

SKEENA RIVER SALMON MANAGEMENT COMMITTEE

ANNUAL REPORT

1967

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OCTOBER, 1970

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SKEENA RIVER SALMON MANAGEMENT COMMITTEE

ANNUAL REPORT 1967

Committee Members

W. R. Hourston

K. R. Allen

In Charge of Investigations

I. Todd

Advisory Board Members

N. Christensen

C. Doyle

K. Harris

R. Johnson

N. K. Nelson

J. Stephens

H. Barton

Canada

Department of Fisheries and Forestry

Fisheries Service

Vancouver, B.C.

October, 1970

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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 the 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 Mr. K. Radway Allen, Director, Pacific Biological Station, Fisheries Research Board of Canada, who assumed his duties in June 1967 from the then Acting-Director, Dr. W. E. Ricker.

The Minister of Fisheries also appointed an Advisory Board to the Committee which consists 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 of British Columbia; 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 Cooperative Association. Present members of the Advisory Board are:

Fisheries Association of B. C.

N. Christensen, Mgr Canadian Fishing Co., Oceanside

N. K. Nelson, Mgr Nelson Brothers, Port Edward

United Fishermen and Allied Workers' Union

C. Doyle, Seine fisherman

K. Harris, Gillnet fisherman

Native Brotherhood of B. C.

H. Barton, fisherman, Kincolith

J. Stephens, fisherman, Kitwanga

Prince Rupert Fishermens' Co-operative Association

R. Johnson, Gillnet fisherman

As in the past, the Committee met with its 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 Vancouver on December 20, 1966, to consider evidence bearing on the probable magnitude of the 1967 sockeye and pink salmon runs to the Skeena system and to formulate appropriate regulation of the fishery.

On the basis of the size of the 1962 and 1963 brood year escapements, the recorded smolt production from those escapements, and the most probable proportions of the progeny returning as 4- and 5-year-old fish, the best estimate of the magnitude of the 1967 Skeena River sockeye stock was considered to be 1,300,000 large fish.

The 1967 pink salmon stock was composed of the progeny from an escapement of 1,295,000 pinks in 1965. In recent odd-

numbered years the return of pinks has averaged 3.0 times the number of parent spawners. The escapement to the Lakelse River in 1965 comprised 64.5 percent of the Skeena River system escapement and sampling of pre-emergent juveniles in the Lakelse River indicated that survival of this brood was one-half the average recorded survival of preceding years. In view of this situation, less than average return was expected and the total run to the Skeena area was anticipated to be 1,900,000 pink salmon.

In consideration of the expected magnitude of the 1967 sockeye run, the Committee recommended that the total system escapement goal for 1967 be established at a minimum of 650,000 sockeye with the provision that if the run returned at a higher level than expected then the escapement would be adjusted accordingly to a maximum of 850,000. In order to satisfy escapement requirements from a run of 1,300,000, the Committee recommended that fishing be permitted for two days per week for the first two weeks of the season, and three days per week for the next three consecutive weeks.

The 1967 pink salmon run was again expected to be composed primarily of fish returning to the Lakelse River. In view of the anticipated magnitude of this stock, the Committee recommended that two days fishing per week be permitted during the period when Lakelse-bound pinks were present in the fishery.

On the basis of the extremely low level of the Kispiox River pink salmon run, the Committee proposed the closure of the Browning Entrance and Ogden Channel sections of Area 5 during

the last two weeks of July to reduce exploitation of these fish during their migration through the fishery. The Committee warned that if this measure failed to increase the escapement level appreciably, further restrictions in the river portion of Area 4 would be required.

It was anticipated that the regulations outlined above would result in a catch of approximately 650,000 sockeye and 1,000,000 pinks.

Details of the proposed regulations were provided in a release issued to the Committee's Advisory Board and to the fishing industry generally on January 6, 1967. 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, 1967, when the prospects for the 1967 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 issued a final release on April 4, 1967, outlining the 1967 regulations governing fishing of Skeena salmon stocks.

A copy of the final release is attached to this report as Appendix II.

The Committee met with the Advisory Board in Prince Rupert on August 10, 1967, to introduce Mr. K. Radway Allen who, as the new director of the Pacific Biological Station replaced Dr. P. A. Larkin on the Committee, and to discuss the

1967 salmon fishery. A trip by the Advisory Board to the Babine Development Project was to be arranged.

The Advisory Board trip was conducted on September 29 and 30, 1967, when Mr. Nelson, Mr. Doyle, Mr. Harris and Mr. Johnson accompanied Mr. Todd to Babine Lake. They were given a comprehensive tour of the Fulton River Channel and construction areas and were flown to Pinkut Creek to view the construction site from the air. They were taken aboard the Fisheries Research Board's drum seiner Tahlok, shown Granisle and Upper and Lower Babine rivers from the air, visited Dr. Narver at Halifax Landing, and viewed the site of the 1951 Babine slide while en route back to Prince Rupert.

The Committee met again on December 21, 1967, in Nanaimo, B. C., to review the 1967 fishing season, and the effects of regulations on catches and escapements. A review of the 1967 season is presented in the following section of this report and is followed in turn by a summary of research and development projects currently being conducted under the direction of the Committee.

III. The 1967 Skeena Salmon Fishery

(a) Sockeye Salmon

Sockeye fishing opened on June 25 on the basis of two days fishing per week as proposed in the regulations. The regulations proposed an increase to three days per week in the third week of the season, but as the size of the run appeared larger than average and the test fishing index remained high

in the third week, the fishery was reopened Saturday evening, July 15, and remained open to Friday evening, July 21. As the run appeared to be the largest since 1956, and the required weekly escapement as measured by test fishing had been realized, the fishery was reopened Sunday evening July 23, and remained open until 6:00 P.M. Saturday, July 28. The peak of the sockeye run was reached during the week ending July 29, but the still substantial run in the following week allowed an extension of fishing to four days. By the week ending August 12 the greatest part of the sockeye run had passed through the fishing area.

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

The commercial catch of sockeye in Area 4 totalled 1,043,659 in 1967, which is the second highest catch recorded back to 1950 (Table 1). In addition, 375,000 sockeye caught in sub-areas 3X and 3Y are considered to have been of Skeena origin, which brings the total estimated catch of Skeena-bound sockeye in 1967 to approximately 1,412,000.

The escapement of sockeye to the system, as estimated from test-fishing catches during the fishing season, totalled approximately 800,000, above the pre-season target of 650,000, but below the 850,000 maximum desired in light of the larger than anticipated run. For the second consecutive year, however, interpretation of test fishing catches resulted in a substantial over-estimate of the actual escapement, as the number of

DAYS RECOMMENDED	DAYS FISHED	Number of Fishing Days per Week							
		2	3	3	3	2	2	2	4
2	2	2	3+1	5	6	4	2	0	2

ESTIMATED RATE OF EXPLOITATION (%)									
PINK	—	—	32.8	64.4	81.2	58.2	32.2	—	33.9
SOCKEYE	59.2	49.2	54.7	74.3	70.3	65.5	36.6	—	29.9

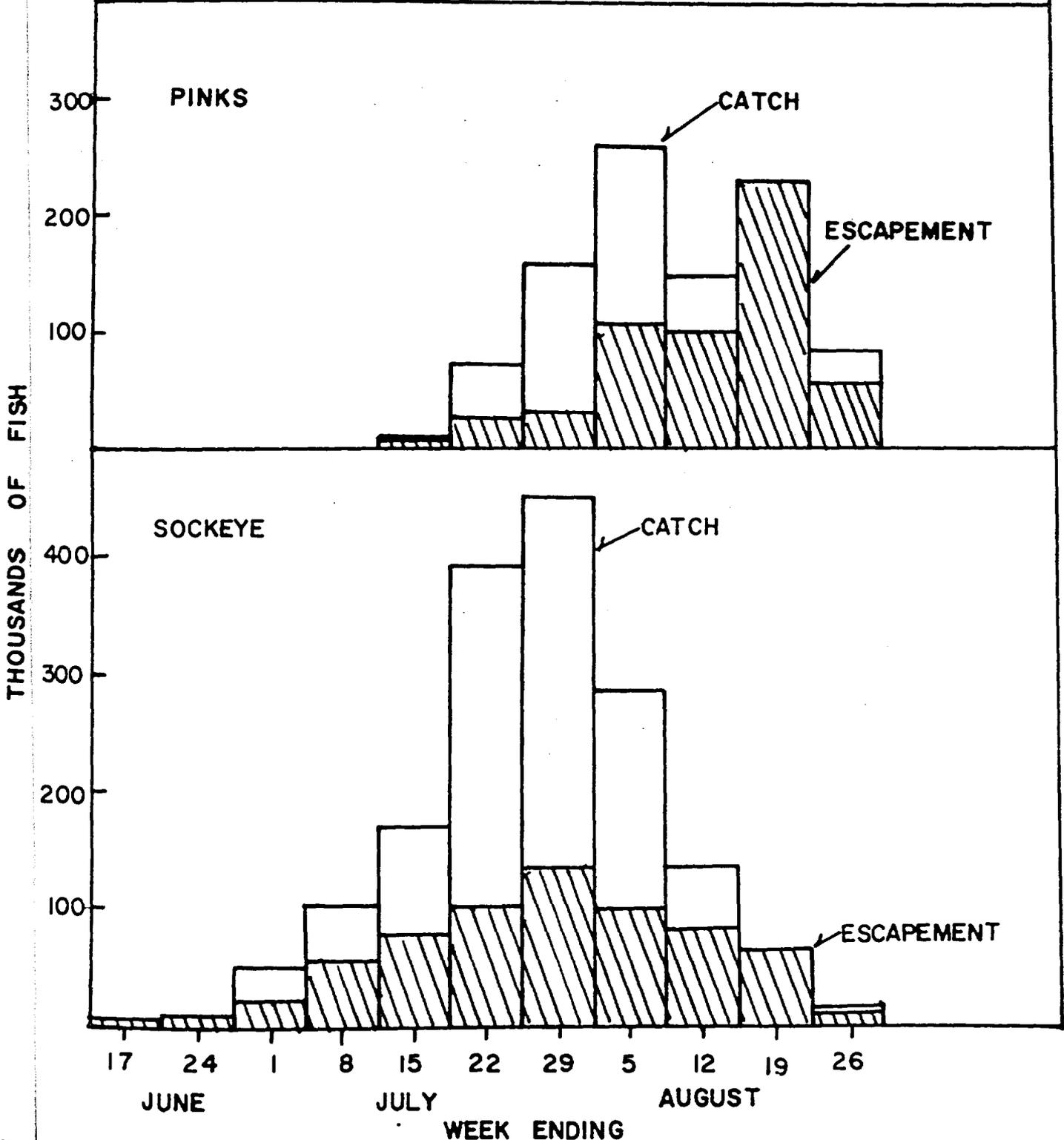


FIGURE 1. WEEKLY SOCKEYE AND PINK CATCHES AND ESCAPEMENTS 1967

sockeye which actually passed the test fishing site totalled 658,000.

TABLE 1. Salmon catches in Gillent Area 4, 1950 - 1967

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
1967	1,043,659	49,298	417,092	26,500	36,378

The 1967 Skeena River sockeye stock (total commercial catch plus total escapement beyond test fishing) totalled approximately 2,070,000, which is the second largest run in the years back to and including 1950.

Age composition of the sockeye run was determined through analysis of scale samples obtained from the commercial fishery and on the spawning grounds. The run in 1967 comprised pre-

dominantly age 4₂ (1,029,000) and age 5₂ (970,000) sockeye with the remainder (71,000) primarily ages 5₃ and 6₃. Both major year-classes returned in greater abundance than anticipated.

The age 5₂ component of the 1967 run completes the return from the 1962 brood year escapement of 548,000. The total return of 1,440,000 (1967 age 5₂'s plus 470,000 age 4₂'s from 1966) represents a rate of return of 2.6:1, near the long-term production average.

The return of 1,029,000 age 4₂ sockeye in 1967 represents the first major year-class return from the 1963 escapement of 588,000 and is indicative of an average or better rate of return from that brood year.

(b) Pink Salmon

Pink salmon began entering the Area 4 commercial fishery in significant numbers during the week ending July 15. During that week and the two succeeding weeks the fishery was regulated to exploit the large sockeye run, and as a result pink salmon stocks in Area 4 were subjected to heavier than desired exploitation (Figure I). Until August 5 the pink run appeared to be developing near the anticipated level, and as a result a two-day fishing period was permitted during the week ending August 12. The anticipated peak failed to appear at the expected level, so fishing was not permitted during the week ending August 19 in an effort to improve the escapement level. This effort was successful, as a secondary peak developed during this week, which added in excess of 200,000 fish to the escapement.

The commercial catch of pink salmon totalled 417,092 in Area 4, about half the average catch recorded in the past odd-numbered years back to 1950. The escapement to the area totalled 581,000, and the total stock (commercial catch plus escapement) approximately 998,100.

The total stock of 998,000 represents a production of 0.74:1.00 from the 1965 brood year escapement of 1,341,000. The one encouraging aspect of the escapement, however, occurred in the Kispiox River as the 1967 escapement totalled 74,000, or three times that of the brood year.

(c) Other Species

The gillnet catch of chinook salmon totalled 29,400 large fish plus an additional 7,000 jacks. Chinook escapements were good throughout the system and food fish catches of this species were the highest for many years.

The chum salmon gillnet catch totalled 26,500 fish, a near average catch for years since 1960. Escapement in 1967 was also average in comparison with past years in the same period.

The net catch of coho in Area 4 totalled 49,300 fish and escapements throughout the Skeena system were good.

IV. Investigations and Fish Cultural Projects

In 1967, Skeena salmon investigations continued to provide the information required for seasonal and long-term management of the salmon stocks. The investigations included collection and analysis of commercial catch and effort data, estimation of escapement size and distribution, and sampling of

both the commercial catch and escapement to provide 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, indicated the size of the runs as they developed and the exploitation rate of the fishery. In addition, a tagging program was conducted in the Skeena estuary in an attempt to provide additional data on the times of passage of the major races of sockeye and pinks through the commercial fishing area.

The first sockeye fry originating from natural spawning in the Fulton River spawning channel migrated into Babine Lake in the spring of 1967 and smolts from the plant of eyed-eggs in the previous year migrated to sea.

In 1967, studies comparing distribution and survival of channel and river fry in the main basin of Babine Lake were continued. A large marking program involving the use of coded magnetic wire tags on sockeye smolts was initiated, following a trial program in 1966.

A. Sockeye Salmon Enumerations

1. Sockeye Salmon Escapements

The total stock of sockeye bound for the Skeena River system exceeded expectations, however, the actual escapement was less than optimum due to over estimation of the escapement based on test fishing catches. Past data on the test fishing index has been reviewed and corrections implemented which should improve this method of estimating escapements.

The escapement past the test fishing site totalled 658,000 of which 602,000 entered Babine Lake. Escapements to areas other than Babine Lake were light. Escapements of sockeye to all spawning areas in the Skeena River system are presented in Table 2.

Approximately 90 percent of the total escapement of sockeye to the Skeena River system enter Babine Lake and are enumerated at the Babine River fence. Daily fence counts are used to calculate migration times from the test fishing site to the fence and to assess errors occurring in the test fishing operation. Distribution of sockeye within the Babine watershed for all years is presented in Table 3. More detailed information on the escapements for years 1949 to 1959 is presented in the Committee's Annual Report for 1965. Counts of all species of salmon passing the Babine fence for the years 1964 to 1967 are presented in Appendix III.

2. Babine Sockeye Production Studies

Progress was made in three studies bearing upon natural production of sockeye at Babine Lake. To assess possible relationships between ages at maturity of parents and their progeny, 13 sub-stocks were sampled in 1967, the fifth year of a nine-consecutive-year program. To assess post-lacustrine mortality of smolts of various sizes, Bergman-Jefferts coded magnetic wire tags were applied for the second consecutive year. Sockeye tagged as smolts in 1966 are expected to return as 4-year-olds in 1968. As part of a study of infection by the cestode parasite, Eubothrium salvelini, 3,300 smolts were

Table 2. Cockeye Escapements - Area 4 - From Department of Fisheries and Research Board Records

	10-Year Average 1950-1959	1960	1961	1962	1963	1964	1965	1966	1967
Babine Fence	448,980	262,719	941,711	548,000	588,000	827,487 ¹	580,000	389,000	603,000
Babine Indian Catch	24,640	16,754	32,304	18,122	20,021	19,855	18,540	21,312	18,992
Babine spawning escapement	424,340	245,965	909,407	529,878	567,979	807,632	561,460	367,688	584,008
Alastair Lake	24,085	15,000	14,250	15,000	5,000	8,000	5,000	8,450	8,000
Kitsumgallum Lake	4,125	2,000	1,750	2,000	N.R.	4,000	3,000	2,700	3,000
Lakelse Lake	8,680	6,000	5,170	13,000	12,000	20,500	33,300	15,081	13,800
Kitwanga Lake	3,850	1,000	200	N.R.	N.R.	200	400	200	-
McDonnell Lake	2,630	600	750	500	N.R.	400	3,000	4,000	200
Morice Lake	24,483	3,300	13,500	8,500	2,000	10,000	20,500	6,800	4,600
Kispiox Lake	4,650	5,000	5,000	3,000	3,500	3,500	2,000	3,000	5,000
Bear Lake	9,058	5,000	1,400	1,500	2,000	3,500	7,000	900	950
Sustut Lake	1,000	500	800	1,500	1,000	1,500	2,000	50	50
Total spawning escapement above test fishing	507,533	284,365	952,227	574,878	593,479	859,232	637,660	408,869	619,608
Total Indian catch above test fishing	41,437	28,808	46,584	29,924	38,687	39,248	35,839	39,412	37,292
Total escapement above test fishing	548,970	313,173	998,811	604,802	632,166	898,480	673,499	448,281	656,900
Shawatlan Lake	3,120	3,500	3,500	3,500	3,500	3,500	3,500	2,000	3,500
Prudhomme Lake	5,375	3,500	7,500	3,500	7,500	3,500	3,500	1,500	4,500
Johnson Lake	838	100	50	-	-	-	50	50	750
Total spawning escapement below test fishing	9,333	7,100	11,050	7,000	11,000	7,000	7,050	3,550	8,750
Total Indian catch below test fishing	412	390	1,400	1,010	8,800	300	2,653	1,768	1,859
Total escapement below test fishing	9,745	7,490	12,450	8,010	19,800	7,300	9,703	5,318	10,609
Total spawning escapement	516,866	291,465	963,277	581,878	604,479	866,232	644,710	412,419	628,358
Total Indian catch	41,850	29,198	47,984	30,934	47,487	39,548	38,492	41,180	39,151
Total escapement	558,716	320,663	1,011,261	612,812	651,966	905,780	683,202	453,599	667,509

¹ Estimate

TABLE 3. Babine sockeye escapements

	11-year average 1949-1959	1960	1961	1962	1963	1964	1965	1966	1967
Babine fence	450,000	262,700	941,700	548,000	588,000	827,500 ⁺	580,000	389,000	603,000
Indian catch	25,000	16,800	32,300	18,100	20,000	19,900	18,500	21,300	19,000
Spawning escapement	425,000	245,900	909,400	529,900	568,000	807,600	561,500	367,700	584,000
Upper Babine River	105,800	36,900	196,000	192,000	119,300	222,000	120,400	60,000	133,000
Lower Babine River	83,400	54,000	171,500	61,000	34,500	46,000	176,000	114,000	54,000
9-Mile Creek	1,100	1,800	2,500	500	1,000	1,500	500	800	900
5-Mile Creek	200	0	500	100	0	100	200	200	100
Morrison River	15,700	9,900	23,600	12,500	41,800	27,000	8,500	8,800	16,700
Fulton River	68,900	36,000	170,100	86,400	98,600	117,000	123,300	59,100	140,000
Pinkut Creek	23,600	27,000	44,100	21,400	40,000	135,300	22,000	21,400	33,000
Pierre Creek	16,200	9,900	24,500	4,100	28,400	22,000	10,000	8,800	26,300
Grizzly Creek	6,800	10,800	23,500	4,600	11,400	8,000	5,000	4,500	1,600
Twin Creek	6,600	5,400	6,900	1,300	11,400	9,000	3,000	2,000	7,700
4-Mile Creek	2,300	1,800	1,000	2,800	2,800	2,500	1,400	1,700	2,900
Tachek Creek	2,400	1,800	0	600	1,600	3,000	700	300	800
Sockeye Creek	1,100	1,800	0	1,000	2,400	1,500	100	1,400	700
6-Mile Creek	1,100	900	0	900	1,400	1,500	100	300	1,000
Pendleton Creek	700	0	0	200	0	1,400	0	0	0
Others	500	300	0	0	0	0	0	0	600
Reported losses	15,200	0	51,800	6,200	6,200	9,300	1,800	0	0
Total spawners	351,600	198,300	716,000	395,600	400,800	607,100	473,000	292,300	419,300
Unreported losses	73,400	47,600	193,400	134,300	167,200	200,500	88,500	75,400	164,700

inspected, and the degree of infection and the condition of the fish were determined (Fig. 2).

Babine sockeye smolt production statistics were obtained as a service to salmon investigations at Babine and for continued management of the Babine stock (Table 4).

TABLE 4. Babine sockeye smolt production

	North Arm		Main Basin	Total
	Nos. ($\times 10^6$)	Percent	Nos. ($\times 10^6$)	Nos. ($\times 10^6$)
1961	6.1	31.7	13.2	19.3
1962	1.7	11.2	13.7	15.4
1963	6.8	46.7	7.7	14.5
1964	16.5	36.0	29.4	45.9
1965	4.5	18.1	20.4	24.9
1966	21.5	61.0	13.8	35.3
1967	9.0	54.1	7.6	16.6

B. Pink Salmon Enumerations

1. Pink Salmon Escapements

The pink salmon escapement above test fishing, compiled from the records of the Resource Development and the Conservation Branches of the Department of Fisheries and the records of the Fisheries Research Board, totalled 565,000 of which 42.9 percent spawned in the Lakelse River. This was the smallest odd-year pink salmon escapement since complete records have been kept. Estimated escapements of odd-year runs of pink salmon to the Skeena River and its tributaries are listed in Table 5.

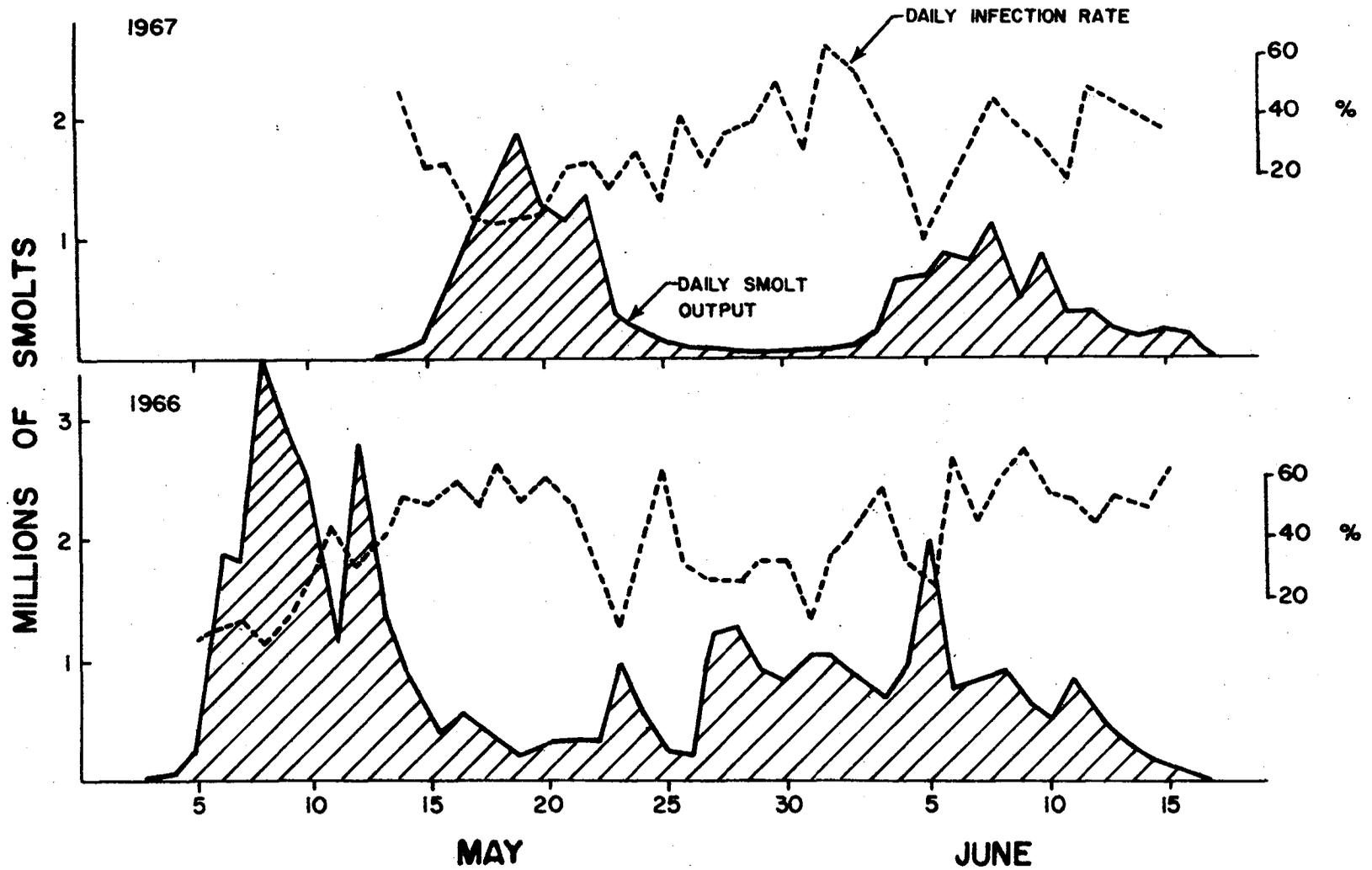


Fig. 2. Parasitism of Babine sockeye smolts by tapeworm *Eubothrium salvelini* in 1966 and 1967.

TABLE 5. Skeena River pink salmon - odd year cycle

	1955	1957	1959	1961	1963	1965	1967
Lakelse River	175	140	185	325	505	835	236
Kisplox River	540	360	650	280	32	23	74
Skeena River	10	50	150	450	40	120	90
Kitwanga River	125	160	250	100	170	47	100
Babine River	5	27	77	75	93	69	44
Bear River	6	15	20	5	15	2	-
Bulkley River	7	1	5	24	35	34	4
Other	112	112	49	76	10	166	17
Total above T.F.	980	865	1386	1335	900	1296	565
Coastal	78	105	95	99	128	45	16
Total	1058	970	1481	1434	1028	1341	581

Escapements to the early run rivers, Babine, Bear and Bulkley were down from the brood year and below average. The Kisplox River escapement, while still far below the desired level, was triple the brood year low of 23,000. The major portion of the Babine River escapement was counted through the fence and the remainder estimated by visual counts, the Kisplox River escapement was enumerated by a tag and recovery program while the others were estimated by aerial surveys.

The mid-season runs to the Kitwanga River and Skeena River mainstem were near average but the Kitwanga River escapement was double that in the brood year. The pink salmon escapement to the Kitwanga River was estimated by a strip-

counting method while the escapement to the Skeena River mainstem was estimated by a drift-net indexing system.

The Lakelse River run which is the latest and currently the largest pink salmon run to the Skeena system returned at less than average abundance as compared with the previous six cycles. The 1967 escapement represented only 28 percent of the brood-year escapement. This poorer than average rate-of-return had been predicted on the basis of pre-emergent-fry sampling in the spring of 1966. The Lakelse River escapement was estimated from a tag-and-recovery procedure which has been used since 1960.

2. Pink Salmon Egg-to-fry Survivals

Redd sampling for pink salmon eggs has been conducted intermittently since 1956 (see 1966 Annual Report) and continuously since 1965 when the hydraulic sampler was introduced.

For the years 1962 to 1966, the Lakelse River run accounted for 68 percent of the pink salmon spawners in the Skeena River system, and probably a similar proportion of the total stock. A measure of freshwater survival in the Lakelse River therefore provides a basis for predicting probable adult returns to the entire system from each brood year.

Table 6 shows the results of sampling eggs and fry of several brood years in the Lakelse River. Pre-emergent-fry sampling has been conducted in late winter on spawn from brood years 1964, 1965 and 1966 at a time when intragravel mortality is believed to be almost complete. Supplementary sampling was

TABLE 6. Indicated survival of pink salmon embryos in the Lakelse River

Brood year	Sampling date	Herman Cr. to Coldwater Cr.			Upper 3-Miles			Total River			Spawning population (thousands)
		Live per sample	Percent live	Samples	Live per sample	Percent live	Samples	Live per sample	Percent live	Samples	
1955	Mid-January	312.0	64.7	20	275.6	73.9	46				175
1961	March 12	48.2	95.4	6							325
1962	January 31 - February 2	104.7	98.6	6	87.5	79.7	27				635
1964	January 23 - February 5	16.0	23.9	75	19.5	40.7	29	10.2	41.4	111	1321
	March 5	14.9	38.0	21							
1965	November 25-28	26.9	72.5	102							835
	December 19	23.5	47.0	50							
	February 9-13	7.8	34.8	50	6.7	36.7	65	9.1	55.6	150	
1966	November 22-29	2.4	85.7	10	11.6	60.0	50	8.1	73.0	155	
	February 10-16	16.9	57.9	35	9.7	63.8	100	9.4	67.2	150	

also conducted in the falls of 1965 and 1966 about one month after spawning terminated.

Hydraulic sampling procedures were standard for the 1964 and 1965 broods, but some minor changes in procedure resulted when the Resource Development Branch of the Department of Fisheries assumed responsibility for enumerating pink salmon populations in 1966. Quantitative data from hydraulic sampling cannot be compared with that of earlier years when shovels and nets were used. The proportion of live to dead within individual samples should not have been affected greatly by the different methods.

Data presented in Table 8 indicate that freshwater survivals have ranged between 5.4 and 19.7 percent for the study years. Freshwater survival for the 1966 brood was calculated to be 13.5 percent and suggests a return in 1968 of approximately 1.3 million adults to the Lakelse River if average marine survival (2.13 percent) prevails.

Adult returns, in terms of production per spawner, have ranged between 0.36 and 6.94 and have averaged 2.76:1.00 for the study years. These production figures are based on estimates of escapement, and commercial catch recorded in Area 4. It is known that Skeena-bound pinks are caught in adjacent Areas 5 and 3, but data are not available to provide accurate quantitative figures. The estimates presented in Table 7 are, therefore minimal.

TABLE 7. LAKELSE RIVER PINK SALMON PRODUCTION IN BROOD YEARS 1959 - 1966.

BROOD YEAR	ESCAPEMENT (x10 ³)	EGG DEPOSITION (x10 ³)	FRY OUTPUT (x10 ³)	EGG-TO-FRY SURVIVAL (%)	ESCAPEMENT (x10 ³)	*EXPLOITATION RATE (%)	*TOTAL RETURN	*MARINE SURVIVAL	*RATE OF RETURN TO SPAWNERS
1959	185	217,027	29,900	13.8	325	55	722	2.41	3.90
1960	122	103,502	20,400	19.7	635	25	847	4.15	6.94
1961	325	454,662	38,800	8.5	505	35	777	2.00	2.39
1962	635	806,196	90,500	11.2	1,321	40	2,202	2.43	3.47
1963	505	615,090	NO ESTIMATE		835	10	928		1.84
1964	1,321	1,029,600	61,776	6.0	397	55	485	0.79	0.36
1965	835	682,300	36,800	5.4	236	35	363	0.99	0.43
1966	397	340,700	45,994	13.5	MEANS			2.13	2.76

* Based on calculated catch of Lakelse Pink Salmon in Area 4 only.

TABLE 8. Skeena estuary tag recoveries 1967

Species	Tags on	Tags recovered	Tag recoveries	
			Commercial Fishery	Other
Sockeye	1492	886	662	224
Chinook	27	11	11	0
Coho	278	87	55	32
Chum	256	69	61	8
Pink	2103	556	413	143
Steelhead	<u>56</u>	<u>24</u>	<u>14</u>	<u>10</u>
	4212	1633	1216	417

C. Skeena Estuary Tagging

A tagging program was conducted in the Skeena River estuary in 1967 in an attempt to establish times of passage and rate of migration of the major races of sockeye and pink salmon. Since the McLean Point tagging site had proved unsuccessful as a location for capturing sockeye in 1966 and a lack of other suitable locations precluded beach-seining, two drum seiners were hired to capture salmon for tagging in the estuary region. These vessels were operated during the period of each week that the commercial fishery was closed.

Nine tagging locations were used in the southern area of Chatham Sound along the shores of Porcher, Kennedy and Smith islands. The most productive sets were made at Hazel Point on Smith Island. A total of 4212 tags was applied to all species and 1633 (38.8 percent) were recovered (Table 8).

When the commercial fishery opened the day of, or the day following tagging, the largest number of recoveries was made the second day of fishing. However, for fish tagged more than two days prior to the opening of fishing, the greatest number of recoveries was made on the first full calendar day of fishing.

Times of passage up the river varied between species and individual stocks. Most recoveries came from Indian food fisheries and the data are unreliable as to time of recovery; for example, some tags were reported to have been recovered on dates preceding the actual tagging date while others were reported caught on the migration route after the fish were on the spawning grounds. Gross misinformation was easily detected but smaller discrepancies from the true mean migration time between points for each species were difficult to detect thus masking the effects of milling, delay due to water conditions or injury. Migration times from the fishing boundary to points on the Skeena are determined where possible by modal group time to recovery or, as a second choice, mean time to recovery (Table 9).

TABLE 9. Migration times - all species

River section	Migration time from Smith Island
Test fishing site (Tyee Station)	1 to 3 days
Terrace	8 to 14 days
Kitwanga	12 to 20 days
Hazelton	15 to 25 days
Babine River Fence	25 to 30 days

The study provided an estimate of migration time for sockeye from the northeast corner of Smith Island to the Babine River fence which was 28.2 days (111 tags). Eighty percent of the fish recovered at the fence were tagged late in the season when the commercial fishery for sockeye was virtually over. The mean migration time to test fishing for this period was 2.6 days (12 tags). Earlier in the season the mean migration time to the commercial boundary (downstream of the test fishing site) was 5.0 days (75 tags). This suggests that the migration rate increases as the season progresses.

Recoveries of tagged pink salmon in the commercial fishery and at Babine Fence were from fish tagged simultaneously over a similar portion of the migration period. The mean time to recovery from tagging to the commercial fishing boundary, the test fishing site and the Babine River fence were 4.7 days (27 tags), 3.4 days (16 tags) and 32.2 days (6 tags) respectively.

D. Nanika River Rehabilitation Project

Evaluation of the incubation facilities at Nanika was continued in 1967 although neither the channel nor the hatchery was operated in the 1966-1967 winter and no operation was planned for the 1967-1968 winter. The biological program now consists primarily of an adult enumeration program and an assessment of the Native food fishery at Moricetown Falls

1. Nanika River Sockeye Escapement

The 1967 escapement to Nanika of 4100 sockeye (Table 10) was composed primarily of age 6₃ sockeye (78%) from the brood year escapement of 1961 and age 5₃ sockeye (18%) from the ..

1962 brood.

TABLE 10. Nanika River sockeye escapements

Year	Escapement	Age composition by percent			
		4 ₂	5 ₂	5 ₃	6 ₃
1957	<1,000	-	-	-	-
1958	<1,000	-	-	-	-
1959	1,000	0.8	4.6	51.7	42.9
1960	3,500	1.2	18.8	61.4	18.1
1961	7,500	2.8	1.1	70.6	24.2
1962	3,500	7.8	1.7	38.6	51.0
1963	1,200	-	-	-	-
1964	6,000	1.2	7.7	85.7	4.8
1965	9,700	3.8	11.9	38.9	44.0
1966	10,700	1.4	1.4	86.9	10.4
1967	4,100	1.1	0.8	18.0	77.7

Age analysis of the sockeye spawning in Nanika River was expected to show increases in age classes (4₂ and 5₂) that could be attributed to artificial incubation facilities. The donor stock from Pinkut Creek on Babine Lake has always been composed of 4₂ and 5₂ sockeye while the Nanika stock has been predominately age 5₃ sockeye. First returns of 4₂ sockeye from the hatchery should have occurred in 1965, but no unusual numbers of 4₂ sockeye were present that year or any year since (Table 9). Similarly, no unusual numbers of 5₂ sockeye returned in 1966 or 1967.

2. Moricetown Falls Native Food Fishery

The sockeye run passed Moricetown Falls on the Bulkley River between mid-July and mid-August. Mean time of delay at the falls where average water level conditions prevailed was calculated to be 7 days and exploitation of the run by the food fishery was calculated to be 18 percent. The reported catch of sockeye was 800 fish, but total fishing mortality was calculated to be 1300 fish. Catches of other species were 1000 chinook, 2000 coho, 200 pink salmon and 200 steelhead trout. Total mortality due to fishing was in the order of 8300 fish.

A study of the effect of the Native Food fishery on migration showed that 81 percent of the fish moved through the fishways during closures or during the early morning when effort was only 19 percent of the total. Fishing effort was highest in the evening, especially on Sunday and Wednesday evenings when the fishery opened at 6:00 P.M. after being closed for 24 hours. Three years of study revealed that on the average, a gaff fisherman lost 1.5 times more fish than he landed.

E. Babine Lake Sockeye Development Program

1. Fry Quality Studies

The purpose of these studies was to determine what physical differences exist between channel fry and river fry. A study was carried out in 1967 to compare the quality of river and channel fry using various indices of quality.

(i) Length, weight and development stage

Fifty fry were randomly selected from each population. These were measured to the nearest millimeter, weighed to the nearest milligram, and then graded for development stage. Each fish was classified according to five development stages, based on the amount of yolk sac visible externally.

The results showed that the river fry were significantly heavier (160 mg compared to 147 mg), not significantly longer (29.4 mm compared to 29.3 mm), and less well developed than their channel counterparts.

(ii) Swimming performance

Samples of 35 fry from each population (selected for development stage) were fin-clipped for later identification and placed in an experimental flume for a 12 hour conditioning period at water velocities of approximately 0.1 ft/sec. The test procedure consisted of recording the order of dropout (ODO) as the water velocity in the flume was gradually increased.

A percentage difference between the means of the ranked ODO's was calculated and the Mann-Whitney U-test was employed to determine the statistical probability of obtaining such a percent difference.

Pooled results from 57 tests (random and non-random samples) revealed that 47% of the tests statistically favoured river fry (only 14% favoured channel fry, while 39% of the tests were not significant).

(iii) Starvation resistance

Non-random samples of each population (i.e. selected for a common development stage, usually buttoned-up fry) were placed in separated portions of an aquarium with a filtered recirculating water supply. Periodic subsamples were taken to determine the rate of weight loss. The tests were continued until most of the fish had died of starvation (usually about 20 days). In general, the river fish survived significantly longer but appeared to lose weight at a slightly faster rate.

(iv) Vulnerability to predation

A number of wild coho salmon smolts and rainbow trout were captured and held in 20 gallon aquaria. These predators were conditioned to their aquaria and periodically fed sockeye fry until they demonstrated an active ability to pursue and capture all available fry within a 12 hour period. Random and selected samples, varying from 50 to 100 fry per population, were differentially fin-clipped and released into the predator aquaria. The test was terminated when the predator had

consumed approximately 50 percent of the prey. The survivors were then removed and identified to source. A chi-square analysis was then carried out to determine whether any differential mortality had occurred. The tests were replicated using single predators and groups of predators. A control, using an equivalent number of marked fish, provided a check on natural mortality.

A pooled chi-square from 24 tests demonstrated that there was no significant difference between the two fry populations. Only three tests showed any significant difference in vulnerability to predation and in these river fry had a higher survival.

(v) Biochemical composition

Fifty fish from each population sample were selected for a common development stage (usually buttoned-up fry). They were measured to the nearest millimeter and weighed to the nearest milligram.

Total nitrogen, total solids and total lipid content of the fish were determined. Observation of the plots of log weight on log length, log lipid on log weight, solids on weight, and nitrogen on weight, reveals no differences between channel and river fry. Statistical analysis is continuing.

In conclusion, the preliminary results indicate that the river fry were superior to channel fry in terms of weight, stamina and resistance to starvation. The length, biochemical

composition and predator avoidance ability of the two fry populations were not shown to be significantly different. It is of interest to note that despite the apparent inferiority of the channel fry they appeared to survive as well in Babine Lake as did their counterparts from the river.

The fry quality program will be continued in 1968 but some changes in technique are anticipated. Absolute measures of the quality indices (rather than relative as in 1967) will be obtained, so that differences in fry migration timing will not confound the effect of the incubation environment and make statistical analysis difficult.

2. Fry Survival in Babine Lake

The fry marking program, begun in 1966 was continued in 1967 with the marking of channel fry and river fry. The immediate objectives of this study are to measure the growth and survival of sockeye fry produced in an artificial spawning channel using naturally produced river fry as a control, and to determine what part of Babine Lake is used by Fulton River sockeye as a lake nursery area. Because the Fulton River is one of the important fry producers at Babine and a major site for development, knowledge of the lake nursery area used by these fish is a prerequisite to answering the broader question of the lake's capacity to produce young sockeye.

In 1966, and again in 1967, fry produced from the Fulton River and from the Fulton River artificial spawning channel were captured during their downstream migration, marked distinctively by removing a ventral fin, and then released to

continue their journey to the lake. Marked fish were recovered in the lake in subsequent months by examining purse-seine catches of young sockeye. In addition, sockeye marked as fry in 1966 were recovered from the 1967 seaward migrants.

Results of the 1966 and 1967 studies provide the following comparison of river fry and channel fry:

- (1) The period of downstream migration to the lake was later for channel fry than for river fry. The difference, as indicated by the dates at which 50 percent of the two groups were marked and released, was 11 days in 1966, and 14 days in 1967;
- (2) Channel fry tended to be smaller at time of lake entry; the difference in mean length was significant in 1967, but not in 1966;
- (3) Channel and river fry grew at about the same rate but channel fish were smaller on the average throughout the first growing season and, in the case of the 1966 fry, at time of seaward migration; the smaller size of channel fish is largely accounted for by the difference observed at the fry stage and the shorter growing period imposed upon channel fry because of late lake entry;
- (4) Both groups of fry dispersed rapidly and widely into Babine's main lake area; initially, most moved southward from the Fulton River into the southern portion of the main lake; substantial shifts in the distribution of both marked groups and of the young

sockeye population as a whole were observed throughout the summer; by the fall of 1966, both marked groups and the young sockeye population as a whole were centered in the northern half of the main lake; in 1967, their fall distribution appeared to be more uniform;

- (5) When the ratios of the number of marked channel and river fish observed at times of recovery were compared to the ratio at time of marking and release, no significant difference in the survival rates of the two groups was indicated.

Some new information regarding the diel vertical movements and feeding activities of young sockeye in the main lake area was obtained in 1967. Throughout most of their first growing season, the young sockeye were found to be concentrated about 30 to 40 meters below the surface during daylight hours. Movement to the surface coincided with the rapid decrease in light intensity at dusk. The sockeye remained in the surface layer throughout the night, and at dawn they began to descend to their daytime level. The presence of a well-developed thermocline did not appear to influence this vertical movement. During the summer, the water temperature at the sockeye's daytime level was about 8°C or less while temperatures at the surface were as high as 17°C.

Feeding appeared to occur only in the surface layer and only for a short period at dusk and again at dawn.

3. Lacustrine Ecology

The objective of the research into the lacustrine ecology of Babine Lake in 1967 was to describe the diel vertical movement of young sockeye in the pelagial zone. The underlying hypothesis was that juvenile sockeye seek a specific light intensity and hence light is the primary factor controlling the diel movement. A good relationship was obtained between juvenile catch by trawling and the number of echo sounder (145 KC Honeywell "Sea Scanar") targets at that depth (correlation coefficient of .81). Purse-seine sets substantiated the reliability of the echo sounder. Unfortunately, an underwater light meter was not procured in time for field use in 1967, which limited the investigation.

A precise, well-defined diel vertical movement was displayed by pelagial sockeye juveniles in the North Arm of Babine Lake from at least mid-July to September. The maximum vertical movement was from the mid-day depth at 130 ft. to the lake surface just after sunset. During the hours of darkness young sockeye were dispersed in the top 50 ft. and at dawn began to descend in a narrow band to deeper water. A distinct and consistent double layer of juveniles was found in the North Arm during the day. The two layers maintained a constant distance apart until the top layer reached the surface in the evening. The bottom layer (the majority of targets) continued to rise until it also reached the lake surface. The pattern of diel vertical movement had changed by October 2-3. Juvenile sockeye no longer came to the surface but remained in

midwater through the night and returned to deeper water during mid-day. The double layer was no longer conspicuous during the day.

In main Babine Lake, the July and August diel vertical movement of young sockeye was similar to that of the North Arm except the mid-day maximum depth was 150-170 ft.

The zooplankton of Babine Lake is composed of Calanoids (2 species), a Cyclopoid copepod, and 3 species of Cladocera. Only 2 zooplankters, Bosmina (Cladocera) and Heterocope (Calanoid copepod), displayed a pronounced diel movement. At night the former descended from the surface, and the latter ascended to the surface. With the exception of Cyclops, the rest were found almost entirely about 35 ft., while Cyclops occurred in greatest concentrations below 35 ft.

An examination of juvenile stomach contents in the North Arm suggests that intensive feeding occurred at dusk as the juveniles reached the 0-35 ft. stratum and again at dawn as the fish commenced to move away from the lake surface. There appears to have been no feeding during the hours of daylight when the fish were mainly below 100 ft. The dominant food item was Heterocope, followed by the Cladocerans, Daphnia and Bosmina.

V. Acknowledgements

This report represents a summary of investigation conducted under the auspices of the Skeena River Salmon Management Committee by staff of the Resource Development Branch of the Fisheries Service and the Fisheries Research Board of Canada. Major contributions to this report have been made by D. Harding, R. K. Kearns, H. D. Smith, J. McDonald, and D. Narver.

APPENDIX I

SKEENA SALMON MANAGEMENT COMMITTEE

Re: Tentative Regulations for 1967

(1) The Committee met on December 20, 1966 to review the 1966 Skeena salmon runs and to consider information bearing on the expected abundance of the 1967 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 1966 Skeena sockeye run of 1,016,000 was smaller than anticipated. The 5₂'s from the 1961 brood escapement returned at near the anticipated level of magnitude (456,000); the return of 4₂'s from the 1962 brood, however, totalled 470,000 rather than the expected 720,000. The remainder of the 1966 run was composed primarily of 5₃'s and 6₃'s (90,000).

The catch of sockeye in the Skeena gillnet area totalled 570,000. The escapement totalled 447,000, of which 389,000 or 87% entered the Babine Lake system. Escapements to other areas were extremely light, with the exceptions of Lakelse Lake and the Bulkley-Morice System, where escapements were improved over those recorded during most recent past years.

(3) The 1966 pink salmon run to the Skeena system totalled 1,650,000, or approximately 73% of the expected return. The catch of pinks in the Skeena gillnet area totalled 1,000,000. Of the total escapement of 650,000 calculated for the entire system, 397,000 entered the Lakelse River. Escapements to other areas except Kitwanga were extremely light.

(4) The anticipated abundance of sockeye in 1967 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 the average ratio of 4- and 5-year olds produced. Extreme variability in production rates and age composition has occurred in the past, however, and the forecast 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 and implemented as the runs develop and their strength becomes apparent.

The 1967 sockeye run will be composed of 5₂'s produced from the 1962 escapement and 4₂'s produced from the 1963 escapement. The number of 4₂'s which returned from the 1962 escapement (470,000) provides the most objective basis for predicting the abundance of 5₂'s in 1967. In the past, the 4₂ production has ranged between 20% and 80% and has averaged 50% of the total production from a given brood. On this basis the number of 5₂'s returning in 1967 could be expected to total 470,000. In view of the large smolt production (50,000,000) arising from the 1962 brood, however, the number of 5₂'s could be expected to be average or better.

The 4₂'s in 1967 will be returning from the 1963 escapement of 597,000. With an average rate of return and assuming that 4₂'s and 5₂'s return in equal abundance, then 750,000 4₂'s could be expected. The smolt production arising from the 1963 brood (26,000,000) suggests that survival to that stage has been about average.

In view of the above information, the most likely size of the 1967 sockeye run is considered to be 1,300,000 (1,220,000 4₂'s and 5₂'s plus 80,000 of other age groups), and this figure has been used for the purpose of formulating fishing regulations at this time.

(5) The 1967 pink salmon run will return from an escapement of 1,295,000 in 1965. In recent odd-numbered years the return of pinks has ranged between 1.0 and 6.0 times the number of parent spawners, and has averaged 3.0 times. The 1965 Lakelse River escapement totalled 835,000 out of the system escapement of 1,295,000. Sampling of pre-emergent juveniles in the Lakelse River during the 1965-66 incubation period suggested that survival to the fry stage would be no better than that of the 1964 brood. 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 1,900,000 pink salmon.

(6) In consideration of the expected magnitude of the 1967 sockeye run, the Committee is recommending that the total system escapement goal for 1967 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 a maximum of 850,000. In order to satisfy catch and escapement requirements from a run of 1,300,000 the Committee recommends that fishing be permitted for two days a week for the first two weeks of the season followed by three days fishing per week for the next three consecutive weeks.

The 1967 pink salmon run is again expected to be composed primarily of fish returning to Lakelse River. In view of the anticipated magnitude of return of this stock, the Committee recommends that two days fishing per week be permitted during the period when Lakelse River-bound pinks are present in the fishery.

At this time it must be brought to the attention of the industry that the early Kispiox pink run is at a disastrously low level, in that escapements have collapsed from the late 1950's level of 500,000 to the 1963 and 1965 brood levels of 32,000 and 23,000 respectively. For this reason particularly stringent protection must be provided these fish during their migration through the fishery during the last two weeks of July if this stock is to be rebuilt to a productive level. In 1967 the Committee proposes to close the Browning Entrance and Ogden channel section of Area 5 during the last two weeks of July as a first step to reduce exploitation on Kispiox-bound pinks. Should this measure fail to increase the escapement level appreciably, further restrictions in the river portion of the Area 4 fishery may be required.

It is anticipated that the regulations outlined above would result in a catch of approximately 650,000 sockeye and 1,000,000 pinks.

PROPOSED REGULATIONS - 1967

(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 25, 1967, only gillnets having mesh not less than 8" linen or 8 $\frac{1}{2}$ " 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 25, 1967, until the end of the fishing season as follows:

- (i) from June 25 to July 9 - 120 hour weekly closed period from 6:00 p.m. Tuesday to 6:00 p.m. Sunday;
- (ii) from July 9 to July 30 - 96 hour weekly closed period from 6:00 p.m. Wednesday to 6:00 p.m. Sunday;
- (iii) from July 30 to August 20 - 120 hour weekly closed period from 6:00 p.m. Tuesday to 6:00 p.m. Sunday;
- (iv) from August 20 to the end of the fishing season - 72 hour weekly closed period from 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:

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

- (a) from July 2 to July 9 - 120 hour weekly closed period from 6:00 p.m. Tuesday to 6:00 p.m. Sunday;
- (b) from July 9 to July 30 - 96 hour weekly closed period from 6:00 p.m. Wednesday to 6:00 p.m. Sunday;
- (c) from July 30 to August 13 - 120 hour weekly closed period from 6:00 p.m. Tuesday 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 July 16 to July 30 - complete closure to afford protection to pink salmon bound for Kispiox River;

(b) from July 30 to August 13 - 120 hour weekly closed period from 6:00 p.m. Tuesday to 6:00 p.m. Sunday.

(c) Provisos:

(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 the development of the 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 1967 regulations with its Advisory Board at a public meeting to be held Wednesday February 8, 1967 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

W. E. Ricker

Committee Members

I. Todd
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Issued - Department of Fisheries of Canada,
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January 6, 1967.

APPENDIX II

SKEENA SALMON MANAGEMENT COMMITTEE

Re: Regulations for 1967

1. The Committee released to its Advisory Board and the industry in general on January 6, 1967, proposals for the regulation of the 1967 Skeena River salmon fishery. These proposals were followed by meetings of the Committee with its Advisory Board in Prince Rupert on February 8 and 9, 1967, where the prospects for the 1967 runs and the basis of the proposed regulations were reviewed. The views of Advisory Board members and other organizations and individuals were received.

2. At the meetings held with its Advisory Board, the Committee pointed out that in proposing regulations for 1967, the following had been considered:

(a) The abundance of sockeye in 1967 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 for 4 and 5 year old sockeye produced from each brood escapement. An expected return of 1,300,000 sockeye has been used as the basis for the formulation of the 1967 fishing regulations. In consideration of the expected magnitude of the run the Committee has agreed to establish a minimum escapement goal of 650,000 for 1967; with the proviso that should the run return at a level greater than anticipated, escapement levels would be adjusted upward accordingly until optimum requirements are reached. Fishing regulations which are detailed in a following section of this release have been designed to provide a catch of 650,000 and an escapement of equal magnitude.

(b) The 1967 pink salmon run will return from the 1965 escapement which totalled 1,295,000. In recent odd-numbered years the rate of return of pinks has ranged between 0.7:1 and 7.0:1, and has averaged 3.2:1. The Lakelse River escapement in 1965 totalled 835,000 or 65 percent of the total system escapement. Sampling of pre-emergent juveniles in the Lakelse River during the 1965-66 incubation period suggested that survival to the fry stage would have approximated that of the 1964 brood which returned at a rate of 1.4:1. In view of this, an average rate of return cannot be expected, and the total run to the Skeena area in 1967

is therefore anticipated to approximate 1,900,000 pink salmon. On the basis that the 1967 run will be composed primarily of fish returning to the Lakelse River, the Committee has recommended that two days fishing per week be permitted during the period when these fish predominate in the fishery. Regulations of this nature should result in an escapement of approximately 900,000 and a catch of 1,000,000 pinks.

3. The Committee has considered all views and alternate proposals received which bear on the regulation of the 1967 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 25 to July 9; three days per week from July 9 to July 30; two days per week from July 30 to August 20; and four days per week thereafter until the end of the fishing season. The Committee is prepared 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 expected.
- (b) that a closure of that portion of Salmon Purse Seine Area 5 including the waters of Ogden Channel, Beaver Passage, Freeman Pass and Browning Entrance only is required during the period July 16 to July 30, 1967, in order to afford protection to pink salmon bound for Kispiox River.
- (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 1967 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 25, 1967, 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 25, 1967, until the end of the fishing season as follows:

- (i) from June 25 to July 9 - 120 hour weekly closed period from 6:00 p.m. Tuesday to 6:00 p.m. Sunday;
- (ii) from July 9 to July 30 - 96 hour weekly closed period from 6:00 p.m. Wednesday to 6:00 p.m. Sunday;
- (iii) from July 30 to August 20 - 120 hour weekly closed period from 6:00 p.m. Tuesday to 6:00 p.m. Sunday;
- (iv) from August 20 to the end of the fishing season - 72 hour weekly closed period from 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:

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

- (a) from July 2 to July 9 - 120 hour weekly closed period from 6:00 p.m. Tuesday to 6:00 p.m. Sunday;
- (b) from July 9 to July 30 - 96 hour weekly closed period from 6:00 p.m. Wednesday to 6:00 p.m. Sunday;
- (c) from July 30 to August 13 - 120 hour weekly closed period from 6:00 p.m. Tuesday to 6:00 p.m. Sunday.

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

- (a) from July 16 to July 30 - complete closure to afford protection to pink salmon bound for Kispiox River;
- (b) from July 30 to August 13 - 120 hour weekly closed period from 6:00 p.m. Tuesday to 6:00 p.m. Sunday.

(e) Provisos:

- (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 the development of the sockeye and pink runs at the time, such might safely be permitted consistent with attaining adequate escapements for reproduction.

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W. E. Ricker

Committee Members

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APPENDIX III

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
1967	603,000	29,000	2,180	43,500	9,380	2

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

** Counts include jacks.

