

Informational Leaflet

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FORECAST RESEARCH ON 1967 COOK INLET AREA

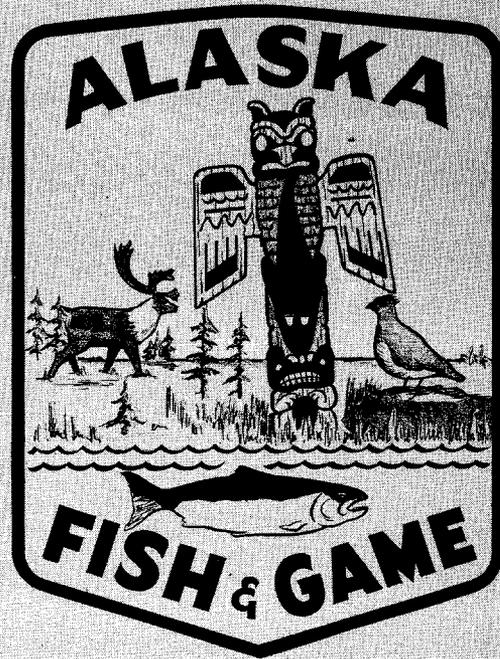
PINK SALMON FISHERIES

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INTRODUCTION

Pre-emergent pink salmon fry sampling was started in 1963 in the Southern portion of the Cook Inlet area. Ten streams in the area from Kachemak Bay to Port Dick Bay were selected for the initial sampling program. Figure 1 shows the location of the study streams. The commercial fishery in the study area consists mainly of hand purse seines with a few scattered set nets in the Kachemak Bay area.

1966 Prediction Results

This will be the second year that a numerical prediction will be published for the Southern and Outer Districts of Cook Inlet. The 1966 predicted return based on pre-emergent fry density amounted to 1.3 million pink salmon in both catch and escapement. The actual total return in 1966 (catch plus escapement) was 911,000 pinks. The commercial fishery in the Southern and Outer Districts caught 569,400 pink salmon. The total estimated pink escapement for the major streams in the study area amounted to 266,000. Due to lack of tender service in the Outer District, 75,600 pink salmon were reported as dead loss.

The 1966 prediction of 1.3 million represents a 30 percent error (relative to the forecast) over the actual return of 911,000 pink salmon. In view of the short duration of the pre-emergent fry sampling program, and consequently the limited data, this magnitude of error is not unreasonable, and, in fact, the prediction did provide additional basis on which the management and fishing industry could plan its operations. It should be emphasized, however, that due to the limited nature of this data, and until more data is available, considerably larger errors could occur in future forecasts.

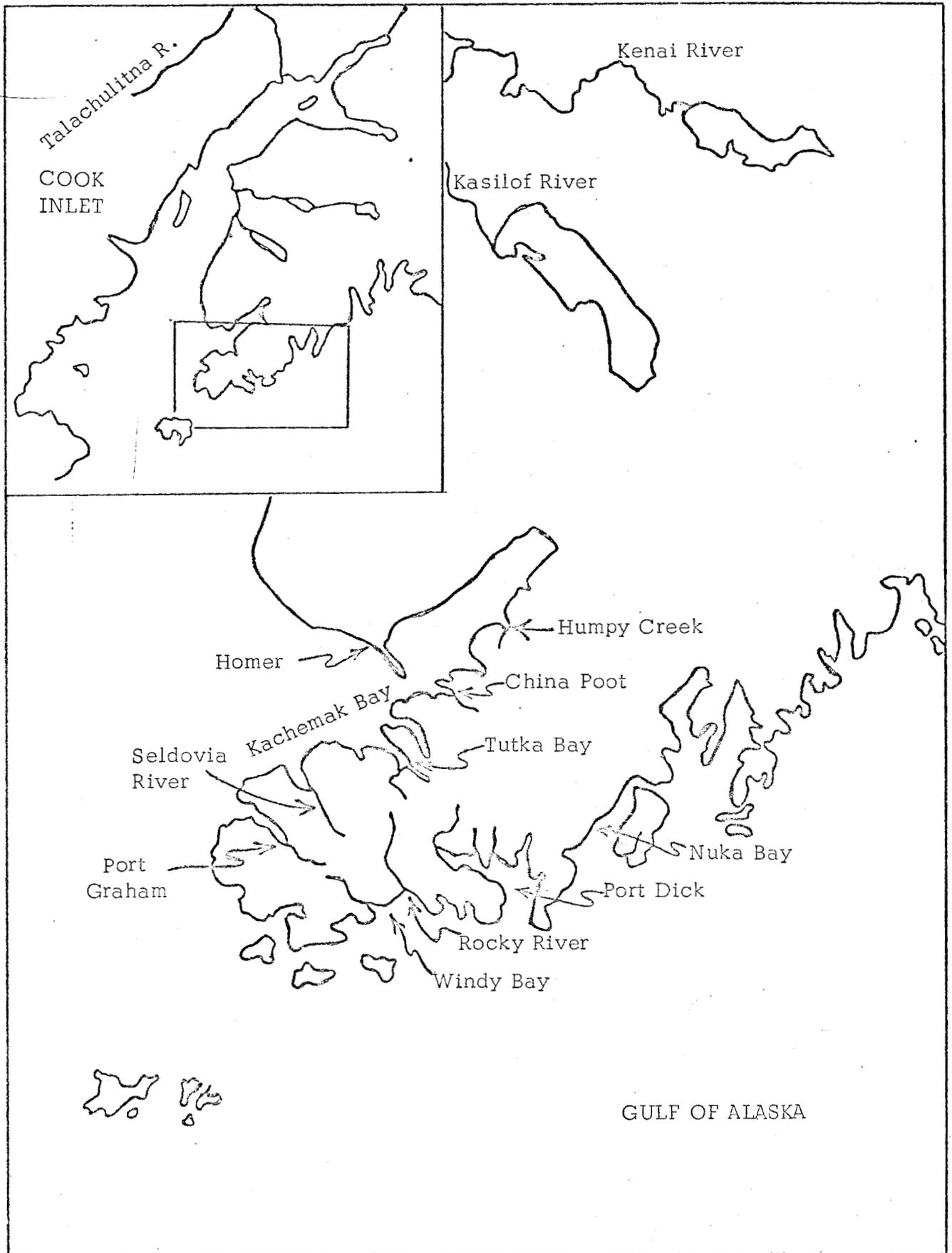


Figure 1. Cook Inlet Pink Salmon Study Stream Locations.

Summary of the 1967 Prediction

Pre-emergent fry sampling of the 1965 brood stock, which is the parent year of the 1967 return, resulted in an overall pre-emergent fry density per square meter of 96.8 (Table 1).

Table 1. Summary of Pink Salmon Catches, Escapements, Pre-emergent Fry Densities and Returns for the Years 1962-1966

Spawning Year	Catch	Stream Esc. Index	Weighted ¹ Pre-emergent Fry Density	Return (year) Catch and Escapement
1962	2,113,570	466,000	217.8	1,306,185 (1964)
1963	121,026	97,684	36.3	255,000 (1965)
1964	1,033,885	272,300	188.4	911,000 (1966)
1965	112,200	142,800	96.8	500,000 ² (1967)

1 - Fry density indices are derived from seven streams in which comparable annual data is available. Weighting factors are based on average escapements to these streams.

2 - 1967 prediction (catch plus escapement).

Figure 2 shows the pre-emergent fry versus total return relationship for the three years that data is available. The indicated return from this data is approximately 530,000 pink salmon. Figure 3 shows the escapement versus return relationship for the years 1962 through 1966. When the 1965 escapement, which is the parent year of the 1967 return, is compared with the previous years, the expected return is approximately 420,000. On the basis of the above results, the pink salmon return for the Southern and Outer Districts of Cook Inlet should be approximately 500,000 fish (giving double weight to the forecast from later-stage pre-emergent fry sampling). The total escapement goal for the streams in the Southern and Outer Districts is 250,000 fish, leaving 250,000 pink salmon available for harvest in 1967.

Figure 2. Cook Inlet Pink Salmon, Return vs. Pre-emergent Fry Index
(Numbers by plotted points represent "brood year/year of return".)

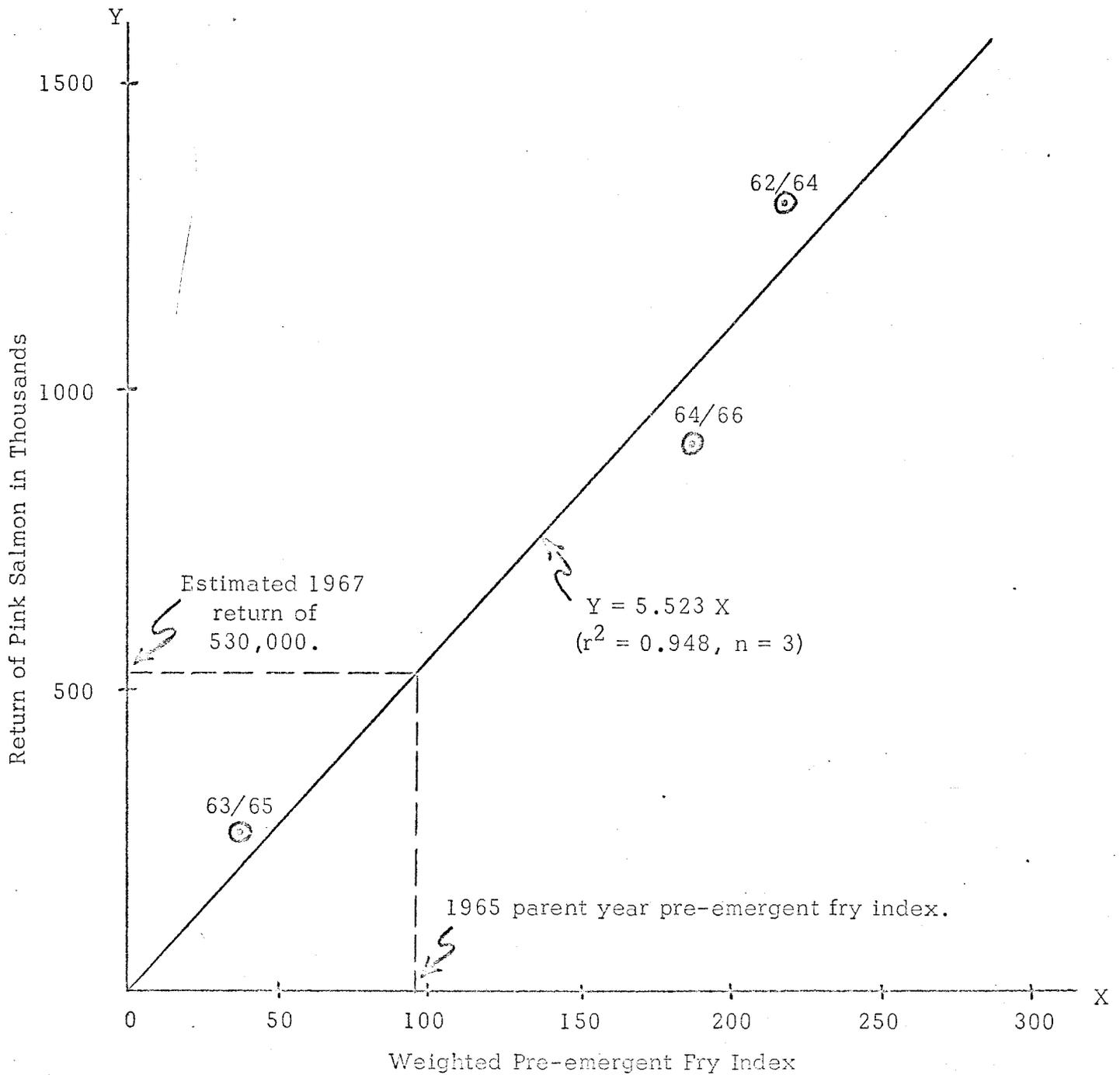
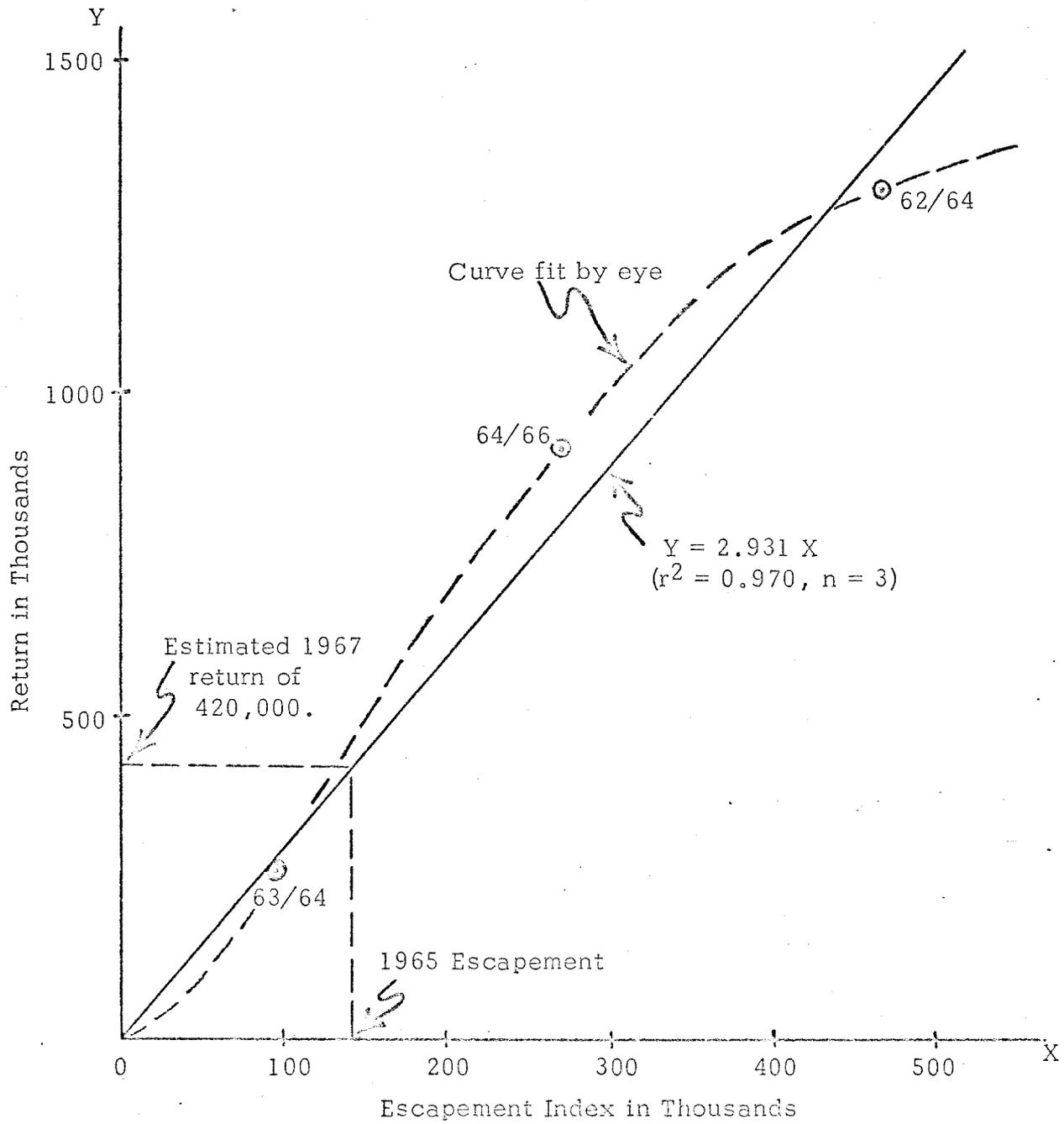


Figure 3. Cook Inlet Pink Salmon, Escapement-Return Relationship
 (Numbers by plotted points represent "brood year/year of return".)



Interpretation of Pre-emergent Fry Data

When the original sampling scheme for the Southern and Outer Districts was set up, ten streams were selected for sampling. Of these ten streams, only seven were successfully sampled in the first two years of digging. For this reason, data from the seven sampled streams are the only densities utilized for the prediction. Pre-emergent fry density information from the streams not included in the analysis is presented in Table 2 for comparison purposes.

The factor utilized for weighting the pre-emergent fry densities is the average escapement for the particular stream. Utilization of the average escapement weighting factor places relative production importance on the pre-emergent fry densities.

Methods and Means of Sampling

Pre-emergent fry sampling methods in the Cook Inlet area are essentially the same as used in other regions of the State. A packboard mounted Homelite water pump with a discharge of 4200 gallons per hour is used for the power source. On the end of the discharge hose is attached a venturi nozzle which mixes air and water. The nozzle is pushed into the gravel and the air-water mixture forces the fry out of the gravel and into the current. The fry are swept downstream and collected in a net attached to the sampling screen. The sampling screen is circular in shape and two square feet in area. Catches of fry are expressed in number of fry per square meter for purposes of this report.

The number of samples collected in a stream is dependent on the amount of spawning area utilized by the salmon. Approximately one sample is dug for every 100 square meters of utilized spawning area. The spawning areas for the individual streams were measured by transit surveys during spawning seasons. Table 3 lists the utilized spawning area for the study streams.

Catch and Escapement Estimates for 1965

Catch information is derived from the statistical compilation of the fish tickets as reported by the individual fishermen. Table 4 lists the 1965 pink catches by bay and gear for the Southern and Outer Districts.

Table 2. Cook Inlet Pink Salmon Pre-emergent Fry Data

Stream	Ave. Escap. ($\times 10^3$)	Fry per m^2			
	1962-1965	1962	1963	1964	1965
Humpy <u>1/</u>	34	118.4	86.4	199.1	245.7
Tutka <u>1/</u>	20	139.9	72.3	195.8	154.7
Seldovia <u>1/</u>	41	231.4	84.3	284.1	151.3
Pt. Graham <u>1/</u>	18	279.9	(40.0) ^{2/}	242.1	40.5
Windy L.				100.1	21.2
Windy R.				75.3	48.4
Rocky <u>1/</u>	73	(284.0) ^{3/}	0.0	131.3	(0.0) ^{6/}
Pt. Dick <u>1/</u>	33 ^{4/}	240.0	5.4	222.7	149.6
Island <u>1/</u>	22	113.0	0.0	80.7	0.0
China Poot					244.3
Total	241				
Weighted Averages <u>5/</u>		<u>217.8</u>	<u>36.3</u>	<u>188.4</u>	<u>96.8</u>

- 1/ Used only these streams when calculating weighted averages.
- 2/ Given same value as 1965 because of similar escapements.
- 3/ Used largest density observed because of large 1962 spawning density in Rocky River.
- 4/ 1963-65 average.
- 5/ Stream fry densities weighted by average escapement.
- 6/ Estimated zero fry density since escapement was estimated to be only 300 spawners.

Table 3. Pink Salmon Escapement, Southern and Outer Districts of Cook Inlet, 1962-1965.

	Utilized m ² Spawning Area	1962	1963	1964	1965
Humpy	19,700	56,000 ¹	34,684 ¹	18,500 ¹	28,000 ¹
Tutka	4,600	30,000	10,000	20,000	20,000
Seldovia	12,000	50,000	15,000	60,000	30,000
Pt. Graham	8,000	50,000	2,000	16,000	1,500
Windy Left	4,700)	25,000	4,500	7,700	10,000
Windy Right	4,700)		4,900	6,200	2,000
Rocky ²		200,000	12,000	80,000	300
Port Dick	7,600)	55,000	16,000	31,500	50,000
Island	3,600)		3,600	30,000	500
Middle	1,500)		1,500	2,000	500
Totals		466,000	97,684	272,300	142,800

1 - Weir Count

2 - Not Measured

Table 4. Catches of Pink Salmon by Gear and by Bay for the Southern and Outer Districts in 1965

Bay	Hand Purse Seine	Set Net
Kachemak Bay	13,577	520
Tutka Bay	39,025	5,574
Seldovia Bay	18,747	194
Port Graham Bay	9,510	550
English Bay	2,224	399
Chugach Bay	877	
Rocky Bay	141	
Windy Bay	5,435	
Port Dick Bay	15,337	
Gear Totals	104,853	7,237
Grand Total Catch		112,090

Total escapement estimates are derived from foot and aerial surveys of spawning pink salmon taken at various intervals during the spawning period. The total escapement figures are determined by graphing the available daily counts of pink salmon in the streams and calculating the area under the graph. This figure is then divided by the estimated time the pink salmon are present in the stream, which averages 2.5 weeks.

Other Studies

Gravel shift and freezing level indicators were described in Alaska Department of Fish and Game Informational Leaflet No. 65 (Davis, 1965). Humpy Creek, Tutka Creek, Seldovia River, Port Dick Creek and Island Creek were checked for mortalities of these types during the winter of 1965-66. The results of this work are as follows:

Humpy Creek - The only portion of this stream checked for gravel shift or freezing mortality was the extreme upper spawning area. Gravel shift and freezing level indicators were not disturbed and live pre-emergent fry were observed in the sample area, indicating that mortalities of these types were negligible.

Tutka Creek - The intertidal spawning area is split into four channels and pink salmon utilized all channels for spawning purposes during the 1965 spawning season. During the winter months, surface water ceased to flow in three of the tributaries and no intergravel water could be located during the pre-emergent fry sampling in those tributaries. Freezing vials in the dried up areas were all broken. It is assumed that extensive freezing mortality occurred in the waterless gravel; however, the fry density in the wet areas was above the odd year average.

Seldovia River, Port Dick Creek, Island Creek - Gravel shift and freezing level indicators from these three streams were not disturbed, and it is assumed that mortality from those sources was not prevalent in the sampled areas.

Northern Cook Inlet Pink Salmon Studies

The Northern, North Central, and South Central Districts of Cook Inlet produce large numbers of pink salmon, especially during the even

numbered years. Pre-emergent fry sampling has been attempted in the Talachulitna River (Figure 1) which is one of the major pink salmon streams in the Northern District. Due to ice and high water conditions the sampling has not been successful. No numerical predictions will be published for the 1967 season. A review of the past ten years catch figures show that less than 30,000 pink salmon can be expected to be harvested from the three northern Cook Inlet districts (Rearden, 1965).

Pre-emergent Fry Distribution in the Southern and Outer Districts

Table 2 compares the pre-emergent fry densities for the streams in the Southern and Outer Districts of Cook Inlet. These data indicate the streams that will produce the majority of the pink salmon for the 1967 return. It appears the bulk of the returning pink salmon will be available for harvest in the Kachemak Bay and Port Dick regions. The 1967 escapement goal for streams in the Southern and Outer Districts is 250,000 pink salmon.

Pink Salmon Predominant Cycle Years

Figure 4 illustrates the Southern and Outer Districts' catch for the years 1955 through 1966 and the total escapement to streams in the area for the years 1963 through 1966. It is interesting to note that in the mid-fifties the dominant cycle year was the odd year. The catch in 1958 was four times larger than its parent year catch. At this point in the fishery history the dominant cycle year changed to the even year and the even-year dominance has continued to the present.

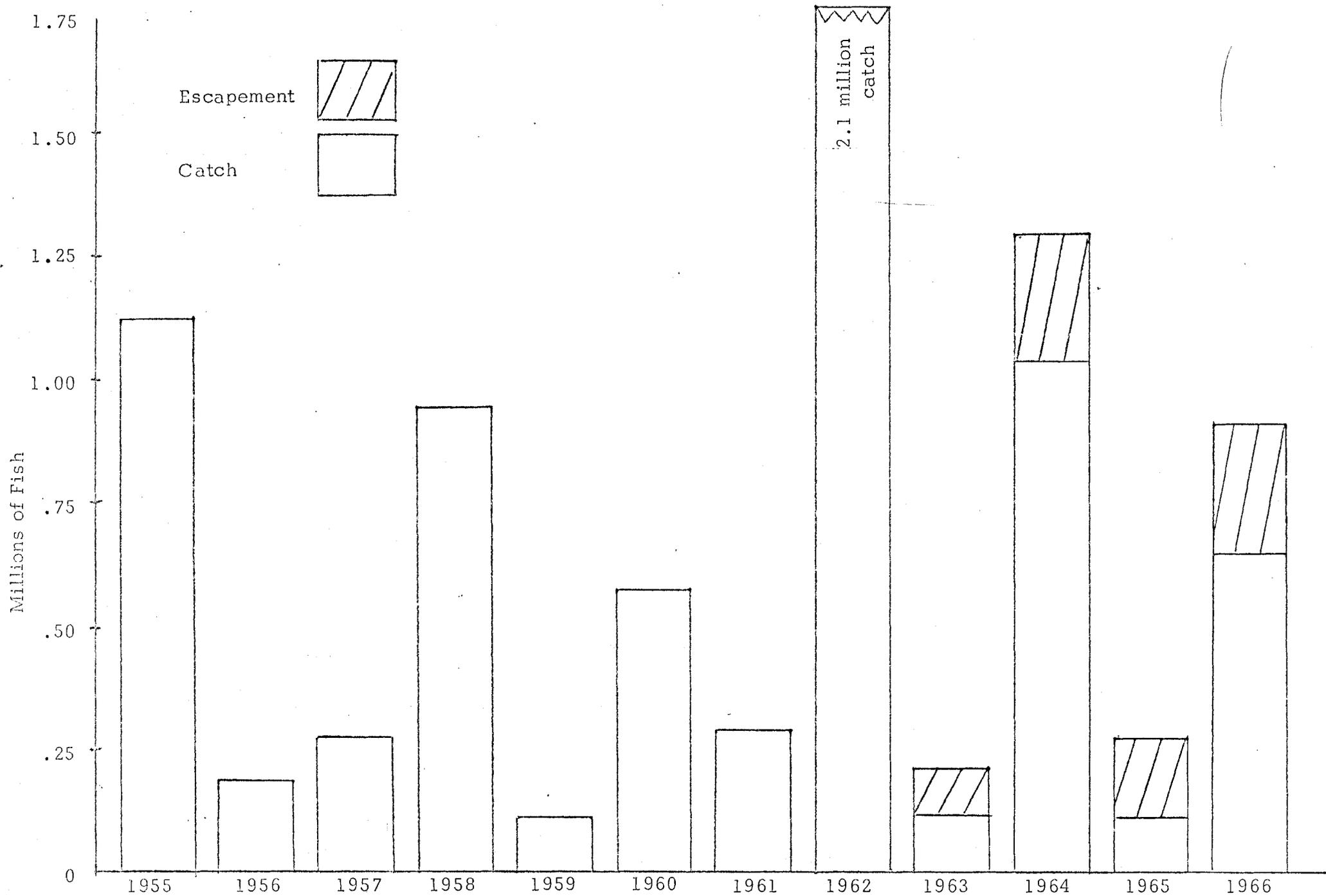


Figure 4. Southern and Outer Districts Catch (1955-66) and Escapement (1963-66).

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