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PRELIMINARY FORECASTS AND PROJECTIONS FOR 1980
ALASKAN SALMON FISHERIES

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ABSTRACT

In 1979 commercial fishermen harvested 86 million salmon in Alaska, the largest catch since 1943. Statewide, the salmon harvest increased for the fifth consecutive year.

A commercial harvest of 103 million salmon is projected for Alaska in 1980. The catch is not expected to be less than 60 million, nor to exceed 130 million fish. Based on projection experience since 1970, only 1 of 4 realized harvests would fall outside this range.

A very large harvest of sockeye and pink salmon is anticipated in Bristol Bay, and more pink salmon are expected to return to Kodiak Island and the south side of the Alaska Peninsula. Significantly decreased salmon harvests are anticipated in Cook Inlet, Prince William Sound, and Southeastern Alaska areas.

INTRODUCTION

This report reviews Alaska's 1979 commercial salmon season and presents preliminary salmon return forecasts and harvest projections for 1980 commercial salmon fisheries. The report is released in December, before final catch figures are available, to provide preliminary information to the Board of Fisheries, the fishing industry, and the public well before the season begins.

Projections of statewide commercial salmon harvests have been published yearly by the Alaska Department of Fish and Game since 1969 (ADF&G; 1969-1979). Table 1 summarizes the accuracy of these projections. On the average, the projections have been too low by 2.8 million fish, or 6% of the average harvest of 48 million fish. Without regard to sign, the mean error is 12 million fish; 25% of the average harvest. Projection errors result from inadequate or lacking knowledge of salmon escapements, numbers of juveniles produced, and early marine survival.

The Department's salmon harvest projections have fallen short of realized harvests every year since 1974, when the statewide salmon catch dropped to 22 million fish. Beginning in 1975, every year's harvest has been an improvement over the last; the 1979 statewide catch of more than 86 million salmon, the fifth consecutive catch increase, was also the largest since 1943. Viewed against this phenomenal recovery, the Department's recently conservative forecasts, which certainly did not seem conservative when announced, are at least understandable. The 1980 projection of 103 million salmon may appear more speculative than conservative, predicting the sixth consecutive increase and the fifth-largest catch in history.

Glossary

Salmon return or run:	The total number of mature salmon returning in a given year from ocean rearing areas to coastal waters.
Escapement, spawning population or brood stock:	That portion of a salmon run which is not harvested and survives to reach the spawning grounds.
Forecast:	Forecast harvests and returns are calculated using information such as parent-year escapements, subsequent fry abundance, spring sea water temperatures and escapement requirements.

Harvest Projection: Harvest projections are averages of recent harvests. They may be modified subjectively when qualitative escapement or other relevant information is available. Only harvests are projected, and harvest projections are given only for salmon runs which are not forecast.

TABLE 1. PROJECTED AND REALIZED ALASKA COMMERCIAL SALMON HARVEST, WITH ABSOLUTE AND RELATIVE ERRORS, 1970-1979

	Millions of fish			
Season	(1) Projected harvest	(2) Actual harvest	(3) Error: (1) - (2)	(4) Relative Error (% of Actual Harvest) (3)/(2) X 100%
1970	91.5	68.5	23.0	34%
1971	41.5	47.5	-6.0	-13%
1972	46.7	32.0	14.7	46%
1973	30.0	22.3	7.7	35%
1974	15.6	21.8	-6.2	-28%
1975	19.9	26.2	-6.3	-24%
1976	37.1	44.4	-7.3	-16%
1977	34.7	50.8	-16.1	-32%
1978	62.9	80.2 a/	-17.3	-22%
1979	72.0	86.4 b/	-14.4	-17%
TOTAL	451.9	480.1	-28.2 (119.0) c/	
1970-79 Average	45.2	48.0	-2.8 (11.9) c/	-6% (25%) c/

a/ Preliminary data. Compiled 11/30/78.
b/ Preliminary data. Compiled 11/23/79.
c/ Values in parentheses are the sum or average of errors without regard to sign.

Alaska Pacific Salmon Species

Common Name	Scientific Name
chinook, king	Oncorhynchus tshawytscha
sockeye, red	Oncorhynchus nerka
coho, silver	Oncorhynchus kisutch
pink, humpy, humpback	Oncorhynchus gorbuscha
chum, dog	Oncorhynchus keta

Brood years of salmon returning to spawn in 1980, by species and age[a/]

Species	Age of Returning Salmon in Years				
	2	3	4	5	6
Pink	1978				
Chum		1977	1976		
Coho		1977	1976		
Sockeye			1976	1975	1974
Chinook			1976	1975	1974

a/ The brood years listed for each species generally comprise more than 90% of the run.

The boundaries of and major fishing areas within the Southeastern, Central, and Western statistical regions are shown in Figure 1. These regions and areas are the ones used in the Department's statistical leaflet series and in prior statistical reports.

Acknowledgments

Information on which this report is based was contributed by Division of Commercial Fisheries biologists located in field offices throughout the state. Area biologists, not individually identified, supplied reviews of the 1979 fishing season. Individual credit for forecast material is given with the area forecast discussions in the Appendix.

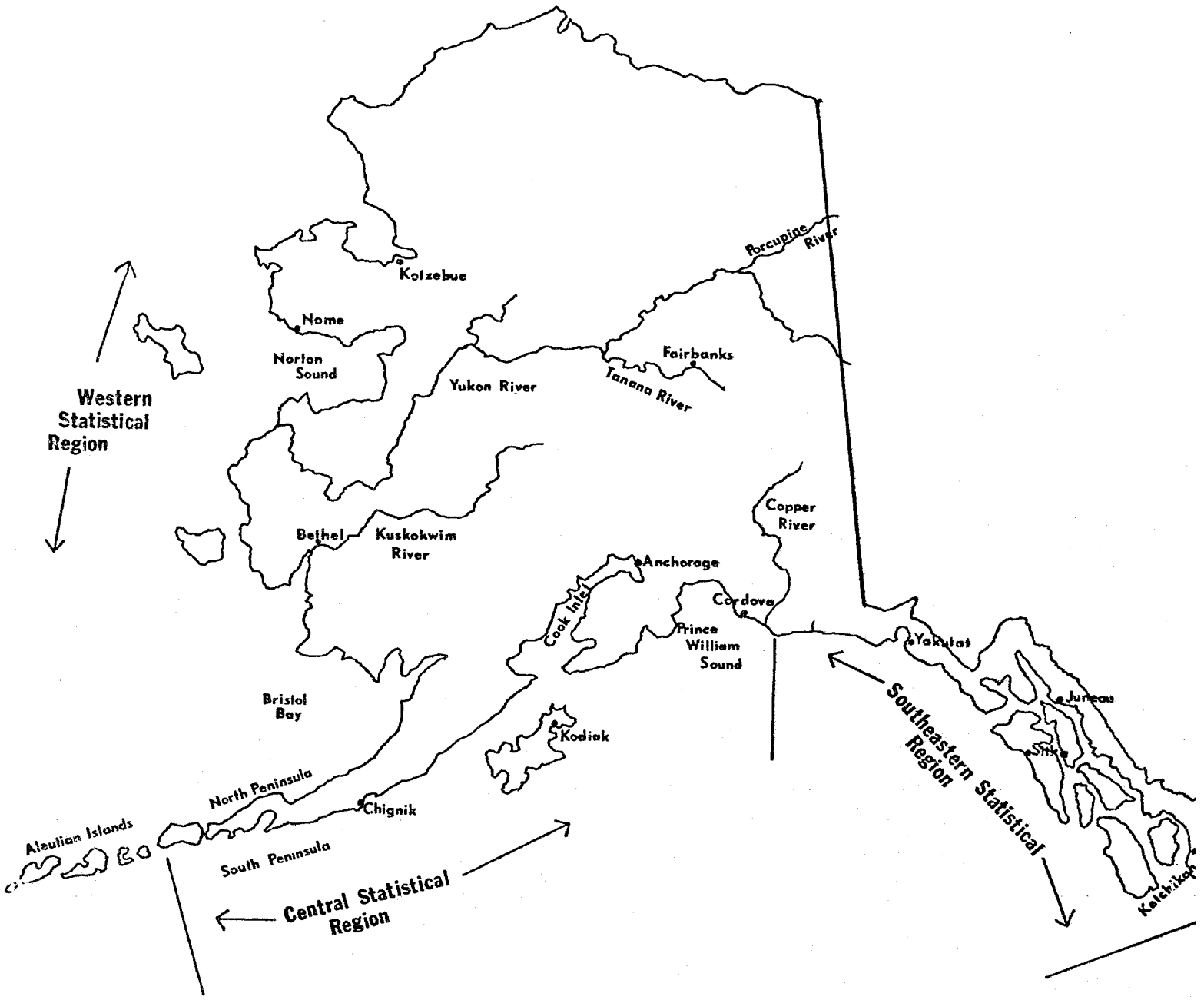


Figure 1. Alaska Department of Fish and Game Commercial Fisheries Statistical Regions.

REVIEW OF THE 1979 SEASON

A preliminary estimate of the 1979 commercial salmon harvest in Alaska is 86.4 million fish. The catch was again above the Department's projection of 72 million fish, issued late in 1978, but within the projected harvest range of from 50 to 100 million. It was the fifth consecutive harvest increase, and the largest commercial salmon catch since 1943.

For the state as a whole, catches of all species except chum salmon exceeded expectations. Chum harvests were close to projections in western Alaska, but 20% below the projection in central Alaska and 40% down in Southeastern Alaska. Impressive returns of sockeye salmon to Bristol Bay and the South Peninsula boosted sockeye harvests in western Alaska nearly 70% over the projection. Coho harvests were also larger than expected, particularly in central and western Alaska. Pink salmon runs were disappointing in southern Southeastern Alaska, but unexpectedly large in Prince William Sound, allowing a record pink salmon harvest in that area. Table 2 compares actual and forecast 1979 salmon returns for selected fisheries, and Table 3 details preliminary estimates of the 1979 salmon harvest by species and area.

TABLE 2. COMPARISON OF ACTUAL[a] AND FORECAST 1979 SALMON RETURNS, WITH ERRORS AND RELATIVE ERRORS, FOR SOME MAJOR ALASKAN SALMON FISHERIES

		Thousands of fish					
		(1)	(2)	(3)	(4)	(5)	(6)
Area	Species	Harvest[a]	Escapement[a]	Return[a] (1) + (2)	Forecast return	Error: (4) - (3)	Relative Error: (5)/(3) X 100%
Southern Southeastern	Pink	6 364	4 003	10 367	15 400	5 033	49%
Northern Southeastern		3 840	4 871	8 711	9 200	489	6%
Southeastern Total		10 204	8 874	19 078	24 600	5 522	29%
Prince William Sound	Pink	15 378	3 022	18 400	8 400	-10 000	-54%
	Chum	324	76	400	360	-40	-10%
Cook Inlet-Southern and Outer Districts	Pink	2 939	568	3 507	1 650	-1 857	-53%
Kodiak	Pink	10 756	2 783	13 539	13 400	-139	-1%
Chignik	Sockeye	1 027	738	1 765	2 100	335	19%
	Pink	2 017	783	2 800	2 600	-200	-7%
Bristol Bay	Sockeye	21 429	18 441	39 870	22 700	-17 170	-43%
	Pink[b]						
South Peninsula	Pink	6 264	2 700	8 964	9 500	536	6%
Total		70 338	37 985	108 323	85 310	-23 013	-21%

[a] Preliminary data, compiled 11/9/79
[b] Pink salmon returns to Bristol Bay are negligible in odd-numbered years.

TABLE 3. PRELIMINARY 1979 ALASKA COMMERCIAL SALMON HARVEST BY SPECIES AND FISHING AREA[a/].

(Number of fish in thousands)

MANAGEMENT AREA	SPECIES					
	Chinook	Sockeye	Coho	Pink	Chum	All
Southern Southeast						
Portland Canal gill net	3.3	91.5	6.0	69.3	59.8	229.9
Prince of Wales Island gill net	2.7	66.1	31.2	647.4	34.2	781.6
Stikine River gill net	0.1	2.2	0.2	13.5	1.1	17.1
Southern districts seine	5.4	283.5	104.6	5 196.8	159.6	5 749.9
Annette Island trap	0.4	33.1	4.8	237.4	10.2	285.9
Southern Southeast total	11.9	476.4	146.8	6 164.4	264.9	7 064.4
Northern Southeast						
Taku-Snettisham gill net	3.8	123.9	15.5	147.5	59.5	350.2
Lynn Canal gill net	3.1	194.2	26.2	28.4	231.1	483.0
Yakutat gill net	4.2	166.4	95.4	152.0	7.3	425.3
Northern districts seine	0.8	34.1	17.8	3 212.0	221.2	3 485.9
Northern Southeast total	11.9	518.6	154.9	3 539.9	519.1	4 744.4
Southeast Region troll	350.0	1.0	800.0	600.0	2.0	1 753.0
SOUTHEASTERN STATISTICAL REGION TOTAL	373.8	996.0	1 101.7	10 304.3	786.0	13 561.8
Cordova area						
Copper River	17.3	80.7	195.6	1.2	0.1	294.9
Bering River	0.4	139.0	114.1	6.9	23.2	283.6
Prince William Sound	2.0	146.5	6.8	15 377.8	323.5	15 856.6
Cordova area total	19.7	366.2	316.5	15 385.9	346.8	16 435.1
Cook Inlet area						
Upper Cook Inlet						
Northern District	1.5	103.9	48.3	25.5	10.1	189.3
Central District	11.6	809.9	202.7	48.8	639.6	1 712.6
Upper Cook Inlet total	13.1	913.8	251.0	74.3	649.7	1 901.9
Lower Cook Inlet						
Southern District	1.2	39.2	5.2	959.5	11.6	1 016.7
Kamishak District	0.0	1.8	1.9	59.2	34.4	97.3
Outer District	0.1	25.9	0.8	1 978.8	178.1	2 183.7
Eastern District						
Lower Cook Inlet total	1.3	66.9	7.9	2 997.5	224.1	3 297.7
Cook Inlet area total	14.4	980.7	258.9	3 071.8	873.8	5 199.6
Kodiak Island	2.8	555.0	97.5	10 756.0	347.0	11 758.3
Chignik	1.3	1 026.6	65.6	2 017.2	151.2	3 261.9
South Peninsula	2.6	1 052.9	353.4	6 263.5	514.4	8 186.8
CENTRAL STATISTICAL REGION TOTAL	40.8	3 981.4	1 091.9	37 494.4	2 233.2	44 841.7
Bristol Bay						
Naknek and Kvichak districts	3.6	15 061.8	0.5	0.1	112.1	15 178.1
Nushagak District	155.4	3 282.2	140.9	0.5	547.2	4 126.2
Egegik District	2.6	2 214.3	7.4	0.0	29.5	2 253.8
Ugashik District	8.3	391.6	0.7		17.4	418.0
Togiak District	30.6	479.4	123.9	1.8	222.2	857.9
Bristol Bay total	200.5	21 429.3	273.4	2.4	928.4	22 834.0
North Peninsula	16.1	1 901.3	110.6	2.5	63.9	2 094.4
Aleutian Islands		13.0		545.7	0.2	558.9
Arctic-Yukon-Kuskokwim						
Kuskokwim River	53.3	39.3	308.6	0.6	297.2	699.0
Yukon River						
Lower Yukon River	122.7		14.2		831.8	968.7
Upper Yukon River	6.3		2.9		334.1	343.3
Yukon River total	129.0		17.1		1 165.9	1 312.0
Norton Sound	10.7	0.1	31.4	167.4	140.8	350.4
Kotzebue area	0.0			1.0	141.6	142.6
Arctic-Yukon-Kuskokwim total	193.0	39.4	357.1	169.0	1 745.5	2 504.0
WESTERN STATISTICAL REGION TOTAL	409.6	23 383.0	741.1	719.6	2 738.0	27 991.3
ALL ALASKA TOTAL	824.2	28 360.4	2 934.7	48 518.3	5 757.2	86 394.8

a/ Compiled 11/23/79

Southeastern Alaska

The pink salmon harvest in southern Southeastern Alaska was smaller than expected when some early runs did not materialize. Escapements, while near average, were below goals and the total return was only two-thirds of that forecast. In northern Southeastern Alaska, pink salmon runs arrived in expected strengths, and the northern Southeastern catch of more than 3.5 million pink salmon was the largest since 1970; estimated escapements exceeded the goal of 4 million for the first time since statehood. The Yakutat pink salmon catch was the largest since 1936. A region-wide seine closure was announced in late August because of low water and high water temperatures caused by the extreme drought conditions prevalent throughout August. Additional pink salmon escapement was needed to compensate for high spawner mortality.

Apparently weak coho salmon returns to Southeastern Alaska led to several troll closures to protect coho stocks. Despite the closures, the coho harvest was larger than had been expected. Most coho were taken in outside districts.

Sockeye catches were slightly better than had been expected, with good gill net harvests in the Taku-Snettisham and Lynn Canal areas. For the third consecutive year, chum salmon catches were poor and fell below projected levels.

Cordova Area

After a disappointing beginning with the weak Copper River sockeye salmon run providing only a limited harvest, commercial fishermen in the Cordova area harvested more than 16 million salmon. Again in 1979 both pink and chum runs appeared in Prince William Sound about a week earlier than usual. The pink runs were much stronger than expected, and escapements of 1.7 million in 1977 produced a 1979 return of 18.4 million, permitting a record harvest of 15.4 million pink salmon.

Chum salmon production came primarily from early and middle runs, and was a little stronger than expected. Sockeye returns to the Coghill District were average, but escapement was excellent. The Copper River District sockeye harvest was far below average, and poor returns, as expected, required almost complete closure of this fishery. Upriver sockeye escapement, as monitored by a sonar fish counter, was slightly below the minimum desired level.

The chinook harvest in the Copper River District was excellent given the relatively short fishing time allowed. Coho salmon catches in this dis-

trict were about 35% above average. The 1979 Bering River sockeye catch of 139 000 was the largest since 1923, and the chum harvest of 23 000 set a new record.

Cook Inlet Area

The odd-year pink salmon return is the dominant cycle year return in lower Cook Inlet. While an excellent return of 1.6 million had been predicted, the actual return of 3.5 million was a complete surprise. The total pink salmon catch for the lower Inlet of 3.0 million was 33% above the previous record catch for the area of 2.2 million in 1962. Catches were spread evenly throughout the Southern and Outer districts with the Kamishak District producing more than twice the average pink catch for that district. Excellent to extremely large escapements were achieved in all pink salmon spawning systems in the Southern and Outer districts with many being the largest ever observed.

Highlighting the season was the return to the Tutka Bay pink salmon hatchery. The total pink salmon return to Tutka Bay was 440 000 with hatchery-produced fish comprising perhaps 85 percent of the run.

An excellent chum salmon harvest of 225 000 was the third highest catch on record for the lower Inlet since 1954. The majority of the catch was produced in the Port Dick and Rocky Bay areas of the Outer District with the Kamishak District producing a slightly above average catch. The sockeye salmon catch of 67 000 was 50% above average.

Salmon fisheries in upper Cook Inlet progressed as expected in 1979 except for the very poor pink salmon catch of 75 000 fish. Good escapements were obtained for most species in major systems, with the exception of the Susitna River chum run, which was unexpectedly weak and heavily fished because of closures elsewhere to insure adequate sockeye escapement. Extensive use of stock identification techniques employing unique sockeye scale characters to define the river system of origin allowed more precise management and helped to assure good sockeye escapements to the Kenai, Kasilof, Crescent, and Susitna rivers in 1979.

Kodiak

Nearly 12 million salmon of all species were harvested in the Kodiak area in 1979. The total pink salmon return to the Kodiak management area of 13.5 million fish, including about 200 000 to the Kitoi hatchery, was very close to the pre-season forecast of 13.4 million. Escapements ranged from good to excellent in nearly all systems.

The sockeye catch was less than projected by 350 000. The mainland harvest was down by at least 150 000 because the June sockeye return to Chignik River was much less than anticipated. The chum salmon harvest was only about one-third of the pre-season projection; about half the 20 year average. Early in the season chum salmon returns to nearly all systems appeared to be weak. Consequently, very limited chum salmon fisheries were allowed in the usually strong Sitkalidak and Kukak sections. Chum salmon escapements were very good.

Despite the very limited June sockeye fishery, the incidental catch of chinook salmon still ranked as the highest since 1953. Excellent chinook escapements were also achieved. Excellent survival from good parent year escapements produced an above average coho catch.

Chignik

Approximately 3.3 million salmon of all species were harvested in the Chignik Management Area in 1979, the largest catch recorded since 1960. The 1979 total pink salmon return to the Chignik Management Area of 2.8 million was 7% above the mid-point estimate of 2.6 million. The pink salmon harvest of 2 million was a record. All systems received average or above average escapements.

The early run of sockeye salmon was approximately 50% below the forecast return, but a strong late run of approximately 1.2 million, which was expected, brought the total return to within 10% of the lower end of the forecast range.

The total coho catch for the season was 66 000, well above the old record of 53 000, and the chum harvest was also relatively high. Chum escapements were good.

South Peninsula

The Shumagin Islands June fishery harvested 180 000 sockeye, 110 000 pink, and 40 000 chum salmon. The fishery was terminated after June 28 when immature salmon mortality due to gilling in purse seine gear became excessive. Had it not been for this problem, the fishery probably would have reached its quota of 200 000 sockeye.

The South Unimak fishery took 680 000 sockeye in June and early July, well below the quota of 900 000. Purse seine gear accounted for 480 000,

all on the west side of Unimak Bight. The chum catch was very light, totaling only 60 000 for the entire fishery.

The Southeast Mainland set net fishery harvested about 24 000 Chignik sockeye, below the allowable harvest of 60 000. This fishery was closed in late June to bolster lagging Chignik early run sockeye escapement.

The South Peninsula pink salmon catch of 6.3 million was the largest since statehood and was nearly identical to the predicted harvest. The run was strong throughout the entire area east of Cold Bay but weak west of Cold Bay. South Peninsula pink escapement was estimated at slightly over 2.7 million, the largest ever recorded.

Excluding June migrants, the South Peninsula chum catch was 375 000, slightly above the 1960-78 average of 311 000. Escapement was above average.

Large numbers of sockeye and coho salmon were harvested during July and August, primarily in the Shumagins, incidental to pink and chum fisheries.

North Peninsula

Chinook, sockeye, and coho salmon catches in North Peninsula fisheries were the highest since statehood. Most of the sockeye catch was taken in the Bear River fishery which was open continuously up to the river mouth for nearly the entire season. The Bear River escapement was 960 000 compared to a goal of 250 000. The Nelson River escapement was 350 000 sockeye with a goal of 100 000.

North Peninsula chum runs were generally weak. Although escapement was above average, it was not evenly distributed.

Aleutian Islands

A total of 13 000 sockeye and 550 000 pink salmon were harvested on Unalaska Island. The pink catch was extremely strong for an odd-numbered year. The escapements were roughly 500 000 pink salmon and more than 5 000 sockeye.

Bristol Bay

The Bristol Bay salmon season was exceptionally rewarding in 1979. Sockeye salmon returns to the Bay totaled 39.9 million fish, some 17.2 million above the forecast return. The 21.4 million sockeye harvest was the largest since 1965 when 24.3 million fish were taken. Sockeye escapement goals were quickly reached this year and all major systems received escapements well above the minimum escapement goals. Even before the sockeye fishery began, Bristol Bay commercial fishermen were enjoying the best chinook salmon harvest in history with over 200 000 fish taken. There was also an exceptionally strong coho salmon run, which supported a record catch of more than 270 000 fish, the largest since 1916.

Arctic-Yukon-Kuskokwim

In 1979 a record 2.5 million salmon were commercially harvested in the Arctic-Yukon-Kuskokwim region. The commercial chinook catch, 190 000 fish, was also a record. The Yukon River chinook run was especially strong, and Norton Sound chinook catches were the highest ever recorded; the coho salmon harvest also set a record in this district.

Chum salmon catches were above average in the Yukon and Kuskokwim districts, and the Yukon fall chum run was very large with record catches and excellent escapements in most major systems.

The sockeye salmon harvests from Quinhagak and Goodnews Bay of the Kuskokwim District were more than twice the recent five-year average. The Kuskokwim coho catch of 310 000 was also considerably above average.

PRELIMINARY FORECASTS OF THE 1980 SALMON RETURNS TO SELECTED ALASKAN FISHERIES

The Department's salmon management program includes a number of salmon return forecast projects. Forecast fisheries were selected using several criteria, including economic importance, feasibility, compatability with existing programs, and management needs. Forecast fisheries are:

Southern Southeastern	-	pink salmon
Northern Southeastern	-	pink salmon
Prince William Sound	-	pink and chum salmon

Cook Inlet: Southern and Outer Districts	-	pink salmon
Kodiak	-	pink salmon
Chignik	-	pink and sockeye salmon
South Peninsula	-	pink salmon
Bristol Bay	-	pink and sockeye salmon

In 1979, more than 80% of the total statewide harvest was taken in these fisheries.

A variety of information is used to make salmon return forecasts, including escapement magnitudes and distribution, survival to intermediate life stages,and population age composition. The return, with upper and lower limits, is predicted for each forecast fishery. In general, based on past experience, the actual return can be expected to fall inside the range (between the lower and upper limits) about 50% of the time. In 1979, 7 of the 10 returns forecast were inside their forecast ranges. The 1980 forecasts and ranges are summarized in Table 4.

TABLE 4. PRELIMINARY FORECASTS OF SALMON RETURNS TO SOME MAJOR ALASKAN FISHERIES IN 1980[a/]

Thousands of Fish

Area	Species	Forecast return	Escapement goal	Estimated harvest	Forecast[b/] return range	Estimated[b/] harvest range
Southern Southeastern	Pink	9 500	6 000	3 500	6 200 - 14 500	500 - 8 500
Northern Southeastern	Pink	4 500	4 000	1 300	2 500 - 8 000	300 - 4 000
Southeastern Total	Pink	14 000	10 000	4 800	8 700 - 22 500	800 - 12 500
Prince William Sound	Pink	5 600	1 800	3 700	3 700 - 7 400	2 400 - 5 000
	Chum	230	250	160	85 - 380	60 - 290
Cook Inlet-Southern and Outer Districts	Pink	1 300	230	1 100	340 - 2 200	110 - 2 000
Kodiak	Pink	17 600	3 900	13 500	15 400 - 19 500	11 500 - 15 600
Chignik	Sockeye	2 100	650	1 400	1 800 - 2 400	1 200 - 1 800
	Pink	2 900	1 000	1 900	2 500 - 3 300	1 500 - 2 300
South Peninsula	Pink	11 000	3 000	8 000	8 900 - 13 100	5 900 - 10 100
Bristol Bay[c/]	Sockeye	54 500	17 500	37 100	39 400 - 69 500	21 900 - 52 000
Bristol Bay, Nushagak District	Pink	15 700	1 000	14 700	[d/]	[d/]
TOTAL		124 930	39 260	86 360		

a/ Compiled 11/23/79

b/ The forecasted return and harvest ranges are estimated by several techniques. Based on past experience, about 50% of the realized returns and harvests can be expected to fall within their respective ranges.

c/ Inshore harvest only.

d/ Not estimated. See discussion, p. 36.

Southeastern Alaska

Weaker pink salmon returns are anticipated in both southern and northern Southeastern Alaska, with a forecast harvest range of from 800 000 to 12 million fish. The return is not expected to exceed escapement needs in many districts, particularly in northern Southeastern.

Prince William Sound

Pink salmon harvests in Prince William Sound are expected to be down significantly from the record 1979 return -- the 1980 forecast harvest range is from 2.4 to 5 million pink salmon. Included in this range is an expected catch in the common property fishery of from 140 000 to 270 000 pink salmon returning to the Prince William Sound Aquaculture Corporation San Juan hatchery. Not included is the expected required hatchery fish sale of from 240 000 to 360 000 fish. Chum salmon returns are expected to be below minimum escapement requirements, but an incidental catch of from 60 000 to 290 000 fish is anticipated.

Cook Inlet -- Southern and Outer Districts

A total pink salmon return to the Southern and Outer districts of from 340 000 to 2.2 million fish is forecast, including the Tutka Lagoon hatchery contribution of from 280 000 to 470 000 fish. The harvest range is from 110 000 to 2 million pink salmon. Parent-year escapement, while still low, was the best since 1970, but not well distributed.

Kodiak

The Kodiak pink salmon harvest is expected to be from 11.5 to 15.6 million fish, including a conservatively estimated 100 000 to 220 000 fish Kitoi Bay hatchery return. Parent-year escapement was well-distributed, and estuarine rearing conditions appeared favorable.

Chignik

Sockeye catches in the Chignik area are expected to range from 1.2 to 1.8 million, mostly from the late run. The pink salmon harvest is forecast at levels similar to those in 1979 -- from 1.5 to 2.3 million fish.

South Peninsula

A further increase, to 8 million, from the large 1979 pink salmon harvest of 6.3 million fish in the South Peninsula area is forecast. The

catch is expected to range from 5.9 to 10.1 million fish. Pre-emergent fry densities were high and spring weather was mild during fry emigration.

Bristol Bay

The largest sockeye harvest in the history of the Bristol Bay fishery is forecast -- 37.1 million fish. The harvest range is from 21.9 to 52 million sockeye. A very large pink salmon return is also predicted, with an estimated harvest of 14.7 million fish, which would also be a record.

PROJECTED 1980 ALASKAN COMMERCIAL SALMON HARVESTS

Projections of the 1980 Alaskan commercial salmon harvest by statistical region and species are presented in Table 5. The projections are composed of forecast harvests and harvest projections (recent harvest averages, sometimes modified if additional information is available), for fisheries without forecasts. Chinook and coho returns are not forecast in any region, and Prince William Sound, in the Central Region, has the only chum forecast. All regions have pink salmon forecasts, but several smaller pink runs are not forecast. Major sockeye runs in the Central and Western Regions are forecast; important exceptions are Copper River, Cook Inlet, and Kodiak. Despite these gaps, 81% of the 1979 salmon harvest of 86 million fish was taken in forecast fisheries.

TABLE 5. PRELIMINARY PROJECTIONS OF 1980 ALASKAN COMMERCIAL SALMON HARVESTS BY REGION AND SPECIES, AND PROJECTED STATEWIDE SALMON PRODUCTION BY SPECIES [a]

Thousands of Fish

STATISTICAL REGION	SPECIES					
	Chinook	Sockeye	Coho	Pink	Chum	All
Southeastern	300	500	850	4 800	1 000	7 450
Central	20	3 200	530	29 400	2 600	35 750
Western	380	38 000	440	17 000	3 600	59 420
TOTAL ALASKA	700	41 700	1 820	51 200	7 200	102 620
Total production, thousands of pounds [b]	8 000	180 000	14 000	120 000	47 000	369 000

a/ Compiled 11/23/79. The projected 1980 harvests were obtained by summing harvest forecasts (Table 4) and harvest projections in the remaining fisheries.

b/ Including canned, cured, fresh, and frozen salmon and roe.

The 1980 statewide total commercial harvest projection is 102.6 million salmon.

Species Outlook

Pink Salmon

50% of the 1980 statewide total harvest projection, or 51 million fish

56% of the 1979 statewide total harvest, or 49 million fish

Declines in pink salmon returns to Southeastern Alaska, Prince William Sound, and Cook Inlet are expected to be masked by increases in the Kodiak and South Peninsula areas; and especially in the Nushagak District of Bristol Bay, which has negligible pink salmon returns in odd-numbered years.

Sockeye Salmon

40% of the 1980 statewide total harvest projection, or 42 million fish

33% of the 1979 statewide total harvest, or 28 million fish

The large increase in the sockeye harvest projected for 1980 is due exclusively to the very large sockeye return forecast for Bristol Bay. Declines are expected in the other two regions.

Chum Salmon

7% of the 1980 statewide total harvest projection, or 7 million fish

7% of the 1979 statewide total harvest, or 6 million fish

Moderate increases in chum salmon harvests are projected for Southeastern and Western Alaska, with the Central Region catch about the same as in 1979.

Coho Salmon

2% of the 1980 statewide total harvest projection, or 1.8 million fish

3% of the 1979 statewide total harvest, or 2.9 million fish

Significant declines in commercial harvests of coho salmon are expected in 1980. In 1979, coho catches exceeded projections in all regions.

Chinook Salmon

1% of the 1980 statewide total harvest projection, or 700 000 fish

1% of the 1979 statewide total harvest, or 800 000 fish

Catches of chinook salmon in 1980 are expected to be similar to or slightly reduced from 1979 in most areas.

Regional Outlook

Statewide

1980 statewide total harvest projection: 102.6 million fish

1979 statewide total harvest: 86.4 million fish

Very large harvests of sockeye and pink salmon in Bristol Bay are expected to overshadow reduced catches in Southeastern and portions of Central Alaska; a 19% increase, from 86 million fish in 1979 to 103 million in 1980, is anticipated.

Southeastern Region

7% of the 1980 statewide total harvest projection, or 7 million fish

16% of the 1979 statewide harvest, or 14 million fish

In Southeastern Alaska, harvests of all species except chum salmon are expected to be smaller in 1980. The total catch is projected to drop by nearly 50%, to 7 million fish.

Central Region

35% of the 1980 statewide total harvest projection, or 36 million fish

52% of the 1979 statewide total harvest, or 45 million fish

Smaller harvests of all species except chum salmon are expected in the Central Region in 1980. The very large pink salmon catches recorded in Prince William Sound and lower Cook Inlet in 1979 are not expected to recur in 1980, although moderate increases in pink salmon catches are expected in Kodiak and South Peninsula areas.

Western Region

58% of the 1980 statewide total harvest projection, or 59 million fish

32% of the 1979 statewide total harvest, or 28 million fish

With record-breaking sockeye and pink salmon returns expected to Bristol Bay in 1980, an increase of 112% from 1979 is projected in the total Western Alaska salmon harvest. This projection assumes that adequate salmon processing and transporting capacity is available in Bristol Bay in 1980.

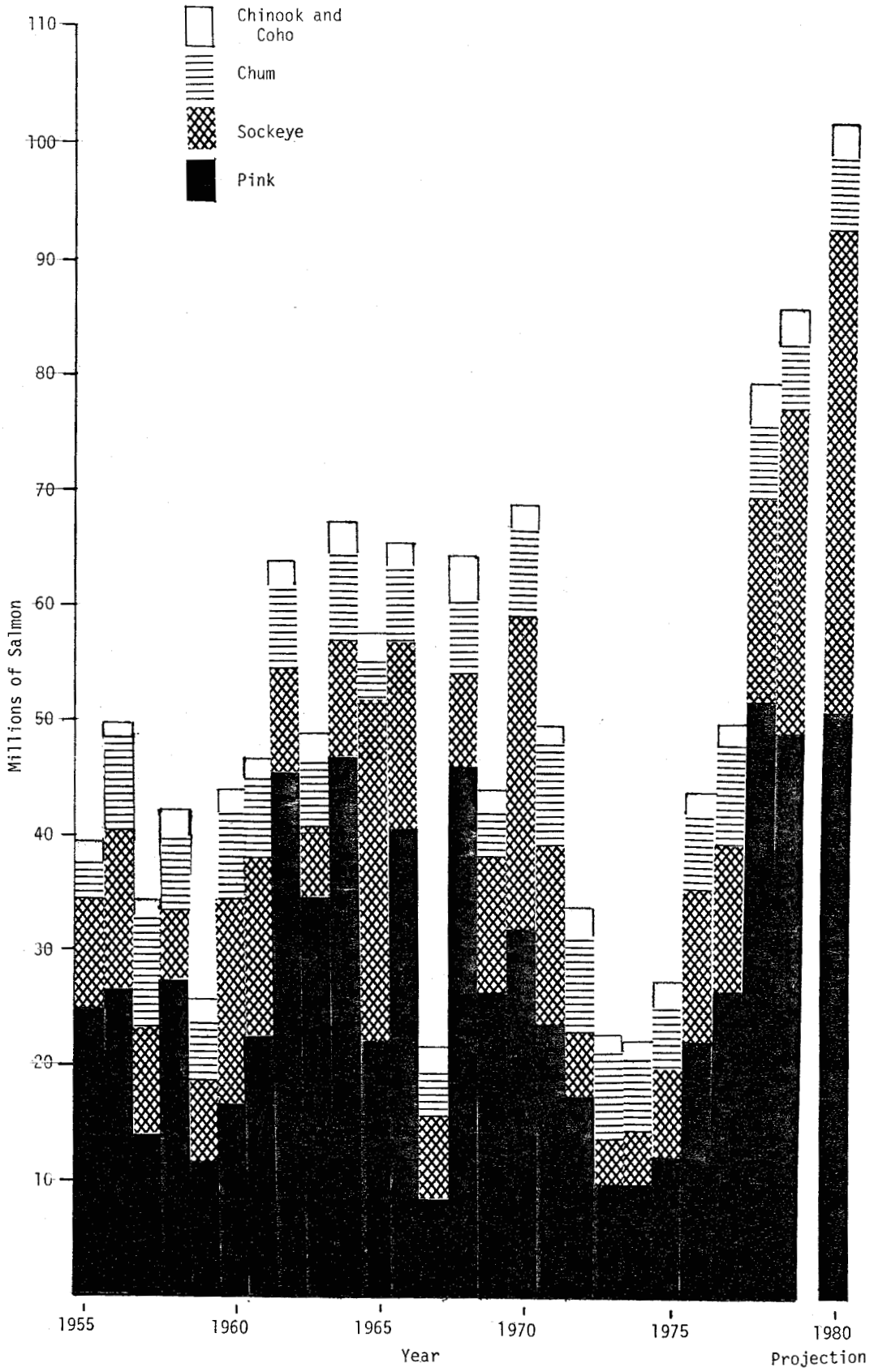
DISCUSSION

Commercial salmon harvests in Alaska, displayed in Figure 2, have consistently increased since the 1974 statewide total catch of 22 million fish. During this period, Department projections have just as consistently fallen below realized catches. The 1980 projection is considerably above the 1979 harvest--which itself was the largest since 1941--but the larger 1980 projection is not composed of relatively uniform improvements in salmon returns to all areas. In fact, of the 11 formally forecast fisheries, only 4 forecast harvests are larger than those realized in 1979. Two of these increases are moderate. Kodiak and South Peninsula pink salmon catches are expected to increase by 20% and 28%, respectively, over 1979 levels; a total increase of less than 4 million pink salmon.

Very large sockeye and pink salmon returns are forecast for Bristol Bay in 1980. The forecast sockeye and pink salmon harvests, if realized, would be the largest in history. Moreover, even if the Department's harvest projections are too high by 50%, more fish will be harvested in Bristol Bay in 1980 than in 1979. The fact that there was insufficient salmon processing capability in Bristol Bay in 1979 suggests that unless significant additional floating processing capacity is introduced in 1980, Bristol Bay harvests will not approach forecast levels and the statewide harvest will fall below the 103 million-fish projection.

The rapid recovery of Alaska's commercial salmon fisheries from the depressed levels of the mid-1970's, believed to have been spurred by recent

Figure 2. Alaskan commercial salmon harvests by species, 1955 - 1979, and the 1980 projected harvest.



warmer weather, could not have occurred without the escapements obtained from 1972 through 1977, when salmon harvests averaged less than 40% of the 86 million-fish 1979 catch. With favorable environmental conditions, and the continued refinement of fisheries management technique through research and the incorporation of appropriate technology, this recovery can mature into a broadly-based improvement in the status of Alaska's salmon stocks.

APPENDIX. FORECAST METHODS AND DISCUSSIONS

FORECAST AREA: Southeastern Alaska

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1980 RETURN:

Southern Southeast

Point Estimate: 9.5 million

Range Estimate: 6.2 million - 14.5 million

Northern Southeast

Point Estimate: 4.5 million

Range Estimate: 2.5 - 8.0 million

Total Southeastern Alaska

Point Estimate: 14.0 million

Range Estimate: 8.7 million - 22.5 million

FORECAST METHODS

Separate forecasts are prepared for the pink salmon return to northern and southern Southeast Alaska due to the difference in migration routes and other population characteristics of the pink salmon returning to the two areas. The southern Southeast forecast for 1980 is based on a multiple regression analysis of the pre-emergent fry index, the average January-February air temperature for several stations located in southern Southeastern, and parent-year escapements. The 1980 northern Southeast forecast was calculated using the pre-emergent fry index and annual temperature average for 15 stations located throughout Southeastern Alaska. A number of forecast formulas were examined but none appeared as accurate as the two used.

DISCUSSION OF THE 1980 FORECAST

Southern Southeastern Alaska: Pink salmon escapements in 1978 to the southern districts (1 through 8) were excellent, being the third

highest recorded since statehood. They were, however, slightly lower that the 1977 escapements which were responsible for the rather disappointing return in 1979. Although the 1979 returns to most areas were as expected, exceptionally poor production from streams in the eastern portion of District 1 was not foreseen.

A relatively low return-per-index-spawner of 1.9 which would result from the forecast 9.5 million return is consistent with other data presently available. The two parameters which exhibit the highest correlation with survival--winter temperatures and parent-stock average weight--were the third and second lowest, respectively, of the 14 year study period. The pre-emergent index was below average and the number of dead fry found was 24% above the recent 10 year average and 44% above the last 5 year's average. While all of the above indicate a poor return, the excellent escapements obtained in 1978 are responsible for the moderate point prediction of 9.5 million.

Pre-emergent values in Districts 5, 6, and 7 were slightly higher than those which produced this year's return, while those in District 1 and 2 were slightly lower. The pre-emergent value from the eastern portion of District 1 was lower than that responsible for the 1979 return. However, another exceptionally poor return to this area is not anticipated since the pre-emergent index apparently does not reflect the unknown parameter(s) which caused the 1979 failure. One bright spot in the 1980 return may be District 3 which exhibited the highest pre-emergent value since 1970 and had the second best escapement since statehood.

Northern Southeastern Alaska: The 1980 return is not expected to exceed escapement needs in most areas of northern Southeastern Alaska. The 1978 parent-year escapements totaled 2.4 million pink salmon, 1.6 million below the overall escapement goal for northern districts. Two districts, 12 and 13, realized escapements over district escapement goal levels and any harvest in 1980 can be expected to occur primarily in these districts.

In District 12, the 1978 escapement was 614 000 pink salmon and of that total 504 000 was from the Tenakee Inlet area. Kadashan Creek accounted for 281 000, but even so, the escapement to the remainder of Tenakee Inlet was by far the best in years. In addition, the pre-emergent fry index for Tenakee Inlet, excluding Kadashan Creek, was well above any for the past several years. Kadashan Creek, although it received excellent escapements, had a low pre-emergent fry index as a result of severe icing conditions during the winter. Another

indication of the winter's effect was a low outmigrant index in Kadashan Creek noted during early marine studies this spring. It appears that the other systems in Tenakee Inlet were not affected as severely as Kadashan, and may produce harvestable returns. Other localized areas of District 12 outside Tenakee Inlet may also produce harvestable returns. The escapements were good to many of the late run systems and pre-emergent fry indexes were correspondingly high.

The Peril Strait area of District 13 had excellent parent-year escapements and a high pre-emergent fry index. The 382 400 fish escapement to Peril Strait streams is better than double any recorded in the past 10 years, and the pre-emergent fry index, while not the highest on record, was very high for this area at 230.2 fry/square meter. One other consideration is the fact that in years of very good escapements, spawning occurs in areas that the fry index does not account for. This could mean that there were more fry produced than the pre-emergent index indicates. There is probably very good potential for some harvest of Peril Strait stocks. The remainder of the District 13 area, however, shows little promise of any return over escapement needs in 1980.

In the remainder of the northern districts little harvest can be expected in 1980 except perhaps in some localized areas. District 9 has some potential for harvest along the western shore of Kuiu Island, but generally little harvest is expected as a result of generally low parent year escapements. Districts 10, 11, and 14 also had poor escapements and little harvest can be expected from these districts.

Winter conditions were poor with the mean temperature for Juneau falling 17 degrees below normal in February. A number of streams in northern Southeastern showed evidence of severe ice scouring during pre-emergent sampling. Another indication of the winter's severity was the high number of dead fry. This year there was an average of 64.5 dead fry per square meter in the northern districts which has been exceeded only once--in the 1971 brood year--since the pre-emergent program was initiated.

Prepared by: Doug Jones
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Juneau

Karl Hofmeister
Fishery Biologist
Ketchikan

FORECAST AREA: Prince William Sound

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1980 RETURN:

NATURAL PRODUCTION

Point Estimate: 5.0 million

Range Estimate: 3.4 million - 6.6 million

SUPPLEMENTAL PRODUCTION

Point Estimate: 557 000

Range Estimate: 326 000 - 788 000

TOTAL PRODUCTION

Point Estimate: 5.6 million

Range Estimate: 3.7 million - 7.4 million

FORECAST METHODS

Natural Production: Forecasts of wild stock returns are based on linear regression analysis between brood year pre-emergent fry indices and the resulting brood year adult returns. Pre-emergent fry indices are collected from a specified set of streams using a standard sample scheme for each stream. Only even-year returns (1966-1978) were used to obtain the 1980 forecast.

The 1980 forecast method deviates from past forecasts in that it is an average of two separate forecasts. The first forecast was based on all the even years between and including 1966 to 1978. This forecast predicts a total return of 5.8 million fish. The second forecast was based on the above years but excluded 1972 and 1974 which were years of low returns. This forecast gives a total return of 4.2 million fish. The 1978 brood year pre-emergent fry index was 334 fry per square meter and was the product of an estimated escapement of 1.06 million spawners. This value is the largest even-year index since the 1964 Alaska earthquake and the escapement is the largest even-year escapement since 1968.

Based on the large escapement and following large pre-emergent fry index it is believed that the 1980 return will be the first even-year return since the 1964 earthquake to exceed 4.0 million fish. Based on the brood year escapement distribution by management district and post-earthquake even-year production of the management districts experiencing good escapement it was felt that the 5.8 million figure was too high. However, at the same time the 4.2 million figure appeared low. Consequently the two figures were averaged.

Supplemental Production: The pink salmon return to the Prince William Sound Aquaculture Corporation San Juan hatchery facility was calculated as follows:

I. Unfed Fry

Point Estimate: 18.35 million fry x 2% survival = 367 000 adults
Range Estimate: 1% to 3% survival: 183 500 to 550 500 adults

II. Fed Fry

Point Estimate: 4.75 million fry x 4% survival = 190 000 adults
Range Estimate: 3% to 5% survival: 142 500 to 237 500 fish

Therefore the point estimate is 367 000 + 190 000 = 557 000 returning adults. The lower range was derived by adding the lower ranges for both fed and unfed fry. The same procedure was used to get the upper estimate of return.

DISCUSSION OF THE 1980 FORECAST

Natural Production: Based on a desired escapement level of 1.5 million fish the expected point estimate harvest is 3.5 million fish. The lower and upper ranges of the commercial catch are 2.3 million and 4.7 million fish respectively.

Early harvestable runs should occur in the Coghill and Eastern districts. The strength of the return is expected to come from the middle and early late segments of the return. The Montague District is not expect to produce any harvestable surplus.

Supplemental Production: With a brood stock requirement of 50 000 pinks and a minimum hatchery fish sale of 239 000 pinks, a maximum hatchery contribution of 268 000 fish can be made to the common property fishery. If fishermen assessment - processor matching funding

problems are encountered a maximum hatchery sale of 365 000 fish will be required. This would result in a common property fishery contribution of 142 000 fish.

Small returns are expected to the Nerka, Inc. hatchery on Perry Island and the F.R.E.D. hatchery at Cannery Creek. Their contribution to the common property fishery is expected to be minimal.

SPECIES: Chum Salmon

PRELIMINARY FORECAST OF 1980 RETURN:

NATURAL PRODUCTION

Point Estimate: 231 000

Range Estimate: 83 000 - 379 000

SUPPLEMENTAL PRODUCTION

Point Estimate: 1 900

Range Estimate: 900 - 2 700

FORECAST METHODS

Natural Production: Linear regression analysis, based on pre-emergent fry indices and subsequent 4-year-old fish returns, is used to forecast annual adult returns. After the 4-year-old fish return is calculated it is divided by the average 4-year-old contribution to total annual returns, yielding a total return figure for all age classes. Chum salmon returns to Prince William Sound are composed of 3, 4, 5, and to a very small extent 6-year-old fish. Four-year-old fish contribute an average of 75% of total annual returns.

The 1980 forecast return to Prince William Sound is based on a pre-emergent fry index of 6 fry per square meter. This is the smallest pre-emergent index in the history of the forecast program. The brood year escapement was 83 900 fish. The desired minimum level is 250 000 spawners.

Supplemental Production: The 1980 forecast return to the San Juan hatchery is based on an average fry to adult survival rate of 2%.

I. The 4-year-old return was calculated as follows:

1977 release of 5 000 fed fry x 73.8%[a/] x 2% survival = 73 fish

1% to 3% survival range: 37 to 111 fish

II. The 3-year-old return was calculated as follows:

1978 release of 1 014 000 fed fry x 9.15%[a/] x 2% survival = 1 856 fish

1% to 3% survival range: 826 to 2 590 fish

a/ Percent contribution of age classes to annual returns as determined by W.H. Noerenberg from samples totaling 10 000 fish for the years 1952 through 1958.

By summing the 2% estimates and rounding to the nearest 100 the point estimate for the 1980 return is obtained. The high and low ranges are obtained by summing the 1% and 3% estimates respectively.

DISCUSSION OF THE 1980 FORECAST

Natural Production: Only the Northern and Coghill districts experienced brood year estimated escapements that came near what is considered a desirable level. The Eastern District fell short of the desired minimum level by some 59 000 fish while the Coghill-Northwestern districts were 9 000 below the minimum desired level. The Northern District came within 3 000 fish of the desired minimum. The remainder of the districts experienced no or dismally low escapements.

Only the Eastern and Northern districts showed any real measurable abundance of pre-emergent fry.

Supplemental Production: Due to its small size the 1980 return is not expected to to contribute to the common property fishery in any measurable way.

Prepared by: Michael L. McCurdy
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Cordova

FORECAST AREA: Cook Inlet, Southern and Outer Districts

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1980 RETURN:

NATURAL PRODUCTION

Point Estimate: 920 000

Range Estimate: 60 000 - 1.8 million

SUPPLEMENTAL PRODUCTION

Point Estimate: 375 000

Range Estimate: 280 000 - 470 000

TOTAL PRODUCTION

Point Estimate: 1.3 million

Range Estimate: 340 000 - 2.3 million

FORECAST METHODS

The 1980 pink salmon forecast for the Southern and Outer districts of Cook Inlet is derived from a linear regression between indices of pre-emergent fry densities in nine major spawning streams and the subsequent adult returns. Pre-emergent fry abundance is determined from these streams each spring and each is weighted by the average escapement for that stream. The resultant individual stream indices are combined to yield a single, weighted pre-emergent fry index for all nine streams.

The Tutka Lagoon pink salmon hatchery released 4.6 million short-term reared fry and 4.8 million unreared fry in 1979. Planning reports have used 4% and 2% survival rates for purposes of estimating adult pink salmon returns. Recent returns in the Halibut Cove and Tutka Lagoon areas have shown much higher survival rates of from 8 to 10% for short-term reared fry. The projected adult pink salmon return to the Tutka hatchery in 1980 is based on 2% survival for unreared fry and 4 to 8% survival for short-term reared fry.

DISCUSSION OF THE 1980 FORECAST

The 1978 pink salmon escapement of 147 000 was the highest even-year escapement since 1970. While still below average, the escapement has shown a significant increase from the poor returns in 1972 and 1974. Windy Bay, Rocky Bay, Island Creek, and South Nuka Island are still areas where escapement levels are severely depressed from the extreme environmental conditions of the early 1970's. The majority of the 1980 return should occur in Port Dick and Tutka Bays with fairly good returns expected to other bays of the Southern District.

Two other forecasts were made which compliment the standard forecast. Using unweighted average fry densities yields a point estimate for the natural return of 830 000 and using the average return per spawner of 4.93 gives a forecast of 725 000. Because of the lack of upstream spawning in Port Dick and the almost complete lack of spawning in three other spawning systems, it is expected that the natural return will be below the point estimate of 920 000 and will probably fall between 600 000 and 750 000 fish.

Prepared by: Thomas R. Schroeder
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Homer

FORECAST AREA: Kodiak

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1980 RETURN:

NATURAL PRODUCTION

Point Estimate: 17.4 million

Range Estimate: 15.4 - 19.5 million

SUPPLEMENTAL PRODUCTION

Point Estimate: 200 000

Range Estimate: 135 000 - 260 000

TOTAL PRODUCTION

Point Estimate: 17.6 million

Range Estimate: 15.5 million - 19.8 million

FORECAST METHODS

The 1980 pink salmon forecast return to the Kodiak Management Area was determined as follows: For the Kodiak - Afognak Island complex, first a usable range estimate and secondly a point estimate representing the midpoint of that range was established. For the Mainland District the return-per-spawner which occurred in the 1978 brood year was multiplied by this district's brood year escapement. This Mainland figure was then added to the range and point estimate figures for the Kodiak - Afognak Island complex to provide the total return to the Kodiak Management Area.

The range estimate for the Island complex represents a narrower spread than standard confidence intervals would provide. A more usable range was derived as follows: The lower estimate resulted from regressing thirteen years of fry densities and subsequent adult returns and the upper estimate resulted from multiplying the ratio of the 1978 fry density to the 1977 fry density by the 1979 return.

DISCUSSION OF THE 1980 FORECAST

Pre-emergent fry sampling indicated generally good to excellent winter survival from an excellent brood year escapement. Sampling

yielded an unweighted index of 234.8 fry per square meter, a 21% increase above the average even-year index of 185.7 and one which is very close to the 245.1 fry index which yielded a record even-year return of 19.6 million pinks to the Kodiak - Afognak Island complex in 1978.

Distribution of a record brood year escapement resulted in 87% of the fish entering the pre-emergent index streams as compared to the even-year average of 73%. Because such a large proportion of the brood year escapement occurred in the index streams where production is more stable, because optimum escapement levels seemed to have been achieved in key systems, and because of favorable estuarine rearing conditions a return-per-spawner which favors the upper end of the forecast range is a definite possibility.

In 1980, from 15.4 to 19.5 million pink salmon are expected to return to the entire management area. Considering a desired escapement goal of 3.9 million, a harvest of from 11.5 to 15.6 million pinks is expected.

A breakdown of the expected return by major geographical district is summarized below. Comparisons are made between the record 1978 brood year and the excellent 1970 return. All district catch projections assume desired escapement goals will be met.

Afognak District: Pre-emergent fry survival was very good from an excellent brood year escapement with the index streams receiving 15% of the district escapement. The district fry density was above the density for the 1978 return, but below the density for the 1970 return by 34% and 32% respectively. District natural production should be approximately 6% of the total area return. Discoverer Bay and that area from Danger Bay to Kitnik will provide the bulk of the local natural production. The desired escapement requirement is 250 000, and a harvest of from 630 000 to 870 000 naturally produced pinks is expected.

Supplemental production from the Kitoi Bay hatchery is expected to result in a total return of approximately 135 000 to 260 000 pinks from the 17.3 million fry released in the spring of 1979. Hatchery brood stock requirements are approximately 40 000 fish, thus leaving about 95 000 to 220 000 pinks available for harvesting.

Westside District: Pre-emergent fry survival was generally very good from an excellent brood year escapement with the index stream receiving 95% of the district escapement. The district fry density was above the density for the 1978 return and below the density for

the 1970 return by 19% and 29% respectively. Because of the excellent escapements and subsequent excellent fry densities for Red River and Karluk River, both key even-year systems, the district production should be approximately 61% of the total return. This district's desired escapement requirement is 2.25 million, and thus a harvest of 7.09 million to 9.72 million is expected.

Alitak District: Pre-emergent fry survival was fairly good from an excellent brood year escapement with the index streams receiving 88% of the district escapement. However, the district fry density was below densities for both the 1978 and 1970 return by 45% and 16% respectively. District production should only be 13% of the total return with the three major systems of Dog Salmon, Deadman, and Humpy all producing well but less than for the 1978 return. This district's desired escapement requirement is 500 000, and thus a harvest of 1.54 million to 2.12 million is expected.

General District: Pre-emergent fry survival was generally only fair to good from an excellent brood year escapement with the index streams receiving 62% of the district escapement. The district fry density was below densities for both the 1978 and the 1970 returns by 9% and 21% respectively. District production should only be 15% of the total return with the Chiniak section and those systems south of Old Harbor providing the bulk of this district's production. This district's desired escapement requirement is 500 000, and thus a harvest of 1.84 million to 2.49 million is expected.

Mainland District: Pre-emergent fry survival was good from an excellent brood year escapement with the index streams receiving 79% of the district escapement. The district fry density was a record density for even-year returns. However, production will only be fair in the Kukak, Kashvik, and Alinchak sections while the Dakavak and Wide Bay sections will be the primary production areas. District production will be approximately 5% of the total return. The desired escapement requirement is 400 000 and thus a harvest of 410 000 is expected.

Prepared by: Larry Malloy
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Kodiak

FORECAST AREA: Chignik

SPECIES: Sockeye Salmon

PRELIMINARY FORECAST OF 1980 RETURN:

Point Estimate: 2.1 million

Range Estimate: 1.8 - 2.4 million

FORECAST METHODS

A linear regression relating the number of sockeye returning after spending 2 years in the ocean (2-ocean fish) to the number of 3-ocean fish the following year was employed. Data from 1950 through 1978 were used, excluding 1963, 1964, and 1969 when inadequate age class data was collected or escapement estimates were imprecise.

The average number of 2-ocean sockeye returning during the years 1970 through 1979, excluding the highest and lowest year, is added to the predicted number of 3-ocean fish. The reason for utilizing only recent data is that the runs appear more productive now than in previous years.

DISCUSSION OF THE 1980 FORECAST

Early run: A return of 930 000 is expected, with 863 000 3-ocean and 67 000 2-ocean fish. The early run harvest is expected to range from 250 000 to 800 000.

Late run: Since there appears to be no correlation between 2-ocean and 3-ocean fish for either the late run or the total run, average return-per-spawner data was used. Only data from 1974-1979 was utilized due to similarities in run strength, climatic conditions, and uniform pre-emergent data. The predicted late run return for 1980 is 1.2 million, with a normal escapement goal of 250 000. The late run harvest should approximate 950 000.

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1980 RETURN:

Point Estimate: 2.9 million

Range Estimate: 2.5 - 3.3 million

DISCUSSION OF THE 1980 FORECAST

The 1979 pre-emergent program included only eight pink salmon index streams due to weather and time restrictions. Of these eight systems six showed signs of stream scouring or high water at the time of sampling. Even with the effects of scouring the index streams were able to produce an average fry density slightly above normal compared to the average odd-year density.

Using the average return-per-spawner for similar climatological years the return for the Eastern District could be from 800 000 to 1 million; for the Western District from 880 000 to 1 million; for the Perryville District from 400 000 to 540 000; and for the Chignik Bay and Central District from 295 000 to 387 000.

The total Chignik area return was determined by using the average return-per-spawner plus the slight 1979 fry density increase with the brood year escapement to produce a forecast of from 2.5 to 3.3 million fish with a midpoint of 2.9 million.

It is likely that due to the scouring and limited number of streams sampled, the actual return will be toward the low end of the range.

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Kodiak

Tyler Gilmer
Assistant Area Management Biologist
Sand Point

FORECAST AREA: South Peninsula

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1980 RETURN:

Point Estimate: 11.0 million

Range Estimate: 8.9 - 13.1 million

DISCUSSION OF THE 1980 FORECAST

Pre-emergent fry sampling indicated good winter survival from Cold Bay to Kupreanof Peninsula. Only three index streams produced below-normal densities when compared to the average odd-year densities. Densities for all other index streams were above normal. Climatic conditions again appear to have been mild throughout the area producing an excellent survival from fry to smolt. These factors, coupled with a good brood-year survival, should produce a strong return to the entire South Peninsula in 1980.

The range was established by using the odd- and even-year average return-per-spawner for 1969 through 1979 of 2.14 and 3.15 respectively, plus the 1979 fry density increase over the average odd-year densities. The result was a range of from 8.9 to 13.1 million fish with a midpoint of 11.0 million pinks for the total South Peninsula area. With escapement requirements of 3 million, a harvest of 8 million pink salmon is expected, with a range of from 5.9 to 10.1 million.

It seems likely, given the mild climatological conditions affecting marine survival, that the actual return will be over 11 million fish.

Prepared by: Tyler Gilmer
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Sand Point

FORECAST AREA: Bristol Bay

SPECIES: Sockeye Salmon

PRELIMINARY FORECAST OF 1980 RETURN:

Point Estimate: 54.5 million

Range Estimate: 39.4 million - 69.5 million

FORECAST METHODS

Most Bristol Bay sockeye salmon mature 4 to 6 years from the time of spawning. The run in 1980 will, therefore, be the progeny of the escapements of 1974, 1975, and 1976. The total Bristol Bay forecast is the sum of the forecasts of individual river systems, each based on one or more of the following methods:

(1) Escapement-return relationships, based on historical data, provide estimates of total production from each brood-year escapement. Average marine maturity schedules are then applied to estimate the numbers of adult salmon returning each year.

(2) On the Kvichak and Wood Rivers, numbers of smolt migrating to the ocean are enumerated annually. The return of adult salmon each year is estimated using these smolt counts, past survival data and average maturity schedules.

(3) For each river system, relationships between the number of adult fish returning a year earlier and the number of adult fish from the same parent escapement and freshwater age group that will return the following year are utilized.

To aid in the selection of forecast techniques a measure of forecast error is calculated for each method and age class. Individual forecasts are then weighted by their relative historic performance.

DISCUSSION OF THE 1980 FORECAST

The pre-season forecast of the 1980 Bristol Bay sockeye salmon return is 54.5 million. Escapement requirements for Bristol Bay in 1980 total 17.5 million sockeye salmon, consistent with the Kvichak River peak cycle escapement strategy of 14 million spawners. Analysis of the projected inshore run by system suggests a harvestable surplus of 37.1

million which would be the largest harvest in the history of the fishery. Point estimates of allowable harvest by district in descending order of magnitude are: Naknek-Kvichak 27.9 million, Nushagak 4.9 million, Egegik 2.8 million, Ugashik 1.0 million, and Togiak 430 000.

Inshore returns are expected to be composed of 75% 2-ocean and 25% 3-ocean sockeye.

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1980 RETURN:

Point Estimate: 15.7 million

Range Estimate: See discussion

DISCUSSION OF THE 1980 FORECAST

After the phenomenal 1978 Nushagak River pink salmon return of nearly 14 million fish, which provided an unprecedented escapement of 9.4 million, and the exceptionally mild spring weather in 1979, any forecast of 1980 pink salmon return will be highly speculative. Since 1958, returns-per-spawner have ranged from a low of 0.1 to nearly 17. Some of this variability can be eliminated by taking account of water temperature in the spring during fry emigration. Spring water temperatures from the nearby Kvichak River are available beginning in 1962. A multiplicative mathematical model incorporating escapement magnitudes and spring water temperatures does fit observed return-per-spawner data reasonably well, but natural variation is so large that the average relative error of prediction (without regard to sign) is 64%. The 1980 forecast of a 15.7 million fish total return is particularly untrustworthy because the parent year escapement of 9.4 million was more than twice as large as any observed before, and the spring water temperature was the warmest measured since 1962 in the years considered. The escapement goal is 1 million pink salmon, and a very large allowable harvest exceeding 14 million fish is expected.

Prepared by: Charles P. Meacham
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