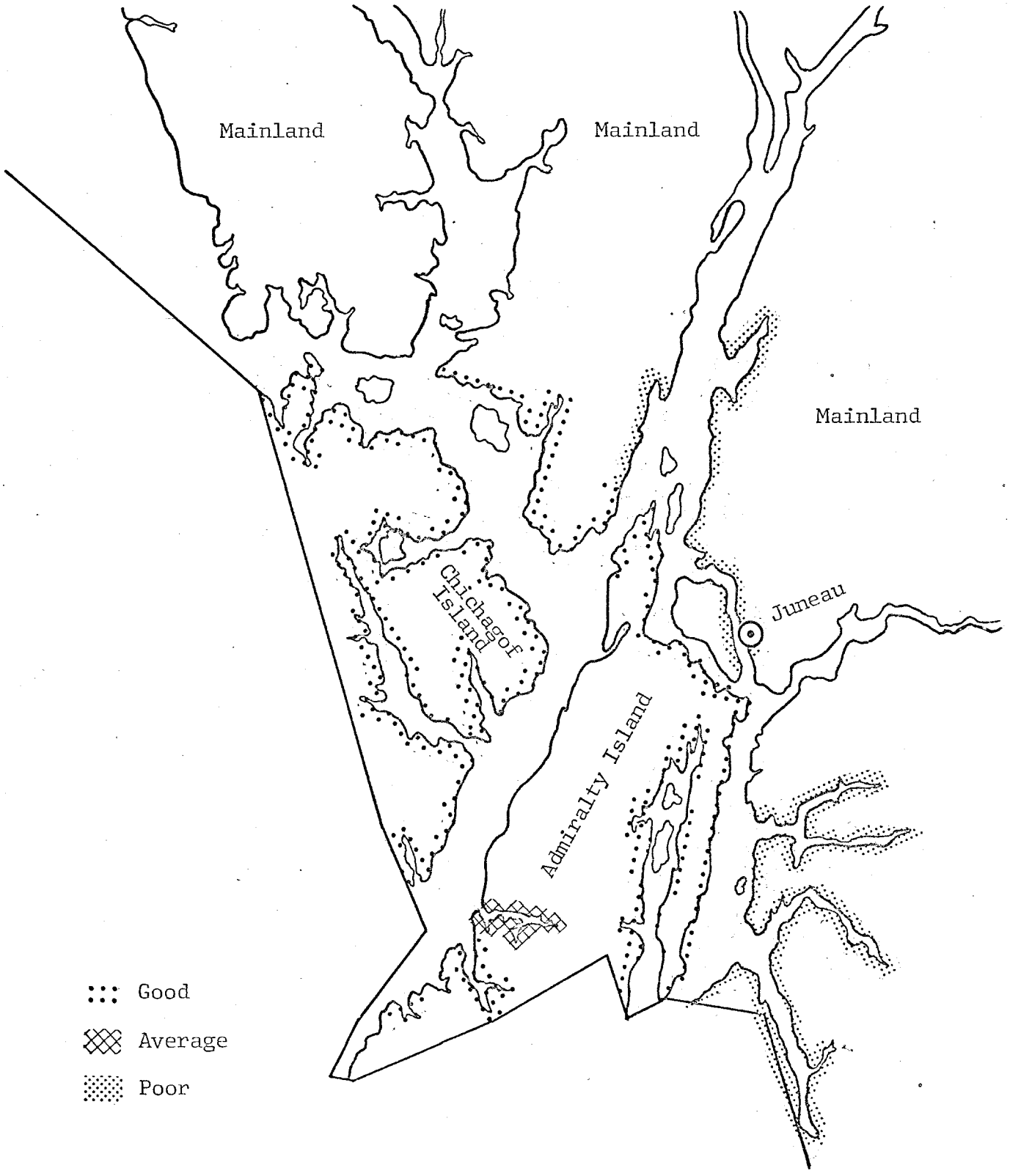


Figure 1A. Relative levels of escapement in the Juneau District in 1963.

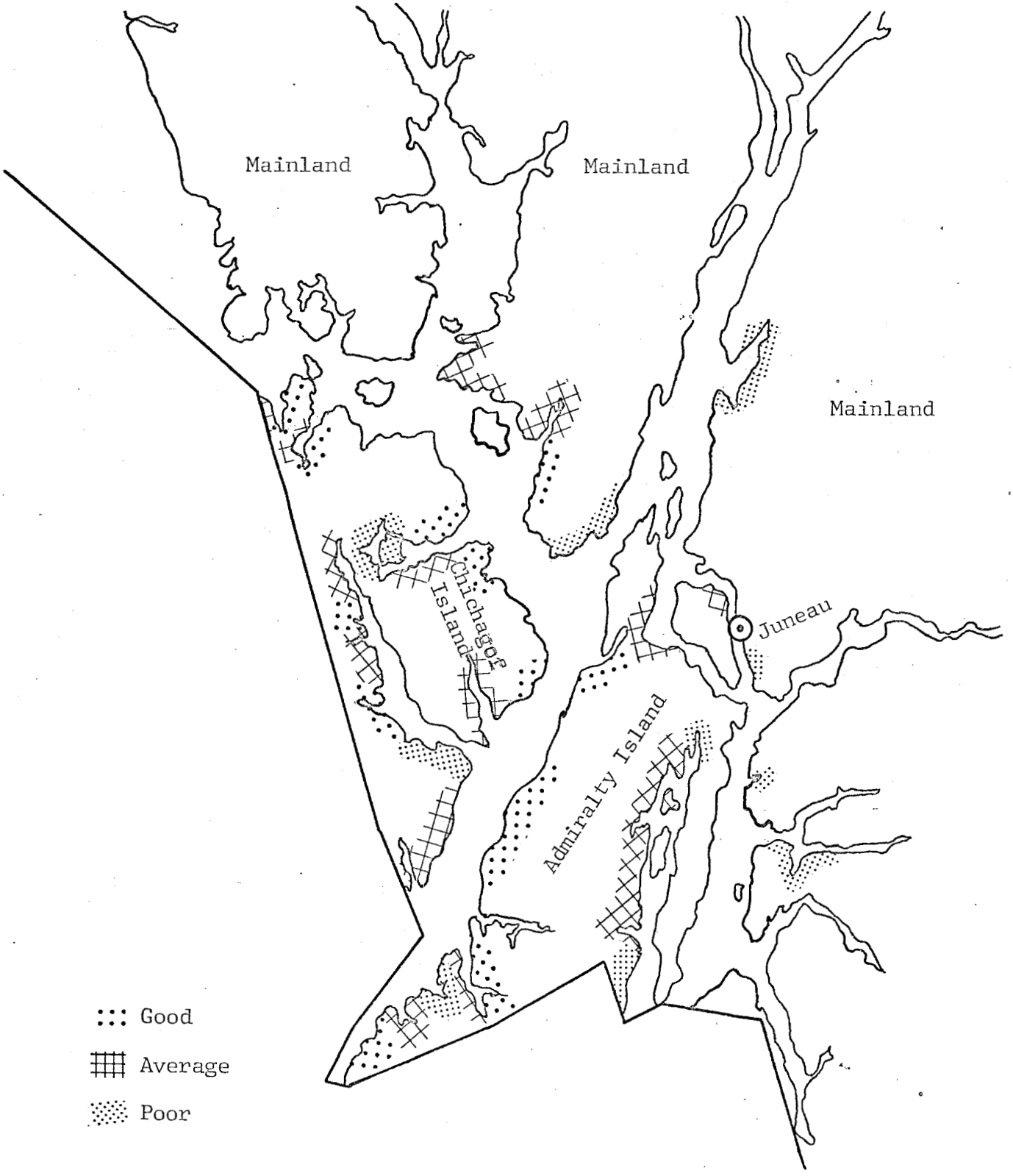


Figure 1B. Relative levels of escapement in the Juneau District in 1964.

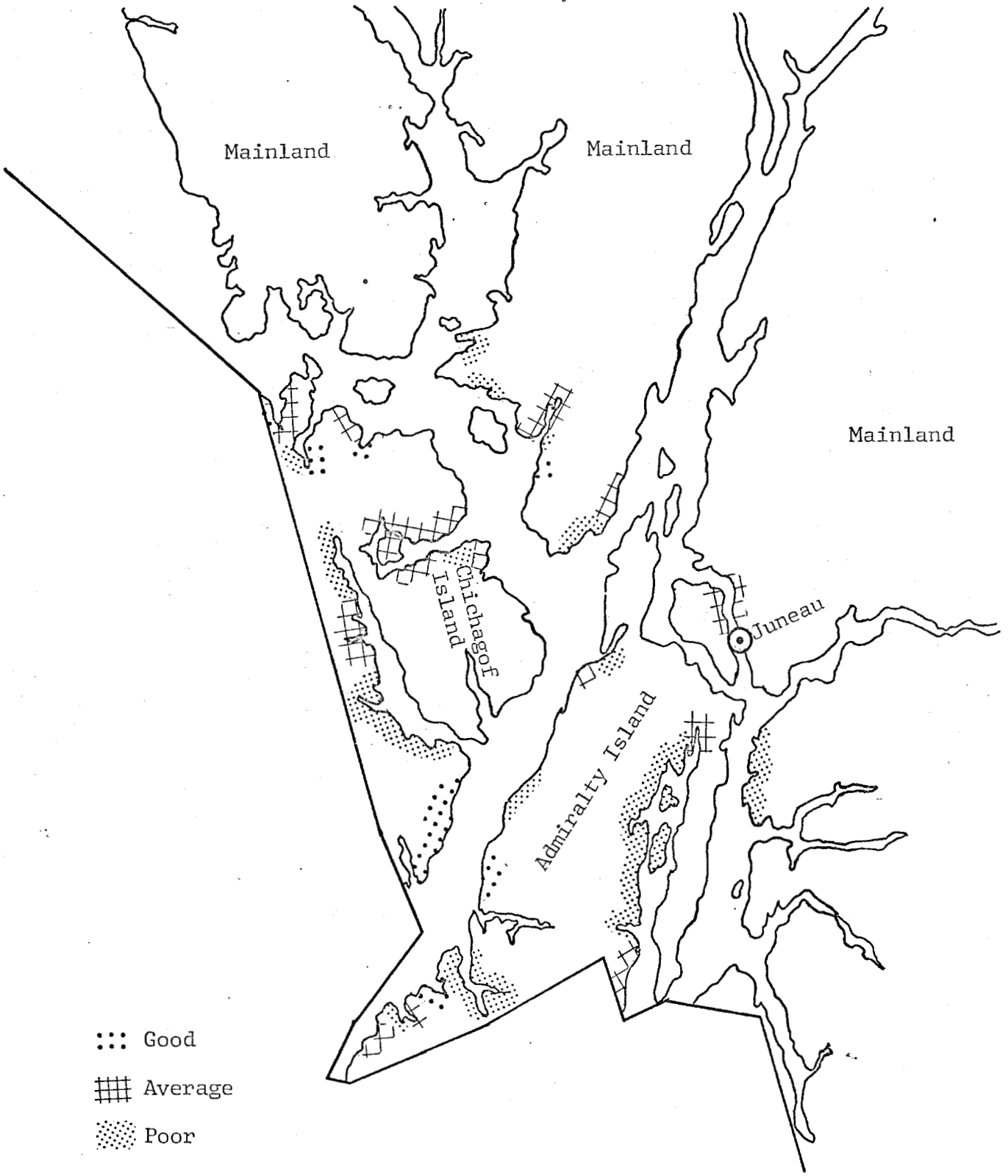


Figure 1C. Relative levels of escapement in the Juneau District in 1965.

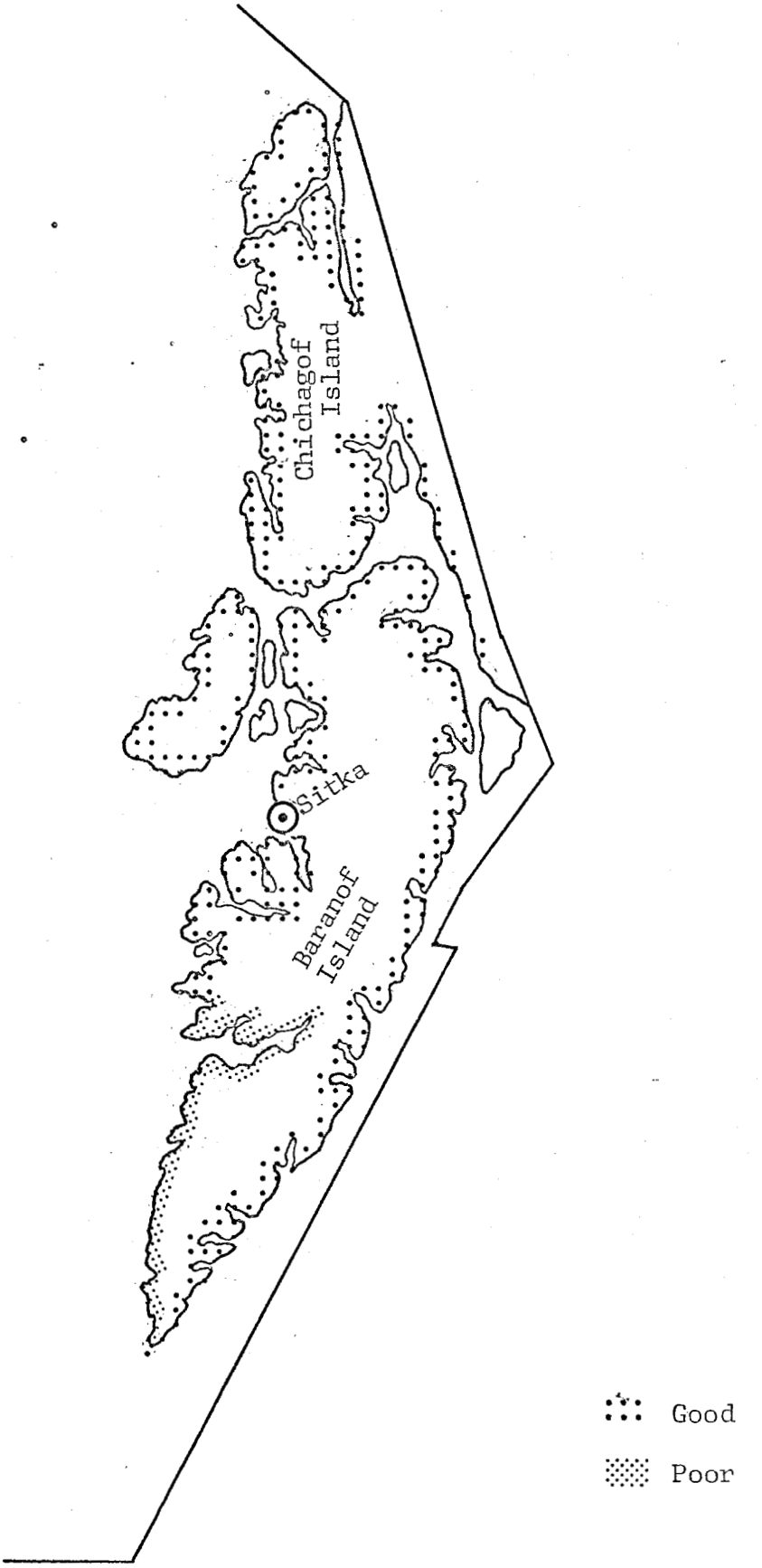


Figure 2A. Relative levels of escapement in the Sitka District in 1963.

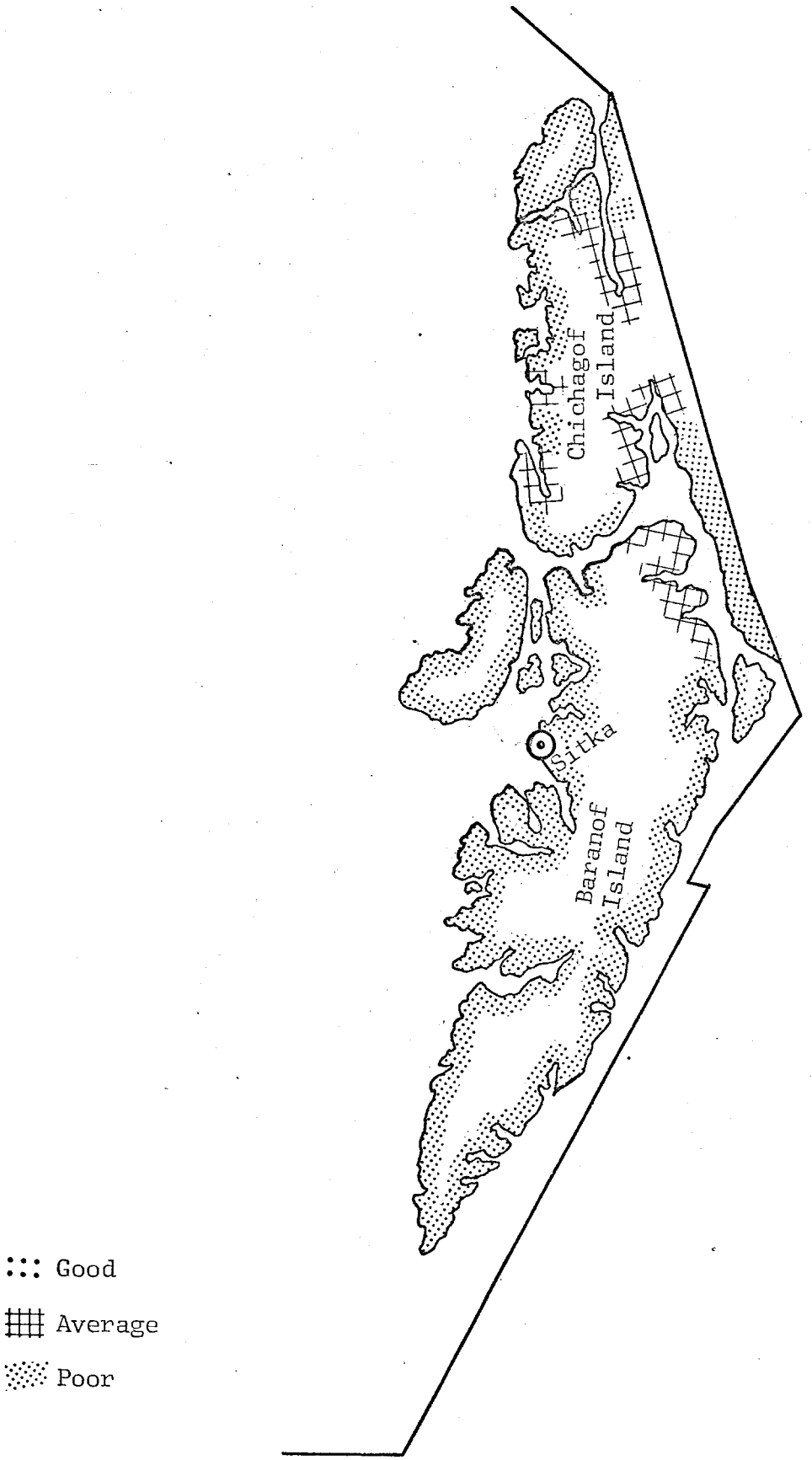


Figure 2B. Relative levels of escapement in the Sitka District in 1964.

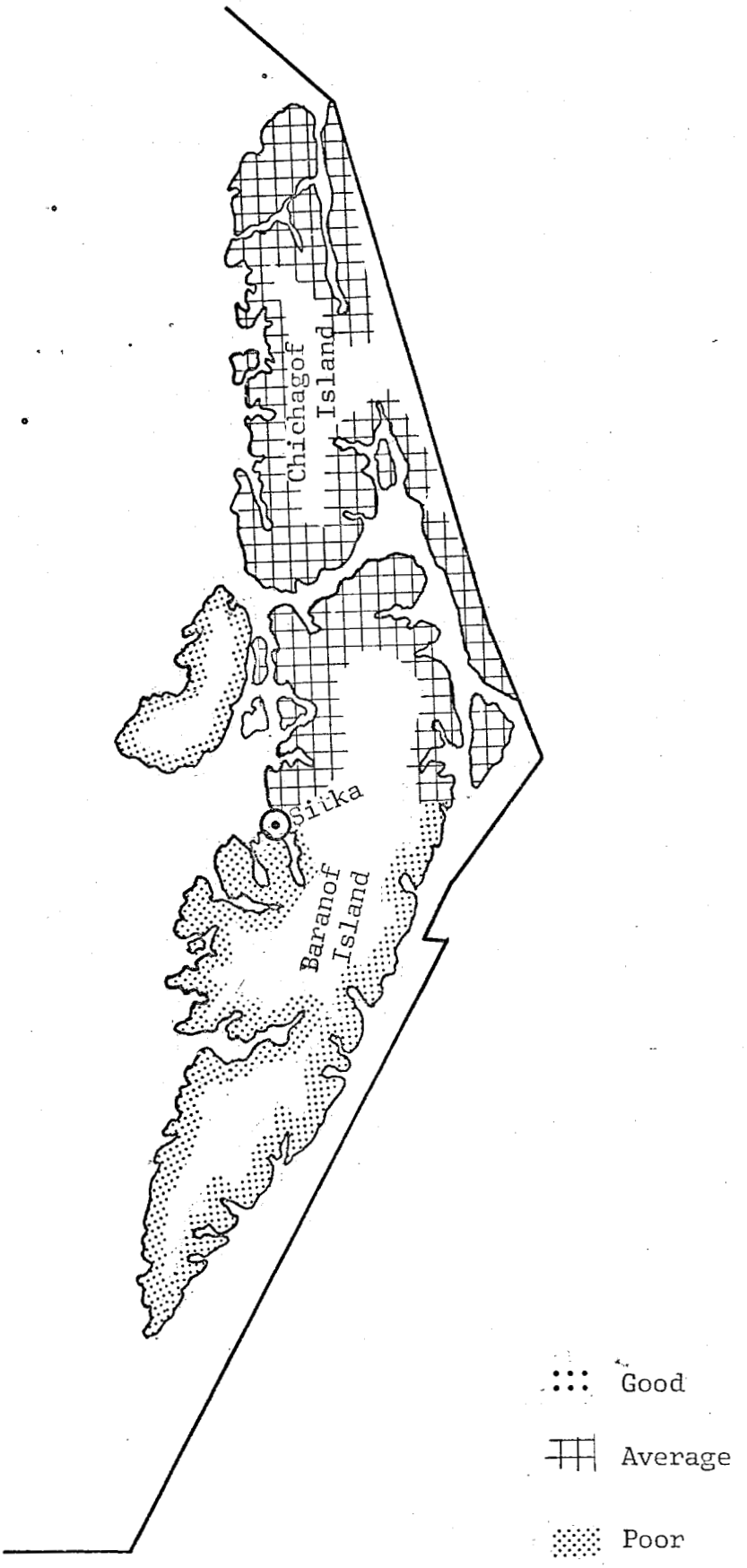
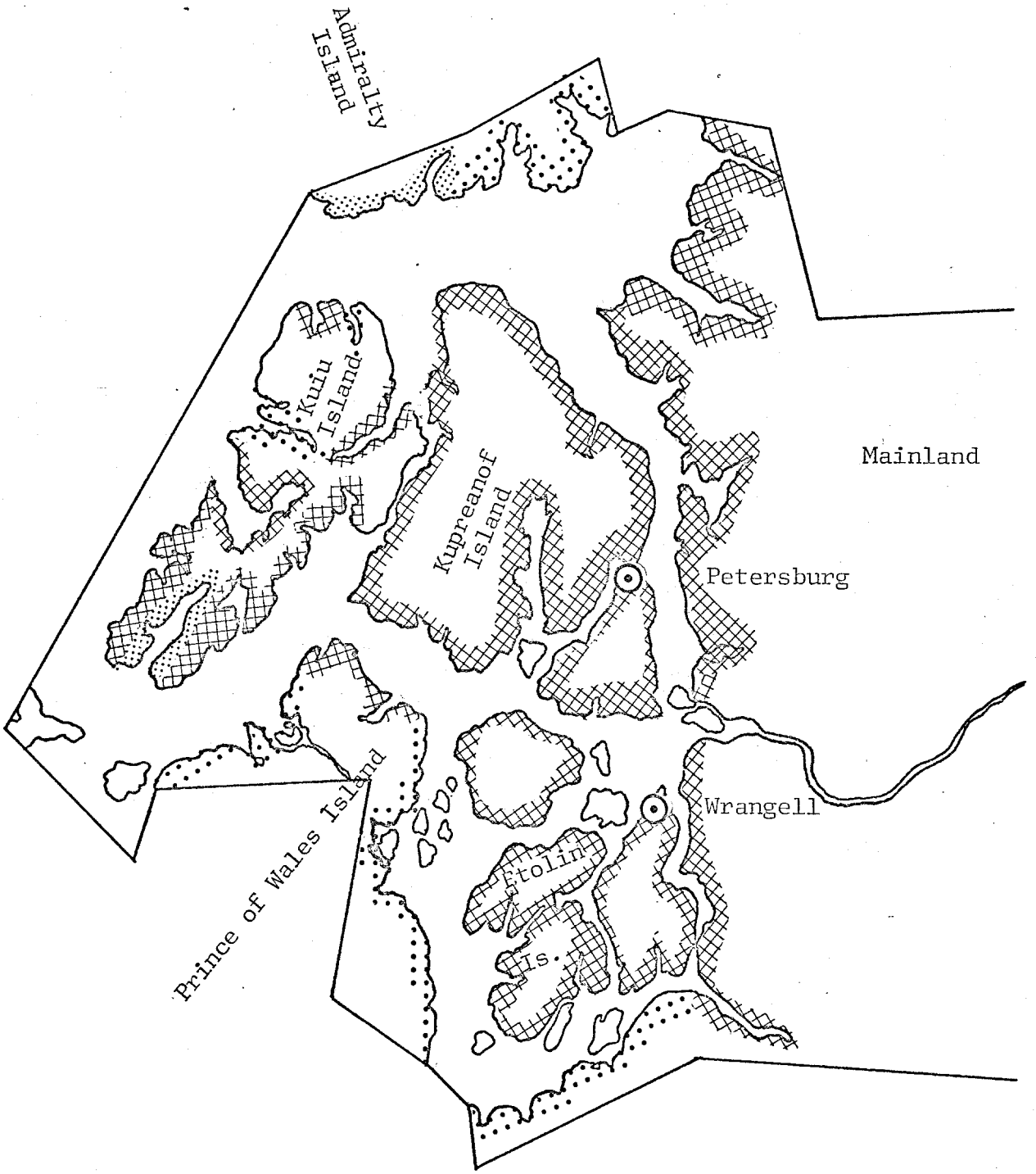


Figure 2C. Relative levels of escapement in the Sitka District in 1965.



::: Good

Average

Poor

Figure 3A. Relative levels of escapement in the Petersburg District in 1963.

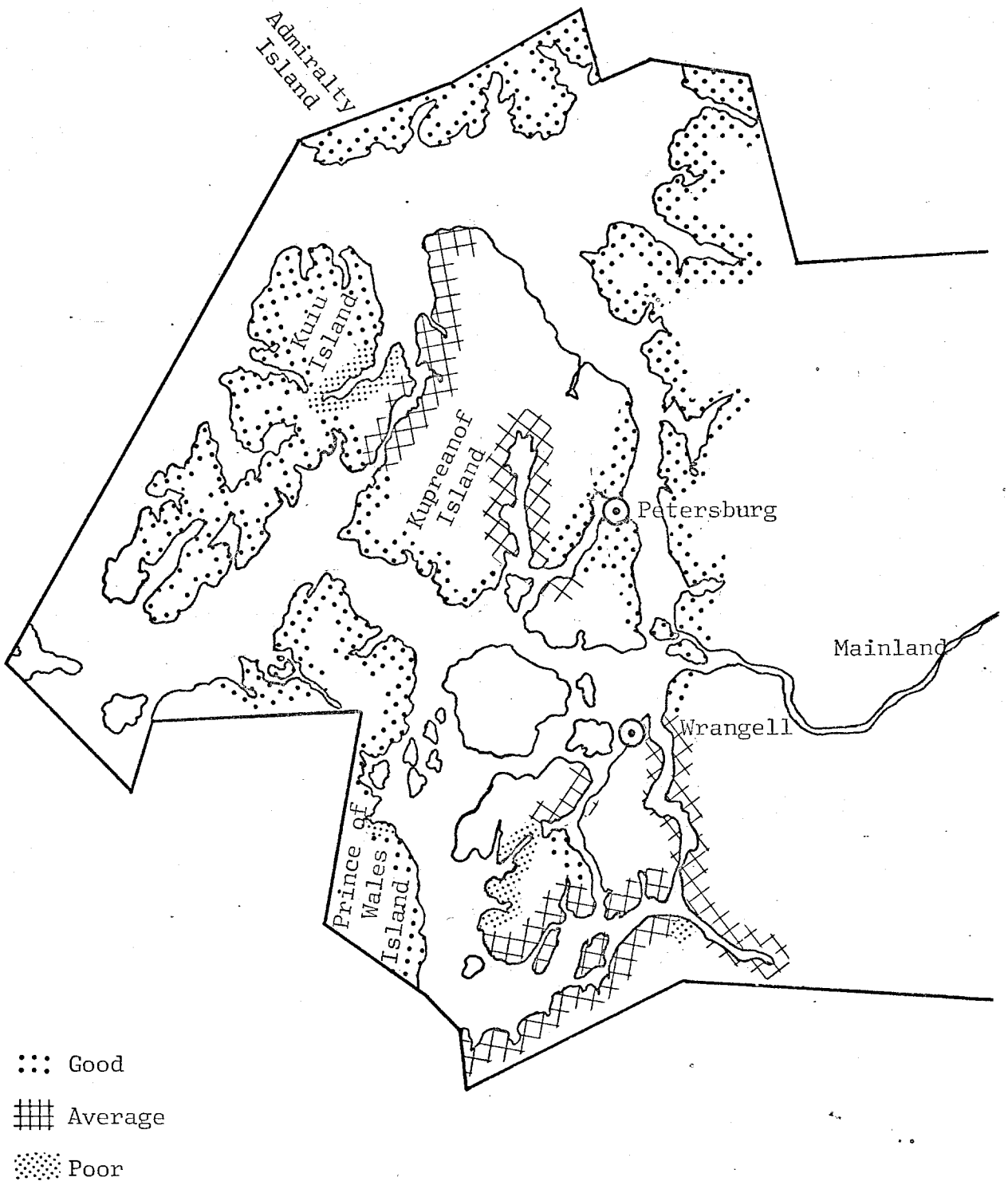


Figure 3B. Relative levels of escapement in the Petersburg District in 1964.

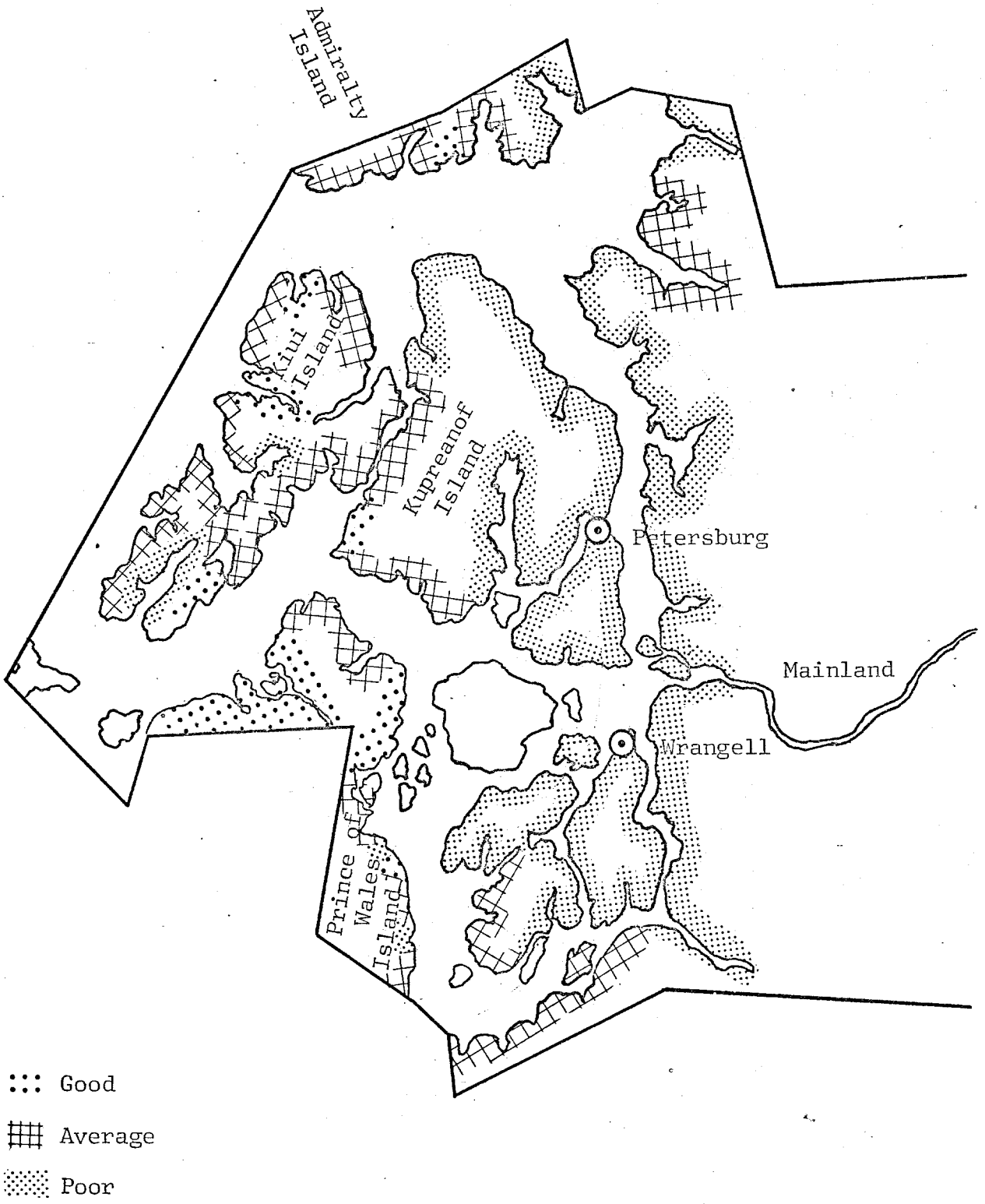
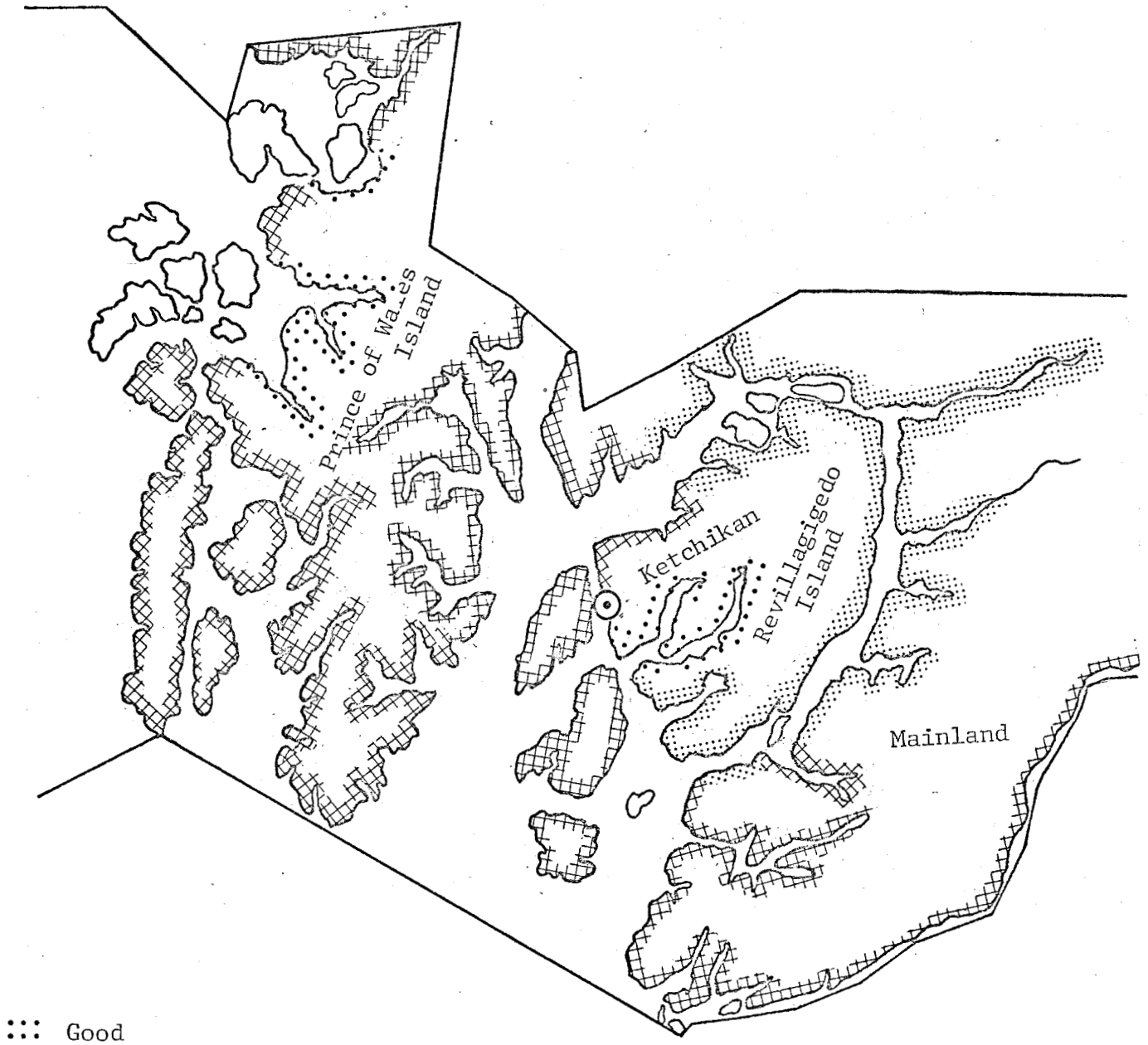


Figure 3C. Relative levels of escapement in the Petersburg District in 1965.



::: Good

Average

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Figure 4A. Relative levels of escapement in the Ketchikan District in 1963.

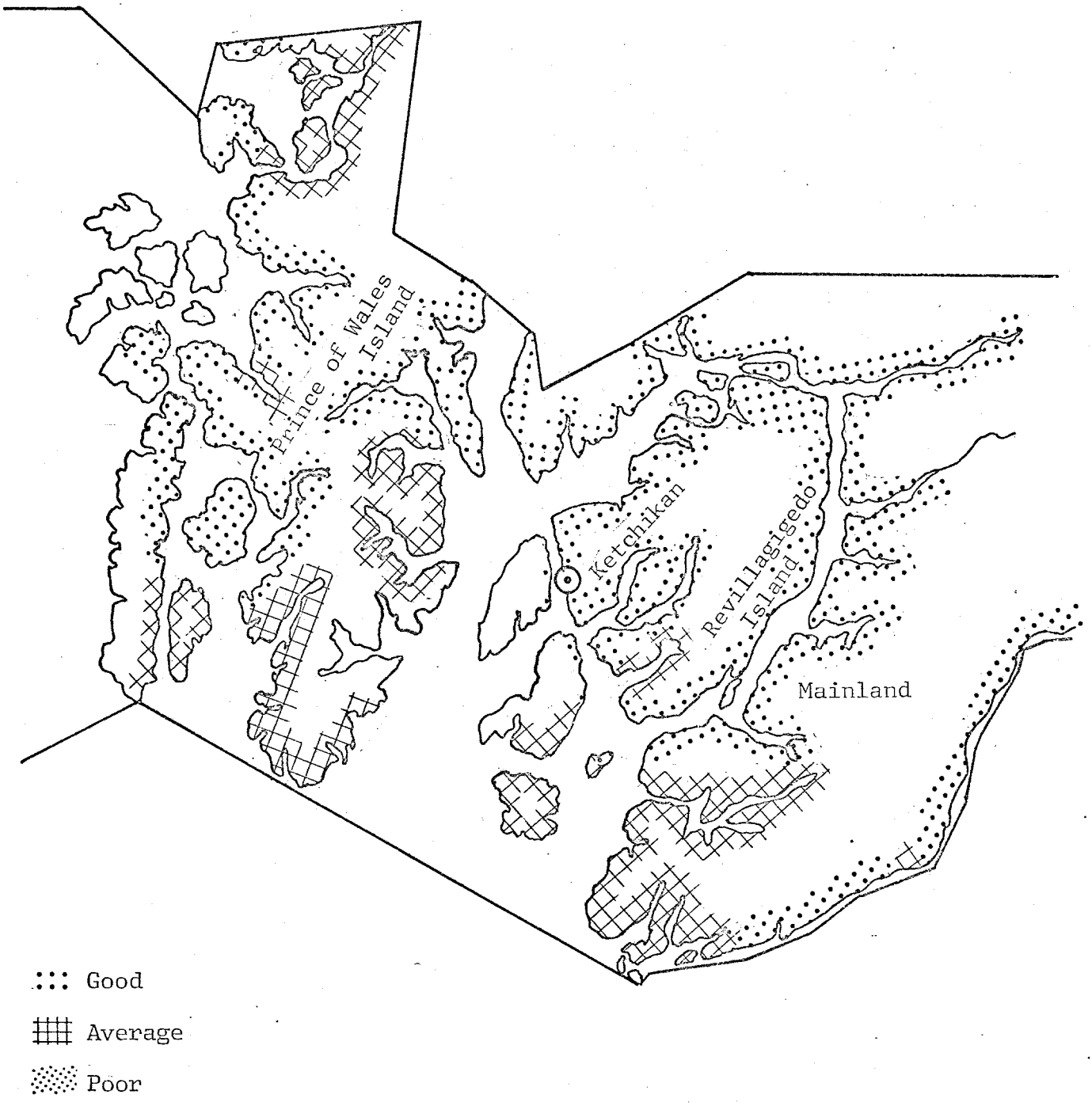

Figure 4B. Relative levels of escapement in the Ketchikan District in 1964.

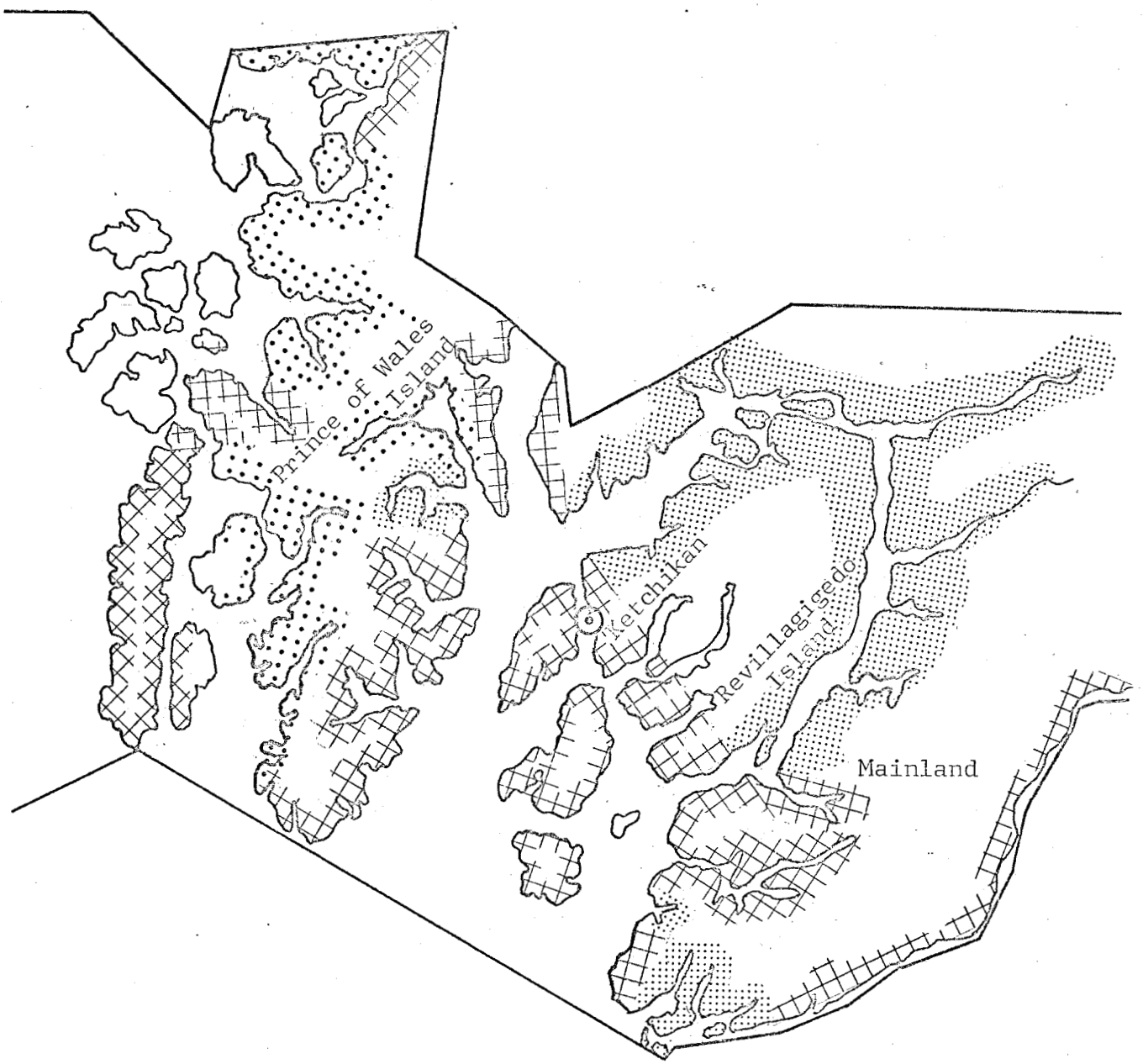

Figure 4C. Relative levels of escapement in the Ketchikan District in 1965.

METHODS

Pre-emergent fry sampling methods are well described in the report of Noerenberg (1964). Differences in methodology as pertains to Southeastern Alaska are presented in the report of Hoffman (1965).

Essentially the Southeastern program is devised to provide estimates of pre-emergent fry abundance per unit area of spawning bed. The stream areas included in the sample are previously inspected and only areas actually utilized by spawning fish are measured for inclusion in the sampling effort. These spawning areas are considered the basic sampling stratum and are divided into sampling units of one acre (43,560 sq. ft.) or tenths of acres.

The sampling effort expended in any one unit is 40 two-square foot sampling digs, or an appropriate fraction of this number for a fraction of a unit. Total sampling thus amounts to 80 square feet per unit (acre) of stratum. These 40 samples are randomly distributed throughout the unit in 8 random clusters of five digs. In any one year the number of units (or parts of units) to be sampled are selected randomly from the total area available. The magnitude of the sampling effort in any single year rests upon budgetary considerations and upon weather conditions as well.

At this stage of the program some 3,000 samples have been taken yearly. Several of the streams sampled in 1964 and 1965 have been sampled in both years to meet specific needs, however the majority of the sampling is made up of randomly selected areas taken from the total area involved. It is hoped this random sampling approach will permit either an increase or decrease in sample size without seriously affecting past data.

With some minor exceptions the sampling areas have been located in the readily accessible lower portions of streams. A further restriction requires the selected areas to conform to the capabilities of the sampling equipment. Extension of pre-emergent sampling into upstream regions inaccessible from tide-water is planned for spring, 1966. Helicopter transport will then become available.

To date insufficient information exists on the relationship between pre-emergent fry density and adult return, to provide a reliable numerical prediction for Southeastern Alaska pink salmon. Only the adult return of 1965 from the pre-emergent fry sampling done in 1964 is available.

RESULTS

1964 Sampling

1964 was the first year of fairly broad pre-emergent fry sampling in Southeastern Alaska and the data collected in that year was used to arrive at a prognosis of the 1965 adult pink salmon return. It should be re-emphasized that in 1964 no samples were taken from Behm Canal, West Coast of Chichagof Island or in the Icy Strait-Cross Sound areas. The aforementioned 1965 prognosis was therefore based entirely upon a sample having these distribution limitations. Further, in this first year of broad sampling, no opportunity existed for comparing adult returns with the fry levels that produced them. To fill this gap the 1964 fry densities were compared with similar fry densities found in Prince William Sound and the adult returns for that area applied to the Southeastern sampling result. The assumption being that similar fry densities would produce similar returns in both areas.

The 1964 prognosis named 3 areas where pre-emergent fry abundance indicated a potential for a good return of adult pink salmon to Southeastern in 1965 based upon the comparison mentioned above. Only the Cordova Bay area produced as expected, the Cross Sound-Icy Strait fishery was mediocre, and the Bradfield-Anan area was poor.

The success of prediction based upon comparative fry densities observed in one area and applied in another must be classed as negative, especially when it is recognized that representative sampling certainly has not been attained in Southeastern Alaska to date.

Pre-emergent Fry Densities, 1964, 1965

It should be kept in mind that pink salmon pre-emergent fry sampling is concerned with production of fry from the brood of the previous calendar year. Thus, 1965 sampling data reveals that production of fry from eggs which were deposited in 1964, and for prediction purposes is concerned with adults destined to return in 1966.

The 1965 pre-emergent sampling densities were similar to those observed in 1964 and workers expected a return in 1966 in the same magnitude as occurred in 1965. The various ways the 1964 and 1965 fry densities were compared are presented below in Table 1.

Table 1 shows fry recovery for various categories of areas in 1964 and 1965.

TABLE 1

Area	Mean live fry or eggs per .1 sq. m 1964	1965
All areas sampled	20.1	17.8
Randomly selected areas only	21.4	21.1
Areas repeated in 1964 and 1965	20.9	22.4
All stream areas north of Frederick Sound	23.7	25.9
All stream areas south of Frederick Sound	17.8	13.7

Regardless of how the area fry densities are grouped (Table 1) there is little difference between 1964 and 1965. Escapement levels, however, that produced these fry densities in 1963 and 1964 were very different. For example, indexed parent escapement based on aerial surveys in the Juneau District for 1963 was 1,516,200 and for the same area in 1964 the escapement was only 467,700, one-third as much. Over-winter survival is one possible explanation of approximately equal fry density from such divergent escapements. Spawner distribution is another, since fry sampling in most cases was done only in those areas adjacent to the intertidal.

Figures 5, 6, 7 and 8 show the relative abundance of pink salmon fry recovered in 1965 by management district. Table 2 gives an alphabetical listing of all streams sampled in 1963, 1964, and 1965 and shows the number of samples per stream plus the results of the sample digging.

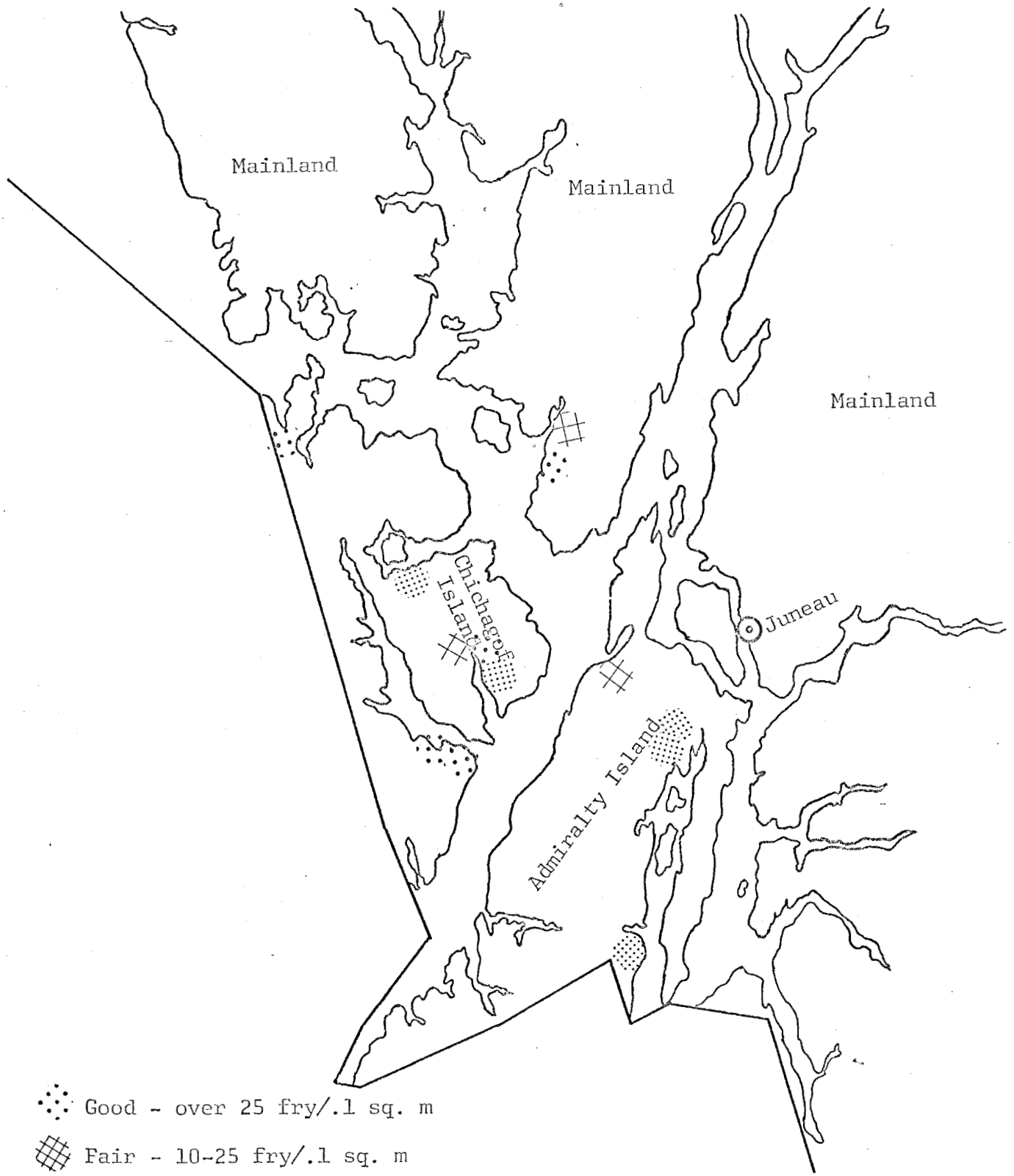

Figure 5. Pink salmon fry per .1 sq. m recovered in 13 streams, Juneau District, March, April, May, 1965.

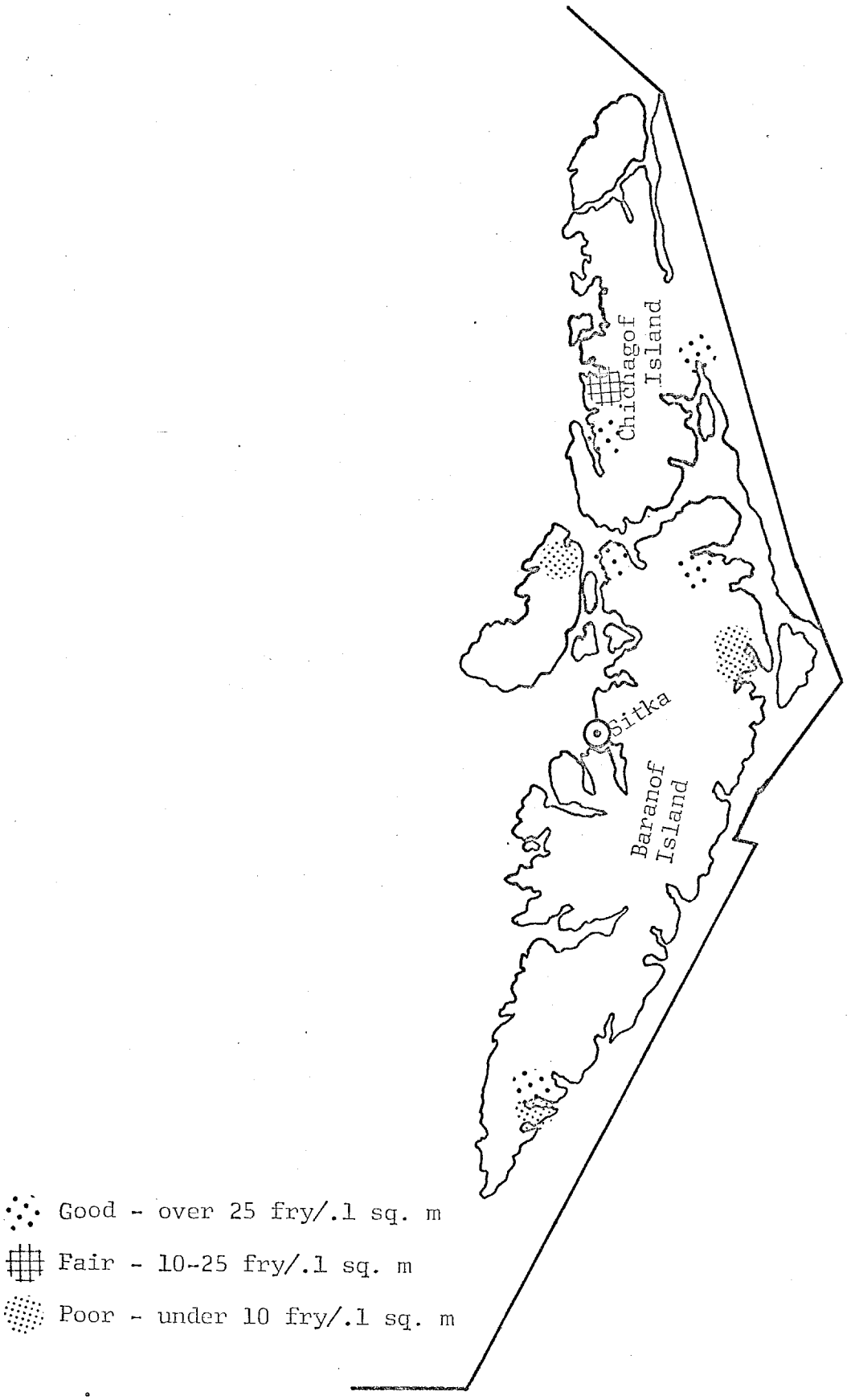

Figure 6. Pink salmon fry per .1 sq. m recovered in 10 streams, Sitka District, March, April, May, 1965.

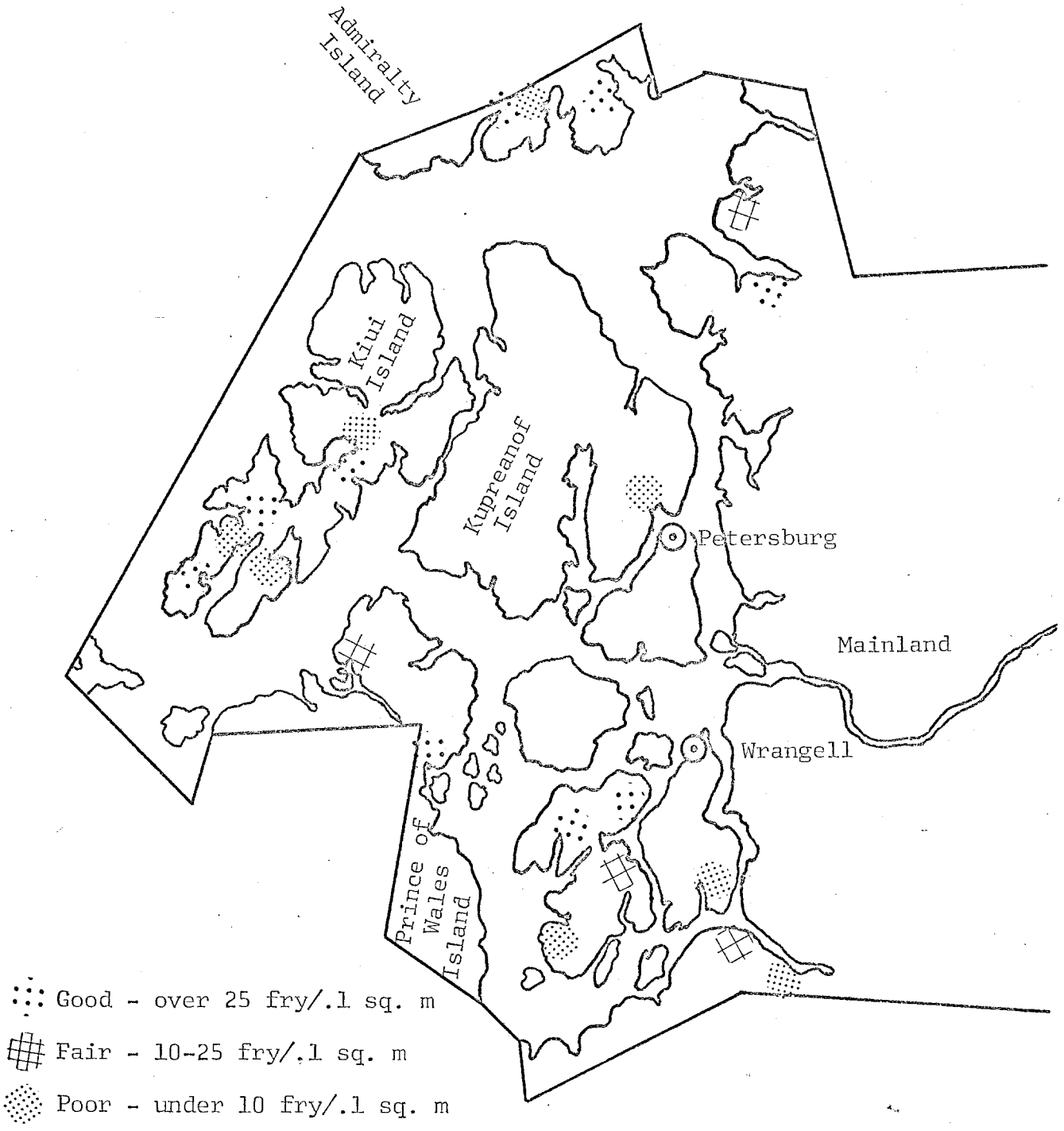

Figure 7. Pink salmon fry per .1 sq. m recovered in 21 streams, Petersburg District, March, April, May, 1965.

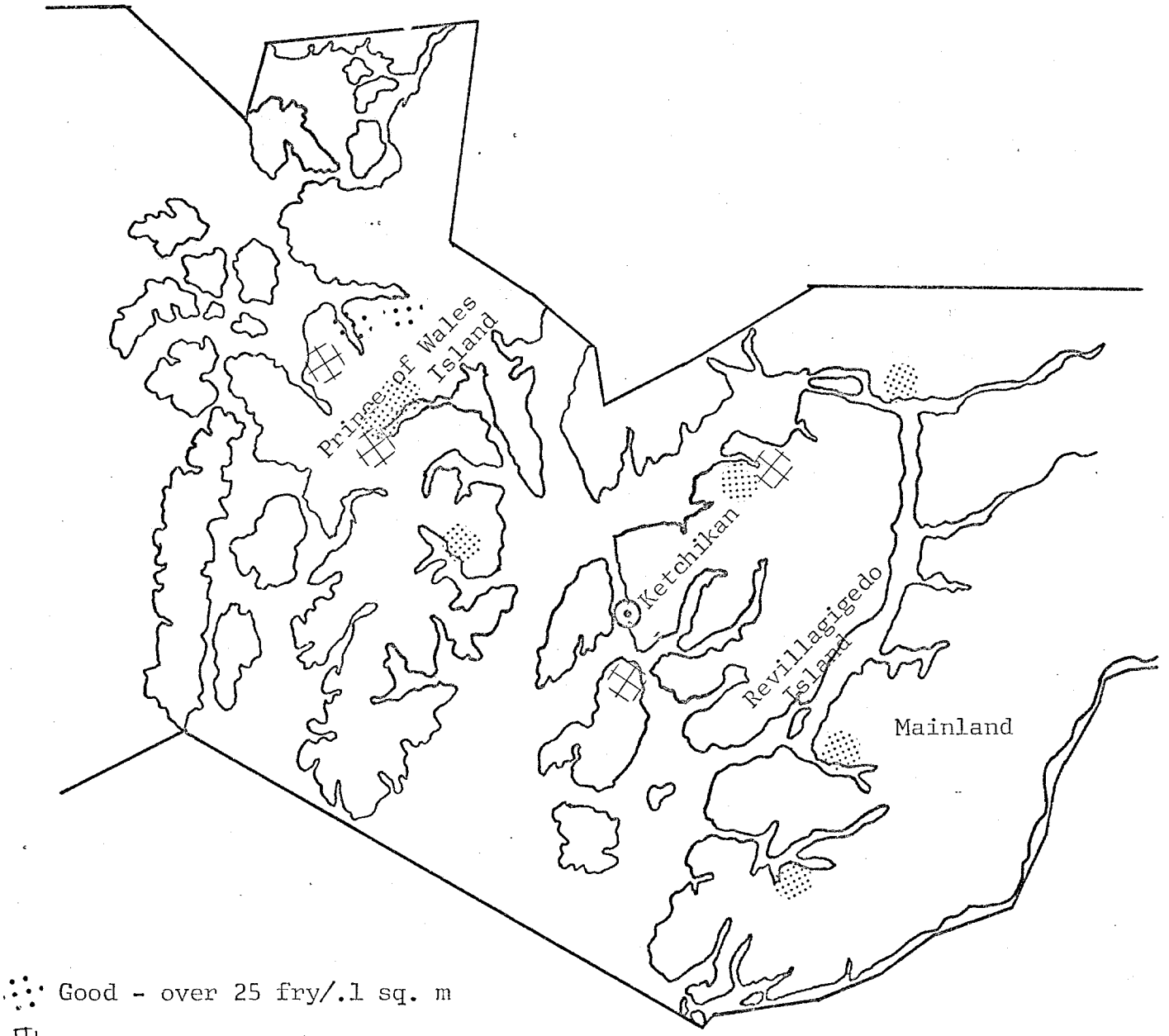

Figure 8. Pink salmon fry per .1 sq. m recovered in 13 streams, Ketchikan District, March, April, May, 1965.

Table 2. Pre-emergent fry densities observed in Southeastern streams; 1963, 1964 and 1965.

Stream Number	Name and Location	Sample Year	No. of Samples	Mean fry density per .1 sq. m Chum	Pink
44C	Alecks Creek, Tebenkof	1965	51	0	28.0
15	Anan Creek, Bradfield Canal, Mainland	1964	198	0	42.5
		1965	200	0	10.9
	Upstream No. 1	1965	20	0	4.8
	Upstream No. 2	1965	20	0	0.4
83	Bear Harbor, Affleck Canal	1965	35	0	4.5
K35	Cabin Creek, Smeaton Bay	1965	34	0	1.5
95	Calder Bay	1965	37	0	20.7
14A	Corner Bay, Tenakee Inlet, Chichagof Island	1964	30	0.0	17.9
		1965	28	0	31.7
K150	Disappearance Creek, Chomley Sound, Prince of Wales Island	1963	--	19.5	negligible
		1964	140	40.7	1.5
14	Eagle River, Bradfield Canal, Mainland	1964	38	0.0	6.0
		1965	40	0	6.6
	Upstream	1965	20	0	1.0
26	Eliza Bay, Admiralty Island	1964	27	0.0	6.7
1	Excursion Inlet	1965	20	0.2	52.9
2	Excursion Inlet	1965	40	0.0	23.0
27A	Fick Cove, Peril Straits, Chichagof Island	1964	45	1.4	28.8
23	Fools Inlet, Wrangell Island	1964	27	0.0	0.4
		1965	24	0.0	1.4
24	Fools Inlet, Wrangell Island	1964	33	0.0	8.8

Table 2 (continued)

4	Freshwater Bay, Chichagof Island	1964	25	0.0	30.9
		1965	22	0.0	20.4
4B	Freshwater Bay, Chichagof Island	1964	8	0.0	22.4
		1965	12	0.0	33.2
4C	Freshwater Bay, Chichagof Island	1964	15	0.0	20.4
		1965	15	0.0	0.0
19	Gambier Bay, Admiralty Island	1964	56	0.9	8.5
		1965	40	0.6	30.9
K176	Harris River, Kasaan Bay, Prince of Wales Island				
	Area 1A	1963	103	negligible	negligible
		1964	20	0.0	0.0
		1965	17	0.0	0.0
	Area 1B	1963	50	0.0	15.5
		1964	50	0.0	10.7
		1965	49	0.0	18.7
	Area 2A	1964	33	0.0	2.0
		1965	50	0.0	0.8
	Area 2B	1963	51	0.0	7.5
		1964	25	0.0	1.2
		1965	50	0.0	7.0
43	Hawk Inlet, Admiralty Island	1964	40	3.6	38.0
		1965	28	4.5	12.9
K50	Herman Creek, Yes Bay	1965	20	0.0	5.4
WC12	Hetta Inlet, Prince of Wales Island	1964	32	14.4	44.2
WC14	Hetta Inlet, Prince of Wales Island	1964	28	0.0	35.4
4B	Hobart Bay, Mainland	1964	130	7.1	9.6
		1965	40	0.0	21.6

Table 2 (continued)

24	Hoonah Sound, Peril Straits, Chichagof Island	1964	50	0.0	40.5
		1965	50	0.0	40.1
25	Hoonah Sound, Peril Straits, Chichagof Island	1964	30	0.0	25.8
K21	Humpback Creek, Revillagigedo Island				
	Upstream	1964*	5	0.0	57.9
		1965	10	0.0	2.3
	Downstream	1964	195	0.0	9.4
		1965	180	0.0	7.4
36	Kalinin Bay	1965	26	0.6	2.7
84	Kell Bay	1965	40	0.0	0.0
39	Kelp Bay	1964	48	0.0	28.5
41	Kelp Bay, Baranof Island	1964	85	11.0	27.9
12	King Salmon, Seymour Canal, Admiralty Island				
	Area I	1964	20	0.0	39.4
		1965	20	0.0	0.0
	Area II	1964	20	0.0	0.2
		1965	20	0.0	0.0
WC5	Klakas Inlet, West Coast Prince of Wales Island	1964	14	0.0	2.4
WC6	Klakas Inlet, West Coast Prince of Wales Island	1964	13	2.4	5.9
WC39	Klawak Creek, West Coast Prince of Wales Island	1964	24	0.0	25.7
		1965	40	1.8	36.4
K154	Lagoon Creek, Chomley Sound, Prince of Wales Island	1964	20	0.0	22.4

Table 2 (continued)

49A	Lovers Cove, Port Walter, Baranof Island	1963	65	0.2	8.8
		1964	50	3.6	18.5
		1965	81	0.0	29.7
K85	Margaret Creek, Traitors Cove	1965	20	1.5	5.3
34	McHenry Inlet, Etolin Island	1964	24	0.0	5.3
		1965	24	0.0	5.2
35	McHenry Inlet, Etolin Island	1964	35	0.0	3.6
38	Mosman, Etolin Island	1964	20	19.3	1.4
		1965	20	0.0	38.7
K112	Nadzaheen, Annette Island	1964	51	0.0	34.5
		1965	40	0.1	24.6
26B	Nakwasina, Sitka Sound, Baranof Island	1964	25	0.0	87.6
K163	Old Tom Creek, Kasaan Bay, Prince of Wales Island	1963	50	4.0	7.3
		1964	33	6.0	0.3
55	Petersburg Creek, Kupreanof Island	1964	20	0.0	3.0
		1965	20	0.0	8.8
16	Pleasant Bay, Seymour Canal, Admiralty Island	1963	18	0.0	42.7
		1964	45	0.0	21.6
		1965	40	negligible	9.0
11	Port Althrop	1965	40	negligible	9.0
78	Port Beauclerc	1965	19	0.0	3.4
17	Port Frederick	1965	40	8.0	6.5
5	Port Houghton, Mainland	1964	41	0.0	5.3
		1965	15	4.4	44.1
WC37	Port St. Nicholas, West Coast, Prince of Wales Island	1964	56	0.0	21.7
		1965	70	1.2	19.4
22A	Pybus, Admiralty Island	1964	15	negligible	1.5

Table 2 (continued)

23	Pybus, Admiralty Island	1964	25	0.0	0.2
		1965	24	7.4	10.1
33	Rodman Creek, Peril Straits, Baranof Island	1964	76	0.0	43.8
		1965	40	0	43.4
28B	Salisbury Sound	1965	16	0	27.9
49	Sashin Creek, Baranof Island	1964	128	negligible	32.2
		1965	454	0	4.5
43	Sisters Lake	1965	40	10.2	11.3
1B	Slocum Inlet, Mainland	1964	25	0.0	4.1
29	Snake Creek, Olive Cove, Etolin Island	1963	45	0.0	7.3
		1964	60	0.0	5.7
		1965	40	0.0	15.5
K156	Sunny Creek, Chomley Sound,	1964	16	0.0	91.4
		1965	25	0.0	8.5
20	Starrigavan, Baranof Island	1964	55	0.0	14.8
44	Tebenkof	1965	40	0.0	0.3
44D	Tebenkof	1965	22	3.4	28.6
WC36	Tracadero, West Coast of Prince of Wales Island	1964	36	0.0	26.5
K84	Traitors Cove, Revillagigedo Island				
	Area 20	1963	100	6.2	13.5
	Area 24	1963	100	17.1	19.8
	Area 20	1964	99	0.1	58.2
	Area 24	1964	100	33.3	10.1
		1965	35	4.7	19.6
14B	Trap Bay	1965	26	0.0	59.6

Table 2 (continued)

K175	Twelvemile Cr., Kasaan Bay, Prince of Wales Island				
	Area I	1963	50	negligible	5.3
	Area I	1964	50	0.0	2.0
		1965	54	0.0	17.4
27	Ushk Bay, Peril Straits, Chichagof Island	1964	12	0.0	28.5
28	Ushk Bay, Peril Straits, Chichagof Island	1964	20	0.0	46.6
40	Waterfall Creek, Slocum Arm	1965	56	0.0	36.9
108	Whale Pass, Prince of Wales Island				
	Area GS-1	1964	50	0.0	24.7
		1965	20	0.0	45.5
	Area GS-2	1964	50	0.0	13.2
		1965	30	0.0	15.0
	Area GS-3	1963	35	0.0	12.9
		1964	50	5.4	3.1
		1965	20	0.0	18.2
	Between GS-1, GS-2	1964	40	2.1	21.1
14	Windfall Harbor, Seymour Canal, Admiralty Island	1963	60	1.4	5.6

*Area sampled immediately below barrier to salmon migration; not included in survey evaluation.

Note: Sampling effort based on 40 digs of .19 sq. m per 4,048 sq m. Deviation from this sample size occurs when other programs or other sources of data are concerned.

DISCUSSION

Sufficient information is not available with the present state of the program development to relate pre-emergent fry densities to adult pink salmon return. From our sampling, however, some comment might be made regarding the 1966 pink salmon return to the fishery. To make any statement of this type we must assume (1) that our sampling covers representative fry producing areas and (2) that the number of fry produced in Southeastern Alaska is related to the adult pink salmon return as expressed by catch. If these assumptions are correct or nearly so, then the similar pre-emergent fry abundance observed in 1964 and 1965 should result in similar adult returns. This would mean that the 1966 return to the fishery should be in the magnitude of 10-11 million pink salmon in all Southeastern Alaska.

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