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PRELIMINARY FORECASTS AND PROJECTIONS FOR 1985 ALASKA SALMON FISHERIES

Edited by

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ABSTRACT

More than 132 million salmon were taken by commercial fishermen in Alaska in 1984, the largest Alaska salmon harvest in history. The return of sockeye salmon to Bristol Bay again, was larger than anticipated. Pink salmon returns were much stronger than expected in Kodiak, Chignik, South Peninsula, and Bristol Bay. An expected strong pink salmon return occurred in Southern Southeastern Alaska.

A moderate decline to 108 million from the record 1984 salmon harvest is expected to occur in 1985. A strong pink salmon return is expected for Southeastern Alaska and Prince William Sound. A weaker pink salmon return, relative to 1984, is expected for Western Alaska and Kodiak. A moderate sockeye return is expected for Bristol Bay. With the high escapement goal and uncertainty in the Kvichak forecast, the 1985 Bristol Bay harvest may decline from high 1983 and 1984 levels. There is much uncertainty associated with the 1985 Alaska salmon harvest projection, but the actual harvest is not expected to be below 60 million or above 150 million. Based on the statistical performance of the harvest projection, 1970-1984, only one of five realized harvests would be expected to fall outside this range.

KEY WORDS: salmon, *Oncorhynchus* spp., salmon return forecast, salmon harvest projection

INTRODUCTION

This report reviews Alaska's 1984 commercial salmon season and presents preliminary salmon return forecasts and harvest projections for the 1985 commercial salmon fisheries. The report is released in November, before final catch figures are available. This is to provide preliminary information to the Board of Fisheries, the fishing industry, and the public well before the season begins.

Forecasts of returns (catch+ escapements) for major salmon fisheries as well as projections of the statewide commercial salmon harvest have been published yearly by the Alaska Department of Fish and Game since 1969 (ADF&G; 1969-1984). The accuracy of those forecasts and harvest projections are summarized in Table 1. On the average, the return forecasts have been very close to the actual returns, with the forecast exceeding the return by 2% (Table 1). Without regard to sign, the error has been 32%. The projected statewide harvest has, on the average, been lower than the actual harvest by 7% of the projected harvest (Table 1). The error without regard to sign has been 26%. The historical performance of the forecasted return to major salmon fisheries (Figure 1), as evidenced by the breadth of the 80% confidence interval on the relation between observed and actual return (1970-1984), has been somewhat poorer than the historical performance of the projected statewide commercial harvest projections (Figure 2). These errors have been due to inadequate knowledge of salmon escapements, the numbers of juvenile salmon produced from these escapements, and of the natural variation in survival of salmon throughout various life history stages.

Table 1. Forecasted return, harvest, escapement goal, preliminary return, escapement, harvest, management error, and return forecast error for major salmon fisheries where formal forecasts were made, 1970-1984. Projected and realized Alaska commercial salmon harvests with absolute and relative error, 1970-1984. Figures are in thousands of salmon.

Year	Only Major Fisheries Where Formal Forecasts Are Made										Projected Collective Harvest of all Alaska Salmon Fisheries			(1)-(2)/(7)x100% Forecasted Harvest	
	Figures Based on Prelim. Returns ¹						(5)	(5)/(2)x100%	(6)	(6)/(1)x100%	(7)	(8)	(9)	(9)/(7)x100%	Relative to Statewide Harvest
	(1)	(2)	(3)		(4)	(4)-(2)	(4)-(2)	(1)-(3)	(1)-(3)	(7)	(8)	(7)-(8)	(7)-(8)	Relative Error	Projected Harvest
	Forecasted Return	Forecasted Harvest	Escapement Goal	Return	Escapement	Harvest	Management Error (thousands)	%	Forecast Error (thousands)	%	Projected Harvest	Actual Harvest	Error	Relative Error	Projected Harvest
1970	114347	77080	37267	64653	17271	47382	19996	54%	49694	77%	95500	68500	27000	39%	81%
1971	41140	28110	13030	50780	18643	32137	-5613	-43%	-9640	-19%	41500	47500	-6000	-13%	68%
1972	52790	30470	22320	30995	13616	17379	8704	39%	21795	70%	46700	32000	14700	46%	65%
1973	38650	18820	19830	21650	10636	11014	9194	46%	17000	79%	30000	22300	7700	35%	63%
1974	27830	7500	20330	29150	19334	9816	996	5%	-1320	-5%	15600	21900	-6300	-29%	48%
1975	28740	8435	20305	45937	28496	17441	-8191	-40%	-17197	-37%	19900	26200	-6300	-24%	42%
1976	45202	25702	19500	48940	18860	30080	640	3%	-3738	-8%	37100	44400	-7300	-16%	69%
1977	43650	23740	19910	56495	21695	34800	-1785	-9%	-12845	-23%	34700	50800	-16100	-32%	68%
1978	70323	48737	21586	97940	36020	61920	-14434	-67%	-27617	-28%	62900	82300	-19400	-24%	77%
1979	84960	57210	27750	108323	37985	70338	-10235	-37%	-23363	-22%	72000	88800	-16800	-19%	79%
1980	124930	86360	38570	144096	62490	81606	-23920	-62%	-19166	-13%	102600	110000	-7400	-7%	84%
1981	78500	55420	23080	116095	28895	87200	-5815	-25%	-37595	-32%	74500	113300	-38800	-34%	74%
1982	136060	109940	26120	105503	27983	77520	-1863	-7%	30557	29%	135000	109100	25900	24%	81%
1983	97210	74330	22880	129363	28672	100691	-5792	-25%	-32153	-25%	94000	127200	-33200	-26%	79%
1984	119068	81671	37397	150034	47410	102624 ²	-10013	-27%	-30966	-21%	103560	132505	-28945	-22%	79%
1970-1984 Averages	73560.00	48901.67	24658.33	79996.93	27867.07	52129.87	-3208.73	-13%	-6436.93	1%	64370.67	71787.00	-7416.33	-7%	71%
Averages without regard to sign							8479.4	33%	22309.73	32%			17456.33	26%	

¹ Preliminary data published in ADF&G (1970-1984).

² Preliminary harvest figures.

Obs. Return versus Fcst. Return

Major Fisheries with Formal Forecasts

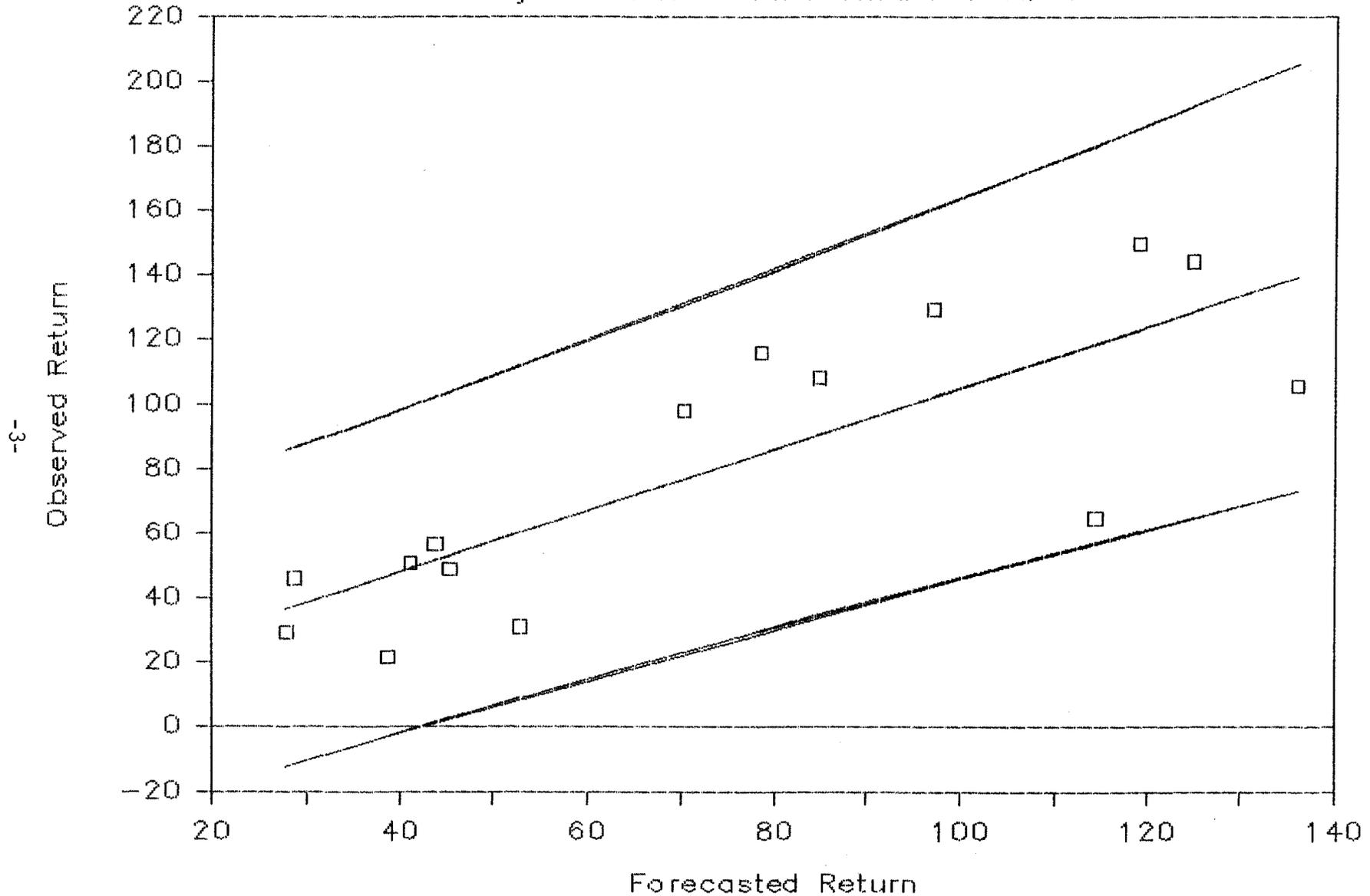


Figure 1. Relationship between observed return (millions) and forecasted return (millions) for major salmon fisheries with formal forecasts, 1970-1984. Also shown are the regression line, $Y = 10.267 + .9477 X$, $R^2 = .658$, together with 80% confidence intervals.

Obs. Harvest versus Fcst. Harvest

Projected Statewide Harvest

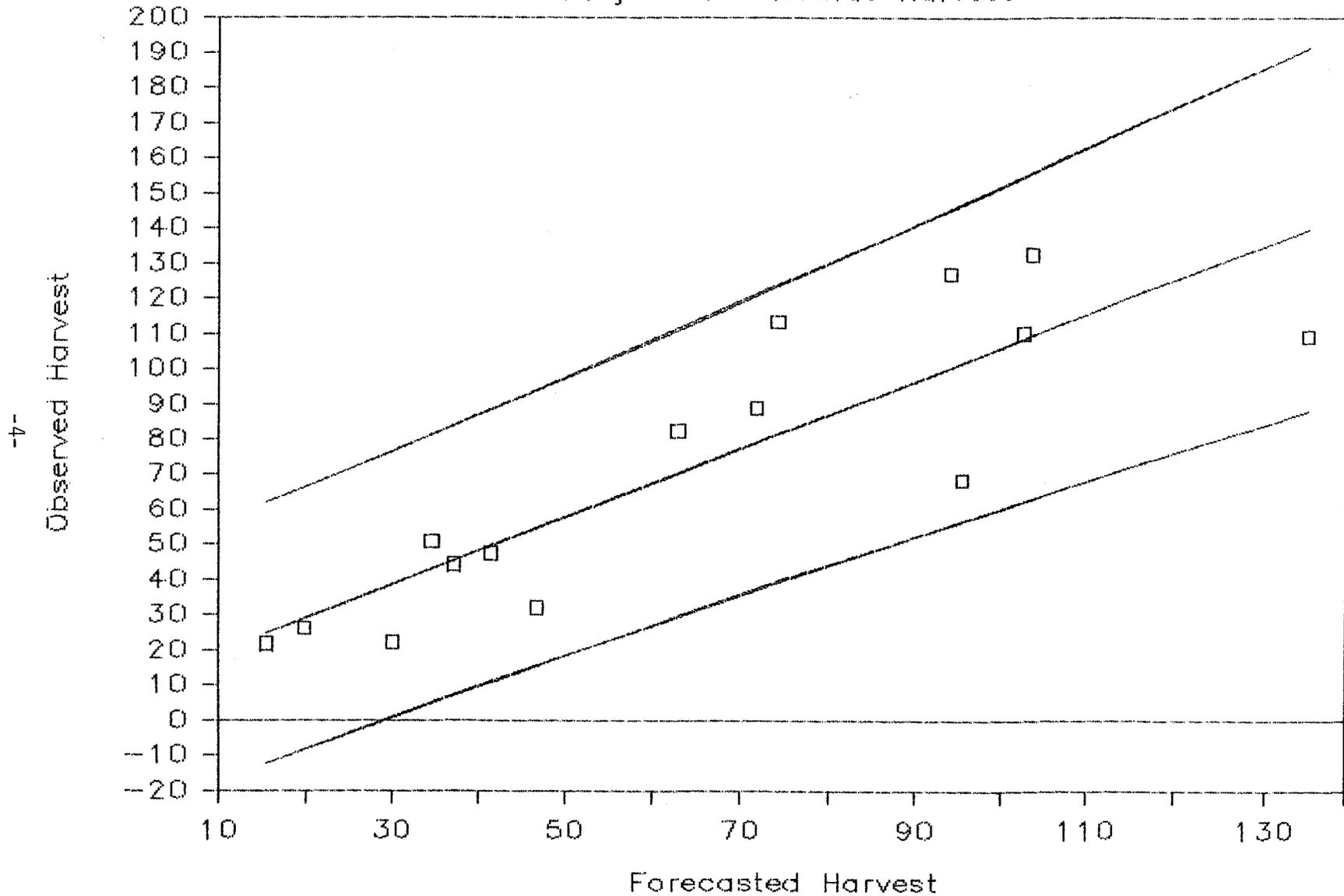


Figure 2. Relationship between observed harvest (millions) and projected harvest (millions) for Alaska commercial salmon fisheries, 1970-1984. Also shown are the fitted regression line, $Y = 9.753 + 0.9637 X$, $R^2 = .755$, together with 80% confidence intervals.

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 or hatchery.
Forecast:	Forecast harvests and returns are estimated using information such as parent-year escapements, subsequent fry abundance, spring sea water temperatures, and escapement requirements.
Harvest projections:	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 have no forecast.

Alaska Pacific Salmon Species

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

Brood years of salmon returning to spawn in 1985, by species and age¹

Species	Age of Returning Salmon in Years				
	2	3	4	5	6
Pink	1983				
Chum		1982	1981	1980	
Coho		1982	1981		
Sockeye			1981	1980	1979
Chinook			1981	1980	1979

¹ The brood years listed for each species generally comprise more than 90% of the run.

Increasing salmon escapement levels through the period 1970-1984, as well as mild winters and generally warmer ocean water temperature contributing to higher juvenile salmon survival are thought to be the major factors responsible for the recent record-breaking commercial salmon harvest in Alaska. These favorable environmental conditions have worked in tandem with industry sacrifices and careful fisheries management that insured adequate well-distributed salmon escapements in the early 1970s when salmon returns were weak throughout the state. Sockeye and pink salmon returns in almost all areas of the state have now rebounded to robust levels. State and non-profit hatcheries have contributed several million salmon to the 132 million-fish 1984 harvest. These supplemental production sources are becoming increasingly significant in Cook Inlet and Prince William Sound areas.

The boundaries of and major fishing areas within the Southeastern, Central, and Western statistical regions are shown in Figure 3. These regions and areas are the ones used in the Department's statistical leaflet series and 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 1984 fishing season. These were summarized by Mike Dean. Individual credit for forecast material is given with the area forecast discussions in the Appendix.

REVIEW OF THE 1984 ALASKA COMMERCIAL SALMON FISHERY

The 1984 Alaska commercial salmon season is estimated to be the largest harvest in history with a commercial catch of 132.5 million salmon (Figure 4). This is the fifth consecutive year Alaskan salmon harvests have exceeded 100 million fish. The second and third largest harvests were set in 1983 and 1936 with catches of 127.1 million and 126.4 million salmon, respectively.

The composition of salmon species taken in 1984 were 57% pink, 29% sockeye, 9% chum, about 4% coho, and less than 1% chinook salmon.

The 1984 salmon season harvest of 132.5 million fish exceeded the pre-season midpoint harvest estimate of 105 million fish. Principal factors involved in this season's record harvest were as follows: (1) the 24.6 million sockeye salmon landed in Bristol Bay; (2) larger than projected returns of wild stocks in the statewide pink salmon fisheries; (3) the contribution of supplemental production from state and private hatcheries; and (4) above average to record runs of coho and chum salmon.

Table 2 compares actual and forecasted 1984 salmon returns for major salmon fisheries. The returns in all of these fisheries, with the exception of pink salmon in northern Southeastern Alaska, were greater than the pre-season forecast. Preliminary catch estimates by fishing area and statistical region are summarized in Table 3, and these estimates are presented in more detail by management region in Tables 4 through 7.

Southeastern Region

Overall, pink salmon returns to Southeastern Alaska were below pre-season forecasted levels. This was primarily a result of poor returns to the early run pink salmon producing areas in the northern fishing districts where the harvest of approximately 3.8 million pink salmon was 6.0 million below the forecasted level. The southern Southeastern pink salmon runs were strong and the harvest of approximately 19.3 million fish was very close to the anticipated harvest. Pink salmon spawning escapements ranged from poor to excellent, depending on the realized return strength by area.

Southeastern landings of chum salmon totaled approximately 3.5 million fish and were the best in the region since the 1954 season. Approximately 1.0 million of this chum salmon harvest resulted from adult returns to state and private hatcheries, however, strong overall natural returns of chum salmon were apparent in most areas.

The overall harvest of approximately 1.2 million sockeye salmon is considered good for recent years, however, the distribution of the return was uneven. Poor harvests of sockeye salmon were reported in the Yakutat set gill net fishery as depressed runs continued for the Situk River and the District 8 drift gill net fishery as a result of weak Stikine River runs. Strong sockeye salmon returns developed again this season in Lynn Canal.

The Southeastern chinook salmon catch of 270,000 fish was below the 1983 catch. The 1984 chinook salmon summer troll season consisted of 45 fishing days and was

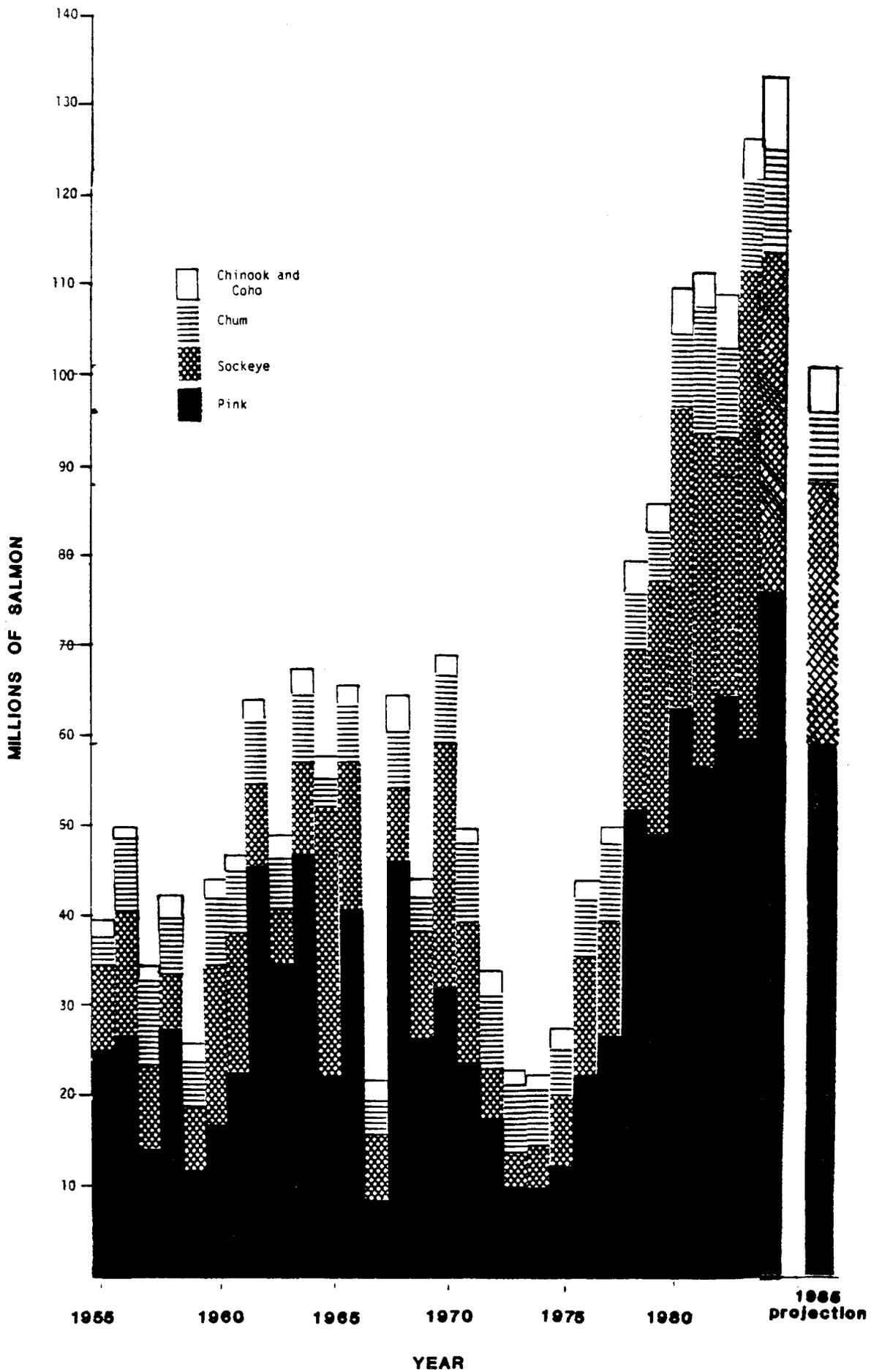


Figure 4. Alaska commercial salmon harvests by species, 1955-1984, and the 1985 projected harvest.

Table 2. Comparison of actual and forecast 1984 salmon returns, with errors and relative errors, for some major Alaska salmon fisheries.

Thousands of Fish							
Area	Species	(1) Harvest	(2) Escapement ¹	(3) Return ¹ (1) + (2)	(4) Forecasted Return	(5) Error (4) - (3)	(6) Relative Error (5)/(3) x 100%
Southern Southeastern	pink	19349.20	7880	27229.20	26000.00	-1229.20	-5%
Northern Southeastern	pink	4265.20	3971.00	8236.20	14200.00	5963.80	72%
Southeastern total	pink	23614.40	11851.00	35465.40	40200.00	4734.60	13%
Prince William Sound	pink	22086	4152	26238.00	18800	-7438.00	-28%
	chum	1202	225	1427.00	870	-557.00	-39%
Lower Cook Inlet- Southern and Outer Districts	pink	380.80	256.30	637.10	1100.00	462.90	73%
Upper Cook Inlet	sockeye	1991.00	1300.00	3291.00	3200.00	-91.00	-3%
Kodiak	pink	10840.00	4650.00	15490.00	11600.00	-3890.00	-25%
Chignik	sockeye ²	3605.67	958.73	4564.39	4400.00	-164.39	-4%
	pink	446.184	882.00	1328.18	350.00	-978.18	-74%
South Peninsula ³	pink	10300.00	3700.00	14000.00	5500.00	-8500.00	-61%
Bristol Bay ⁴	sockeye	24684.00	16399.00	41083.00	31100.00	-9983.00	-24%
Bristol Bay, Nushagak ⁴ District	pink	3154	2926	6080.00	1700	-4380.00	-72%
Kotzebue Sound	chum	320.21	110.00 ⁵	430.21	248.00	-182.21	-42%
TOTAL		102624.26	47410.03	150034.28	119068.00	-30966.28	-21%

¹ Preliminary data compiled 25 October 1984.

² The harvest includes estimated interceptions of Chignik bound sockeye taken at Cape Igvak, Stepovak Bay, Aniakchak, and Hook Pass fisheries.

³ The harvest does not include June catches (approximately 900 thousand fish) of migrating pink salmon bound for other areas.

⁴ Inshore harvest only.

⁵ Includes a subsistence harvest of 11 thousand fish.

Table 3. Preliminary 1984 Alaska commercial salmon harvest by species and fishing area¹.

Fishing Area	SPECIES					Total
	Chinook	Sockeye	Coho	Pink	Chum	
Southern Southeastern	63.6	630.1	654.2	19349.2	1650.2	22347.2
Northern Southeastern	206.6	539.5	1163.4	4265.2	1883.4	8058.1
Southeastern Statistical Region Total	270.2	1169.6	1817.5	23614.5	3533.5	30405.3
Cordova Area	39.6	1291.6	636.1	22118.4	1230.0	25315.7
Cook Inlet Area	9.1	2251.9	435.2	1239.7	736.0	4671.9
Kodiak Area	4.7	1950.0	228.0	10842.0	645.0	13669.7
Chignik	4.3	2662.5	110.1	446.2	63.4	3286.5
South Peninsula	7.0	2316.0	311.0	11200.0	1716.0	15550.0
Central Statistical Region Total	64.6	10472.0	1720.5	45846.3	4390.4	62493.7
Aleutian Islands		44.0		3018.0	16.0	3078.0
North Peninsula	25.0	1707.0	197.0	38.0	785.0	2752.0
Bristol Bay Area	102.0	24684.0	569.0	3389.0	1839.0	30583.0
Kuskokwim Area	73.9	81.4	829.9	23.8	488.6	1497.6
Yukon Area	119.9		81.9		796.7	998.5
Norton Sound	8.5		67.8	119.4	146.5	342.2
Kotzebue Area	0.1				320.2	320.3
Western Statistical Region Total	329.4	26516.4	1745.6	6588.2	4392.0	39571.6
ALASKA TOTAL	664.2	38158.0	5283.6	76048.9	12315.9	132470.6

¹ Compiled 1 December 1984, catches in thousands of fish.

Table 4. Preliminary 1984 Southeastern Alaska commercial salmon harvest by species and management area¹.

Management Area	SPECIES					
	Chinook	Sockeye	Coho	Pink	Chum	Total
Southern Southeastern						
Portland Canal gill net	1.6	86.2	32.3	699.3	211.3	1030.7
Annette Island gill net	0.1	26.1	6.8	428.2	65.0	526.1
Annette Island trap	0.2	16.5	5.6	649.5	6.3	678.0
Prince of Wales Is. gill net	0.9	91.7	40.6	342.3	69.6	545.1
Stikine River gill net	.0	1.4	0.5	4.7	1.9	8.6
Southern hatcheries	.0	.0	19.5	0.4	350.3	370.3
Southern districts seine	18.7	407.1	298.2	17102.9	943.1	18769.8
Southern districts troll	42.1	1.0	250.6	122.0	2.8	418.6
Southern Southeastern total	63.6	630.1	654.2	19349.2	1650.2	22347.2
Northern Southeastern						
Taku-Snettisham gill net	1.5	72.0	28.7	135.9	76.2	314.4
Lynn Canal gill net	5.9	325.6	60.6	71.8	612.4	1076.3
Yakutat gill net	0.9	101.1	171.4	19.2	31.5	324.2
Northern hatcheries			5.0	155.0		160.0
Northern districts seine	0.7	32.2	18.3	3431.4	1137.5	4620.1
Northern districts troll	197.5	8.6	879.4	451.9	25.8	1563.1
Northern Southeastern total	206.6	539.5	1163.4	4265.2	1883.4	8058.1
SOUTHEASTERN REGION TOTAL	270.2	1169.6	1817.5	23614.5	3533.5	30405.3

¹ Compiled 1 December 1984, catches in thousands of fish.

Table 5. Preliminary 1984 Central Region Alaska commercial salmon harvest by species and management area¹.

Management Area	SPECIES					Total
	Chinook	Sockeye	Coho	Pink	Chum	
Cordova Area						
Bering River	0.3	91.8	209.7	0.3	20.4	322.5
Copper River	38.7	886.9	414.0	32.2	7.9	1379.8
Prince William Sound						
Hatcheries				402.8	4.9	407.7
Coghill District	0.4	96.0	0.6	908.4	266.0	1271.3
Unakwik District	.0	18.5		26.9	7.0	52.3
Eshamy District	.0	46.7	0.4	525.5	18.5	591.1
General purse seine	0.1	151.7	11.5	20222.3	905.4	21291.0
Prince William Sound total	0.5	312.9	12.4	22085.9	1201.7	23613.4
Cordova Area total	39.6	1291.6	636.1	22118.4	1230.0	25315.7
Cook Inlet Area						
Lower Cook Inlet						
Outer District	0.5	155.3	1.8	309.2	7.6	474.4
Southern District	.0	28.4	.0	71.6	4.2	104.2
Kamishak District	.0	24.5	13.9	136.5	62.4	237.3
Eastern District	.0	52.6	.0	128.0	8.8	189.5
Lower Cook Inlet total	0.5	260.9	15.7	645.3	83.0	1005.4
Upper Cook Inlet						
Central District	7.7	1794.9	311.1	496.9	581.7	3192.2
Northern District	0.8	196.1	108.4	97.6	71.3	474.2
Upper Cook Inlet total	8.5	1991.0	419.4	594.4	653.0	3666.4
Cook Inlet Area total	9.1	2251.9	435.2	1239.7	736.0	4671.9
Bristol Bay						
Egegik District	5.0	5301.0	63.0	6.0	183.0	5558.0
Ugashik District	5.0	2661.0	60.0	1.0	211.0	2938.0
Naknek-Kvichak District	9.0	14238.0	3.0	207.0	426.0	14883.0
Nushagak District	61.0	2165.0	272.0	3154.0	680.0	6332.0
Togiak District	22.0	319.0	171.0	21.0	339.0	872.0
Bristol Bay total	102.0	24684.0	569.0	3389.0	1839.0	30583.0
CENTRAL REGION TOTAL	150.6	28227.5	1640.3	26747.2	3805.0	60570.6

¹ Compiled 1 November 1984, catches in thousands of fish.

Table 6. Preliminary 1984 Arctic-Yukon-Kuskokwim Region Alaska commercial salmon harvest by species and management area¹.

Management Area	SPECIES					Total
	Chinook	Sockeye	Coho	Pink	Chum	
Kuskokwim Area						
Kuskokwim River	31.70	48.60	623.40	2.90	423.80	1130.40
Kuskokwim Bay	42.20	32.80	206.50	20.90	64.80	367.20
Kuskokwim Area total	73.90	81.40	829.90	23.80	488.60	1497.60
Yukon River						
Lower Yukon River	114.40		73.20		686.60	874.20
Upper Yukon River	5.50		8.70		110.10	124.30
Yukon River total	119.90	0.00	81.90	0.00	796.70	998.50
Norton Sound	8.50		67.80	119.40	146.50	342.20
Kotzebue Area	0.10				320.20	320.30
ARCTIC-YUKON-KUSKOKWIM REGION TOTAL	202.40	81.40	979.60	143.20	1752.00	3158.60

¹ Compiled 1 November 1984, catches in thousands of fish.

Table 7. Preliminary 1984 Westward Region Alaska commercial salmon harvest by species and management area¹.

Management Area	SPECIES					Total
	Chinook	Sockeye	Coho	Pink	Chum	
Kodiak Area	4.66	1950.00	228	10842.00	645.00	13669.66
Chignik Area	4.32	2662.45	110.13	446.18	63.41	3286.49
Alaska Peninsula and Aleutians						
South Peninsula	7.00	2316.00	311.00	11200	1716.00	15550.00
North Peninsula	25.00	1707.00	197.00	38.00	785.00	2752.00
Aleutian Islands		44.00		3018.00	16.00	3078.00
Alaska Penin. Aleut. total	32.00	4067.00	508.00	14256.00	2517.00	21380.00
WESTWARD REGION TOTAL	40.98	8679.45	846.13	25544.18	3225.41	38336.14

¹ Compiled 1 November 1984, catches in thousands of fish.

the shortest on record. Region-wide commercial landings of coho salmon totaled approximately 1.9 million fish, continuing a recent year trend for increased returns of this species.

Central Region

Bristol Bay:

Salmon returns to Bristol Bay in 1984 were average to above average. The total commercial catch of all salmon species was 30.6 million fish only surpassed by the record harvest last year of 39.1 million fish.

The total sockeye salmon return to Bristol Bay river systems was 41.0 million sockeye about 10.0 million more than the pre-season forecast, with a commercial harvest of 24.7 million sockeye salmon. Sockeye salmon returns to all three eastside districts (Naknek-Kvichak, Egegik, and Ugashik) were about 30 to 100% above pre-season expectations. However, sockeye salmon returns to both westside districts (Nushagak and Togiak) were about 25% below expectations.

Harvests of pink, chum, and coho salmon were exceptionally large for Bristol Bay, while the catch of chinook salmon was below recent levels. The 3.4 million catch of pink salmon was the second highest in the history of the fishery (only exceeded by the 5.2 million catch landed in 1978); the Nushagak district pink salmon catch of 3.2 was almost twice as large as the pre-season total run forecast of 1.7 million fish.

The 1.8 million catch of chum salmon was the largest recorded in the history of the fishery, while the harvest of 560,000 coho salmon was the second highest in the history of the fishery (only exceeded by 1982 when 649,000 coho salmon were taken). Only the harvest of 102,000 chinook salmon was well below recent and long term levels, (200,000 and 130,000 chinook salmon, respectively).

The ex-vessel value of the 1984 Bristol Bay salmon fisheries was estimated to be worth \$108 million which is down from the \$135 million value in 1983. Average weights of salmon by species, for the total catch were as follows: sockeye 5.69, chinook 20.11, chum 6.75, pink 3.24, and coho salmon 7.57 pounds.

Upper Cook Inlet:

The harvest of 2.0 million sockeye salmon was well above the long-term average of 1.3 million but well below last year's record catch of 5.0 million. The overall sockeye salmon return consisted of a strong run to Kasilof River, a relatively weak return to the Kenai system, a good return to the Susitna system and extremely strong returns to both Crescent River and Fish Creek.

The fishery got off to a relatively slow start because of the delayed season openings on the eastside and a partially effective strike among the drift fleet for the first several fishing periods. The eastside openings occurred on the scheduled dates - 2 July for the southern portion and 9 July for the northern portion - as neither the Kasilof or Kenai approached the necessary escapements needed for earlier openings. The attempted strike halved the expected drift effort for the first three periods but effort returned to normal levels by 6 July.

The sockeye salmon return to the Crescent River was extremely strong and Western Subdistrict set netters enjoyed continuous fishing time and a record harvest.

The Kasilof River return was very strong again this year and required substantial additional fishing time to the south to keep escapement within reasonable levels. The Kasilof escapement of 231,685 sockeye salmon exceeded the 150,000 maximum goal by a wide margin.

An extended closure of the drift fishery and eastside setnet fishing was needed to attain an escapement of 344,571 sockeye into the Kenai River, slightly below the 350,000 minimum escapement goal.

The harvest of 653,000 chum salmon is equal to the long-term average although the overall chum return was probably slightly better than average.

The harvest of 594,000 pink salmon was the poorest even-year catch since 1974 and was less than half the long-term average. The Kenai pink salmon return was poor and no additional fishing time was directed toward this stock. Escapement appeared adequate.

The 415,000 coho salmon harvest represents one of the better catches on record and is nearly double the long-term average. The escapement of Susitna River and early-run Kenai River coho was exceptional.

The catch of 8,523 chinook salmon is below average and the lowest catch since 1975. Judging from the sport catch rates in the Kenai River, the escapement was probably very good.

Rough calculations on the ex-vessel value of the U.C.I. fishery totals \$17.9 million, a substantial decline from the \$28.7 million of 1983. Sockeye salmon prices showed some improvement at \$1.00 per pound (up from \$.70 in 1983) as did coho salmon at \$.85 (up from \$.65). Prices for the other species were stable.

Lower Cook Inlet:

The 1984 Lower Cook Inlet salmon harvest of 1,001,120 fish can be considered average compared to all years. The sockeye salmon harvest of 260,903 was five times the 30-year average and was due primarily to the return of 120,000 fish to the Leisure Lake stocking project, the harvest of 16,600 sockeye salmon from Chenik Lake, (the first significant harvest in over 40 years), and the harvest of 50,000 fish from Aialik Lake, a 90 acre pond. The return to Leisure Lake marks the second year where ocean survivals of outmigrating smolt have reached 35 to 37%.

Chum salmon returns were weak as expected. The harvest of 82,971 fish was 30% below average and 13% below the pre-season projected harvest. The Kamishak District chum salmon harvest of 62,374 fish was 90% above average, but several sub-districts did not produce as expected.

The natural pink salmon return was weak as expected. The harvest of 640,767 fish was 38% below the pre-season forecasted harvest and was primarily because of the failure of the Tutka hatchery return. The return of 285,000 pink salmon to the hatchery was 58% below the forecasted return of 685,000 fish.

The harvest of 15,947 coho salmon was the second highest in the history of the fishery. The harvest was over twice the average for the Lower Inlet and was due entirely to the Kamishak District harvest of 14,600 fish. Escapements of all salmon species were adequate to excellent.

Prince William Sound:

The area-wide commercial harvest of all salmon species amounted to 25.3 million fish and establishes a new record for the Prince William Sound area. The return was highlighted by a record harvest of 20.2 million pink salmon from the purse seine districts. Pre-season harvest projections were exceeded for all districts and species. In addition to the new record pink salmon catch for the purse seine fishery, the coho salmon harvest of 210,000 fish from the Bering River and the 525,500 pink salmon from the Eshamy District also establishes new records for those areas. The record pink salmon harvest from the Eshamy District was from returns to the new state hatchery at Main Bay. Pink salmon returning to other state and private hatcheries also made significant contributions to other purse seine and gill net fisheries. All districts were generally open throughout the season for regular weekly periods and time was extended so continuous fishing occurred in several districts during the peak of the pink salmon run to permit the harvest of surplus fish.

Escapement goals were achieved or exceeded for all species and districts in Prince William Sound in 1984. The pink salmon escapement of over 4.1 million fish was the largest ever observed for this area and was characterized by excellent distribution over all districts.

Arctic-Yukon-Kuskokwim Region

Kuskokwim Area:

The commercial salmon season began on 18 June with a 6 hour opening in District W-1, the lower Kuskokwim River district. The Kuskokwim River districts set a record high coho salmon catch of 623,447 fish which passed the previous record of 447,000 fish set in 1982. The catch of 423,718 chum salmon was second to the record set in 1980 with 483,000 chum salmon.

Commercial fishing opened in District W-4 Quinhagak, and District W-5 Goodnews Bay on 18 June, with a 12-hour period. The 1984 salmon catch in both districts were above the previous 5-year averages. The coho salmon catch was a record in both districts. The Quinhagak catch of 135,342 coho salmon passed the previous 1982 record of 73,000 coho salmon. The Goodnews Bay District W-5 1982 record of 46,683 coho salmon was passed in 1984 by a record of 71,176 coho salmon.

Yukon River:

The 1984 commercial salmon harvest yielded approximately 120,000 chinook, 82,000 coho, and a combined harvest of 797,000 summer and fall chum salmon.

The chinook and combined summer and fall chum salmon harvest were 16% and 29%, below the previous five-year averages, respectively.

The 1984 coho salmon harvest was the largest on record and more than triple the recent five-year average. Yukon River fishermen received an estimated \$5.7 million for this season's harvest, which was down 25% when compared to 1983. Nine processors operated in the Lower Yukon River, while 14 processors and 10 catcher/sellers operated in the Upper Yukon.

Norton Sound:

The 1984 Norton Sound commercial salmon catch totaled 342,159 fish which was comprised of 8,455 chinook, 119,381 pink, 146,442 chum, 67,875 coho, and six sockeye salmon.

The coho salmon harvest was the second highest on record with the chinook salmon harvest only slightly above the 5-year average. The chum and pink salmon harvests were 25% and 40% below the 5-year averages, respectively. Although the chum and pink salmon catches were below average the runs were above average district-wide. The poor harvests were due to weak markets and to the lack of buyers in some subdistricts.

A total of 194 commercial fishing permits was renewed for the 1984 season, with only 141 actually fished. This is 29 less than the 170 permits that were fished in 1983. The very low effort during the 1984 season was because of the lack of buyers in some of the subdistricts.

In addition to the six domestic processors, a joint venture between 3NC and the North Pacific Longline Gillnet Association operated during the 1984 season. Under a permit issued by the Governor, two Japanese freezer ships were allowed to buy Norton Sound pink and chum salmon taken from the Golovin, Moses Point, and Norton Bay subdistricts.

Kotzebue:

The commercial harvest of 320,206 chum salmon was larger than five of the last 10 years and slightly below the recent 10-year average catch of 343,000 chum salmon. A total of 181 permit holders actually made deliveries of salmon during the 1984 season.

The commercial catch was worth approximately \$1,148,884 excluding noncash bonuses. This was the sixth most valuable catch since the start of the fishery in 1962. Each permit holder participating in the fishery sold an average of \$6,347 worth of fish. The average weight of the chum salmon harvested was 8.2 pounds.

Westward Region

Kodiak:

The 1984 harvest of 10,842,000 pink salmon was 3.1 million fish more than the 7.5 million pre-season forecast. An indexed escapement of 4.5 million pink salmon was achieved with good distribution throughout the area.

The chum salmon harvest of 645,000 was only 65% of the pre-season projection of 1.0 million fish. The estimated escapement of 683,000 chum salmon is considered good.

Near record harvests characterized the 1984 sockeye, coho, and chinook salmon returns. The sockeye salmon harvest of 1.9 million fish ranks third over the last 50 years and was well over the 1.5 million fish pre-season projection. Roughly 464,000 Chignik bound sockeye salmon were harvested in the Cape Igvak section for a 13.5% harvest level. Good to excellent escapements of sockeye salmon were achieved into most streams with the exceptions of the Frazer and Karluk systems. The total sockeye salmon escapement of 1.4 million is the sixth consecutive year escapements have totaled 1.3 million or more. The 20-year average escapement is 900,000 fish.

The harvest of 4,657 chinook salmon taken incidentally during the June sockeye salmon fishery is the highest catch since 1941. The escapement of 14,500 chinook salmon is well above average.

The coho salmon harvest of 228,000 fish was above the pre-season projection of 150,000 and represents the third highest coho harvest on record. Coho salmon escapements of more than 100,000 fish have been estimated for 1984 with good to excellent distribution to most systems.

Chignik:

The Chignik sockeye salmon fishery started on 7 June with a 24-hour fishery, resulting in an estimated harvest of 237,000 sockeye salmon. Due to the strength of the early sockeye salmon run, which was apparent by daily catches and weir escapement counts, the fishery was extended until 21 June. Commercial fishermen fished predominately on early run fish until 15 July, when it was determined through in-season scale analysis that the majority of the fish were of late run stocks. The commercial harvest for the period of 7 June through 15 July is estimated at 2.5 million fish.

The late sockeye salmon run did not materialize as forecasted, and restricted fishing periods were enforced until the minimum escapement goal of 250,000 sockeye salmon was achieved. The total sockeye salmon harvest for the Chignik area totaled 2.66 million fish.

Due to the anticipated weak pink and chum salmon returns, the areas outside of the Chignik Bay District were kept closed. Excellent escapement was achieved in the majority of the Chignik chum and pink salmon systems.

The coho salmon fishery was strong; however, processors quit buying on 14 September, and outside areas were not fished.

South Peninsula:

The South Unimak and Shumagin Islands June fisheries were very brief, because of high daily sockeye salmon catch rates. The South Unimak fishery was open for only four days, resulting in a catch of 1,134,000 sockeye, 465,000 pink, and 229,000 chum salmon. The Shumagin Islands were open for five days during June for a catch of 258,000 sockeye, 450,000 pink, and 109,000 chum salmon. The sockeye salmon guideline harvest levels were 1,111,000 at South Unimak and 254,000 in the Shumagin Islands.

Another 900,000 sockeye salmon were harvested in a combination of the Southeast Mainland fishery and July-August fisheries in the balance of the South Peninsula.

The Southeast Mainland fishery caught an estimated 403,000 Chignik destined sockeye salmon by 10 July.

Approximately 300,000 coho salmon were taken incidental to the July-August pink and chum salmon fisheries. Another 10,000 coho salmon were taken along the South Peninsula during September. Fall coho salmon catches and escapements were light, causing this fishery to be closed after 13 September.

South Peninsula pink salmon runs greatly exceeded all previous records. The catch (not including approximately 900,000 fish harvested during June) was roughly 10.3 million. The escapement totaled about 3.7 million pink salmon.

The South Peninsula July-August chum salmon catch of 1.3 million fish was the highest since at least 1962. The chum salmon escapement totaled roughly 534,000 fish, the third highest on record. Processors were overwhelmed and had to put the fishing vessels on catch limits.

North Peninsula:

The North Peninsula chinook salmon catch was 25,000 with an escapement of 15,000 fish.

The sockeye salmon catch totaled 1.7 million and the escapement was 824,000. The Nelson River escapement totaled 244,000 fish, well over the guideline goal of 100,000 to 150,000 fish. The latter case was due to a situation where the sockeye salmon run severely dropped off when it should have been peaking, then hit suddenly with the majority of the fish coming into Nelson Lagoon and up the river during a three-day period while the fishery was closed.

The North Peninsula chum salmon catch of 785,000 was a new record as was the escapement of 863,000. Due to market conditions, the quality of some fish, and the lack of canning facilities on the North Peninsula, there was little interest in chum salmon in this area.

North Peninsula pink salmon runs are considered minor and produced a catch of 38,000 fish. A total of 197,000 coho salmon were caught which is the second highest on record for the North Peninsula.

Aleutian Islands:

The Aleutian Islands pink salmon catch of roughly 3,000,000 fish was a new record. The escapement in the Unalaska Bay, Makushin Bay, and Kashega Bay sections totaled about 1.4 million pink salmon. These three sections, all located on Unalaska Island were the only areas fished.

PRELIMINARY FORECASTS OF 1985 SALMON RETURNS TO
SELECTED ALASKA FISHERIES

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

- Southern Southeastern - pink salmon
- Northern Southeastern - pink salmon
- Prince William Sound - pink, chum, and Coghill District sockeye salmon
- Prince William Sound/
Copper River - sockeye and chinook salmon
- Lower Cook Inlet: Southern
and Outer Districts - pink salmon
- Upper Cook Inlet - sockeye salmon
- Kodiak - pink salmon
- Chignik - pink and sockeye salmon
- South Peninsula - pink salmon
- Bristol Bay - pink, sockeye, and chinook salmon

In 1984 79% of the total statewide harvest was taken in these fisheries (Table 1).

A variety of information is used to make salmon return forecasts, including escapement magnitudes and distribution, egg deposition, survival to intermediate life stages, high seas abundance, environmental conditions, 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 within the range (between the lower and upper limits) somewhat less than half the time. In 1984, seven of thirteen return forecasts were outside their respective ranges. The 1985 forecasts and ranges are summarized in Table 8.

Forecast abstracts are given below; the reader is referred to the Appendix for further details.

Southeastern Alaska Pink Salmon

The total Southeastern pink salmon harvest is expected to be 32.1 million, a moderate increase over the large 1984 harvest. A return of 30.8 million pink salmon is expected to southern Southeastern districts in 1985, with an expected harvest of 24.8 million fish. The parent escapement for the 1985 return was the largest since statehood and winter temperatures were above average. A return of 11.9

Table 8. Preliminary forecasts of salmon returns and commercial harvests for some major Alaska fisheries in 1985.

Thousands of Fish								
Area	Species	Forecast ¹ Return	Escapement Goal	Estimated Harvest	Forecasted Return ¹ Range		Estimated Harvest Range	
Southern Southeastern	pink	30800	6000	24800	22100 -	39400	16100 -	33400
Northern Southeastern	pink	11900	4600	7300	7900 -	15900	3300 -	11300
Southeastern total	pink	42700	10600	32100	33200 -	52200	22600 -	41600
Prince William Sound ²	pink	21500	3300	18200	17452 -	25548	14152 -	22248
	chum	2109	317	1792	1557 -	2661	1240 -	2344
PWS Coghill District ²	sockeye	220	40	180	140 -	300	100 -	260
Copper River	sockeye	1780	576	1200	1580 -	1980	1000 -	1450
	chinook	44.5	15	29.5	38 -	51	25 -	35
Lower Cook Inlet- ² Southern and Outer Districts	pink	1217	311	906	391 -	2743	80 -	2432
Upper Cook Inlet	sockeye	3400	1000	2400	2700 -	4100	1700 -	3100
Kodiak ²	pink	6780	2150	4630	5300 -	8270	3150 -	6120
Chignik ³	sockeye	2490	650	1840	2244 -	2736	1594 -	2086
	pink	500	700	0 ⁶	300 -	700	0 -	0
South Peninsula ⁴	pink	5000	1500	3500	2400 -	7600	900 -	6100
Bristol Bay ⁵	sockeye	34700	14700	20000	21700 -	47700	9600 -	33000
Bristol Bay, Nushagak District	chinook	188	75	113	156 -	220	81 -	145
		122629	35934	86891	105711 -	139596	69777 -	103662

- ¹ Compiled 1 November 1984. The forecast return and harvest ranges were estimated by several techniques. Based on past experience, somewhat less than half of the realized returns and harvests can be expected to fall within their respective ranges.
- ² Includes supplemental production, PWS pink escapement goal includes 1.4 million hatchery harvest, chum escapement includes 126 thousand hatchery harvest.
- ³ Includes estimated interceptions of Chignik bound sockeye taken at Cape Igvak and Stepovak Bay.
- ⁴ Not including pink salmon taken in June near False Pass, South Unimak, and Shumagin Islands, which are returning to other areas.
- ⁵ Inshore harvest only.
- ⁶ Zero indicates incidental harvest only.

million pink salmon is expected to northern Southeastern districts, with the 1985 harvest expected to be 7.3 million. Overall escapements were strong with the pre-emergent fry index the best since the program began in 1966.

Prince William Sound Pink, Chum, and Coghill River Sockeye Salmon

The 1985 Prince William Sound forecast total harvest of 18.2 million pink salmon (including 1.4 million hatchery harvest) is a slight decrease from the 1984 harvest and consists of about two-thirds natural and one-third hatchery stocks of pink salmon. The forecasted chum harvest is 1.8 million (includes 26 thousand hatchery harvest) and is substantially above the 1984 harvest. The harvest of Coghill River sockeye is expected to be 180 thousand.

Prince William Sound/Copper River Sockeye and Chinook Salmon

A harvest of 1.2 million sockeye and 29.5 thousand chinook is expected for the Copper and Bering River fisheries. This is the first year that a formal forecast has been made for these fisheries.

Lower Cook Inlet (Southern and Outer Districts) Pink Salmon

Slightly less than one half of the 1985 harvest is expected to come from Tutka Lagoon hatchery fish. The total harvest from these districts is expected to be 906 thousand pink salmon.

Upper Cook Inlet Sockeye Salmon

A harvest of 2.4 million sockeye salmon is expected in 1985. This is a moderate increase over the 1984 harvest. Last year's forecast was the first ever made for this fishery. The forecast was very accurate with a relative error of 3%.

Kodiak Pink Salmon

The 1985 Kodiak pink salmon return forecast is about 6.8 million, with an expected catch of 4.6 million. This is a substantial decrease from the 1984 harvest of 10.8 million. The pre-emergent fry indices were generally poor, the overall unweighted index was the third lowest on record. Low stream discharge levels during spawning and scouring due to high water during incubation are thought to contribute to the low survival of deposited eggs.

Chignik Pink and Sockeye Salmon

The return of pink salmon to Chignik in 1985 is expected to be lower than escapement goals, as such no directed fishery for Chignik pink salmon is expected to occur in 1985. The poor anticipated return is due to poor escapements in 1983. The harvest of Chignik sockeye is expected to be 1.8 million. This is substantially lower than the 1984 harvest.

South Peninsula Pink Salmon

The harvest of pink salmon in the South Peninsula fisheries is expected to be 3.5 million. This is substantially lower than the 10.3 million harvest that

occurred in 1984. The large 1984 return was due to exceptional survival and the projected returns in 1985 are based on average survival rates.

Bristol Bay Sockeye and Chinook Salmon

The 1985 return of sockeye salmon to Bristol Bay is expected to be 34.7 million, with an expected harvest of 20.0 million. There was inconsistency, both in the magnitude and ocean age composition, between forecast made with standard ADF&G methods (24.7) and the forecast made on high seas gillnet sampling (41.9). The high seas forecast was much stronger in two ocean returns. The harvest of Nushagak chinook salmon is expected to be 113 thousand, a substantial increase over the low 1984 harvest.

PROJECTED 1985 ALASKA COMMERCIAL SALMON HARVESTS

Projections of the 1985 Alaska commercial salmon harvest by statistical region and species are presented in Table 9. Table 10 gives the projections by management region and species. These projections are composed of forecast harvests, and harvest projections (recent harvest averages, sometimes modified if additional information is available) for fisheries without formal forecasts. Coho returns are not forecast in any region. Forecasts of chum salmon returns are available only for Prince William Sound. Several smaller pink salmon runs are not forecast. Major sockeye runs in the Central and Western statistical regions are forecast; an important exception is the sockeye fisheries in Kodiak. Despite these gaps, 79% of the 1984 salmon harvest of 132 million fish came from fisheries where formal forecasts are made.

The 1985 statewide total commercial harvest projection is 108.2 million fish.

Species Outlook

Pink Salmon

56% of the 1985 statewide total harvest projection, or 60 million fish.

57% of the 1984 statewide total harvest, or 76 million fish.

A moderate decrease, from the 76 million pink salmon harvested in 1984 to 60 million in 1985, is expected. The 1985 pink catch is expected to increase in Prince William Sound and Southeastern Alaska, and to decrease significantly in Western Alaska and Kodiak.

Sockeye Salmon

30% of the 1985 statewide total harvest projection, or 33 million fish.

29% of the 1984 statewide total harvest, or 38 million fish.

The 1985 catch of sockeye is expected to decrease from the large 1984 catch. The 1985 sockeye harvest is expected to be lower in Bristol Bay and higher in Cook Inlet.

Chum Salmon

10% of the 1985 statewide total harvest projection, or 10.8 million fish.

9% of the 1984 statewide total harvest, or 12.4 million fish.

Coho Salmon

4% of the 1985 statewide total harvest projection, or 4.2 million fish.

4% of the 1984 statewide total harvest, or 5.6 million fish.

Table 9. Preliminary projections of 1985 Alaska commercial salmon harvests by statistical region and species¹.

STATISTICAL REGION ²	SPECIES					Total
	Chinook	Sockeye	Coho	Pink	Chum	
Southeastern	258	1300	2000	32100	2200	37858
Central	57	9249	1240	27426	4492	42464
Western	426	22097	966	305	4125	27919
TOTAL ALASKA	741	32646	4206	59831	10817	108241

¹ Compiled 1 November 1984, catches in thousands of fish. The projected 1985 harvest were obtained by summing harvest forecasts (Table 8) and harvest projections for remaining fisheries. The latter based on recent catches.

² See Figure 3 for definition of statistical areas.

Table 10. Preliminary projections of 1985 Alaska commercial salmon harvests by management region and species¹.

Management Region ²	SPECIES					Total
	Chinook	Sockeye	Coho	Pink	Chum	
Southeastern	258	1300	2000	32100	2200	37858
Central	223	24109	1131	19296	4067	48826
Arctic-Yukon-Kuskokwim	225	95	400	300	2000	3020
Westward	35	7142	675	8135	2550	18537
TOTAL ALASKA	741	32646	4206	59831	10817	108241

¹ Compiled 29 October 1984, catches in thousands of fish. The projected 1985 harvests were obtained by summing harvest forecasts (Table 8) and harvest projections for remaining fisheries. The latter was based on averages of catches in recent years.

² See Tables 4, 5, 6, and 7 for definition of management regions.

APPENDIX. FORECAST METHODS AND DISCUSSIONS

FORECAST AREA: Southeastern Alaska

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1985 RETURN:

	<u>Point</u>	<u>Range</u>
Southern Southeastern:		
Return Estimate:	30.8 million	22.1 million - 39.4 million
Escapement Goal:	6.0 million	
Harvest Estimate:	24.8 million	16.1 million - 33.4 million
Northern Southeastern:		
Return Estimate:	11.9 million	7.9 million - 15.9 million
Escapement Goal:	4.6 million	
Harvest Estimate:	7.3 million	3.3 million - 11.3 million
Total Southeastern:		
Return Estimate:	42.7 million	33.2 million - 52.2 million
Escapement Goal:	10.6 million	
Harvest Estimate:	32.1 million	22.6 million - 41.6 million

FORECAST METHODS

Returns to the southern and northern areas of Southeastern Alaska are forecast separately because of differences in migration routes and run timing. The southern Southeastern forecast was based on estimates of parent egg deposition and average winter air temperatures at several stations in the area. The northern Southeastern forecast was prepared using parent year escapements, the pre-emergent fry index and spring air temperatures at several stations in northern Southeastern.

DISCUSSION OF THE 1985 FORECAST

Southern Southeastern: The 1985 pink salmon return to southern Southeastern Alaska is expected to continue exhibiting the strength it has in recent years. The point prediction of 30.8 million is the largest ever made in this program which dated back to 1967. One of the primary factors responsible for this optimistic outlook was the excellent parent year escapement index of 9.1 million, which was the largest since statehood. Winter temperatures,

although above average were below those which influenced last year's strong return of 26 million.

The brood year average adult weight (a factor known to directly influence fecundity) was the lowest of the study period at 3.1 pounds. This is of little concern in Districts 1 through 5 as each exhibited the largest parent year escapements since statehood. However, the escapement indices in Districts 6, 7, and 8 were all below both the escapement goal and below the last five-year average escapement. Consequently, although the need to exercise caution in not overharvesting fish returning to District 5 through 8 has been emphasized in the last three prediction publications, it will be even more important for the 1985 return.

Observations made during the spring of 1984 verified large numbers of pink salmon fry rearing in both Boca de Quadra and Smeaton Bays. Although actual counts are not feasible, densities appeared only slightly lower than those observed in 1983. Fry densities in Cholmondeley and Moira Sounds were significantly lower than those observed in 1983, consequently, District 2 is not expected to contribute as heavily to the overall catch as it did in 1984. Comments from both fishermen and Alaska Department of Fish and Game staff indicated unusually large numbers of fry rearing in District 3. The above plus a parent year escapement index of over half a million higher than any recorded since statehood suggest the bulk of the 1985 catch will occur off the west coast of Prince of Wales Island in Districts 3 and 4. Although it is doubtful that the catch on the west coast of Prince of Wales Island will approach the 1983 catch of 19.3 million, it will most likely exceed the 1984 catch of 8.9 million.

Northern Southeastern: Pink salmon returns to the districts in northern Southeastern Alaska are also expected to be strong in 1985. Overall escapements in the parent year (1983) were very strong at 4.6 million and the resulting pre-emergent fry index (316.1 fry per meter) was the best since the program was initiated in 1966.

District 9 parent year escapements were just short of the goal for the district and the resulting fry index of 273.9 fry per meter was excellent indicating good overwinter survival. Escapements in both the Sitka and Petersburg management areas of this district were over double the parent year levels. This coupled with the high fry index indicates good potential for harvest.

In District 10, parent year escapements were less than half of the goal and the fry index was well below the previous year. Any harvest from the pink salmon stocks in this district should be from areas with localized return strength.

Parent year escapements in District 11 were excellent and the fry index was correspondingly strong at 442.1 fry per meter. This is the best fry index for this district since the program was initiated. Seymour Canal had good escapements and a very strong fry index indicating good potential for harvestable returns. The stocks in the Taku River area were also strong in the parent year. Although no pre-emergent sampling is conducted on the Taku system survival was probably good, as it was in the other areas of the district, so strong returns are expected.

District 12 had excellent escapements again and the resulting fry index was fair. Escapements were particularly strong in the Tenakee Inlet streams which accounted for over half of the total district escapement. The fry index in Tenakee Inlet was the best ever recorded and excellent numbers of fry were observed in the Inlet during the Early Marine program so good returns are expected.

The outer coastal area of District 13 is expected to produce another strong odd-year return. Parent year escapements of 1.4 million combined with the good subsequent winter conditions should produce strong returns. The Peril Straits streams also had strong escapements and the potential for harvestable surpluses in this area is good.

The District 14 escapements, while slightly above parent year levels, were still well below desired levels. The pre-emergent fry index was encouraging but little harvest is expected from the streams in this District.

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Fishery Biologist
Juneau

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Ketchikan

FORECAST AREA: Prince William Sound

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1985 RETURN:

NATURAL PRODUCTION	<u>Point</u>	<u>Range</u>
Return Estimate:	14.3 million	10.7 million to 17.9 million
Harvest Estimate:	12.8 million	9.2 million to 16.4 million
Escapement Goal:	1.5 million	

SUPPLEMENTAL PRODUCTION

Cannery Creek Hatchery

Return Estimate:	1.3 million	0.9 million to 1.6 million
Common Property Harvest Estimate:	1.2 million	0.8 million to 1.5 million
Brood Stock and Stream Escapement:	79,000	

Main Bay Hatchery

Return Estimate:	1.0 million	0.7 million to 1.3 million
Common Property Harvest Estimate:	1.0 million	0.7 million to 1.3 million
Brood Stock:	0	

Valdez Fisheries Development Association

Return Estimate:	0.4 million	0.3 million to 0.5 million
Common Property Harvest Estimate:	0	0
Brood Stock:	0.1 million	0
Hatchery Harvest:	0.3 million	0

Prince William Sound Aquaculture Corporation

Return Estimate:	4.5 million	2.7 million to 4.9 million
Common Property Harvest Estimate:	3.2 million	1.4 million to 3.6 million
Brood Stock:	0.2 million	
Hatchery Harvest:	1.1 million	

TOTAL SUPPLEMENTAL PRODUCTION

Return Estimate:	7.2 million	4.6 million to 8.3 million
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	<u>Point</u>	<u>Range</u>
Common Property Harvest Estimate:	5.4 million	2.9 million to 6.4 million
Brood Stock and Stream Escapement:	0.4 million	
Hatchery Harvest:	1.4 million	
Total Harvest:	6.8 million	4.3 million to 7.8 million
 TOTAL PRODUCTION		
Return Estimate:	21.5 million	17.5 million to 25.6 million
Harvest Estimate:	18.2 million	14.2 million to 22.2 million
Escapement, Brood Stock, and Hatchery Harvest:	3.3 million	

FORECAST METHODS

Natural Production: The 1985 forecast is the result of a multiple linear regression analysis of odd-numbered year pre-emergent fry indices, March-April air temperature regimes of the following year and subsequent adult returns. The brood years used for this analysis were 1965 through 1983.

The estimated wild stock return is the product of a 1983 estimated escapement of 2.3 million fish. The resultant pre-emergent fry index was 260 fry per square meter. This is the lowest index since the 1973 brood year; its estimated productivity, however, is balanced out by the highest March-April air temperatures recorded since the 1965 brood year.

Supplemental Production: The 1985 hatchery return is based on a total hatchery release of 159,255,200 fed and unfed fry. Returns to individual hatcheries are based on estimated fry to adult survival rates as calculated by hatchery personnel.

DISCUSSION OF THE 1985 FORECAST

Natural Production: The 1983 brood year estimated escapement was 2,270,200 fish. With the exception of the Eshamy District all estimated district escapements exceeded their upper ranges; the Eshamy District estimated escapement came in right at its upper range.

Harvestable surpluses of fish will be available throughout the commercial fishing season. The only expected weak spot will be in Eaglek where brood year escapements were very weak. This condition, however, may be somewhat alleviated by F.R.E.D. Division fry transplants in selected streams in Eaglek.

Supplemental Production: Supplemental hatchery production is expected to contribute 5.4 million fish to the common property fishery; this contribution could range from 2.9 million to 6.4 million fish.

The majority of these fish should be available to the fishery from mid-July to late August.

FORECAST AREA: Prince William Sound

SPECIES: Chum Salmon

PRELIMINARY FORECAST OF 1985 RETURN:

NATURAL PRODUCTION	<u>Point</u>	<u>Range</u>
Return Estimate:	1,950,000	1,400,000 to 2,500,000
Harvest Estimate:	1,700,000	1,150,000 to 2,250,000
Escapement Goal:	250,000	

SUPPLEMENTAL PRODUCTION

Valdez Fisheries Development Association

Return Estimate:	4,600	3,400 to 5,700
Common Property Harvest Estimate:	0	
Brood Stock:	4,600	

Main Bay Hatchery

Return Estimate:	25,000	15,000 to 35,000
Common Property Harvest Estimate:	0	0
Brood Stock:	25,000	

Prince William Sound Aquaculture Corporation

Return Estimate:	129,000	96,800 to 161,200
Common Property Harvest Estimate:	92,000	59,800 to 124,200
Brood Stock:	11,000	
Hatchery Harvest:	26,000	

TOTAL SUPPLEMENTAL PRODUCTION

Return Estimate:	158,600	115,200 to 201,900
Common Property Harvest Estimate:	92,000	59,800 to 124,200
Brood Stock:	40,600	
Hatchery Harvest:	26,000	
Total Harvest:	118,000	

TOTAL PRODUCTION

Return Estimate:	2,108,600	1,557,000 to 2,661,000
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	<u>Point</u>	<u>Range</u>
Harvest Estimate:	1,792,000	1,240,000 to 2,344,000
Escapement, Brood Stock, and Hatchery Harvest:	317,000	

FORECAST METHODS

Natural Production: The 1985 forecast is the result of linear regression analysis of brood year production relationships of 3-year-old to 4-year-old fish and 4-year-old to 5-year-old fish. This analysis estimated 1.5 million 4-year-olds and 196,000 5-year-olds. As these two age groups, on the average, contribute 88% of total annual returns the 1985 total return is the product of dividing 0.88 into the sum of the estimated returns of 4- and 5-year-old fish.

Continued high productivity is still being experienced by Prince William Sound chum stocks. This was particularly highlighted during the 1984 season when 2-year-old and 7-year-old fish were discovered in the return. Prior to the 1984 season these two age classes had never been detected in either catch or escapement age samples. It is believed that the broadening of age class contribution to annual returns is due to highly favorable estuarine and high seas environmental conditions.

Supplemental Production: Numbers of released hatchery reared chum fry that will be contributing to the 1985 return totaled 7,930,000 fish.

At present little is known regarding Prince William Sound fry to adult survival rates. Consequently a 2% survival rate was applied by all of the hatcheries expecting a return in 1985.

As can be seen from the expected return figures Prince William Sound Aquaculture Corporation (PWSAC) is providing the majority of the fish.

DISCUSSION OF THE 1985 FORECAST

Natural Production: The vast majority of harvestable returns are expected to be returning to the northern portion of the Sound with some minor harvestable fish being available on Hinchinbrook Island. The harvestable surplus will be available throughout the commercial fishing season.

Supplemental Production: Due to the fact that the chum salmon hatchery program is still in its building stage the only harvestable surplus will be from the PWSAC return. Returns to the Main Bay and Valdez Fisheries Development Association (VFDA) facilities will all be required for brood stock. Due to their early timing it is expected that the majority of Main Bay returns should be available for brood stock; in contrast, however, it is expected that VFDA's return will be harvested to some unknown degree due to their late timing.

FORECAST AREA: Prince William Sound

SPECIES: Sockeye Salmon, Coghill River

PRELIMINARY FORECAST OF 1985 RETURN:

NATURAL PRODUCTION	<u>Point</u>	<u>Range</u>
Return Estimate:	220,000	140,000 to 300,000
Harvest Estimate:	180,000	100,000 to 260,000
Escapement Goal:	40,000	

FORECAST METHODS

Post-statehood catch, escapement, and age composition data were used to construct brood year production tables. This data, in turn, was used to determine 1-ocean to 2-ocean and 2-ocean to 3-ocean ratio relationships by freshwater age groups and average contribution, by age groups, to brood year returns. Additionally, optimum escapement analysis was conducted using a Ricker spawner/recruit curve.

DISCUSSION OF 1985 FORECAST

This represents the first formal forecast of sockeye salmon returns to the Coghill River fishery. The forecast is based on brood year production for the years 1966 to 1978.

Prior to the calculation of the 1985 return data analysis indicated that annual escapements of between 30,000 and 40,000 fish offered the best opportunity for maximum harvest rates and that escapements of 80,000 produced a 1 to 1 return ratio. However, based on the 1984 return of 4-year-old fish, it appears that the 1980 escapement of 142,300 may produce returns larger than anticipated. This phenomenon is thought to be at least partially due to favorable year round environmental conditions extant in Prince William Sound and high seas migration routes since the winter of 1977-78. Based on this trend in productivity the escapement goal of 40,000 to 60,000 fish will be managed for, until signs of a lessening of favorable environmental conditions is observed.

The fishery, which commences in mid-June, should encounter harvestable numbers of fish at its outset. An escapement enumeration weir will be installed on the Coghill River during the first week of June.

Michael L. McCurdy
Research Project Leader
Prince William Sound

FORECAST AREA: Prince William Sound/Copper River

SPECIES: Sockeye Salmon

PRELIMINARY FORECAST OF 1985 RETURN:

NATURAL PRODUCTION	<u>Point</u>	<u>Range</u>
Return Estimate:	1,720,000	1,520,000 to 1,920,000
Harvest Estimate:	1,170,000	970,000 to 1,370,000
Escapement Goal:	554,000	
SUPPLEMENTAL PRODUCTION		
Gulkana Hatchery		
Return Estimate:	55,500	44,500 to 66,600
Harvest Estimate:	33,300	26,640 to 39,960
Brood Stock and Stream Escapement:	22,200	
TOTAL PRODUCTION		
Return Estimate:	1,780,000	1,580,000 to 1,980,000
Harvest Estimate:	1,200,000	1,000,000 to 1,500,000
Escapement and Brood Stock:	576,000	

FORECAST METHODS

Natural Production: The 1985 sockeye salmon forecast utilizes historical return per spawner data and parent year escapement weighted age class (4-, 5-, and 6-year-olds) for the Copper River Delta and Upper Copper River independently. The 1985 predicted return is influenced heavily by the 1980 and 1981 brood years for the upper Copper River.

Supplemental Production: The 1985 supplemental return will be the result of production from Gulkana Hatchery. Brood years 1980 and 1981 using F.R.E.D. Division standard survival assumptions should produce an adult return of 55,500. A harvest level of 60% would contribute 33,300 salmon to the catch.

DISCUSSION OF THE 1985 FORECAST

Natural Production: Continued mild winter conditions, particularly on the Copper River Delta during the freshwater life history stages of the age groups represented in the 1985 return should allow at least an average return per spawner contribution from the above average parent year escapements of 1980 and 1981. Upper Copper River escapements were below average except in 1981 but generally mild conditions and good distribution should yield above average returns.

Supplemental Production: Facility production data and conditions suggest that even a wide variation in survival from the expected would not significantly alter the 1985 total sockeye return; however, in future years with the significant increases in fry production that have occurred since the 1980 and 1981 brood years, production data and variations will become increasingly important.

SPECIES: Chinook Salmon

PRELIMINARY FORECAST OF 1985 RETURN:

NATURAL PRODUCTION	<u>Point</u>	<u>Range</u>
Return Estimate:	44,500	38,000 to 51,000
Harvest Estimate:	29,500	25,000 to 35,000
Escapement Goal:	15,000	

FORECAST METHODS

The 1985 chinook salmon forecast utilized historical aerial index and age composition data from the 4-, 5-, 6-, and 7-year-old age classes. Weighted index figures are combined to create a single index of abundance figures which for lack of better data base is compared to the historical average escapement index. The expected return is then a return per spawner calculation which does not consider density, climate conditions or distribution of spawners.

DISCUSSION OF THE 1985 FORECAST

During the past 8-10 years, chinook salmon returns to the Copper River have been consistently above average and have established several of the top catches on record while escapements have also been maintained at high levels. Only a failure of the 1979 brood year or significant extra production of the 1978, 1980 or 1981 brood years could seriously affect the forecasted return. No climate condition or other event is believed to have impacted any of the brood years involved. A chinook salmon harvest of the 30,000 fish magnitude appears to be a solid estimate.

Kenneth Roberson
Research Biologist
Glennallen

FORECAST AREA: Lower Cook Inlet, Southern and Outer Districts

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1985 RETURN:

NATURAL PRODUCTION	<u>Point</u>	<u>Range</u>
Return Estimate:	630,000	0 to 2,144,000
Escapement Goal:	269,000	
Harvest Estimate:	361,000	0 to 1,875,000
SUPPLEMENTAL PRODUCTION		
Return Estimate:	587,000	391,000 to 782,000
Required Brood Stock:	42,000	
Harvest Estimate:	545,000	349,000 to 740,000
TOTAL PRODUCTION		
Return Estimate:	1,217,000	391,000 to 2,743,000
Escapement and Brood Stock:	311,000	
Harvest Estimate:	906,000	80,000 to 2,432,000

FORECAST METHODS

The 1985 pink salmon forecast for the Southern and Outer Districts of Lower Cook Inlet is derived from a linear regression between indices of alevin densities in nine major spawning streams and the subsequent adult returns. Alevin abundance is determined from these streams each spring prior to emergence and are weighted by the average escapement for that stream. The resultant individual stream indices are combined to yield a single, weighted alevin index for all nine streams. The 1985 forecast was based on a regression line forced through the origin. The slope-intercept regression model gave a negative prediction due to the very low alevin index observed in 1984.

The Tutka Lagoon pink salmon hatchery has provided 35-88% of the entire Southern District pink harvest since 1978. The hatchery released 19,563,862 pink salmon fry. Overall 11 million were to be short-term reared, but due to problems with the food all fish were released early with little weight gain. Past survival rates for directly released fry have been 2-4%.

The sockeye salmon return to Leisure Lake is also forecasted annually. In the past, ocean survival rates of 5-10% for Age I and 10-15% for Age II smolt have been used. Returns in 1980 and 1981 from fingerling stockings indicated ocean survival rates of 18-23%, whereas, returns in 1983 and 1984 from fry stockings produced survival rates of 37% on outmigrating smolt. Recent adult returns have been 94-98% two-ocean adults. The 1984 and 1983 outmigrations of Age I and Age II smolt respectively totaled 417,000 fish.

DISCUSSION OF THE 1985 FORECAST

The 1983 pink salmon escapement of 261,900 was above average and well within the desired escapement range. However, heavy flooding in November of 1983 reduced fry levels in most of the major producing systems with large watersheds. The alevin density for the nine index streams is the lowest since 1967, when the odd-year returns were the low production part of the cyclic return.

Some early fry outmigration was indicated in several streams, but the magnitude cannot be projected. Average return per spawner data yields a return of 1,095,000.

Flooding did not appear to affect small drainage systems as severely as large drainage streams and good returns could occur to Windy Bay streams, Island Creek, and Nuka Bay streams.

Sockeye salmon returns should be good based on good parent year escapements. The return to the Leisure Lake stocking project in China Poot Bay should continue to be the major contributor and should produce a harvest in excess of 60,000 sockeye. Good catches should also occur on returns to Aialik, Delight, and Desire Lakes.

Thomas R. Schroeder
Area Management Biologist
Homer

FORECAST AREA: Upper Cook Inlet

SPECIES: Sockeye Salmon

PRELIMINARY FORECAST OF THE 1985 RETURN:

NATURAL PRODUCTION	<u>Point</u>	<u>Range</u>
Return Estimate:	3.4 million	2.7 million to 4.1 million
Escapement Goal:	1.0 million	
Harvest Estimate:	2.4 million	1.7 million to 3.1 million

FORECAST METHODS

The major sockeye salmon systems in Upper Cook Inlet are the Kenai, Kasilof, Susitna, Crescent, Chakachatna/McArthur, and Big Rivers. Fish Creek is also significant in some years.

Historical data on total sockeye salmon return are available for the first four systems noted and these data form the basis of the forecast. Escapement-return relationships by system provided estimates of total production from each brood year escapement. Average marine maturity schedules were then applied to estimate the numbers of adult salmon returning each year.

DISCUSSION OF THE 1985 FORECAST

The total return of sockeye salmon to Upper Cook Inlet is estimated to be 3.4 million in 1985. Desired escapement levels to the four major river systems and various minor systems total 1 million, providing an anticipated harvestable surplus of 2.4 million. Estimated returns to the Kenai River are 2.0 million, to the Kasilof River are 663,000, to the Susitna River are 488,000, and to the Crescent River are 132,000. Based on these forecasts and required escapement objectives, exploitation rates for the major contributing systems are calculated to be 80% for the Kenai, 77% for the Kasilof, 59% for the Susitna, and 62% for the Crescent Rivers.

The 1985 forecast represents the second attempt at forecasting sockeye salmon returns to Upper Cook Inlet. In 1984, the first attempt, the forecast was for a total return of 3.2 million fish with a harvest of 2.2 million fish. The actual return was estimated to be 3.3 million fish (103% of forecast) with a harvest of 2.0 million fish (91% of forecast). However, caution is still advised in interpreting these results, as the program is still relatively untested.

Kenneth Tarbox
Research Project Leader
Upper Cook Inlet

FORECAST AREA: Kodiak

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1985 RETURN:

	<u>Point</u>	<u>Range</u>
NATURAL PRODUCTION		
Return Estimate:	5.5 million	4.8 million to 6.8 million
Escapement Goal:	2.0 million	
Harvest Estimates:	3.5 million	2.2 million to 4.8 million
SUPPLEMENTAL PRODUCTION		
Return Estimate:	1.26 million	53,000 to 2.01 million
Required Brood Stock:	15,000	
Harvest Estimate:	1.11 million	38,000 to 1.86 million
TOTAL PRODUCTION		
Return Estimate:	6.78 million	5.30 million to 8.27 million
Escapement and Brood Stock:	2.15 million	
Harvest Estimate:	4.63 million	3.15 million to 6.12 million

FORECAST METHODS

The 1985 pink salmon forecast return to the Kodiak Management area was determined as follows. A point estimate for the total management area return was calculated from a multiple linear regression analysis of the past 19 years pre-emergent data. Variables used in the analysis were the indexed live fry densities and the average April ambient air temperatures taken in Kodiak. The upper and lower range estimates are the 80% confidence intervals.

DISCUSSION OF THE 1985 FORECAST

Pre-emergent fry sampling this spring (1984) indicated poor to good overwinter survival from the brood year escapement of 2.0 million pink salmon. Sampling resulted in an unweighted live fry index of 104.54 live fry/m². This fry index is the third lowest on record.

Distribution of the brood year escapement resulted in 69% of the fish entering the pre-emergent index streams. Bad weather and high water conditions delayed the sampling, however weather conditions improved greatly and all sampling was completed by 2 April 1984. Low and warm water conditions in the fall of 1983 and heavy rains in November 1983 appear to be the major reasons for the lower live fry index.

In 1985 4.76 to 8.81 million pink salmon are expected to return to the Kodiak Management Area. An escapement goal of 2.15 million pinks is desired; leav-

ing 2.61 to 6.67 million pinks available for harvesting.

A breakdown of the expected return by major geographical districts is summarized below. All district harvest projections assume desired escapement goals will be met.

Afognak District: The pre-emergent fry index was the poorest on record. Low and warm water conditions during peak spawning and heavy fall rains appear to be responsible for the low fry survival. One hundred fifty thousand pinks are expected to return. The desired escapement level of 150,000 pinks, resulting in an incidental harvest of pink salmon only.

Afognak District Supplemental Production: Kitoi Bay Hatchery total return point estimate is 1.26 million pink salmon. Hatchery brood stock requirements are 150,000 pink salmon, leaving an estimated 1.11 million pink salmon available for harvesting. Considering the worst and the best survival estimates, pink salmon available for harvesting could range from 380,000 to 1.86 million.

Westside District: Overall live fry densities for the district are also the lowest on record. Overwinter survival of the excellent brood year escapement appeared to be reduced by the heavy November 1983 rains which resulted in heavy scouring. A total of 2.22 million pink salmon are expected to return to the Westside District. The desired escapement goal is 400,000 pink salmon leaving approximately 1.82 million pink salmon available for harvesting.

Alitak District: The live fry index for this district is average. Freezing temperatures and heavy fall rains appear to be the reason for the lower than expected fry survival based upon the very good brood year escapements. Only 1.1 million pink salmon are expected to return to the Alitak District. The desired escapement goal is 400,000 pink salmon, leaving approximately 700,000 pink salmon available for harvesting.

General District: Once again the overall live fry index is one of the lowest on record. Low and warm water conditions during peak spawning and heavy fall rains appear to be responsible for the lower fry survival. One and a half million pink salmon are expected to return. The desired escapement goal is 650,000 pink salmon, leaving 850,000 pink salmon available for harvesting.

Mainland District: The overall live fry index was below average. Most streams appeared to have suffered some scouring. Big Creek and Geographic Creek were the only creeks sampled in which no live fry were observed. Five hundred thousand pink salmon are expected to return to the Mainland District. The desired escapement goal is 400,000 pink salmon, leaving approximately 100,000 pink salmon available for harvesting.

Hatchery production forecast is for Kitoi Bay Hatchery and was prepared by Roger Blackett. See Afognak District for additional discussion.

Prepared by:

David Prokopowich
Assistant Area Management Biologist
Kodiak Management Area

FORECAST AREA: Chignik

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF THE 1985 RETURN:

	<u>Point</u>	<u>Range</u>
Return Estimate:	500,000	300,000 to 700,000
Escapement Goal:	700,000	
Harvest Estimate:	0	Incidental catch only

FORECAST METHODS

The 1985 Chignik forecast was determined using the last 21 years of return per spawner rates in the Western and Perryville Districts and the last 5 odd-years of return per spawner rates in the Central and Eastern Districts, taking into account the stream conditions observed during the limited pre-emergent fry studies done in the spring of 1984. The Central and Eastern District streams are more unstable and only the most recent years of data were used to minimize environmental change. Forecasts were made dividing the Chignik area in half based on the observed stream conditions, historical catch and escapement data.

DISCUSSION OF THE 1985 FORECAST

The 1985 forecast was derived using return per spawner rates instead of using the pre-emergent fry sampling data due to the limited sampling effort during the spring of 1984 in the Chignik area. The pre-emergent fry sampling studies that were conducted did indicate that stream conditions were fair to good as scouring wasn't as evident as in past years.

The parent year escapement for the 1985 return was extremely poor at 100,500 for the Western and Perryville Districts and 58,380 for the Central and Eastern Districts. Return per spawner rates have been variable throughout the years as have been the returns. The mean return per spawner for the past 21 years in the Western and Perryville Districts is 3.29. The streams in these districts are reasonably stable and coupled with the parent year escapement should produce a midpoint return of about 300,000 pink salmon in 1985. The less stable streams of the Central and Eastern Districts produced a return per spawner rate for the last 5 odd-years equal to 3.00 and should produce about 175,000 pink salmon based on the parent escapement of 58,380. Due to the variability of pink salmon returns for odd- and even-years in the Central and Eastern Districts only the most recent odd-years data was used. Both areas combined should yield a midpoint return of 500,000 fish with a range of 300,000 to 700,000.

The downward trend in pink salmon stocks in the rest of Western Alaska may be reversing itself as ocean survival conditions seem to be improving. If ocean survival is good one might expect the Chignik return to be at the upper end of the forecast range. The Chignik Area pink salmon escapement goal is 700,000

pink salmon, so other than a short prospect commercial fish opening at the beginning of July, no other targeted pink salmon harvests are expected. Undoubtedly some incidental harvest of pink salmon will occur.

Prepared by:

David Hicks
Assistant Area Management Biologist
Chignik Area

FORECAST AREA: Chignik

SPECIES: Sockeye Salmon

PRELIMINARY FORECAST OF THE 1985 RETURN:

EARLY RUN	<u>Point</u>	<u>Range</u>
Return Estimate:	1.55 million	1.35 million to 1.75 million
Escapement Goal:	.40 million	
Harvest Estimate:	1.15 million	.95 to 1.35 million

LATE RUN

Return Estimate:	.94 million	.79 to 1.08 million
Escapement Goal:	.25 million	
Harvest Estimate:	.69 million	.54 million to .83 million

TOTAL CHIGNIK

Return Estimate:	2.49 million	2.24 million to 2.74 million
Escapement Goal:	.65 million	
Harvest Estimate:	1.84 million	1.59 million to 2.09 million

FORECAST METHODS

Point estimates given above are sums of the predicted returns of 3-ocean and 2-ocean age sockeye in the respective runs.

A multiple linear regression equation predicts the return of 3-ocean age fish in the early run from data on the return of 1.2 age fish in the previous year, mean length of 1.2 males in the previous year, and size of the early run escapement 5 years earlier. The expected return of 2-ocean age fish in the early run is the geometric mean of 2-ocean returns since 1965, excluding 1969 and 1975. The late run forecast was derived by using the average return per spawner based on the past 25 years of observed late run returns.

DISCUSSION OF THE 1985 FORECAST

Early Run: Due to the date the preliminary forecasts were required and the amount of time required to digitize scales, separation of the two Chignik runs were accomplished by using the average time of entry curve (ATOE) instead of direct allocation by scale pattern analysis. Sockeye salmon scales collected from the commercial fishery and from Black Lake for the period of 23 May to 31 July were read to determine the percent allocation by age class and the placement of the ATOE curve. The values derived from this method were then used in the early run forecast model developed by the University of Washington, Fisheries Research Institute (FRI). Performance of this model expressed as a

percentage of the observed run for 15 years tested since 1983 is 16.8%. At a later date scales will be digitized and allocation by age class will be done by scale pattern analysis. The results derived from the scale pattern analysis should not significantly change the forecast.

The total point return estimate of 1.55 million for the early run falls well within the range of past years' runs. The 20-year average return for the early run equals 774,547 with a range of 222,000 to the high experienced in 1984 of 2,937,255.

Late Run: The former method of forecasting the late run was omitted until the late run scales collected from the commercial fishery in 1984 can be analyzed and allocation by age class can be accomplished by scale pattern analysis. This method used a linear regression equation that predicted the number of 3-ocean age fish in the late run based on the number of 2-ocean age fish in the previous year's run.

The 1985 preliminary forecast was developed by using average return/spawner based on the past 25 years of observed returns. This method of forecasting much like the former method produces a lot of variability between the forecast and the actual return. The 1985 forecast midpoint estimation of 935,511 is slightly above average (831,621) of the observed returns based on 25 years of return data. It is anticipated that the actual return should fall within the prediction range given.

Prepared by:

Peter J. Probasco
Area Management Biologist
Chignik Area

FORECAST AREA: South Peninsula

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1985 RETURN:

	<u>Point</u>	<u>Range</u>
Return Estimate:	5.0 million	2.4 million to 7.6 million
Escapement Goal:	1.5 million	
Harvest Estimate:	3.5 million	0.9 million to 6.1 million

FORECAST METHODS

The forecast was developed from a combination of linear regression using average pre-emergent fry/m², average return per spawner, trends and linear regression using the percent of pre-emergent samples which contained live fry. Climatic conditions and pink salmon return strength in other Western Alaska areas were also considered in adjusting the point estimate forecast.

DISCUSSION OF THE 1985 FORECAST

The forecast is based on the pre-emergent pink salmon fry sampling program conducted each March in key index streams. This method appears accurate in determining the overwinter fry survival and yields a value which related yearly returns to fry density. Linear regression analysis using 11 years of pre-emergent fry density points were used to develop the present forecast with 80% confidence intervals.

The percent of pre-emergent samples which contained live fry was determined to be approximately the same as in 1982 and significantly below the 1983 level. Because the brood year escapement producing the 1985 return was 2.7 times less in strength as compared to 1982 and 1983, importance was placed on the overwinter survival of the fry in determining the point estimates.

Because the 1984 pink salmon return was significantly above the forecast range, importance was placed on return per spawner data from 1974. The 1984 total return of 13.895 million pink salmon resulted in a return per spawner of 6.04 which is the third largest since 1964. This may indicate excellent ocean survival conditions. Another consideration in developing the point estimate were observations from several fishermen in different geographic locations on the South Peninsula concerning large numbers of pink salmon fingerlings in the bays this summer. All of the survival trends indicate a return greater than that predicted by pre-emergent fry data.

The point estimate is a total return of 5.0 million with an expected harvest of 3.5 million, with a range of 2.4 to 7.6 million and 0.9 to 6.1 million, respectively.

The forecast does not include the incidental pink salmon harvest during the June fishery on salmon migrating to other areas.

Prepared by:

James N. McCullough
Acting Assistant Area Management Biologist
Peninsula/Aleutians Area

FORECAST AREA: Bristol Bay

SPECIES: Sockeye Salmon

PRELIMINARY FORECAST OF 1985 RETURN:

	<u>Point</u>	<u>Range</u>
Total Return:	34.7 million	21.7 million to 47.7 million
Escapement Goal:	14.7 million	
Projected Harvest:	20.0 million	9.6 million to 33.0 million

FORECAST METHODS

The 1985 Bristol Bay sockeye salmon forecast was derived from the following two independent methods:

- 1) Standard ADF&G (based upon spawner-recruit relationships, sibling age class returns, and smolt production-survival estimates for individual age classes and river-lake systems); and
- 2) Japanese Research Catches (based upon mean length and geometric mean catch per unit of effort of sockeye salmon collected by Japanese research vessels fishing south of the Aleutian Islands during summer months, and mean June air temperatures at Cold Bay during the period of sockeye salmon ocean residence).

These methods produced the following results (in millions of sockeye salmon):

<u>Method</u>	<u>Estimates</u>	<u>Std. Dev.</u>	<u>Range</u>
Standard ADF&G	24.7	11.3	9.8 to 39.6
Japanese Research Catches	41.9	9.4	28.9 to 54.9

Standard deviations and 80% confidence limits (ranges) for each of the two estimates were calculated using standard linear regression analysis to describe the relationship between past forecasts and actual returns. A total of 25 and 11 years of data were used to test the accuracy of the Standard ADF&G and Japanese Research Catches methods, respectively. The 1985 forecast was the sum of the weighted averages for the two-ocean and three-ocean age class estimates obtained from the Standard ADF&G and Japanese Research Catches methods. The inverse of the squared standard deviation for each estimate was used as a weighting factor to calculate the estimate for each ocean age class.

DISCUSSION OF THE 1985 FORECAST

The spawner-recruit component of the Standard ADF&G method produced a much higher prediction for the total 1985 return to the Kvichak system (37.4 million)

than either the sibling age class (4.4 million) or smolt (8.4 million) components. Although results of all three components have traditionally been given equal weight in calculating Standard ADF&G system forecasts, only results of sibling age class and smolt components were used to forecast 1985 returns of five-year-old sockeye salmon (5_3 and 5_2 age classes) to the Kvichak system. Although the 1980 spawning escapement to this system was the second largest ever documented (1980, 22.5 million spawners; 1965, 24.3 million spawners), prediction of a large return of five-year-old sockeye salmon from the 1980 spawning escapement was not supported by results from either the sibling age class or smolt models (both of which fit available data for all age classes much better than the composite spawner-recruit model). Estimates from all three components were used, and given equal weight, for 1985 Standard ADF&G forecasts for all other systems, since differences among estimates were not as great as noted for the Kvichak system.

The Japanese Research Catches forecast for total Bristol Bay sockeye salmon returns was 70% greater than the Standard ADF&G forecast. The greatest difference between the two forecasts was due to predictions for two-ocean (4_2 and 5_3 age classes) returns. The Japanese Research Catches prediction for two-ocean returns (34.1 million) was 164% greater than the Standard ADF&G prediction (12.9 million), while the Japanese Research Catches prediction for three-ocean (5_2 and 6_3 age classes) returns (7.8 million) was 34% less than the Standard ADF&G prediction (11.8 million).

If there is a greater return of two-ocean sockeye salmon to Bristol Bay in 1985 than was predicted by the Standard ADF&G method, allocation of sockeye salmon within the pooled forecast could be in error. This could result in a substantial increase in the actual proportion of two-ocean sockeye salmon returning to the Kvichak system and decreases in the proportion returning to other systems.

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FORECAST AREA: Bristol Bay, Nushagak District

SPECIES: Chinook Salmon

PRELIMINARY FORECAST OF 1985 RETURN:

	<u>Point</u>	<u>Range</u>
Total Return:	188,000	156,000 to 220,000
Escapement Goal:	75,000	
Projected Harvest:	113,000	81,000 to 145,000

FORECAST METHODS

The 1985 Nushagak District chinook salmon forecast was based upon the relationship between returns of sibling age classes (i.e., age classes produced from the same spawning escapement). Standard linear regression techniques were used to estimate returns, calculate standard deviations, and provide 80% confidence intervals (ranges) for each major age class. These results were summed to provide the total return estimate.

DISCUSSION OF THE 1985 FORECAST

This was the first formal attempt to forecast chinook salmon returns to the Nushagak District of Bristol Bay. The predicted return of 188,000 chinook salmon would be about average for Nushagak District (mean, 1966-1984, 173,000). The projected catch of 113,000 would be 38% greater than the long term average catch (mean, 1966-1984, 82,000), but 16% less than the recent average catch (mean, 1978-1984, 134,000). Age 5₂ chinook salmon are expected to dominate the return (45% of total), while ages 6₂ (38%), 4₂ (11%), and 7₂ (6%) are expected to comprise the remainder.

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