SKEENA RIVER SALMON MANAGEMENT COMMITTEE

ANNUAL REPORT

1966

DEPARTMENT OF FISHERIES AND FORESTRY OF CANADA
FISHERIES SERVICE
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SKEENA RIVER SALMON MANAGEMENT COMMITTEE

Annual Report 1966

Committee Members

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In Charge of Investigations

I. Todd

Advisory Board Members

H. Barton
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Department of Fisheries and Forestry
of Canada,
Fisheries Service,
Vancouver, B.C.
January, 1970

I. TERMS OF REFERENCE

The Skeena River Salmon Management Committee was established by the Minister of Fisheries in 1954 to investigate the condition of the Skeena River salmon stocks, to improve management of the runs, and if possible to increase the annual yield. To achieve these objectives, the Committee draws upon the Administrative, Conservation and Protection, Resource Development, and Research Board staffs of the Department of Fisheries. Present members of the Committee are Mr. W.R. Hourston, Director Pacific Region, Department of Fisheries, and Dr. W.E. Ricker, Acting-Director Pacific Biological Station, Fisheries Research Board of Canada, who replaced Dr. P.A. Larkin in September, 1966.

The Minister of Fisheries also appointed an Advisory Board to the Committee which consisted of individuals representing the various sections of the industry concerned with the Skeena salmon fishery. During 1965, the Advisory Board was re-constituted and now consists of two representatives from the Fisheries Association; two from the Native Brotherhood of B.C. including one representative from the Nishga Tribal Council; two representatives from the United Fishermen and Allied Workers' Union; and one representative from the Prince Rupert Fishermen's Co-operative Association.

Present members of the Advisory Board are:

Fisheries Association of B.C.

N.K. Nelson, Mgr. Nelson Bros., Port Edward
N. Christensen, Mgr. Canadian Fishing Co., Oceanside

United Fishermen and Allied Workers' Union

K. Harris, Gillnet fisherman
C. Doyle, Seine fisherman

Native Brotherhood of B.C.

J. Stephens, Kitwanga
H. Barton, Kincolith

Prince Rupert Fishermen's Co-operative Association

R. Johnson, Gillnet fisherman

As in the past, the committee met with the Advisory Board several times during the year to discuss the progress of investigations and the basis for regulation of the fishery.

II. RECORD OF MEETINGS

The Committee met in Nanaimo on December 7, 1965, to consider evidence bearing on the probable magnitude of the 1966 sockeye and pink salmon runs to the Skeena system and to formulate appropriate regulations for the fishery.

On the basis of the size of the 1960 and 1961 parent escapements, the recorded smolt production and the most probable proportion of the progeny returning as 4- and 5-year-old fish, the most likely size of the 1966 sockeye run was considered to be 1,350,000 fish.

The 1966 pink salmon run is the progeny of an escapement of 1,700,000 pinks in 1964, of which 1,321,000 spawned in the Lakelse River. In recent even-numbered years the return of pinks has averaged 3.2 times the number of parent spawners. Sampling of pre-emergent juveniles in the Lakelse River during the 1964-65 incubation period, however, suggested that survival to the fry stage would be about one-half that recorded during preceding years. On this basis, the total run to the Skeena system in 1966 was anticipated to be in the order of 2,500,000 pinks.

In proposing regulations for 1966, the Committee noted that optimum escapement requirements for sockeye would limit the commercial catch to approximately 500,000 fish. In consideration of the economic situation of the industry arising from the small pack of 1965, the Committee recommended, therefore, that the total system escapement goal for 1966 be set at a minimum of 650,000 sockeye. If the run returns at a higher level than forecast then the escapement will be adjusted accordingly to meet the optimum requirement of 850,000. The Committee recommended, therefore, that two days fishing per week be permitted during the period when sockeye predominate in the fishery.

The 1966 pink salmon run as in all years since 1956 is expected to be composed primarily of fish returning to the Lakelse River. In view of the estimated escapement requirements for that system, the Committee recommended that three days

fishing per week be permitted during the period when the Lakelse River pink stock predominates in the fishery.

It was anticipated that the regulations outlined above would result in a catch of approximately 690,000 sockeye and 1,100,000 pinks.

Details of the proposed regulations were provided in a release issued to the Committee's Advisory Board and to the industry generally on January 5, 1966. A copy of that release is attached to this report as Appendix I.

The Committee then met with its Advisory Board in Prince Rupert, B.C., on February 8 and 9, 1966, where the prospects for the 1966 run and the basis for the proposed regulations were reviewed.

On the basis of the meeting with the Advisory Board, the Committee decided that no alteration to the recommended fishing pattern was warranted, and in this regard issued a final release on April, 1966. A copy of the final release is attached to this report as Appendix II.

The Committee met again on December 20, 1966 in Vancouver, B.C. to review the 1966 fishing season, and the effects of regulations on the catches and escapements. A review of the 1966 season is presented in the following section of this report, followed in turn by a summary of research and development projects currently being conducted under the direction of the Committee.

III. THE 1966 SKEENA SALMON FISHERY

The 1966 sockeye and pink salmon runs were expected to total 1,350,000 and 2,500,000 fish respectively. In view of the escapement requirements established for each species, the Committee recommended that fishing for sockeye commence on June 26 and that fishing periods be limited to two days per week from June 26 to August 7, during which time sockeye predominate in the fishery and to three days per week from August 7 to August 28, during which time pink salmon are predominant.

The 1966 Skeena sockeye run of 1,016,000 fish was smaller than anticipated. The 5_2's resulting from the 1961 escapement returned at near the anticipated level of magnitude (456,000); however, the 4_2's returning from the 1962 escapement totalled 470,000 rather than the expected 720,000. The remainder (90,000) was primarily 5_3's and 6_3's.

The 1966 pink salmon run was expected to return at a level of 2,500,000 fish. The actual return totalled 1,635,000.

The number of days fishing per week recommended by the Committee prior to the season, the actual number of day fished, the estimated weekly abundance of sockeye and pinks, and the calculated weekly rates of exploitation are presented in Figure 1.

On the basis of the catches in the area and the test fishing index of escapement, the sockeye run developed at almost the expected level during the first two weeks of the season and consequently two days fishing per week was allowed. During the third week, late catches from the outer fishing

Number of Fishing Days per Week									
Days Recommended	2	2	2	2	2	3	3	3	4
Days Fished	2	2	4	2	5	3 1/2	3	4	3

Estimated Rates of Expoitation (%)									
Pink			72.7	45.9	60.7	53.2	46.1	50.6	81.5
Sockeye	27.6	47.7	55.2	67.9	70.1	26.2	72.9	39.8	59.0

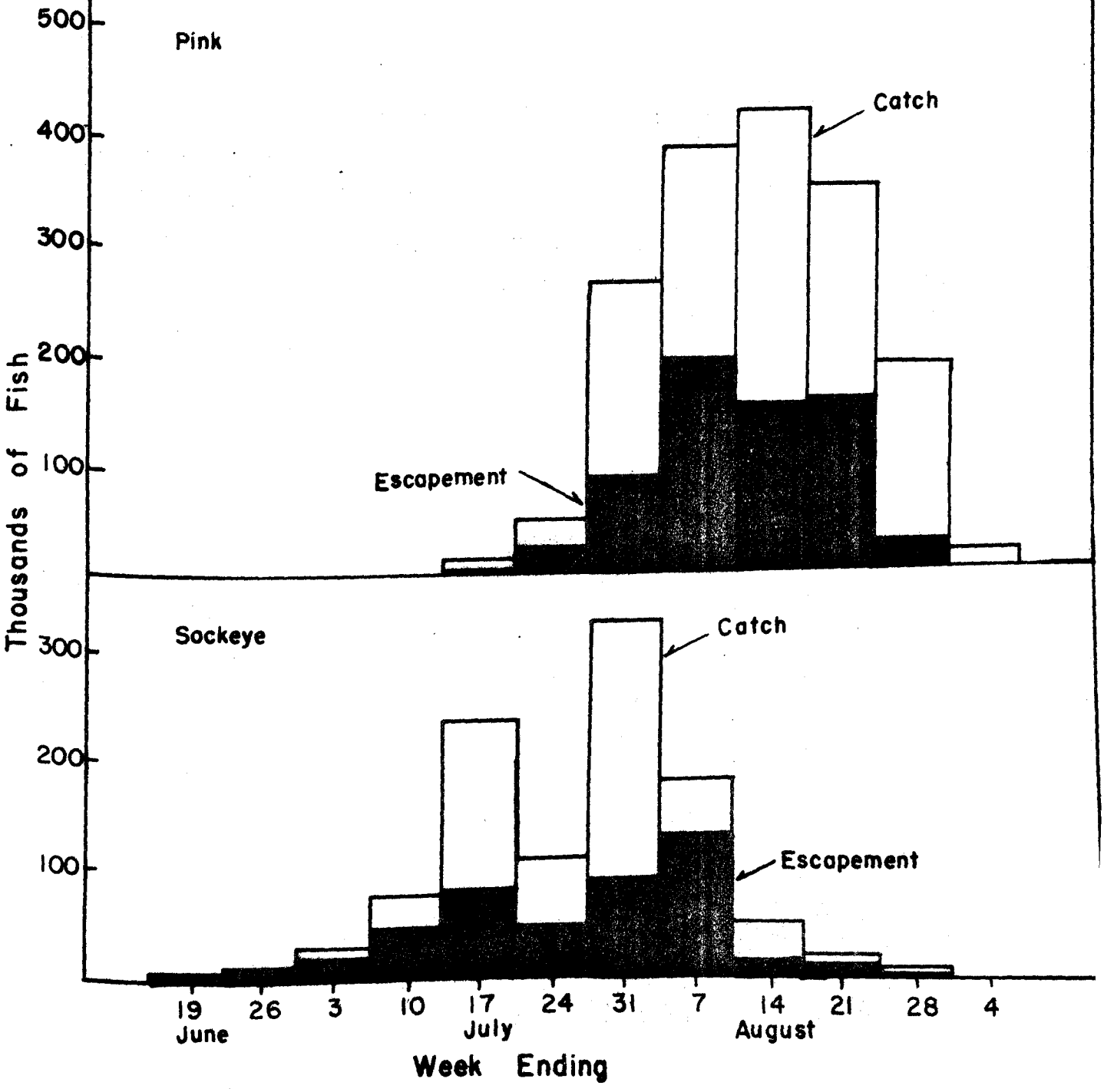

Figure 1. Weekly Sockeye and Pink Catches and Escapements - 1966

areas appeared stronger than expected and test fishing catches showed that escapements would be higher than requested. For these reasons, the area was re-opened Friday evening, July 15, and fishing was permitted until Tuesday July 19. Pink salmon also appeared in significant numbers during this week.

Catches and escapements of sockeye for the first two days of the week ending July 31 were at high levels so a total of five days fishing was allowed, during which time daily escapement levels also remained high. The pink salmon run was also fairly strong throughout the week.

Sockeye catches recorded for Monday and Tuesday of the week ending August 7 were at a low level although pink catches were good. Test fishing catches of both species increased rapidly during the week, so the fishery was re-opened at 8 A.M. Saturday. Test fishing catches of sockeye decreased following the opening and remained at a low level for the remainder of the season. Pink salmon catches were maintained at good levels until August 21.

The sockeye catch recorded in the Skeena gillnet area totalled 550,000, which represents slightly more than 50 percent of the total run of 1,016,000. Catches recorded since 1950 are presented for comparison in Table I.

The Skeena system sockeye escapement totalled 447,000 fish of which 389,000 entered the Babine Lake system. Not included in the escapement were an additional 182,000 jack sockeye which entered Babine Lake, the second highest total of jacks on record.

TABLE I. SALMON CATCHES IN GILLNET AREA 4, 1950 - 1966

Year	Sockeye	Coho	Pinks	Chums	Chinooks
1950	531,180	58,566	393,881	83,909	15,094
1951	691,442	102,588	443,294	64,468	16,538
1952	1,294,483	45,772	1,446,302	36,988	20,467
1953	659,210	54,175	423,853	55,650	13,205
1954	571,456	85,160	661,009	115,142	19,500
1955	157,362	92,453	1,322,162	28,835	13,685
1956	149,016	61,146	406,960	51,112	14,882
1957	279,934	52,143	2,329,316	35,389	9,025
1958	602,032	59,995	899,837	43,317	17,952
1959	195,698	47,111	572,616	31,284	14,620
1960	185,731	36,076	162,842	20,896	17,594
1961	894,697	37,271	1,041,290	26,255	8,761
1962	484,141	70,980	576,738	21,466	9,681
1963	141,516	48,646	466,020	25,831	8,279
1964	765,042	82,495	939,650	37,490	13,458
1965	294,213	53,708	144,259	7,689	12,885
1966	592,582	124,952	1,046,315	37,265	14,205

Other portions of the Skeena sockeye escapement include 19,000 which entered Lakelse Lake and 16,000 which entered the Bulkley-Morice system. Escapements to other areas were extremely light.

The pink salmon catch for the Skeena gillnet area totalled 1,000,000 fish. The escapement of pink salmon to the entire Skeena River system, based on spawning ground enumeration procedures, totalled 636,000. Of this total 64 percent or 397,000 spawned in the Lakelse River, although the total return to this system was not up to expectations. The escapement to the Kispiox of 2,000 pinks was the lowest recorded to date.

The gillnet catch of chinook salmon totalled 14,200 large fish plus an additional 10,000 jacks. The chinook escapement to the Bear River was low, while escapements to other areas were considered to be average.

The gillnet catch of chum salmon totalled 37,300 fish, which is equivalent to the 1964 catch and higher than any other year since 1958. Escapements were considered to be good.

The coho catch of 125,000 fish is the highest on record and escapements to all areas were good.

Long term annual catches of sockeye and pink salmon are presented graphically in Figures 2 and 3 respectively, and Figure 4 depicts the annual catches of other salmon species since 1950.

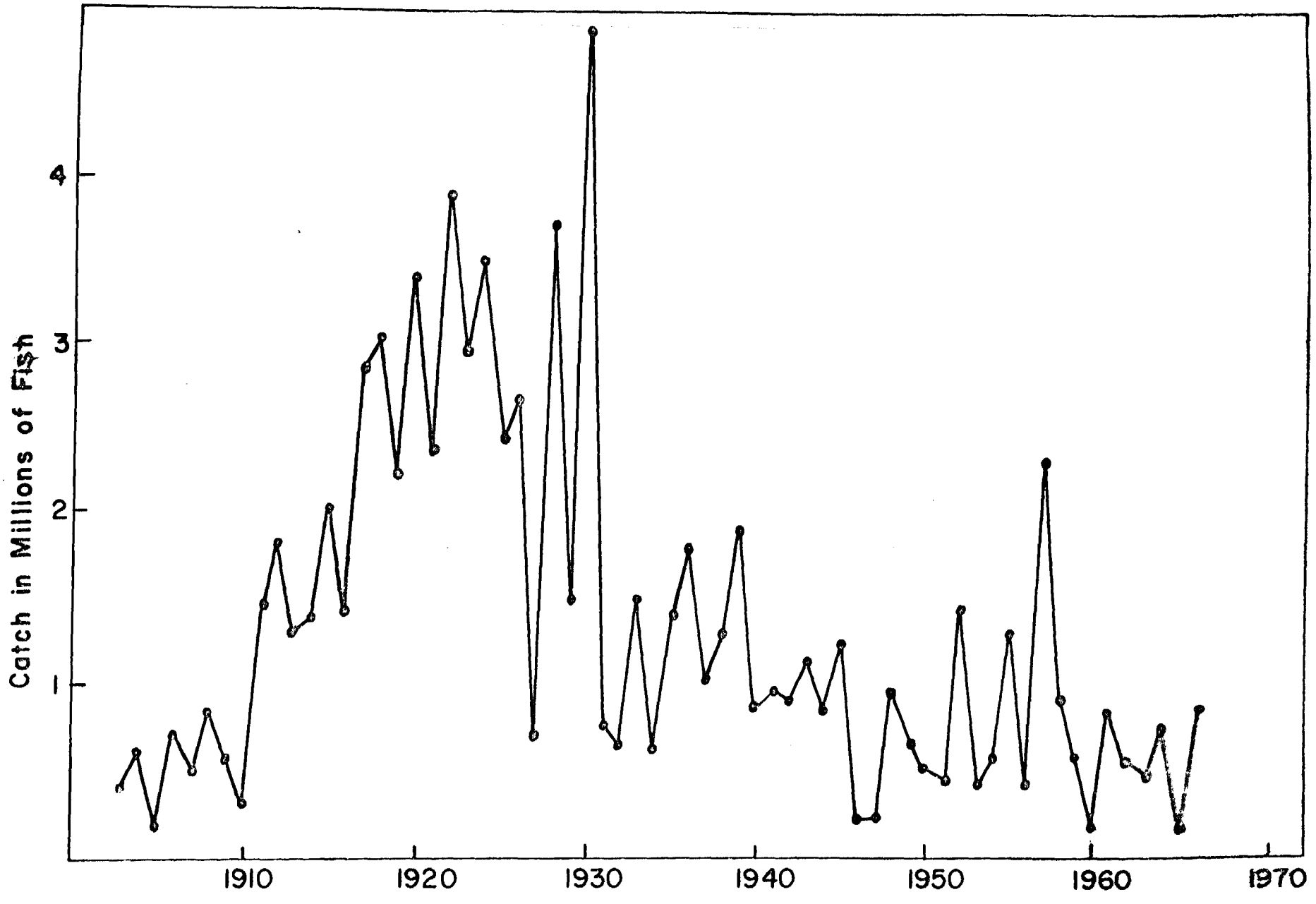

Figure 3. Estimated Annual Catch of Pink Salmon in the Skeena Gillnet Area (1903–1949 using pack figures and available information of annual average fish per case; 1950–1966, from British Columbia catch statistics of the Department of Fisheries).

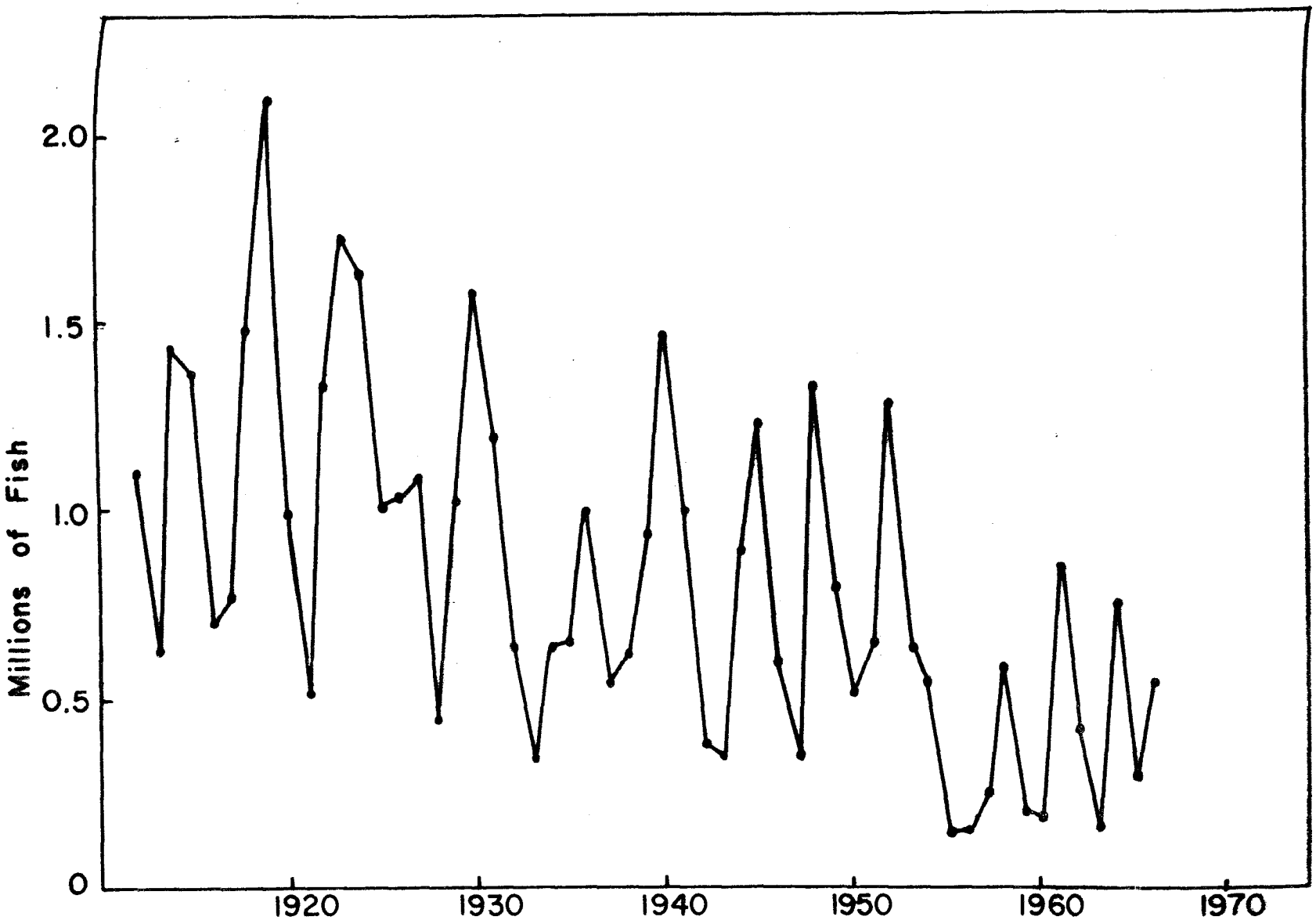

Figure 2. Annual Catch of Sockeye in the Skeena Gillnet Area (from British Columbia Catch Statistics of the Department of Fisheries, 1950-1966; and from pack and sampling data, 1912-1949).

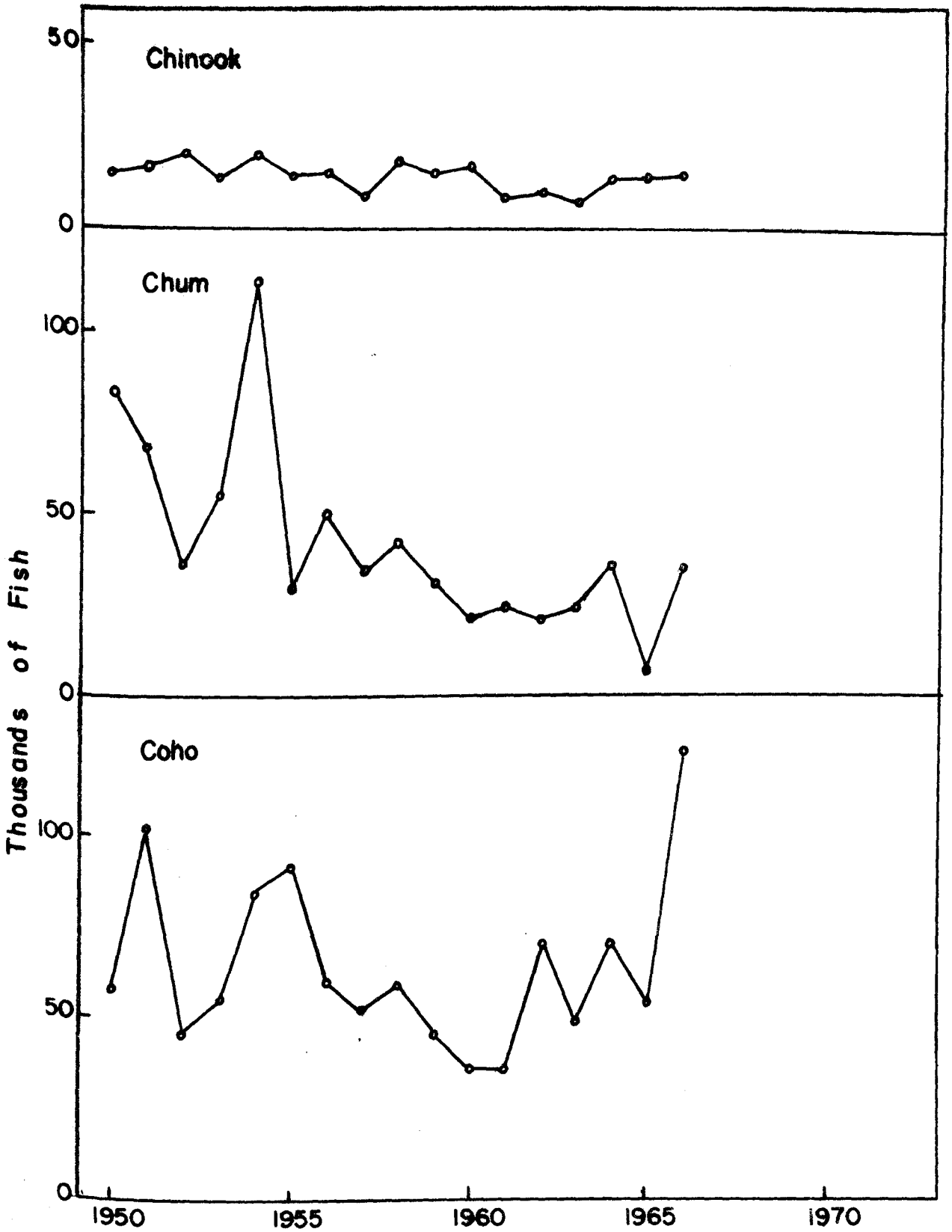

Figure 4. Annual Gillnet Catches of Chinook, Chum and Coho Salmon in the Skeena Gillnet Area (B.C. Catch Statistics of the Department of Fisheries), 1950-1966

Investigations and Fish Cultural Projects

In 1966, Skeena salmon investigations continued to provide the information required for seasonal and long-term management of the salmon runs. The investigations included collection and analysis of commercial catch and effort data, estimation of escapement size and distribution, and sampling of both the catch and escapement for age and size composition of the runs. Test fishing provided daily and weekly estimates of sockeye and pink escapements from the fishing area, which, supplemented by catch data, were used to assess the size of the runs as they developed and the exploitation rate of the fishery.

The Resource Development Branch of the Department of Fisheries assumed the responsibility in 1966 for the enumeration of the pink salmon escapement to the Skeena system and conducted an additional tagging program at McLean Point on the Skeena River to study timing and distribution of the sockeye and pink runs bound for major spawning areas.

The first stage spawning channel on Fulton River at Babine Lake was operational in 1966 and preparations were underway at Pinkut Creek for the construction of the first stage of a spawning channel. Late in 1966, the engineering staff of the Department of Fisheries began reconstruction of the Babine Fence.

1. The 1966 Babine Escapement

The Babine Lake system comprises the largest sockeye salmon producing area in the Skeena system, having supported approximately 90% of the total Skeena escapement of that species in recent years. In addition, good runs of all other species of salmon except chums occur in most years.

The Babine counting fence has been operated every year since 1946 to obtain counts and certain vital statistics of the escapements. Counts are complete for all years except 1948 when the fence washed out and 1964 when unusually high water prevented fence operation until September 1.

The counts of the five species of salmon in the years 1946 to 1966 are presented in Table 2.

In 1966, fence operations began on July 14. The first peak in the sockeye migration occurred on August 2 and another peak occurred on August 28. The latter date coincides with the peak of the jack sockeye run. Fence operations were discontinued on September 16 after a fairly steady decline in the daily counts.

The portion of the chinook escapement counted above the fence totalled 1600 large fish and 2500 jacks (61%). The 1966 count of this portion of the escapement is larger than any recorded count since 1959 but smaller than the 1964 estimate.

TABLE 2. COUNTS OF SALMON PASSING THE BABINE FENCE.

Year	Sockeye		Chinook**	Pink	Coho**	Chum
	Large	Jacks				
1946	444,551	31,154	10,528	28,161	12,489	18
1947	261,460	261,101	15,614	55,421	10,252	7
1948*	650,000					
1949	461,139	47,993	7,433	13,663	11,938	5
1950	364,356	179,302	6,838	38,728	11,654	7
1951	141,415	11,042	2,778	50	2,122	0
1952	349,011	27,936	5,915	2,706	10,554	1
1953	686,586	28,028	8,353	1,108	7,648	17
1954	493,677	9,745	5,925	4,604	3,094	66
1955	71,352	30,624	3,528	2,151	8,947	3
1956	355,345	18,164	4,345	2,691	9,250	3
1957	433,149	50,162	7,509	25,865	4,421	15
1958	812,043	30,769	8,274	6,600	7,606	8
1959	782,868	31,920	9,597	57,766	10,947	20
1960	262,719	49,396	2,855	4,876	6,794	6
1961	941,711	27,853	2,921	70,044	10,024	4
1962	548,000	46,200	3,030	37,500	11,000	23
1963	588,000	173,000	3,400	90,600	3,600	9
1964	827,500	N.A.	5,700	23,400	8,400	-
1965	580,000	64,300	3,200	67,200	20,000	-
1966	389,000	182,000	4,100	46,000	7,200	2

* Total sockeye estimated from comparison with stream surveys and fence counts from other years.

** Counts include jacks.

The pink salmon escapement past the fence totalled 46,000 and is the largest even-year escapement in the history of the fence.

A total of 7,200 coho had passed the fence when operations were discontinued. The 20-year average for this period in the coho migration is 9,300.

2. Pink Salmon Escapements

In 1966, as in the past, the pink salmon escapement to each stream was considered as a separate problem requiring its own enumeration solution. A variety of methods was employed in obtaining estimates of escapement and information on timing and distribution.

The escapement estimates for the entire Skeena River system are compiled from the records of the Protection and Resource Development Branches of the Department of Fisheris and the Fisheries Research Board. The pink salmon escapement to the Skeena system totalled 636,000 in 1966 of which 65 percent spawned in the Lakelse River.

A tagging program was conducted in 1966 at McLean Point, which is twenty miles above the test fishing site on the Skeena River. By comparison of the daily test fishing indices with the daily catches at McLean Point, the average time of migration between these two locations for pink salmon was calculated to be three days. A total of 2500 tags was applied to pink salmon and recoveries were made throughout the system.

On the evidence of the McLean Point tagging program, it was determined that Lakelse-bound fish were present throughout the run. Tagging evidence from other years indicated that Lakelse-bound fish were absent from the early part of the escapement but were dominant in the latter part. The Kispiox River stock is usually the main contributor to the earliest segment of the run and the drastically reduced level of this stock would be noticed in the early period. Sixty-five percent of the tags receovered in 1966 were from the Lakelse River and an additional twenty-five percent were from the Native Food fishery (Figure 5).

The earliest peak in the escapement appeared at test fishing on August 5, and three days later was reflected in a peak catch at McLean Point. Recoveries of tags applied at that time indicate that fish bound for all major pink spawning areas were present in the river. The two later peaks in the escapement, August 14 and August 19 at test fishing, were shown to be composed mainly of Lakelse-bound fish.

Tags recovered in the Native food fishery on the Skeena River are not too useful for timing purposes because of the mixed nature of the stocks on which this fishery operates. On the assumption that Native recoveries are made on fish migrating to some point upstream of the point of capture, this data can be used to supplement the more precise data from stream recoveries. In figure 5,

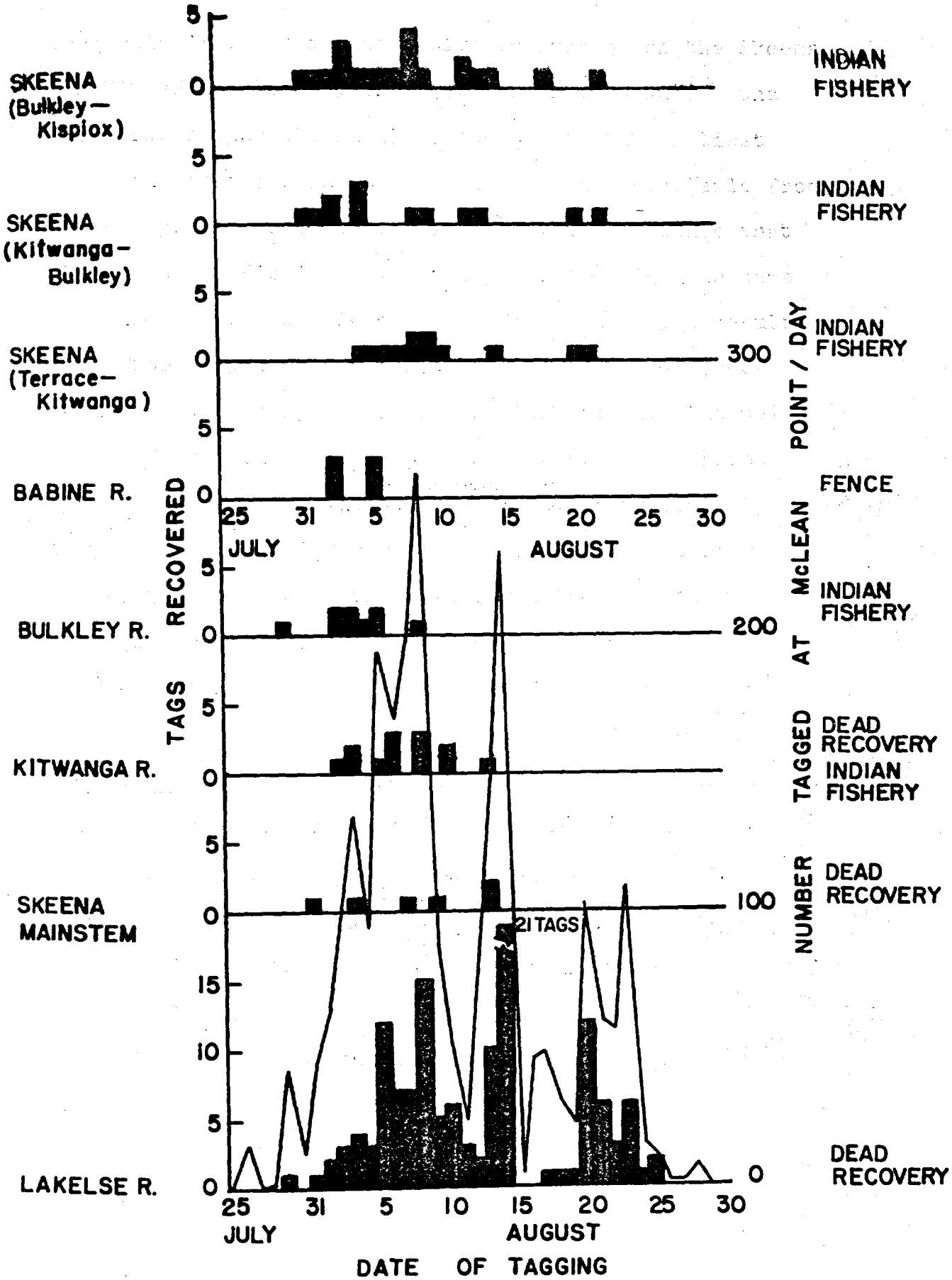

FIGURE 5. PINK SALMON TIMING BY McLEAN POINT TAGGING 1966

disregarding for the moment Native recoveries on the Skeena below Kitwanga it is evident that pink salmon runs bound for the Babine and the Bulkley Rivers were the earliest to pass the test fishing site in 1966. Data available from tagging experiments conducted in past years indicate that pinks bound for Kispiox River are present during the same period as Babine and Bulkley River fish, but, as a result of the extremely low escapement to Kispiox in 1966, no information was collected regarding its timing. The next segment of the run moving up the Skeena River was bound for the Kitwanga River and the Skeena River mainstem spawning areas. The Lakelse River run, although present throughout the migration period in the river, was the last to reach peak abundance.

Estimated escapements of even-year runs of pink salmon to the Skeena River and its tributaries are listed in Table 3. By comparison with past brood cycles, the 1966 escapements of pink salmon to the Babine River and to the Bulkley River (tabled under "Others"), both early run streams, were good. Conversely, the escapement to the Kispiox River, also early, was even lower than the poor brood-year escapement.

The Babine River escapement was counted at the Babine River fence and the Bulkley River escapement was counted through the fishway at Moricetown Falls. The Kispiox escapement was estimated from aerial surveys conducted at frequent intervals.

TABLE 3. ESTIMATED ESCAPEMENTS OF EVEN-YEAR CYCLE SKEENA RIVER PINK SALMON 1956-1966

Place	1956	1958	1960	1962	1964	1966
			(thousands)			
Lakelse River	75	262	122	635	1321	397
Kispiox River	75	66	45	50	8	2
Skeena River	5	50	10	37	200	76
Kitwanga River	35	158	27	65	50	90
Babine River	3	10	7	40	24	46
Others	10	10	5	8	8	12
Total above T.F.	203	556	216	835	1611	633
Coastal	75	116	45	165	no data	3
Total	278	672	261	1000	1611+	636

The pink escapement to the Kitwanga River, intermediate in timing, was estimated on the spawning grounds using a strip count method. The resultant estimate was the second largest even-year escapement recorded for this river.

The Skeena River mainstem population was estimated by drifting a gillnet over several bars in the region of the Skeena River bounded on the east by Terrace and on the west by Salvus. High water hampered the operation in 1966 and the higher velocities encountered required a change in the method of calculating the escapement. Comparison of the escapement estimates calculated by the two methods are shown in Table 4. The number of pink salmon spawning in Shames Slough and a slough near Morse booming grounds is added to the calculated escapement to the mainstem. In 1966, small numbers of pinks were found spawning in the Skeena between Terrace and Cedarvale. Unsubstantiated reports indicate that there once was a considerable number of pink salmon spawning in that area.

The 1966 Lakelse River pink salmon escapement was enumerated by a tag and recovery program similar to that conducted annually since 1960. The first portion of the run arrived in the river at an early date for an even-year run and the fish were in a very "green" condition. The condition of the fish resulted in a longer than usual period between the time of tagging and the time of recovery.

TABLE 4. COMPARISON OF SKEENA MAINSTEM PINK SALMON ESCAPEMENT ESTIMATES

Year	Linear Yds.	Catch	1966 Estimates	Previous Method
1962	10,000	107	39,000	39,000
1963	11,805	125	39,000	41,000
1964	9,812	533	186,500	206,000
1965	4,240	114	90,700	125,000
1966	3,005	66	76,500	249,000

A short period of high water occurred just after the peak migration of fish into the river and may have resulted in the loss from the river of many fish weakened by spawning or tagging.

The calculated escapement of 397,000 was less than expected on the basis of the test-fishing index and considerably less than the brood year escapement of 1,321,000.

3. Pink Salmon Egg-to-Fry Survival

Estimates of pink salmon fry abundance were made on several large spawning areas tributary to the Skeena River from 1956 to 1961. In the spring of 1962, the fry program was restricted to comprehensive trapping on the Lakelse River, some limited trapping in the Babine River and some redd excavation and fry trapping in Shames Slough. The program was limited to the Lakelse River in the spring of 1963 and was discontinued the following year.

The Lakelse River supported approximately 70 percent of the pink salmon escapements to Area 4 in 1964 and 1965 and it is probable that a similar percentage of the total stock in the area is attributable to this river. Because of the importance of this river, some indication of freshwater survival is important to the Skeena Management Committee.

Table 5 shows the result of sampling eggs and fry of several brood years in the Lakelse River. Hydraulic sampling of fry and eggs was conducted in the river during the winters of 1964-65 and 1965-66 at a time when intragravel mortality is believed to be almost complete.

Table 5. Indicated survival of pink salmon eggs and fry in the Lakelse River: 1956, 1962, 1963 1965 and 1966.

Sample date	Section sampled	Number of Samples	Summary of results					
			Live		Dead		Both	
			Number	%	Number	%	Number	%
		1956						
Mid-January	Upper 3 miles	46	12,679	73.9	4,478	26.1	17,157	100.0
" "	Herman Cr.-Coldwater Cr.	20	6,236	64.7	3,406	35.3	9,642	100.0
		1962						
March 12	Herman Cr.-Coldwater Cr.	6	289	95.4	14	4.7	303	100.0
		1963						
Jan. 31 - Feb. 2	Upper 5 miles	27	2,361	79.7	602	20.3	2,963	100.0
Feb. 1	Herman Cr.-Coldwater Cr.	6	628	98.6	9	1.4	637	100.0
		1965						
Jan. 23 - Feb. 5	Entire river	111	1,135	41.4	1,604	58.6	2,739	100.0
" "	Upper 3 miles	29	530	40.7	772	59.3	1,392	100.0
Jan. 23-24; Feb. 3	Herman Cr.-Coldwater Cr.	75	1,201	23.9	3,831	76.1	5,032	100.0
March 5	Above Coldwater Creek	21	312	38.0	510	62.0	822	100.0
		1966						
Feb. 9-13	Entire river	150	1,366	55.6	1,089	44.4	2,455	100.0
Feb. 9 -11	Upper 3 miles	65	434	36.7	747	63.3	1,181	100.0
Nov. 25-28	Herman Cr.-Coldwater Cr.	102	2,744	72.5	1,039	27.5	3,783	100.0
Dec. 19	" "	50	1,177	47.0	1,325	53.0	2,502	100.0
Feb. 9-10	" "	50	389	34.8	729	65.2	1,118	100.0

Procedures were standardized in the two winters but quantitative data cannot be compared with that of earlier years when eggs and alevins were excavated by shovels. Survival percentage among excavated materials should, however, be meaningful.

The freshwater survival from both the 1964 and 1965 brood years is between 5% and 7% having regard for the total number of organisms in the stream in February as well as the percentage remaining alive. The survival is much lower than measured in other years (mean = 13%) and suggests a total return of about one million pink salmon to the Lakelse River in 1967 if average marine survival (2.75%) prevails.

4. Nanika River Rehabilitation Program

As a result of the increasing escapements to the Nanika River, the concern with respect to its future status has eased considerably. For this reason, the hatchery operation, initially a rehabilitation measure, was limited during the winter of 1965-66 to the incubation to the eyed-stage of 3.4 million eggs for transplant to an experimental incubation channel located near the hatchery site. Neither facility will be operated during the 1966-67 season.

The hatchery operation, initiated in 1960, after escapements dropped to a very low level in 1954 to 1959 period, reached full production in the 1962-63 season. The fry output from the hatchery averaged over 6.5 million fry per year for the three years of full operation. In the 1964-65 season,

a pilot operation of the channel was conducted in conjunction with the hatchery operation utilizing 1.5 million eggs.

The channel was built and operated as a means of assessing the operation of this type of facility under extreme winter conditions. Egg-to-fry survival from the channel for the 1965-66 season totalled 59 percent as compared to 80 percent in the year of pilot operation. The operation of both the hatchery and the channel was discontinued in 1966 pending evaluation of the contribution made by these facilities in terms of adult production.

The 1966 escapement to the Nanika River, 10,700 sockeye, represented the largest escapement since 1953. The escapement consisted predominantly of age - 5 fish and a return of this magnitude could have occurred from natural reproduction of the 1961 Nanika River sockeye escapement which totalled 7500 fish. The eggs used in the hatchery were taken from the Pinkut Creek stock on Babine Lake, a stock with a predominately 4_2 life cycle. Analysis of age composition data from the 1966 spawning stock would reveal any unusual numbers of the 4_2 age class. Examination of the fish produced no evidence that the hatchery operation in the 1961-62 winter contributed a significant number of age - 4 fish to the escapement.

The biological program, initiated in 1961 to assess the contribution of the artificial transplants and the status of the native sockeye population, now consists primarily of a smolt and an adult enumeration program.

5. Babine Lake Sockeye Smolt Migration.

Sockeye smolts migrating from Babine Lake are enumerated annually at the Babine fence. The total sockeye smolt migration in 1966 was 37 million fish of which 20 million formed the early segment of the migration. The 1966 total represents egg-to-smolt survivals of about 2.7 percent, somewhat lower than the 9-year average of 3.2 percent.

In order to relate smolt survival to size, 47,000 smolts were tagged in 1966 with a fine wire implanted in the nose cartilage and marked by the clipping of the adipose fin as an aid to subsequent recovery.

6. Distribution of Fulton River Fry in Babine Lake.

The spawning channels on the Fulton River are designed to increase the population of sockeye fry rearing in the main basin of Babine Lake. For the evaluation of these facilities it is necessary to know what part of Babine Lake is used as a nursery area by young sockeye from the Fulton River, and how the distribution, growth and survival of sockeye produced in the spawning channel compare with sockeye produced naturally in the river. In 1966, fry from the river and from the channel were marked distinctively during their May and June migration into the lake. Marked and unmarked fish were captured throughout the main lake area from June throuch October in a special purse seine, using a small aluminum drum seiner. Dispersal of both groups of fry was rapid and extensive. The main body of fry first moved southward and by mid-July marked fish were recovered as far as 42 miles south of the Fulton River. Subsequently

the population shifted to the north and by fall sockeye were most abundant in the northern half of the main lake basin. "Channel" and "river" fish were of comparable size as fry and grew at the same rate. However, the channel fish, because of their later entry into the lake, were smaller on the average throughout the season. No difference in survival rate could be demonstrated between marked "channel" and "river" fish.

7. Primary productivity of Babine Lake.

Carbon-14 in situ experiments were used in 1966 to compare various regions of Babine Lake with respect to rates of carbon fixation by phytoplankton. Primary productivity in 1966 was slightly lower in the North Arm (outlet) and Morrison Arm (an inlet) than in the main lake region. Morrison Lake, a major tributary, was much lower in rate of photosynthesis, pH, alkalinity, compensation depth and total dissolved solids than any part of Babine Lake. An unusually high rate of photosynthesis at one place in the main lake in September may have been related to the decomposition of salmon carcasses in a nearby stream. Carbon fixation at Babine Lake was much less per unit area than in the majority of 24 sockeye salmon lakes studied in Southwestern Alaska, but it was as good as most when put in terms of the volume of the euphotic layer because the depth of light penetration was considerably less at Babine Lake. Compared to the 24 Alaskan lakes Babine ranked first in alkalinity, third in total dissolved solids and fifth in pH.

Behaviour of young sockeye in a lake

A 145 kc echo sounder (Sea Scanar by Honeywell) was operated from a 20-foot cruiser in Babine Lake. Certain types of echoes received were identified as sockeye fry by catches made with nets. The echo sounder greatly extended our knowledge of the horizontal distribution of young sockeye and revealed a daily vertical movement. From late July to mid-September the fry at midday occurred in a band situated 150 to 200 feet below the surface; by late afternoon this band had ascended to about 50 feet; near sunset they ascended rapidly and arrived at the surface just after sunset where they remained for about one-half hour then they dispersed into the 30 to 130 foot stratum where they remained until dawn; at dawn they began a slow descent to midday depths.

APPENDIX I

SKEENA SALMON MANAGEMENT COMMITTEE

Re: Tentative Regulations for 1966

(1) The Committee met on December 7, 1965 to review the 1965 Skeena salmon fishery and to consider evidence bearing on the expected abundance of the 1966 sockeye and pink salmon runs. Regulations based on the probable abundance of the runs, their escapement requirements, and the effectiveness of the fishing fleet are proposed in this release for consideration by the Committee's Advisory Board and the industry generally.

(2) The 1965 Skeena sockeye run of 966,000 was smaller than anticipated. The return of 52's from the small 1960 escapement was in the order anticipated (351,000). The return of 42's from the 1961 spawning escapement, as anticipated in view of the low smolt output, was less than average. The total number of 42's (529,000), however, was even less than expected. The remainder of the 1965 run was composed primarily of 53's and 63's (85,000).

The catch of sockeye in the Skeena gillnet area totalled 291,500. The escapement totalled an estimated 666,400, of which 580,000 or 87% entered the Babine Lake system. Escapement to other areas were light, with the exceptions of Lakelse Lake and the Bulkley-Morice System, where escapements were improved over those recorded during past recent years.

(3) The 1965 pink salmon run to the Skeena System totalled 1,368,000 - a little better than one-half the number which would have resulted from an average rate of return from the 1963 escapement. The catch of pinks in the Skeena gillnet area totalled 143,000. Of the total escapement of 1,225,000 estimated for the Skeena River System, 835,000 entered the Lakelse River. Escapements to other areas, particularly to the "early" streams, were generally poor.

(4) The abundance of sockeye in 1966 has been forecast mainly on the basis of brood year escapement magnitude and the past performance of Skeena sockeye with respect to the average return per spawner and average ratio of 4- and 5-year olds produced. Extreme variability in production rate and in age composition has occurred in the past, however, and the forecast therefore merely provides an objective basis for formulating regulations at this time. As has been the case in past years, appropriate changes in fishing regulations will be required as the runs develop and their strength becomes apparent.

The 1966 sockeye run will be composed primarily of 5_2's produced from the 1961 escapement and 4_2's produced from the 1962 escapement. The number of 4_2's which returned from the 1961 spawning (529,000) suggests that the total return will be much below average. At best, the number of 5_2's returning in 1966 cannot be expected to exceed 529,000.

The 4_2's in 1966 will be returning from the 1962 escapement of 575,000. With an average rate of return and assuming that 4_2's and 5_2's return in equal abundance, then 719,000 4_2's might be expected. In view of the exceptionally good smolt production arising from the 1962 brood (50,000,000) the number of 4_2's could be expected to be average or better.

In view of the above information, the most likely size of the 1966 sockeye run is considered to be 1,350,000 (1,248,000 4_2's and 5_2's plus approximately 100,000 of other age groups), and this figure has been used for the purpose of formulating fishing regulations at this time.

(5) The 1966 pink salmon run will return from an escapement of 1,700,000 in 1964. In recent even-numbered years the return of pinks has ranged between 0.7 and 7.3 times the number of parent spawners, and has averaged 3.2 times. The 1964 Lakelse River escapement totalled 1,321,000 out of the system escapement of 1,700,000. Sampling of pre-emergent juveniles in the Lakelse River during the 1964-65 incubation period suggested that survival to the fry stage would be about one-half that recorded during preceding years. In view of this situation, an average rate of return cannot be expected and the total run to the Skeena area is therefore anticipated to approximate 2,500,000 pink salmon.

(6) In proposing regulations for 1966, the Committee noted that in order to satisfy optimum escapement requirements for sockeye, the catch would be limited to approximately 500,000 from the anticipated run of 1,350,000. In consideration of the economic situation of the industry arising from the small pack of 1965, the Committee is recommending that the total system escapement goal for 1966 be established at a minimum of 650,000 sockeye. If the run returns at a higher level than forecast then the escapement will be adjusted accordingly to meet the optimum requirement of 850,000. The Committee will recommend, therefore, that two days fishing per week be permitted during the period when sockeye predominate in the fishery.

The 1966 pink salmon run is again expected to be composed primarily of fish returning to the Lakelse River. In view of the estimated escapement requirements to that system, the Committee will recommend that three days fishing per week be permitted during the period when Lakelse River-bound pinks are in the fishery.

It is anticipated that the regulations outlined above would result in a catch of approximately 690,000 sockeye and 1,100,000 pinks.

Proposed Regulations - 1966

(a) That the upriver commercial fishing boundary be maintained at the Mowitch - Veitch Point line.

(b) That prior to 6:00 P.M. Sunday, June 26, 1966 only gillnets having mesh not less than 8" linen or 8½" synthetic fibre, stretched mesh, be permitted, and that prior to this date a 96-hour weekly closed period from 6:00 P.M. Wednesday to 6:00 P.M. Sunday be maintained.

(c) That fishing for salmon with gillnets of any mesh size be permitted after 6:00 P.M. Sunday, June 26, 1966, until the end of the fishing season as follows:

(i) from June 26 to August 7 - 120 hour weekly closed period 6:00 P.M. Tuesday to 6:00 P.M. Sunday;

(ii) from August 7 to August 28 - 96 hour weekly closed period 6:00 P.M. Wednesday to 6:00 P.M. Sunday;

(iii) from August 28 to the end of the fishing season - 72 hour weekly closed period 6:00 P.M. Thursday to 6:00 P.M. Sunday.

(d) The Committee also proposes to make recommendations as follows for adjacent fishing areas in order to extend similar protective measures for Skeena-bound sockeye and pink salmon while passing through those areas.

Area 3, Nass River - Sub Areas 3X and 3Y only

(i) from July 3 to August 7 - 120 hour weekly closed period from 6:00 P.M. Tuesday to 6:00 P.M. Sunday;

(ii) from August 7 to August 14 - 96 hour weekly closed period from 6:00 P.M. Wednesday to 6:00 P.M. Sunday.

Salmon Purse Seine Area 5 - Beaver Passage and Ogden Channel only

(i) from July 24 to July 31 - complete closure to afford protection to pinks bound for Kispiox River;

(ii) from July 31 to August 7 - 120 hour weekly closed period from 6:00 P.M. Tuesday to 6:00 P.M. Sunday;

(iii) from August 7 to August 14 - 96 hour weekly closed period from 6:00 P.M. Wednesday to 6:00 P.M. Sunday.

(e) Provisoes:

(i) That the weekly closed periods outlined above shall be extended in the event that for any week or series of weeks during the progress of the fishing season the proposed weekly closures, in the opinion of the Committee, are deemed insufficient to provide adequate escapement of salmon for reproduction purposes.

(ii) That extra fishing time will be granted if, in the opinion of the Committee in the light of development of sockeye and pink runs at the time, such might safely be permitted consistent with attaining adequate escapements for reproduction.

(7) The Committee will discuss the results of investigations and the basis for the proposed 1966 regulations with its Advisory Board at a public meeting to be held February 8, 1966 at 1:00 P.M. at the Civic Centre, Prince Rupert, B.C. A further meeting with the Advisory Board only will be held February 9, 1966, at 9:00 A.M. again at the Civic Centre, Prince Rupert.

W.R. Hourston
P.A. Larkin
Committee Members

I. Todd
in charge of Investigations for the Committee

Issued from:

Department of Fisheries of Canada,
1155 Robson Street,
Vancouver 5, B.C.

January 5, 1966.

APPENDIX II

Skeena Salmon Management Committee

Re: Regulations for 1966

1. The Committee released to its Advisory Board and the industry in general on January 5, 1966, proposals for the regulation of the 1966 Skeena River salmon fishery. These proposals were followed by meetings of the Committee with its Advisory Board in Prince Rupert, B.C., on February 8th and 9th, 1966, where the prospects for the 1966 run and the basis of the proposed regulations were reviewed. The views of Advisory Board members and other individuals and organizations were received.

2. At the meetings held with its Advisory Board, the Committee pointed out that in proposing regulations for 1966, the following had been considered:

(a) The abundance of sockeye in 1966 has been forecast mainly on the basis of brood year escapements and the past performance of Skeena sockeye with respect to average return per spawner and the average ratio of return of 4 and 5 year old sockeye produced from each brood escapement. An expected return of 1,350,000 sockeye has been used as the basis for the formulation of the 1966 fishing regulations. In consideration of the economic situation of the industry arising from the small pack of 1965, the Committee has recommended that the total system escapement goal for 1966 be established at a minimum of 650,000 sockeye. On a stock of 1,350,000, two days fishing per week should provide a catch of approximately 700,000 pieces, and an escapement of 650,000.

(b) The 1966 pink run will return from an escapement of 1,700,000 recorded in 1964. In recent even-numbered years, the rate of return of pinks has ranged between .73:1 and 7:1, and has averaged 3.2:1. The Lakelse River escapement in 1964 totalled 1,321,000 or 78 percent of the total system escapement of 1,700,000. Sampling of pre-emergent juveniles in the Lakelse River during the 1964-65 incubation period suggested that survival to the fry stage would have been about one-half that recorded during preceding recent years.

In view of this situation, an average rate of return cannot be expected, and the total run to the Skeena area in 1966 is therefore anticipated to approximate 2,500,000 pink salmon. On the basis that the 1966 run will be composed primarily of fish returning to the Lakelse River, the Committee has recommended that three days fishing per week be permitted during the period when Lakelse River-bound pinks predominate in the fishery. Regulations of this nature should result in a catch of approximately 1,100,000, and an escapement of 1,400,000 pinks.

3. The Committee has considered all views and alternate proposals received which bear on the regulation of the 1966 runs and has concluded as follows:

(a) that no changes in the original proposals for sockeye and pink salmon fishing in Area 4 are warranted; i.e., fishing will be permitted for two days per week during the period June 26, 1966 to August 7, 1966, and for three days per week during the period August 7, 1966, to August 28, 1966; the Committee is prepared, however, to recommend regulatory changes which will permit additional fishing time should the sockeye or pink run return at a level greater than anticipated, or less fishing time should the runs return at levels lower than anticipated;

(b) that in order to provide adequate protection to pink salmon stocks migrating to the Skeena River through the northern portion of Area 5, regulatory measures recommended for Ogden Channel and Beaver Passage also be applied to the Freeman Pass - Browning Entrance portion of that area;

(c) that with regard to net fishing for spring salmon, additional fishing time or the movement of fishing boundaries does not appear warranted; in the event that sockeye fishing is not permitted in any given week, however, consideration will be given to permitting a spring salmon fishery with nets having mesh not less than 8 inches extension measure for linen nets and 8½ inches extension measure for synthetic fibre nets during daylight hours in the Skeena River only.

4. In view of the foregoing considerations, the Committee has recommended to the Department of Fisheries that the following regulations apply to the 1966 Skeena salmon fishery:

(a) that the upriver commercial fishing boundary be maintained at the Mowitch-Veitch Point line;

(b) that prior to 6:00 p.m. Sunday, June 26, 1966, only gillnets having mesh not less than 8 inches extension measure for linen nets and 8½ inches extension measure for synthetic fibre nets, be permitted, and that prior to this date a 96 hour weekly closed period from 6:00 p.m. Wednesday to 6:00 p.m. Sunday, be maintained;

(c) that fishing for salmon with gillnets of any mesh size be permitted after 6:00 p.m. Sunday, June 26, 1966, until the end of the fishing season as follows:

(i) from June 26 to August 7 - 120 hour weekly closed period 6:00 p.m. Tuesday to 6:00 p.m. Sunday;

(ii) from August 7 to August 28 - 96 hour weekly closed period 6:00 p.m. Wednesday to 6:00 p.m. Sunday;

(iii) from August 28 to the end of the fishing season - 72 hour weekly closed period 6:00 p.m. Thursday to 6:00 p.m. Sunday.

(d) that the Committee further proposes the following regulations to apply to adjacent fishing areas in order to extend similar protective measures to Skeena-bound sockeye and pink salmon while present in these areas:

(i) Area 3, Nass River - Sub Areas 3X and 3Y only -

(a) from 6:00 p.m. Sunday, July 3 to 6:00 p.m. Sunday, August 7 - 120 hour weekly closed period from 6:00 p.m. Tuesday to 6:00 p.m. Sunday;

(b) from 6:00 p.m. Sunday, August 7 to 6:00 p.m. Sunday, August 14 - 96 hour weekly closed period from 6:00 p.m. Wednesday to 6:00 p.m. Sunday;

(ii) Salmon Purse Seine Area 5 - to include the waters of Ogden Channel, Beaver Passage, Freeman Pass and Browning Entrance only* -

(a) from 6:00 p.m. Sunday July 10, 1966 to 6:00 p.m. Sunday, August 7, 1966 - 120 hour weekly closed period from 6:00 p.m. Tuesday to 6:00 p.m. Sunday;

(b) from 6:00 p.m. Sunday, August 7, 1966 to 6:00 p.m. Sunday, August 14, 1966 - 96 hour weekly closed period from 6:00 p.m. Wednesday to 6:00 p.m. Sunday.

*N.B. The northern section of Salmon Purse Seine Area 5 referred to above includes all the waters of Freeman Passage, Browning Entrance, Beaver Passage and Ogden Channel, and is bounded on the north by the southern boundary of Skeena Gillnet Area 4, and on the south by a line which extends from Archibald Pt. on Banks Island to Baird Pt. on McCauley Island thence following the northerly coast of McCauley Island and Pitt Island, but not including the waters of Petrel Channel south of a line from Strouts Point on McCauley Island to a white boundary sign on Pitt Island, and the waters of Grenville Channel south of a line from Bonwick Point on Pitt Island east magnetic to a white boundary sign on the mainland shore opposite.

(e) Provisoes:

(i) that the weekly closed periods outlined above shall be extended in the event that for any week or series of weeks during progress of the fishing season the proposed weekly closures, in the opinion of the Committee, are deemed insufficient to provide adequate escapement of salmon for reproduction purposes;

(ii) that extra fishing time would be granted if, in the opinion of the Committee, such might safely be permitted consistent with obtaining adequate escapements for reproduction.

W. R. Hourston
P. A. Larkin
Committee Members

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i/c of Investigations for the Committee

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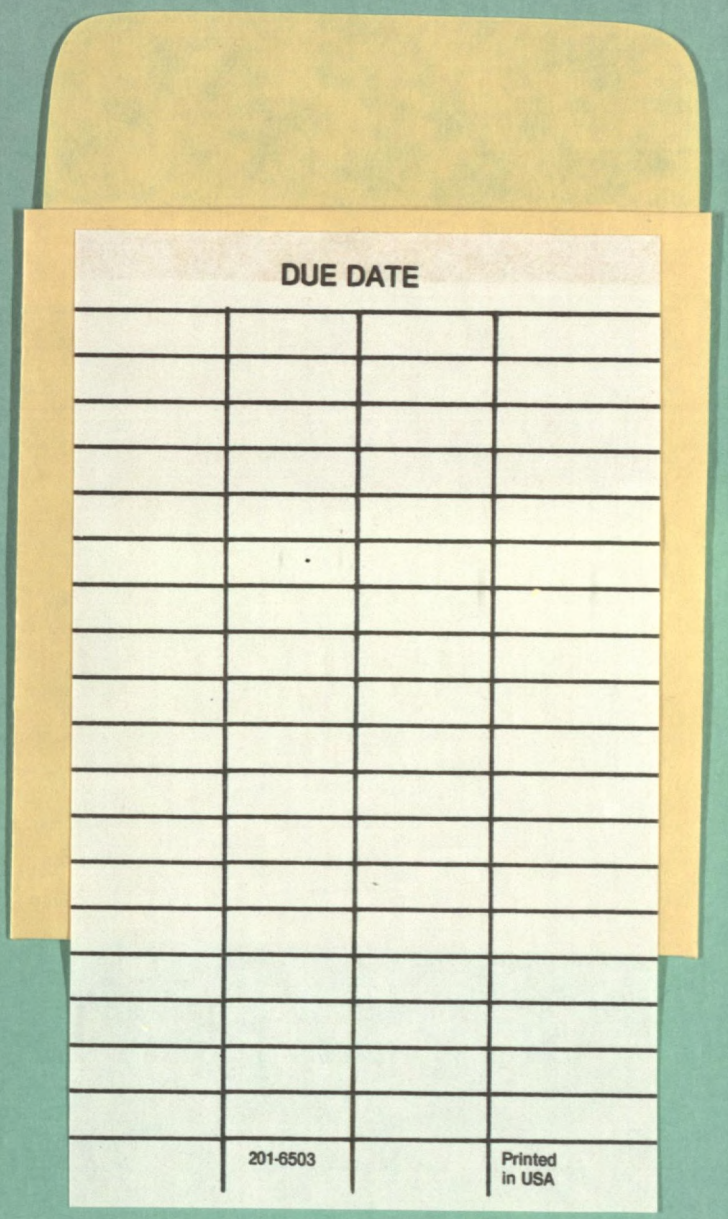
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