Fishery Data Series No. 94-32

Escapements of Chinook Salmon in Southeast Alaska and Transboundary Rivers in 1993

by

Keith A. Pahlke

October 1994

Alaska Department of Fish and Game

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ABSTRACT

As part of its continuing program of assessment of Southeast Alaska chinook salmon *Oncorhynchus tshawytscha* stocks, the Division of Sport Fish obtained indices of spawner abundance for all Southeast Alaska and transboundary rivers. The estimated escapement increased from 68,953 fish in 1992 to 101,797 fish in 1993, the highest observed since the start of the program in 1975. The total escapement of chinook salmon in 1993 was 48%, or 32,844 fish, more than in 1992 and exceeded the escapement goal by almost 20,000 fish. The 1993 escapement was three times the 1975-1980 base period average of 32,701 chinook salmon, over twice the 1981-1985 average of 47,187, and 160% of the 1986-1990 average of 63,606.

Escapements exceeded goals in the Stikine (up 73% from 1992), Taku (up 20%) and Situk rivers (down 44%) and in Andrew Creek (up 36%), and were good although below goal in the Alsek River (up 147%). The King Salmon River escapement increased from 117 fish in 1992 to 280 in 1993 (up 139%).

Escapements to the Behm Canal systems improved but remained below goals: Unuk (up 22%), Chickamin (up 12%), Blossom (up 102%), and Keta (up 67%) rivers.

KEY WORDS: Chinook, *Oncorhynchus tshawytscha*, escapement, Taku River, Stikine River, Alsek River, Chilkat River, Unuk River, Chickamin River, Blossom River, Keta River, Marten River, Wilson River, King Salmon River, Situk River, Andrew Creek, Behm Canal, Southeast Alaska, U.S./Canada Treaty, transboundary rivers.

INTRODUCTION

Populations of chinook salmon *Oncorhynchus tshawytscha* are known to occur in 34 river systems throughout Southeast Alaska, northwestern British Columbia, and the Yukon Territory. In the mid-1970s it became apparent that the majority of chinook salmon stocks in the Southeast Alaska region were depressed, relative to historical levels of production (Kissner 1974). As a result, a fisheries management program was implemented to rebuild depressed stocks of chinook salmon in Southeast Alaska and transboundary rivers (rivers that originate in Canada and flow into Southeast Alaska coastal waters)(ADF&G 1981). Initially, this management program closed commercial and recreational fisheries in terminal and near-terminal areas. The program was formalized and expanded in 1981 to a 15-year rebuilding program (roughly three life cycles) for the transboundary Taku, Stikine, Alsek, Unuk, Chickamin, and Chilkat rivers and the non-transboundary Blossom, Keta, Situk, and King Salmon rivers (ADF&G 1981). The program used regionwide, all-gear catch ceilings for chinook salmon to enable spawning escapements to rebuild by 1995 (ADF&G 1981). Then, in 1985, the Southeast Alaska rebuilding program was incorporated into a broader, coastwide rebuilding program for wild stocks of chinook salmon under the auspices of the U.S./Canada Pacific Salmon Treaty (PST).

Indices of abundance are obtained at the peak time of spawning in major, medium, and minor stocks and are expanded to total estimates of escapement for each system and for all Southeast Alaska, according to formulas in Mecum (1990) (Appendix A1). These estimates are provided to the Joint Chinook Technical Committee of the Pacific Salmon Commission. The status of index stock escapement is reviewed annually by the Pacific Salmon Commission (PSC) as one measure of rebuilding progress since implementation of conservation actions (PSC 1991a). Evaluation focuses on changes in escapements relative to base period years, comparison of current escapement with a linear trend from the escapement base period to the goal at the rebuilding target date, and trends in escapements since PST implementation. Decisions on rebuilding progress provide the basis for regulations to restrict or expand fisheries.

As part of a continuing program by the Division of Sport Fisheries to improve wild chinook stocks, this project obtained indices of spawner abundance of major chinook salmon stocks in southeast Alaska. Objectives in 1992 were to estimate peak escapement of large (age 1.3, 1.4 and 1.5) chinook salmon to tributaries and mainstem areas of the Taku, Stikine, Alsek, Situk, Unuk, Chickamin, Blossom, Keta, King Salmon rivers and Andrew Creek, and compile and compare the indices with past data.

METHODS

Of the 34 river systems with documented spawning populations of wild chinook salmon, the transboundary Taku, Stikine, and Alsek are classified as major producers, with potential production in each river exceeding 10,000 fish. Nine systems are considered medium producers, with potential production of 1,500-10,000 fish. The remaining 22 rivers are minor producers, with production less than 1,500 fish. Although chinook salmon in small numbers have been observed in other Southeast Alaska streams, successful spawning has not been documented.

Many chinook salmon spawning streams are surveyed annually to document escapements and to expand the database for Southeast Alaska (Appendix A3). Three major, six medium, and one minor producing system are designated as index areas and used to calculate an index of abundance for all Southeast Alaska/transboundary river chinook salmon stocks. Index areas were selected on the basis of their historical importance in local fisheries, size of stocks, geographic distribution, historical and ongoing database, and ease of collecting escapement data. Descriptions of the index areas and expansion methods are summarized in the following text and in Appendix A1. A detailed description of survey areas and spawning distribution in index tributaries can also be found in Mecum and Kissner (1989).

Description of Study Areas

The Taku River originates in northern British Columbia and flows into the ocean 48 km east of Juneau, Alaska (Figure 1). The Taku River drainage covers over 16,000 km^2 and maximum flows range from 787 to 2,489 m^3/sec. Principal tributaries include the Sloko, Nakina, Sheslay, Inklin, and Nahlin rivers. The clearwater Nakina and Nahlin rivers contribute less than 25% of total drainage discharge; most drainage discharge comes from glacier-fed streams on the eastern slope of the Coast Range of British Columbia. Upstream of the abandoned mining community of Tulsequah, British Columbia, the drainage remains in pristine condition with very little mining, logging, or other development activity. The upper Taku River area is extremely remote, with no road access and few year-round residents. All of the important chinook salmon spawning areas in the Taku River are found in tributaries in the upper drainage in British Columbia: the Nakina, Nahlin, Dudidontu, Tatsamenie, Hackett, and Kowatua rivers and Tseta Creek.

The Stikine River originates in British Columbia and empties into Eastern Passage approximately 32 km south of Petersburg, Alaska (Figure 2). The drainage covers about 52,000 km^2, about 90% of which is inaccessible to anadromous fish because of natural barriers and velocity blocks. Principal tributaries include the Tahltan, Chutine, Scud, Iskut, and Tuya rivers. Only 2% of the Stikine River drainage is in Alaska (Beak Consultants Limited 1981), and most chinook salmon spawning areas are located in British Columbia in the mainstem Tahltan and Little Tahltan rivers (including Beatty Creek). However, **Andrew Creek** in the lower Stikine drainage (Figure 3) supports a significant run of chinook salmon. The lower Stikine and most of its tributaries are glacially occluded (e.g., the Chutine, Scud, and Iskut rivers). The upper Stikine drainage is accessible via Telegraph Creek Road. Development includes several active mines in the Canadian portion of the Stikine drainage, and there are proposals for major hydroelectric projects.

The Alsek River originates in the Yukon Territory, Canada and flows south into the Gulf of Alaska approximately 75 km Southeast of Yakutat, Alaska (Figure 4). The Dezadeash and Tatshenshini rivers are its largest tributaries. Velocity barriers and blockages prohibit migration of anadromous salmonids to most of the Alsek River drainage; the significant chinook salmon spawning areas are found in tributaries of the Tatshenshini River: the Klukshu, Blanchard, and Takhanne rivers and Village and Goat creeks. The Klukshu and upper Tatshenshini rivers are accessible by road near Dalton Post, Yukon Territory.

The Unuk, Chickamin, Blossom, and Keta river drainages all feed into Behm Canal—a narrow passage of water encircling Revillagigedo Island in southern Southeast

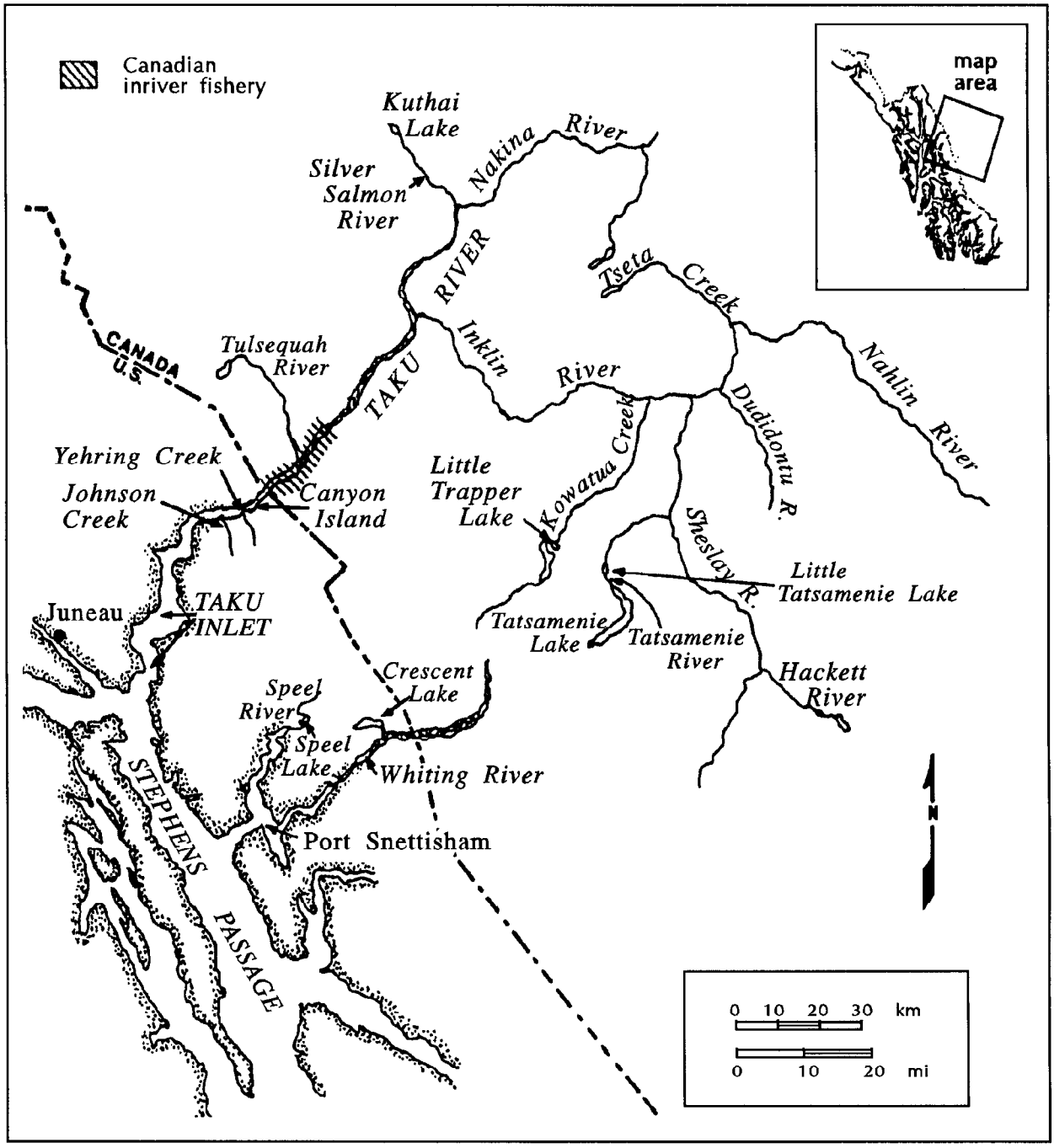


Figure 1. Taku River drainage, northwestern British Columbia and Southeast Alaska.

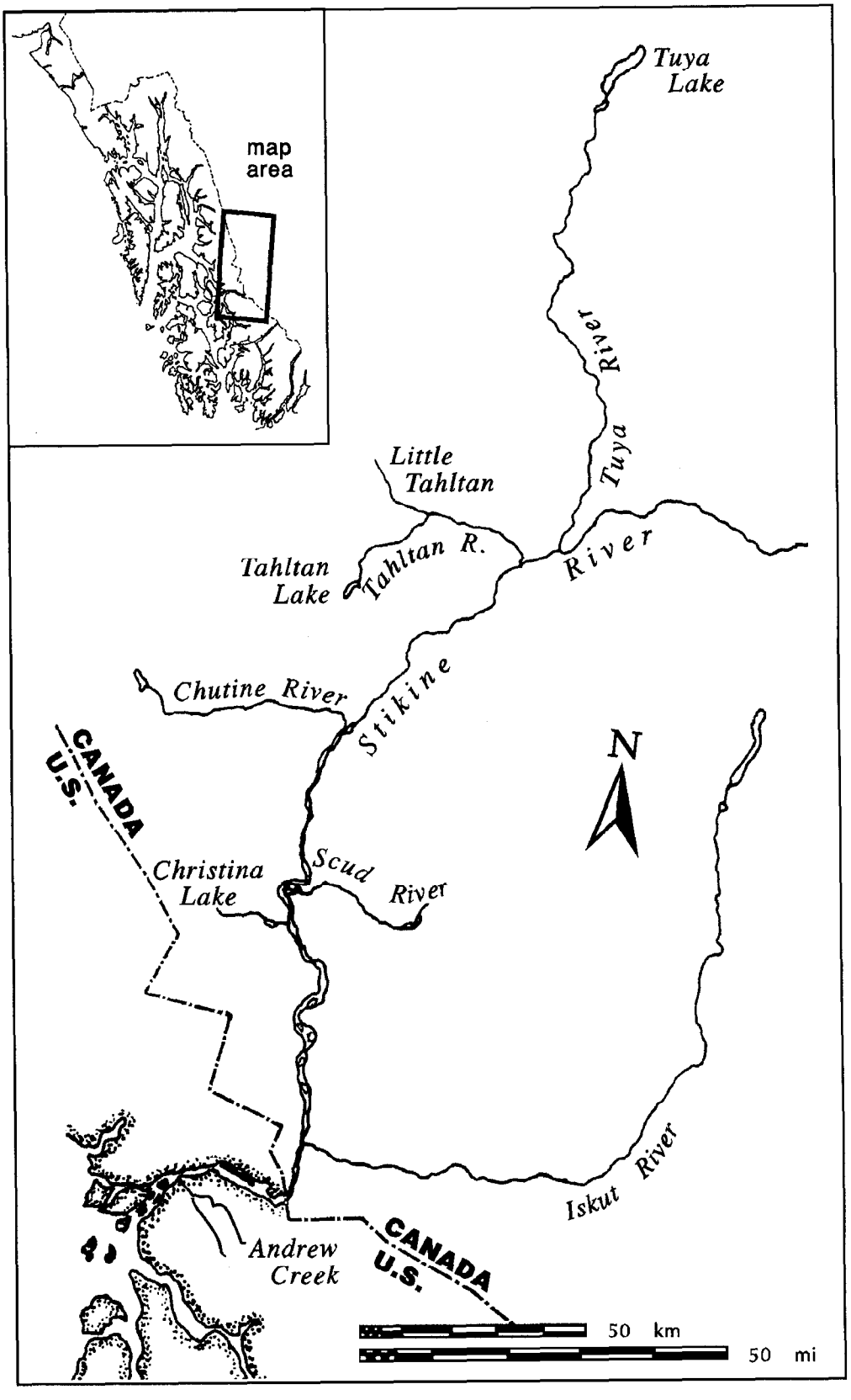


Figure 2. Stikine River drainage, northwestern British Columbia and Southeast Alaska.

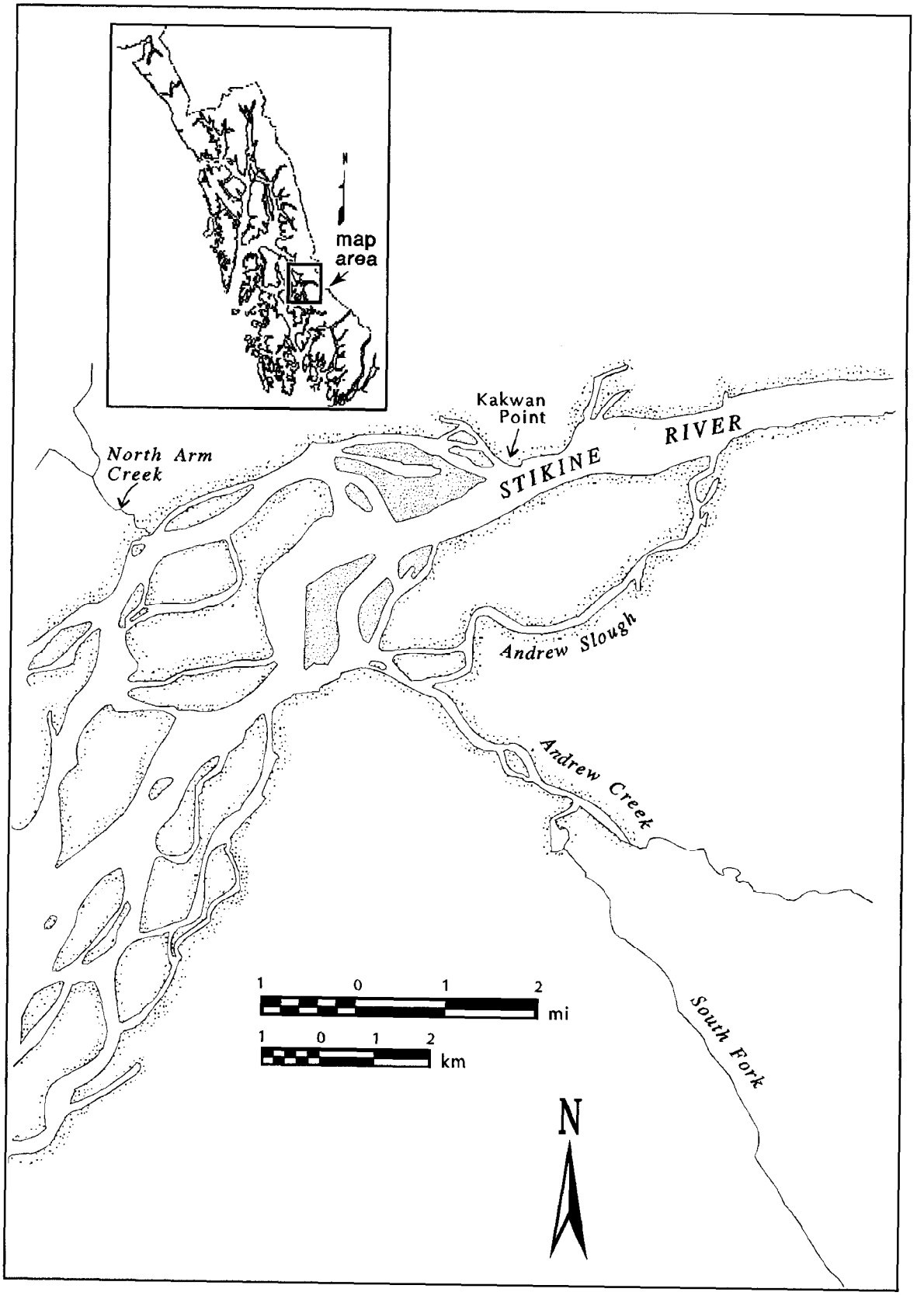


Figure 3. Andrew Creek, Southeast Alaska.

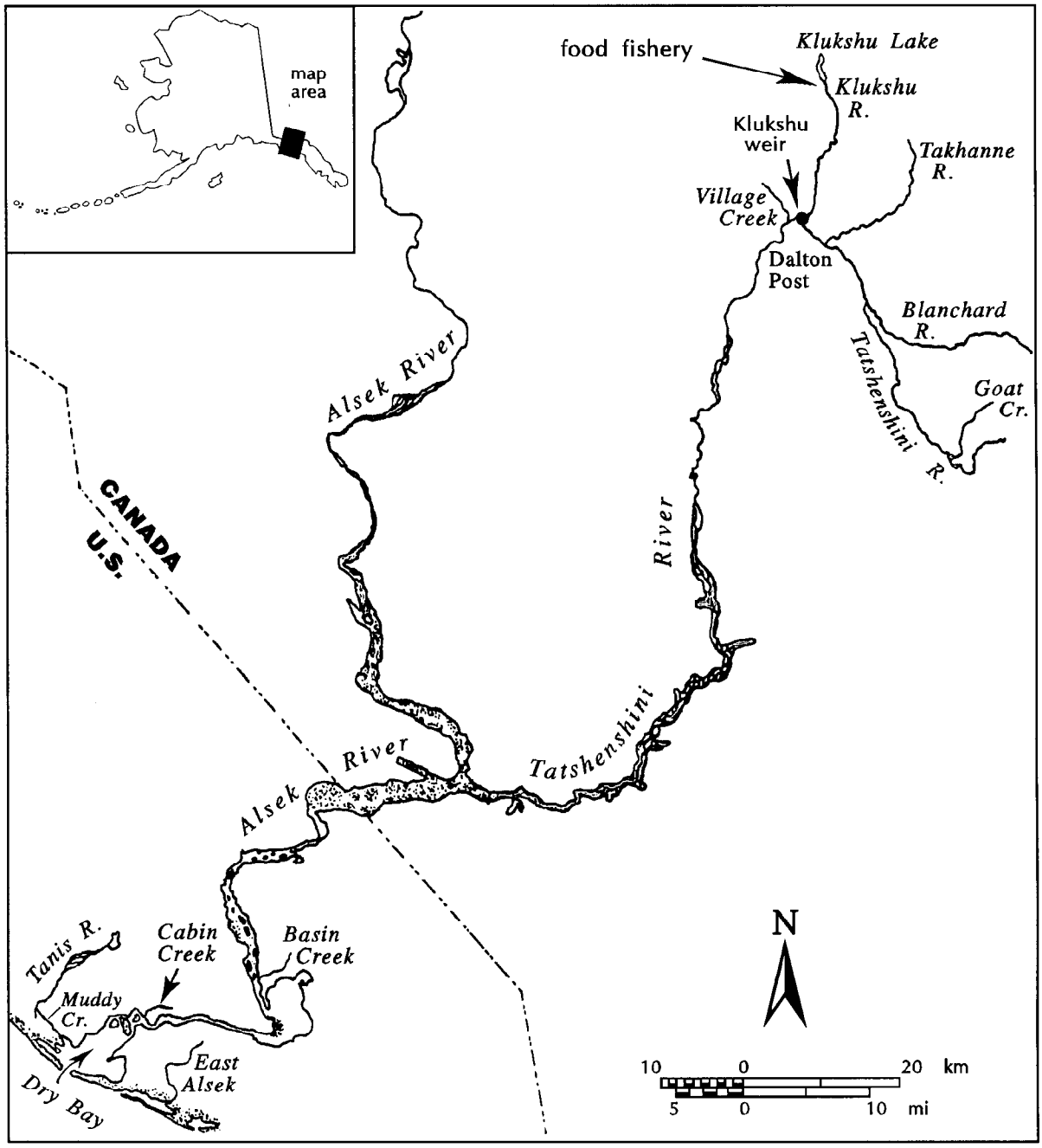


Figure 4. Alsek River drainage, northwestern British Columbia and northern Southeast Alaska.

Alaska. Misty Fjords National Monument/Wilderness Area surrounds the eastern or "back" Behm Canal and encompasses the Boca de Quadra fjords. Many of the mainland rivers in this area support wild chinook salmon populations; the Unuk, Chickamin, Blossom and Keta rivers are designated chinook salmon escapement index systems.

The Unuk River originates in a glaciated area of British Columbia and flows 129 km to Burroughs Bay (85 km northeast of Ketchikan, Alaska); only the lower 39 km of the river are in Alaska (Figure 5). The Unuk is a large, braided, glacially occluded river with an approximate drainage of 3,885 km^2. Of the known chinook salmon spawning areas, most occur in tributaries of the Alaska portion of the river. The survey index areas are all small clearwater tributaries: Eulachon River and Cripple, Genes Lake, Clear, Lake, and Kerr creeks. Cripple Creek and Genes Lake Creek cannot be surveyed from the air because of heavy vegetation, and the escapements are counted by foot surveys.

The Chickamin River is a large, glacial river that originates in British Columbia and empties into Behm Canal approximately 32 km southeast of Burroughs Bay and 65 km northeast of Ketchikan (Figure 6). Although it is technically a transboundary river, there are no known chinook spawning areas on the Chickamin River upstream from the Canadian border. Important spawning tributaries are the South Fork of the Chickamin and Barrier, Butler, Indian, Leduc, Humpy, King, and Clear Falls creeks.

The Blossom, Keta, Wilson, and Marten rivers are non-transboundary rivers that flow into Behm Canal approximately 45 km east of Ketchikan (Figure 7). These rivers lie inside the boundaries of the Misty Fjords National Monument in southern Behm Canal, but are within an area which has been specifically excluded from Wilderness designation due to potential development of a large-scale molybdenum mine (Quartz Hill) near the divide of the Blossom and Keta rivers. The mine is presently inactive, but the access road has been completed; it terminates at salt water near the mouth of the Blossom River. Chinook salmon escapements to the Wilson and Marten rivers have been monitored on an intermittent basis in recent years. The Marten River, the southernmost of the four rivers, flows into Marten Arm near Boca de Quadra.

The King Salmon River drains an area of approximately 100 km^2 on Admiralty Island and empties into King Salmon Bay in the eastern portion of Stephens Passage about 48 km south of Juneau (Figure 8). The King Salmon River is the only island river system in Southeast Alaska to support a significant population of spawning chinook salmon. The only other island system with a documented run of chinook salmon is Wheeler Creek, also on Admiralty Island. The Alaska Department of Fish and Game (ADF&G) operated an upstream weir on the King Salmon River from 1983 through 1992 to collect chinook salmon eggs for Snettisham Hatchery broodstock.

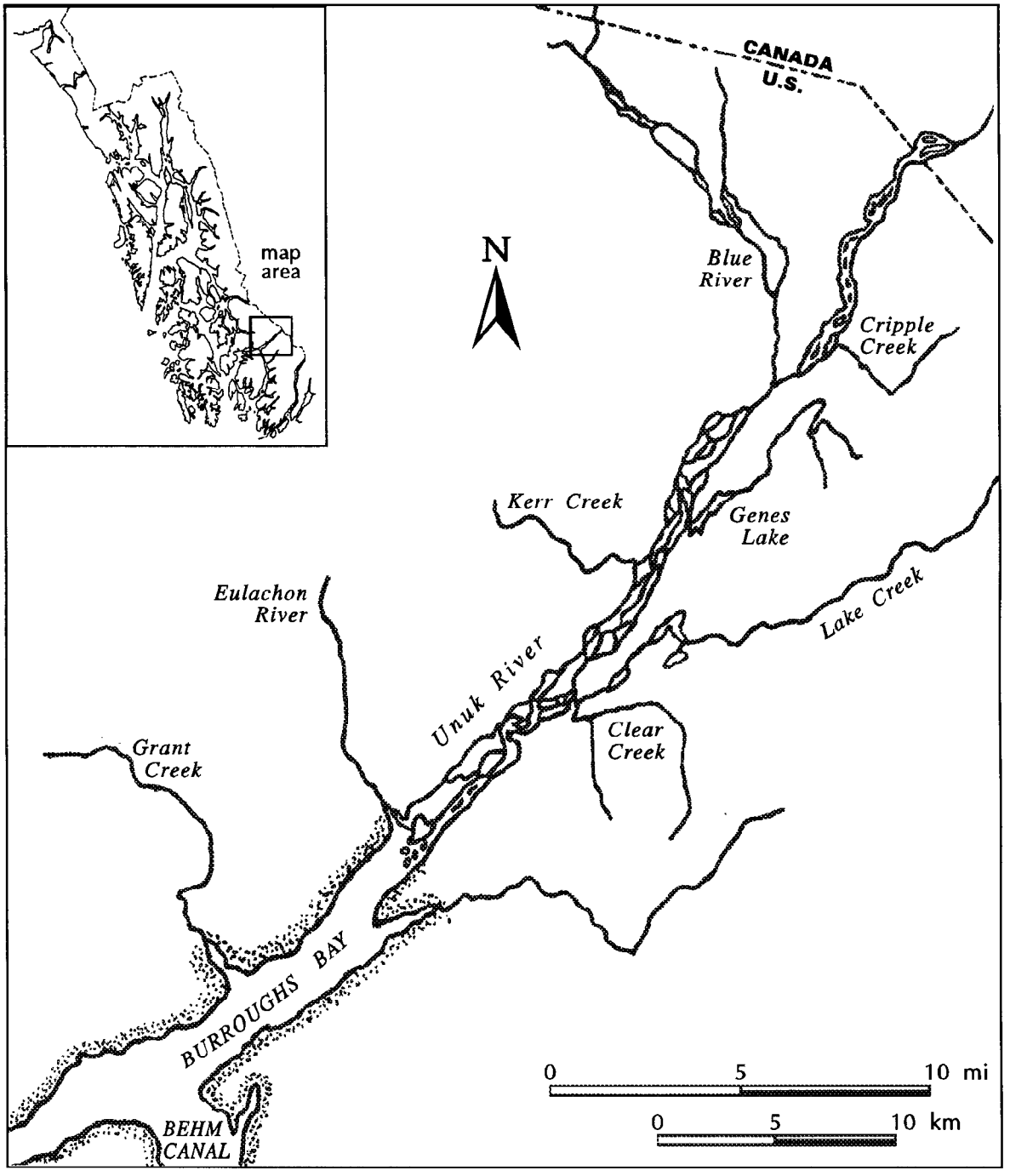


Figure 5. Unuk River drainage, northwestern British Columbia and southern Southeast Alaska.

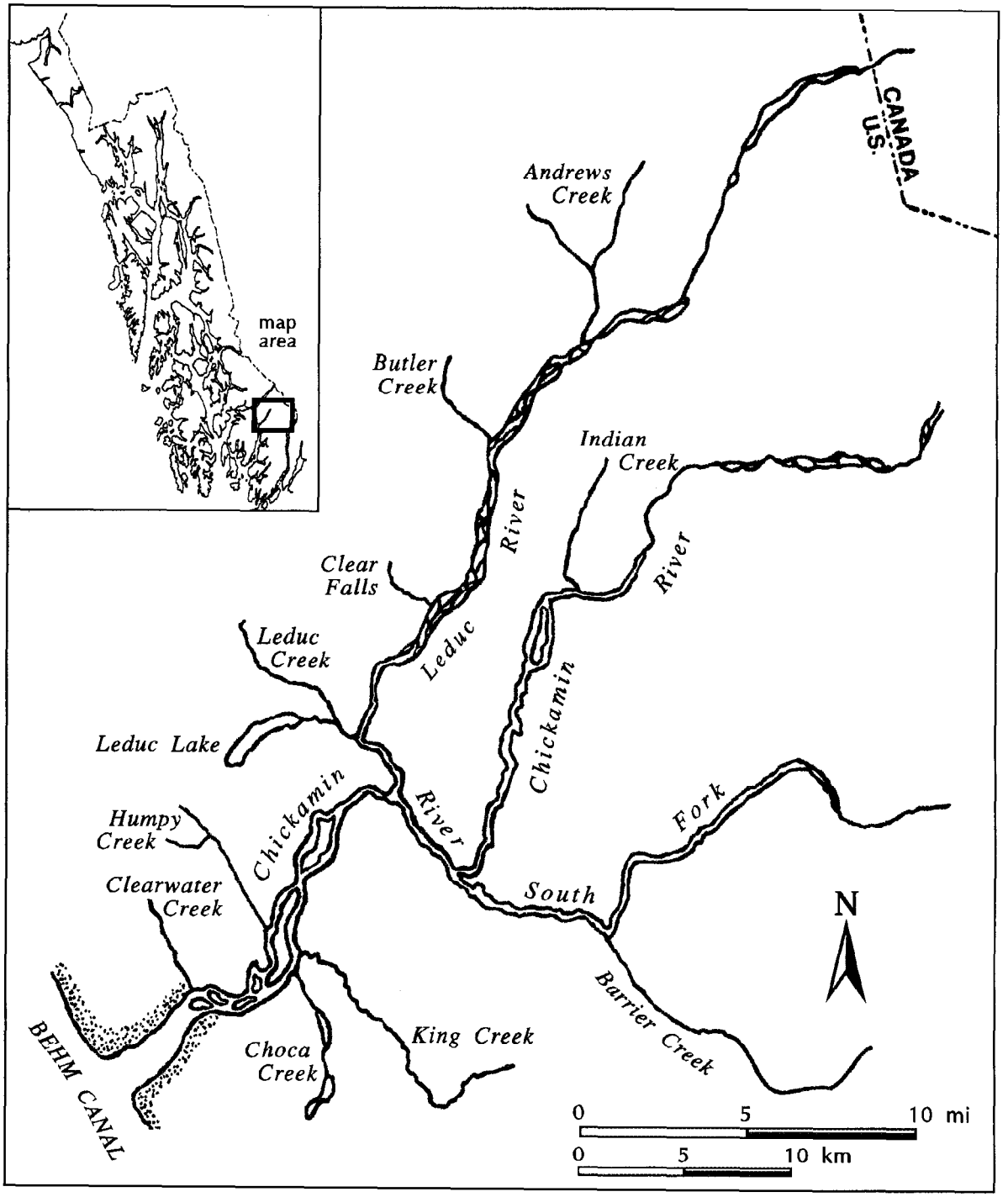


Figure 6. Chickamin River drainage, southern Southeast Alaska.

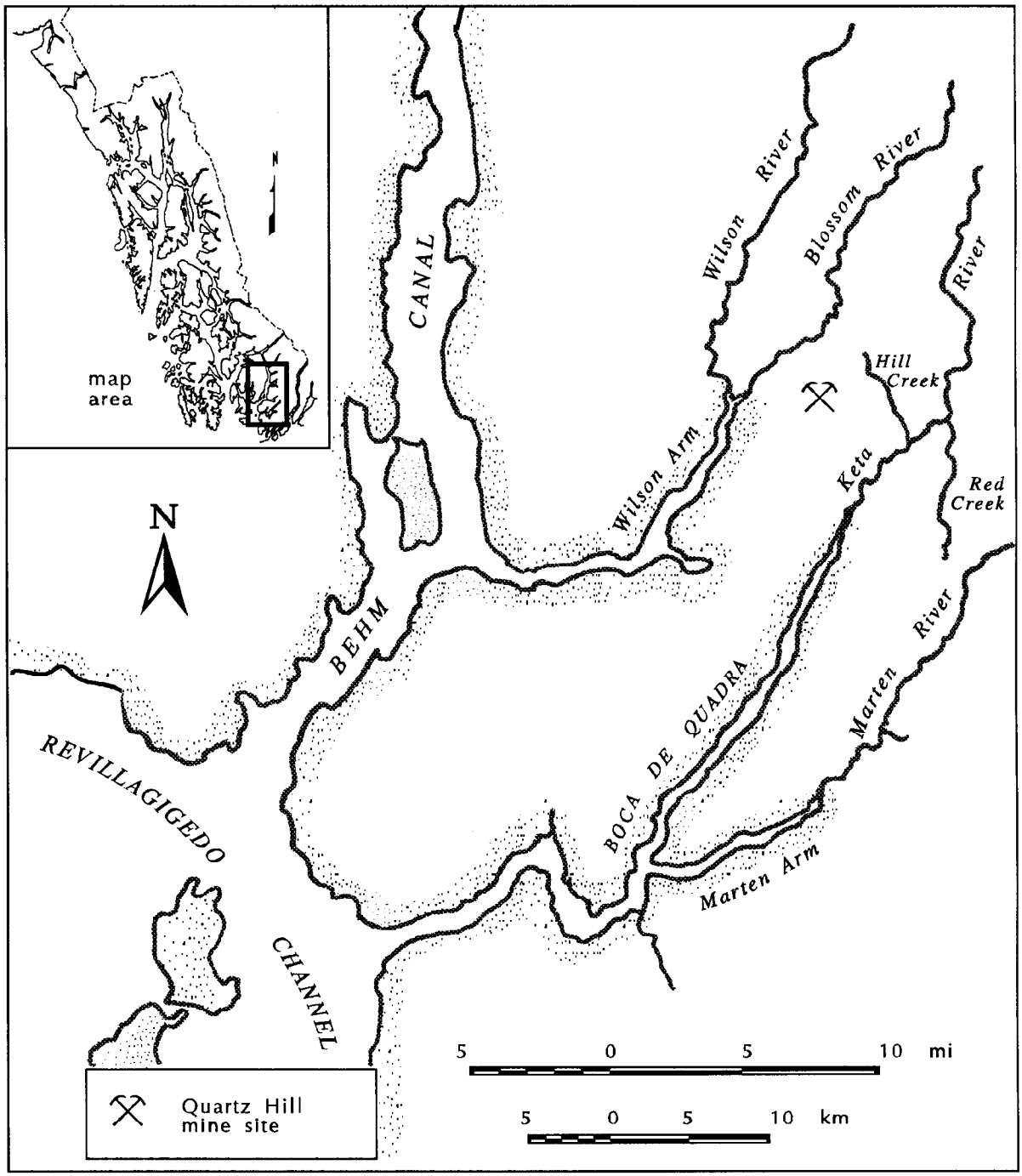


Figure 7. Blossom, Keta, Wilson, and Marten river drainages, southern Southeast Alaska.

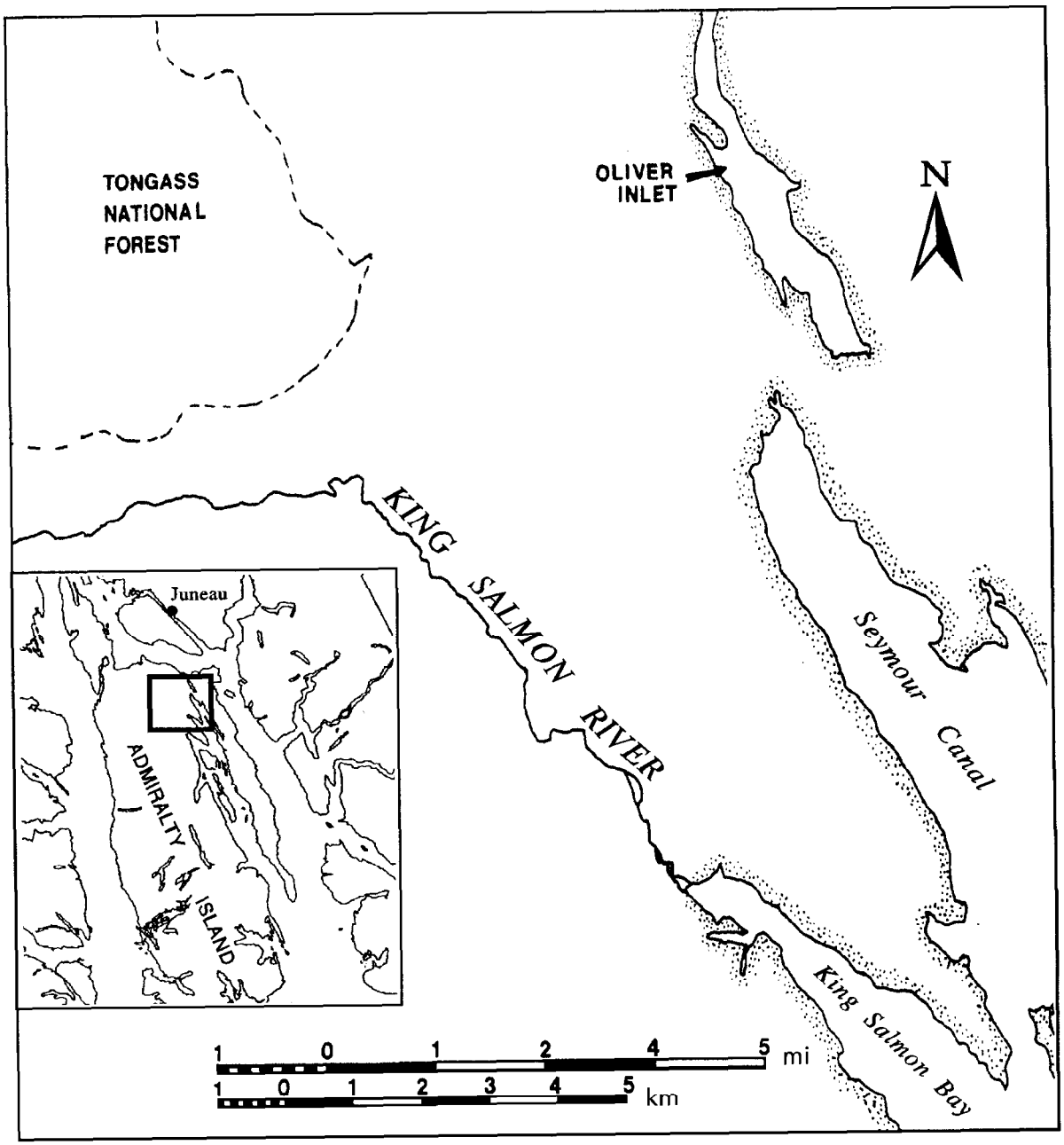


Figure 8. King Salmon River drainage, Admiralty Island, Southeast Alaska.

The Situk River is located about 16 km east of Yakutat, Alaska (Figure 9). The Situk supports a large run of sockeye salmon *O. nerka* which are harvested in commercial and subsistence set gill net fisheries concentrated at the river's mouth. Situk River chinook salmon have been harvested incidentally in the set gill net fishery and a recreational fishery in the lower river. A weir was operated on the Situk River at the upper limit of the intertidal area from 1928 to 1955 to count all five species of Pacific salmon spawning in the river. From 1976 to 1988, a weir operated farther upstream near the Ninemile Road bridge, primarily to count chinook and sockeye salmon. This weir was moved downstream closer to the old weir location in 1988 and operated there from 1988 through 1993 by the Commercial Fisheries Management and Development Division (CFMD) of ADF&G.

Indices of Escapement

Indices of chinook salmon escapement are obtained from 26 designated index areas in nine river systems annually. The surveys are conducted on foot or from a Bell 206 or Hughes 500D helicopter during periods of peak spawning. Peak spawning times, defined as the period when the largest number of adult chinook salmon actively spawn in a particular stream or river, are well documented from surveys of these index areas conducted over the past 15 years (Kissner 1982) (Appendix A1). Index areas were surveyed at least twice unless turbid water or unsafe flying conditions precluded the second survey. Pilots were directed to fly the helicopter from 6 to 15 m above the river bed at a speed of 6-16 km/h. The helicopter door on the side of the observer was removed, and the helicopter was flown sideways while observations of spawning chinook salmon were made from the open space. Only large (age 1.3, 1.4, and 1.5) chinook salmon >660 mm mideye-to-fork length (MEF) were counted during aerial or foot surveys. No attempt was made to accurately count small (age-.1 and -.2) chinook salmon that are typically <660 mm MEF (Mecum 1990). These small chinook salmon, also called jacks, are early maturing, precocious males that are considered to be surplus to spawning escapement needs. They are easy to separate visually from their older counterparts under most conditions because of their short, compact bodies and lighter color. They are however, difficult to distinguish from other smaller species such as pink *O. gorbuscha* and sockeye salmon.

Detailed escapement survey counts are entered into the ADF&G CFMD Integrated Fisheries Database (IFDB), where they are accessible to any interested party (Appendix A3).

Counts from index areas are expanded by a "survey expansion factor" and/or a "tributary expansion factor." A survey expansion factor (SEF) is an estimate of the proportion of the total season escapement observed during the peak spawning period. Survey expansion factors are based on professional judgments and vary among index areas according to the difficulties encountered in observing spawners, such as overhanging vegetation, turbid water conditions, presence of other salmon species (i.e., pink and chum *O. keta* salmon), or protraction of run timing.

Survey expansion factors range from 1/0.75 for the Nakina and Nahlin Rivers to 1/0.625 for most other index areas (Appendix A1). Survey expansions are not necessary for those streams where weirs are used to count all migrating chinook salmon.

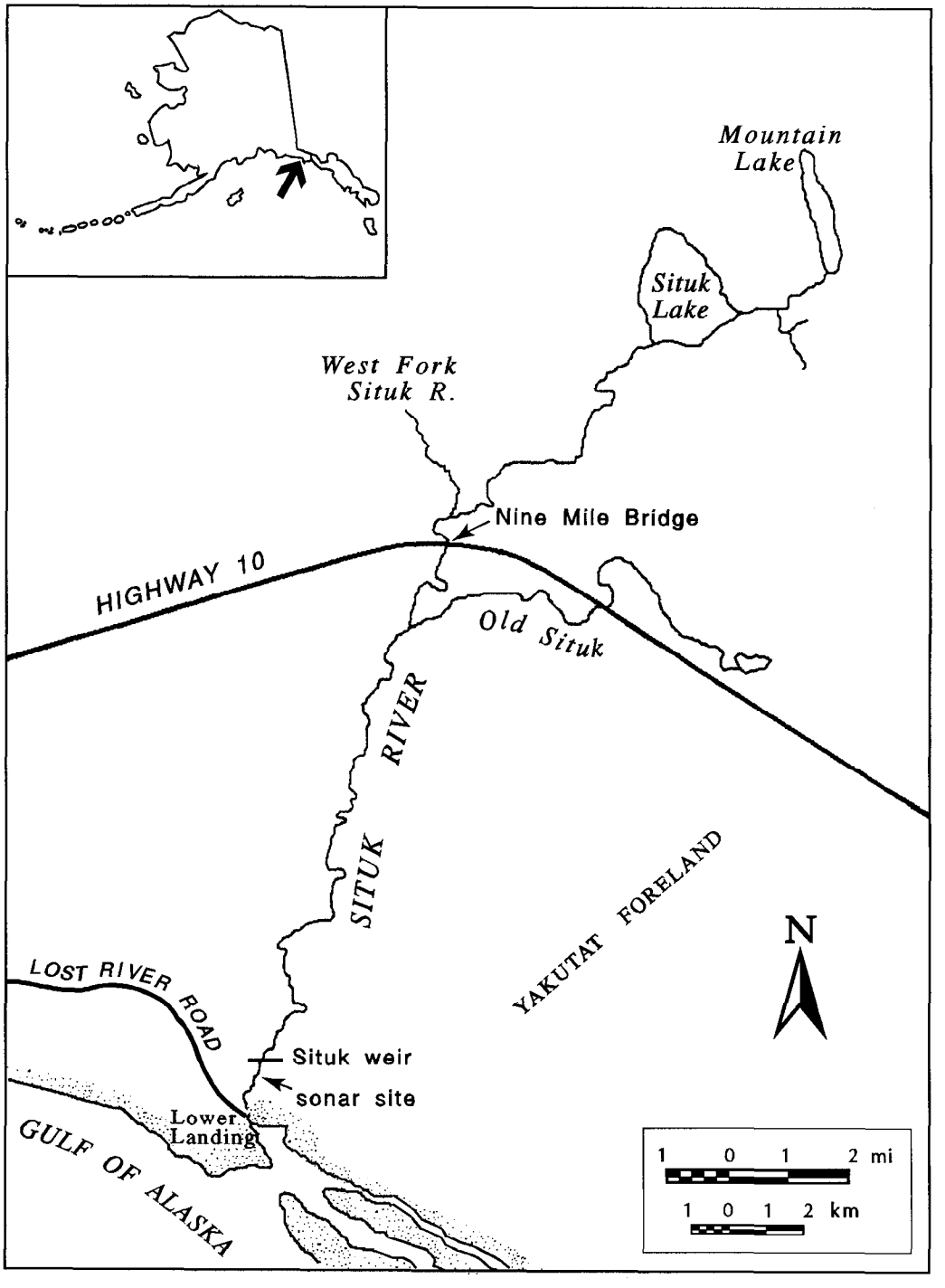


Figure 9. Situk River drainage, northern Southeast Alaska.

Peak aerial, foot, or weir counts are also expanded by a tributary expansion factor (TEF), which is an estimate of the proportion of spawners observed in index areas in relation to the escapement to the entire drainage (i.e., not all tributaries or spawning areas were surveyed). Tributary expansion factors range from 1/0.25 for the Stikine River to 1/0.64 for the Klukshu River (Appendix A1).

The expansion factors represent estimates whose validity is unknown for the majority of the index areas. Comparison of aerial surveys with weir counts on some systems indicates the survey expansion factors for the larger systems may be too low. However, these expansion factors have been used since 1981 and have been adopted by the Joint Chinook Salmon Technical Committee (CTC) of the Pacific Salmon Commission (PSC). Changing the expansion factors would require a formal review by ADF&G, the Canadian Department of Fisheries and Oceans (DFO) and the CTC. In 1991, the Transboundary Technical Committee (TBTC) of the PSC reviewed the escapement goals for the Taku, Stikine and Alsek rivers and developed jointly accepted goals which are different from the goals discussed in the 1991 escapement report (Pacific Salmon Commission 1991b).

In the process of revising escapement goals, the aerial survey index method was modified for the Taku River to include six index areas rather than the two areas used since 1981. This change was based on new estimates of spawner distribution collected in 1989 and 1990 (Eiler *In prep.*).

Escapement counts are also obtained from fish-counting weirs operated by the DFO on the Little Tahltan (Stikine), Tatsamenie (Taku), and Klukshu (Alsek) rivers, and by ADF&G on the Situk River. Except for the Situk River, where aerial surveys were not practical because of overhanging vegetation, weir counts were compared with aerial or foot surveys to determine the relative accuracy of surveys of peak escapement in predicting total escapements.

RESULTS

Thirty-six locations were surveyed specifically for chinook salmon escapement in 1993, 26 of which were designated index areas (Appendix A3). Surveys generally progressed as planned, but poor weather and water conditions delayed the aerial survey of the Little Tahltan River. However, total counts to that system are obtained at a weir and the surveys are primarily for calibration of survey technique. The frequency of surveys of the Behm Canal systems (Unuk, Chickamin, Blossom, and Keta rivers) was increased to insure that at least two good surveys were completed for each index system.

Taku River

The peak escapement count of 13,204 large chinook salmon into the six index areas of the Taku River was the largest count since surveys began in 1951 (Table 1). Counts were above recent year averages in all index areas (Table 2). Expanding the index counts by survey expansion factors (1/0.75 for Nakina/Nahlin and 1/0.625 for the other four tributaries), and expanding those numbers by the tributary expansion factor (1/0.52)(Appendix A1), resulted in a total escapement estimate for the Taku River of 36,208 large chinook salmon (Appendix A2). The Taku River chinook salmon escapement has increased steadily since 1983, and the estimated total escapement for 1993 is 99% of the revised escapement goal of 36,500 large chinook salmon. The six-tributary count of 13,204 meets the escapement count goal of 13,200 fish, as revised in 1991 for those six systems (PSC 1991b)(Figure 10).

Table 1. Peak escapement counts of chinook salmon for index areas of the Taku River, 1951-1993.

Year[a]	Nakina River	Kowatua River	Tatsamenie River	Dudidontu River	Tseta Creek	Nahlin River	Total
1951	5,000 (F)[b]	-	-	400 (F)	100 (F)	1,000 (F)	6,500
1952	9,000 (F)	-	-	-	-	-	9,000
1953	7,500 (F)	-	-	-	-	-	7,500
1954	6,000 (F)	-	-	-	-	-	6,000
1955	3,000 (F)	-	-	-	-	-	3,000
1956	1,380 (F)	-	-	-	-	-	1,380
1957	1,500 (F,W)	-	-	-	-	-	1,500[c]
1958	2,500 (F,W)	-	-	4,500 (A)	-	2,500 (A)	9,500[c]
1959	4,000 (F,W)	-	-	-	-	-	4,000[c]
1962	-	-	-	25 (A)	81 (A)	216 (A)	322
1965	3,050 (H)	200 P(A)	50 P(A)	110 (A)	18 (A)	35 (A)	3,463
1966	3,700 P(A)	14 P(A)	100 P(A)	252 (A)	150 (A)	300 (A)	4,516
1967	700 (A)	250 P(A)	-	600 (A)	350 (A)	300 P(A)	2,200
1968	300 P(A)	1,100 (A)	800 E(A)	590 (A)	230 (A)	450 (A)	3,470
1969	3,500 (A)	3,300 (A)	800 E(A)	-	-	-	7,600
1970	-	1200 P(A)	530 E(A)	10 (A)	25 (A)	26 (A)	1,791
1971	500 (A)	1,400 E(A)	360 E(A)	165 (A)	- (A)	473 (A)	2,898
1972	1,000 (F)	170 (A)	132 (A)	102 (A)	80 P(A)	280 (A)	1,764
1973	2,000 N(H)	100 N(H)	200 E(H)	200 E(H)	4 (A)	300 E(H)	2,804
1974	1,800 E(H)	235 (A)	120 (A)	24 (A)	4 (A)	900 E(H)	3,083
1975	1,800 E(H)	-	-	15 N(H)	-	274 E(H)	2,089
1976	3,000 E(H)	341 P(A)	620 E(H)	40 (H)	-	725 E(H)	4,726
1977	3,850 E(H)	580 E(H)	573 E(H)	18 (H)	-	650 E(H)	5,671
1978	1,620 E(H)	490 N(H)	550 E(H)	-	21 E(H)	624 E(H)	3,305
1979	2,110 E(A)	430 N(H)	750 E(H)	9 E(H)	-	857 E(H)	4,156
1980	4,500 E(H)	450 N(H)	905 E(H)	158 E(H)	-	1,531 E(H)	7,544
1981	5,110 E(H)	560 N(H)	839 E(H)	74 N(H)	258 N(H)	2,945 E(H)	9,786
1982	2,533 E(H)	289 N(H)	387 N(H)	130 N(H)	228 N(H)	1,246 E(H)	4,813
1983	968 E(H)	171 E(H)	236 E(H)	117 E(H)	179 N(H)	391 N(H)	2,062
1984	1,887 (H)	279 E(H)	616 E(H)	-	176 (H)	951 (H)	3,909[d]
1985	2,647 N(H)	699 E(H)	848 E(H)	475 (H)	303 E(H)	2,236 E(H)	7,208
1986	3,868 (H)	548 E(H)	886 E(H)	413 E(H)	193 E(H)	1,612 E(H)	7,520
1987	2,906 E(H)	570 E(H)	678 E(H)	287 E(H)	180 E(H)	1,122 E(H)	5,743
1988	4,500 E(H)	1,010 E(H)	1,272 E(H)	243 E(H)	66 E(H)	1,535 E(H)	8,626
1989	5,141 E(H)	601 (W)	1,228 E(H)	204 E(H)	494 E(H)	1,812 E(H)	9,480[e]
1990	7,917 E(H)	614 (W)	1,068 N(H)	820 E(H)	172 N(H)	1,658 E(H)	12,249[e]
1991	5,610 E(H)	570 N(H)	1,164 E(H)	804 E(H)	224 N(H)	1,781 E(H)	10,153
1992	5,750 E(H)	782 E(H)	1,624 N(H)	768 N(H)	313 N(H)	1,821 E(H)	11,058
1993	6,490 E(H)	1,584 E(H)	1,491 E(H)	1,020 E(H)	491 N(H)	2,128 N(H)	13,204

[a] Escapement counts before 1975 may not be comparable due to changes in survey dates and methods. Early foot surveys may have included jacks.

[b] - = no survey conducted; (F) = foot survey; (A) = fixed-wing aircraft; (H) = helicopter; (W) = weir. P = survey conditions hampered by glacial or turbid waters; N = normal water flows and turbidities; average survey conditions; E = survey conditions excellent.

[c] Partial survey of Nakina River in 1957-59; comparisons made from carcass weir counts.

[d] Surveys in 1984 conducted by DFO; partial survey of Tseta Creek and Nahlin.

[e] Carcass weir at Kowatua River used to partially enumerate escapement due to unfavorable water conditions.

Table 2. Percent escapement observed in index areas of the Taku River during years when all index areas were surveyed.

Year	Nakina River	%	Kowatua River	%	Tatsamenie River	%	Dudidontu River	%	Tseta Creek	%	Nahlin River	%	Total
1981	5,110	52	560	6	839	9	74	1	258	3	2,945	30	9,786
1982	2,533	53	289	6	387	8	130	3	228	5	1,246	26	4,813
1983	968	47	171	8	236	11	117	6	179	9	391	19	2,062
1985	2,647	37	699	10	848	12	475	7	303	4	2,239	31	7,211
1986	3,868	51	548	7	886	12	413	5	193	3	1,612	21	7,520
1987	2,906	51	570	10	678	12	287	5	180	3	1,122	20	5,743
1988	4,500	52	1,010	12	1,272	15	243	3	66	1	1,535	18	8,626
1989	5,141	54	601	6	1,228	13	204	2	494	5	1,812	19	9,480
1990	7,917	65	614	5	1,068	9	820	7	172	1	1,658	14	12,249
1991	5,610	55	570	6	1,164	11	804	8	224	2	1,781	18	10,153
1992	5,750	52	782	7	1,624	15	768	7	313	3	1,821	16	11,058
Average	4,268	52	583	8	930	11	394	5	237	3	1,651	21	8,064
1993	6,490	49	1,584	12	1,491	11	1,020	8	497	4	2,128	16	13,204

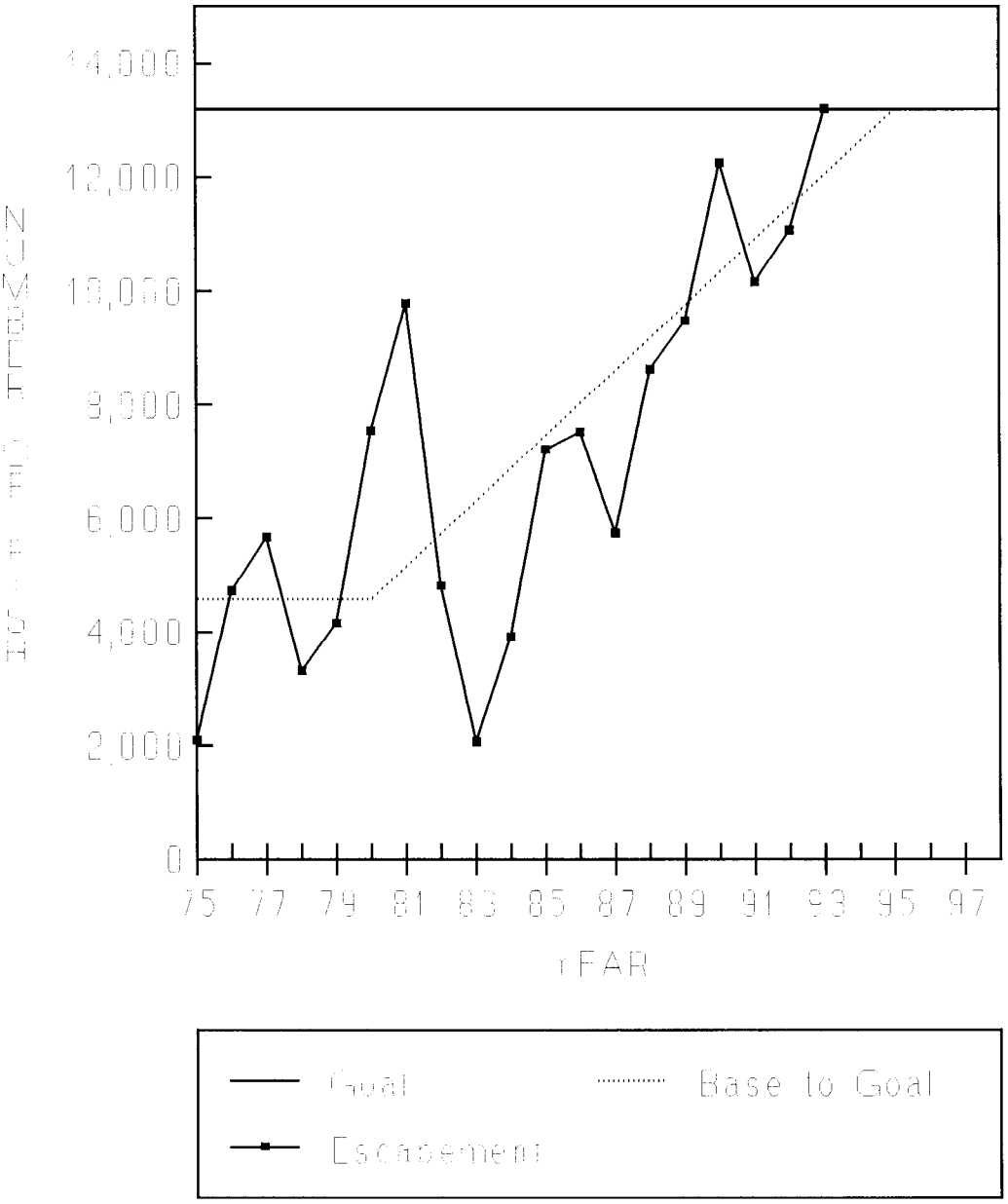


Figure 10. Escapement counts of chinook salmon in index areas of the Taku River, 1975-1993. Base-to-goal line indicates linear rebuilding schedule, starting in 1981 at average escapement level during the base period (1975-1980) and ending at revised escapement goal of 13,200 large chinook salmon in 1995 (final year of the three-cycle rebuilding program).

Stikine River

Helicopter surveys of the Little Tahltan River index area have been conducted annually since 1975, and the DFO has operated a fish counting weir at the mouth of the Little Tahltan River since 1985. From 1985 to 1992, the percent of total chinook salmon escapement observed during peak aerial surveys has ranged from 39.2% in 1991 to 56.6% in 1987 and averaged 48.2% (Table 3). The proportion of total escapement observed in a single survey often declined after the peak of spawning as fish died or were removed by predators. The low proportion of total escapement observed in 1986 resulted from poor survey conditions, caused by a mudslide. The low counts in 1990 and 1991 were attributed in part to the formation of a new river channel through a heavily wooded area which was difficult to survey.

In 1993, the first scheduled survey was canceled because of high muddy water caused by heavy rains. The second survey was past the peak of spawning, as more than half the observed fish were already dead. Despite the late survey, the peak aerial count of 3,770 large chinook salmon in the Little Tahltan River was the second highest on record (Table 4). A total of 11,449 large chinook salmon was counted through the Little Tahltan weir in 1993, 74% higher than the weir count of 6,627 fish observed in 1992 and 157% of the previous record count of 7,292. The observed escapement on the glacially turbid mainstem Tahltan River in 1993 was 2,249. The peak escapement count of 757 large chinook salmon in Beatty Creek was the highest ever recorded.

Expansion of the 1993 Little Tahltan weir count of 11,449 large chinook salmon by the tributary expansion factor (1/0.25) produced a total Stikine River escapement estimate of 45,796 large chinook salmon. The revised escapement goal agreed to in 1991 is 5,300 fish through the Little Tahltan River weir. The 1993 escapement through the weir was above the revised goal, and for the seventh year in a row, above the linear rebuilding schedule required to achieve the escapement goal by 1995 (Figure 11).

Andrew Creek

The peak escapement count of chinook salmon to Andrew Creek increased from 778 in 1992 to 1,060 in 1993 (Table 4). A foot survey counted 1,060, and a helicopter survey counted 865. This was the seventh year since 1985 that the Andrew Creek escapement exceeded the goal of 470 fish (Figure 12). The stream channel changed significantly in 1987 and counts before that were revised in 1991 to be consistent with the present survey. Changes were small, <40 fish except in 1987 when 137 fish were added to the count. From 1976 to 1984 some adult chinook from Andrew Creek were used to provide brood stock for hatcheries. Total spawners removed from the creek ranged from 12 in 1978 to 275 in 1982 (Table 5).

Table 3. Comparison of weir counts and aerial survey estimates of chinook salmon escapements to the Little Tahltan River, 1985-1993.

Date	Weir count	Low level helicopter count	Percent escapement observed from helicopter
8/02/85	2,379	1,262	53.1
8/06/85	2,864	1,598	55.8
Final	3,146	1,598	50.8
8/01/86	2,323	1,101	47.4
8/05/86	2,646	1,143	43.2
Final	2,893	1,201	41.5
7/31/87	3,903	2,446	62.7
8/03/87	4,456	2,706	60.7
Final	4,781	2,706	56.6
7/30/88	5,573	3,484	62.5
8/05/88	6,822	3,796	55.6
Final	7,292	3,796	52.1
7/29/89	3,772	2,515	66.7
8/04/89	4,394	2,527	57.5
Final	4,715	2,527	53.6
7/31/90	3,780	1,658	43.8
8/07/90	4,232	1,678	39.7
Final	4,354	1,755	40.3
7/31/91	3,649	1,768	48.5
8/07/91	4,141	1,678	32.0
Final	4,506	1,768	39.2
7/30/92	6,070	3,419	56.3
8/06/92	6,587	2,702	41.2
Final	6,627	3,419	51.6
8/04/93	11,247	3,770	33.5
Final	11,449	3,770	32.9

Table 4. Peak escapement counts for Stikine River tributaries, including Andrew Creek, 1956-1993.

Year[a]	Little Tahltan River		Mainstem Tahltan River	Beatty Creek	Andrew Creek	Total
	Peak count	Weir count				
1956	493 (F)[b]	-	-	-	4,500 (A)	4,993
1957	199 (F)	-	-	-	3,000 (F/A)	3,199
1958	790 (F)	-	-	-	2,500 (F/A)	3,290
1959	198 (F)	-	-	-	150 (F/A)	348
1960	346 (F)	-	-	-	287 N(F)	633
1961	-	-	-	-	103 (F)	103
1962	-	-	-	-	300 (A)	300
1963	-	-	-	-	500 (A/H)	500
1964	-	-	-	-	400 (H)	400
1965	-	-	85	-	100 (A)	185[c]
1966	-	-	318	-	75 (A)	393[c]
1967	800 N(H)	-	-	-	30 (A)	830
1968	-	-	-	-	15	15
1969	-	-	-	-	12 (A)	12
1970	-	-	-	-	-	-
1971	-	-	-	-	305 (A)	305
1972	-	-	-	-	-	-
1973	-	-	-	-	40 (A)	40
1974	-	-	-	-	129 (A)	129
1975	700 E(H)	-	2,908 E(H)	-	260 (F)	3,868
1976	400 N(H)	-	120 (H)	-	468 (W)	988[d]
1977	800 P(H)	-	25 (A)	-	534 (W)	1,359
1978	632 E(H)	-	756 P(H)	-	400 (W)	1,788
1979	1,166 E(H)	-	2,118 N(H)	-	382 (W)	3,666
1980	2,137 N(H)	-	960 P(H)	122 E(H)	363 (W)	3,582
1981	3,334 E(H)	-	1,852 P(H)	558 E(H)	654 (W)	6,398
1982	2,830 N(H)	-	1,690 N(F)	567 E(H)	947 (W)	6,034
1983	594 E(H)	-	453 N(H)	83 E(H)	444 (W)	1,574
1984	1,294 (H)	-	-	126 (H)	389 (W)	1,809[e]
1985	1,598 E(H)	3,114	1,490 N(H)	147 N(H)	319 E(F)	5,070[f]
1986	1,201 E(H)	2,891	1,400 P(H)	183 N(H)	707 N(F)	5,181
1987	2,706 E(H)	4,783	1,390 P(H)	312 E(H)	788 E(H)	7,273
1988	3,796 E(H)	7,292	4,384 N(H)	593 E(H)	564 E(F)	12,833
1989	2,527 E(H)	4,715	-	362 E(H)	530 E(F)	5,607
1990	1,755 E(H)	4,392	2,134 N(H)	271 E(H)	664 E(F)	7,461
1991	1,768 E(H)	4,506	2,445 N(H)	193 N(H)	400 N(A)	7,544[g]
1992	3,607 E(H)	6,627	1,891 N(H)	362 N(H)	778 E(H)	9,658
1993	3,770 P(H)	11,449	2,249 P(H)	757 E(H)	1,060 E(F)	15,515

[a] Escapement counts before 1975 may not be comparable because of differences in survey dates and counting methods.

[b] (F) = survey conducted by walking; (A) = survey conducted by fixed-wing aircraft; (H) = survey conducted by helicopter; (W) = weir count; (F/A) = combined foot and aerial count; N = normal survey conditions; P = survey conditions hampered by glacial or turbid waters; E = excellent survey conditions; - = no survey conducted or data not comparable.

[c] Chinook lifted over barrier on mainstem Tahltan.

[d] Late count on mainstem Tahltan, minimal estimate.

[e] Surveys by DFO in 1984.

[f] Total = Little Tahltan weir count plus aerial or weir counts on other systems.

[g] Andrew Creek counts revised to include North Fork; some fish removed for broodstock 1976-1984. *See* Mecum and Kissner (1989).

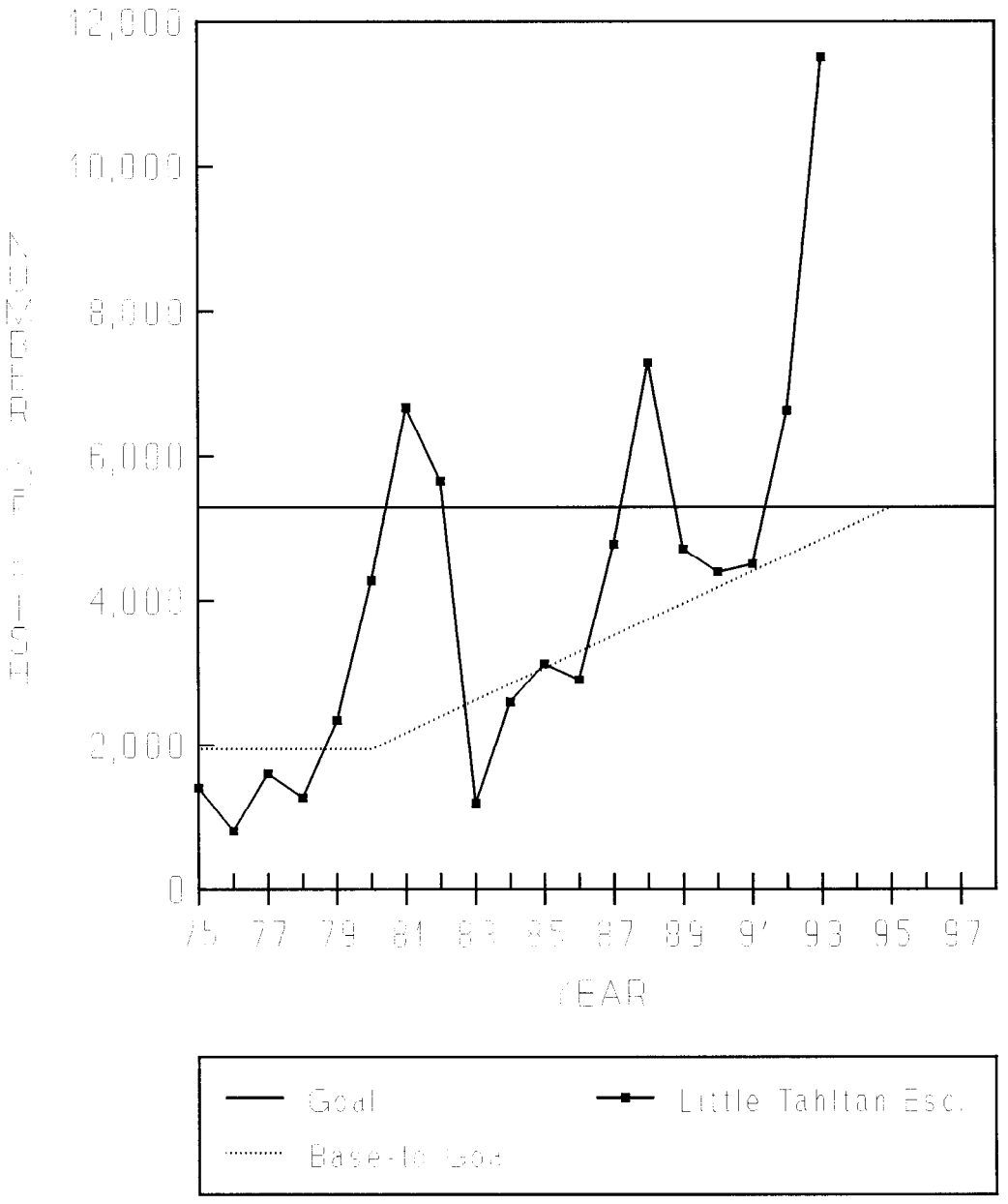


Figure 11. Escapement counts of chinook salmon to the Little Tahltan River, tributary of the Stikine River, 1975-1993. Base-to-goal line shows linear rebuilding schedule, starting in 1981 at average escapement level during base period (1975-1980) and ending at escapement goal of 5,300 large chinook salmon in 1995 (final year of the three-cycle rebuilding program).

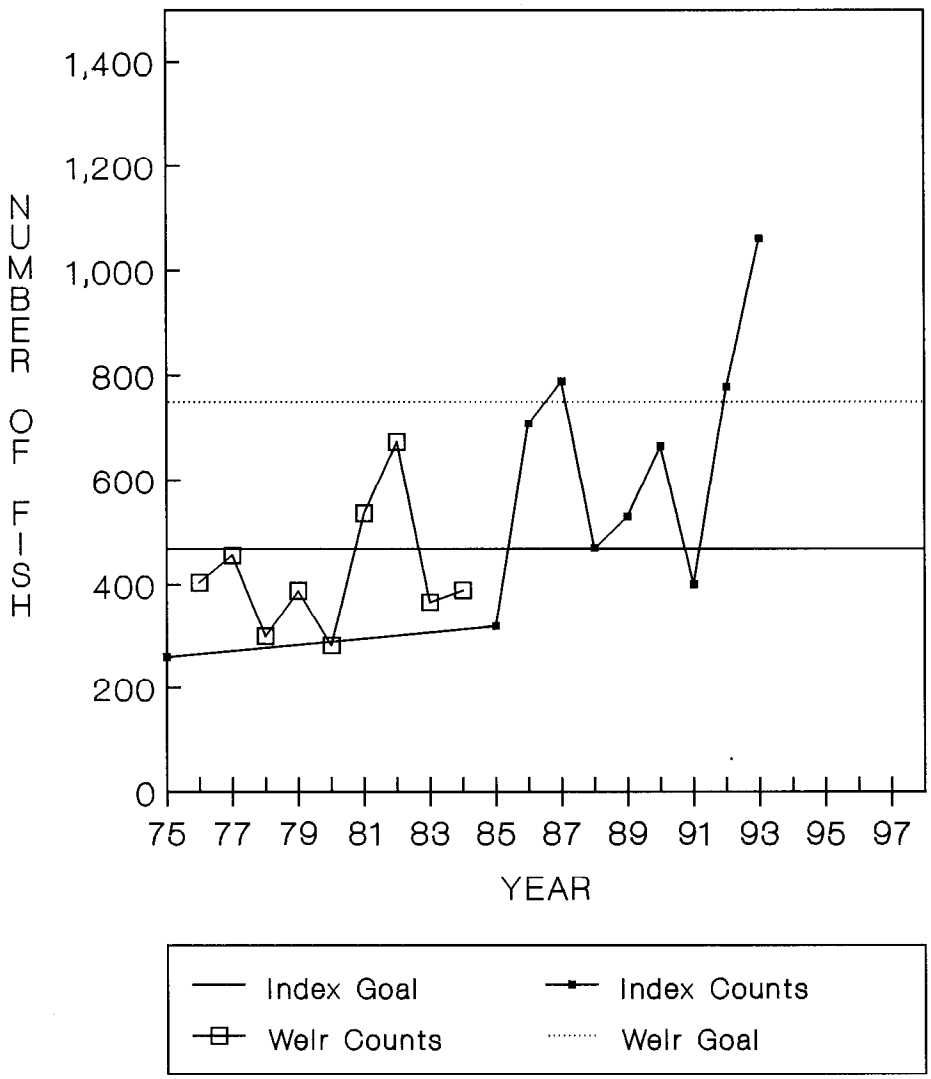


Figure 12. Observed escapements and weir counts of chinook salmon to Andrew Creek, 1975-1993.

Table 5. Peak index counts and weir counts of chinook salmon for Andrew Creek, 1956-1993.

Year	Index count: South Fork A	Index count: North Fork B	Total hatchery egg take C	Total weir count (adults) D	Total weir count (jacks) E	Spawners below weir (foot) F	Total return[a] [D+F+C+B]	Total large natural spawning [D+F+B] or [A+B]
1956	4,500 (A)[b]							4,500
1957	3,000 (F/A)							3,000
1958	2,500 (F/A)							2,500
1959	150 (F/A)							150
1960	287 (F)							287
1961	103 (F)							103
1962	300 (A)							300
1963	500 (A/H)							500
1964	400 (H)							400
1965	100 (A)							100
1966	75 (A)							75
1967	30 (A)							30
1968	15							15
1969	12 (A)							12
1970	-							-
1971	305 (A)							305
1972	-							-
1973	40 (A)							40
1974	129 (A)							129
1975	260 (F)							260
1976			64	351	50	53	468	404
1977			78	396	36	60	534	456
1978			12	343	75	45	400	388
1979	221 (F)		55	289	89	38	382	327
1980		1	81	240	272	41	363	282
1981	275 N(F)	25	118	440	119	71	654	536
1982	295 N(A)	37	275	524	124	111	947	672
1983			78	316	38	50	444	366
1984	120 N(A)	34	0	315	200	40	389	389
1985	320 E(F)							320
1986	708 N(F)							708
1987	651 E(H)	137						788
1988	470 N(F)	94						564
1989	530 E(F)							530
1990	664 E(F)							664
1991	400 N(A)							400
1992	778 E(H)							778
1993	1,060 E(F)							1,060

[a] Total return equals sum of egg take, weir count, below weir, and North Fork.

[b] (A) = survey conducted by fixed-wing aircraft; (F) = survey conducted by walking; (H) = survey conducted by helicopter; (F/A) = combined foot and aerial count; N = normal survey conditions; E = excellent survey conditions; - = no survey conducted or data not comparable.

Alsek River

Escapement data on Alsek River chinook salmon has been collected since 1962. Since 1976, the DFO has operated a counting weir at the confluence of the Klukshu and Tatshenshini rivers to count chinook, sockeye, and coho *O. kisutch* salmon into the Klukshu River drainage. Helicopter surveys of chinook salmon escapements to index areas of the Alsek River have been conducted by ADF&G since 1981. Before 1976, chinook salmon escapement surveys were usually conducted from fixed-wing aircraft.

The count of 3,302 large chinook salmon through the Klukshu River weir in 1993 was the highest since 1979 (Table 6). The escapement to the Klukshu, estimated by subtracting subsistence harvest and brood stock removal from the weir count, was 3,125—an increase of 1,842 fish from 1992. Twenty-five chinook were taken from above the weir to provide broodstock for an inriver incubation box project. The 1993 peak aerial count of 351 large chinook salmon in the Takhanne River was a large increase over the 1992 count of 77 fish. The aerial count of large chinook salmon escapement to Goat Creek in 1993 was 50 fish, up from only 16 in 1992. The total escapement for the Alsek River drainage, estimated by expanding the weir escapement count for the Klukshu River by 1/0.64 (tributary expansion factor) and subtracting sport (171) and subsistence (152) harvest and broodstock (25), was 4,811 large chinook salmon. This was 149% of 1992 and close to the pre-1991 escapement goal of 5,000 large chinook salmon. Escapements of chinook salmon to the Alsek River have exceeded the escapement goal only in 1979, and average escapements during the first two cycles of the rebuilding program (1981-1985 and 1986-1990) have actually declined relative to the 1975-1980 base period (Figure 13). In 1991, the TBTC revised the Alsek River chinook escapement goal to 4,700 large fish through the Klukshu River weir. New expansion factors were not agreed upon therefore the total escapement was estimated using the above factors.

Unuk River

In 1993, 1,068 large chinook salmon were observed in index areas of the Unuk River (Table 7) and escapements were below average in 5 out of 6 index areas (Table 8). This was 41% below the survey escapement goal of 1,800 fish. In 1993, Boundary Creek was again surveyed, but not included in the index expansion. A recent change in the river has revealed more spawning area in that tributary than previously observed. Expansion of 1993 peak aerial survey counts by a survey expansion factor of 1/0.625 resulted in a total escapement estimate of 1,709 large chinook salmon. The 1993 estimated total escapement was 22% above the 1992 escapement of 1,400 chinook salmon and only 59% of the management escapement goal of 2,880 large chinook salmon. The 1993 estimated escapement of chinook salmon to the Unuk River was 14% below the average escapements observed during the first rebuilding cycle (1981-1985) and 16 above the 1975-1980 average of 1,469 chinook salmon. Escapements of chinook salmon to the Unuk River have been below the linear rebuilding schedule since 1989 (Figure 14).

Table 6. Peak escapement and weir counts of chinook salmon for tributaries of the Alsek River, 1962-1993.

Year[a]	Klukshu aerial	Klukshu weir	Canadian inriver harvest IFF	Canadian inriver harvest Sport	Klukshu escapement[b]	Blanchard River	Takhanne River	Goat Creek	Total[c]
1962	86				86	-[d]	-	-	86
1963	-				-	-	-	-	-
1964	20				20	-	-	-	20
1965	100				100	100	250	-	450
1966	1,000				1,000	100	200	-	1,300
1967	1,500				1,500	200	275	-	1,975
1968	1,700				1,700	425	225	-	2,350
1969	700				700	250	250	-	1,200
1970	500				500	100	100	-	700
1971	300				300	-	-	-	300
1972	1,100				1,100	12 (A)	250	-	1,362
1973	-				-	-	49 (A)	-	49
1974	62				62	52 (A)	132	-	246
1975	58				58	81 (A)	177 (A)	-	316
1976	-	1,278	125	200	1,153	-	-	-	1,153
1977	-	3,144	250	300	2,894	-	-	-	2,894
1978	-	2,976	300	300	2,676	-	-	-	2,676
1979	-	4,404	130	650	4,274	-	-	-	4,274
1980	-	2,637	150	200	2,487	-	-	-	2,487
1981	-	2,113	150	315	1,963	35 (H)	11 (H)	-	2,009
1982	633 N	2,369	400	224	1,969	59 (H)	241 (H)	13 (H)	2,282
1983	917 N	2,537	300	312	2,237	108 (H)	185 (H)	-	2,530
1984	-	1,672	100	475	1,572	304 (H)	158 (H)	28 (H)	2,062
1985	-	1,458	175	250	1,283	232 (H)	184 (H)	-	1,699
1986	738 P	2,709	102	165	2,607	556 (H)	358 (H)	142 (H)	3,663
1987	933 E	2,616	125	367	2,491	624 (H)	395 (H)	85 (H)	3,595
1988	-	2,037	43	249	1,994	437 E(H)	169 E(H)	54 E(H)	2,654
1989	893 N	2,456	167	272	2,289	-	158 E(H)	34 E(H)	2,481
1990	1,381 E	1,915	173	555	1,742	-	325 E(H)	32 E(H)	2,099
1991	-	2,489	336	388	2,153	121 N(H)	86 E(H)	63 E(H)	2,423
1992	261 P	1,367	84	102	1,283	86 P(H)	77 N(H)	16 N(H)	1,462
1993	1,058 N	3,302	152	171	3,125[e]	326 N(H)	351 E(H)	50 N(H)	3,852

[a] Escapement counts prior to 1975 may not be comparable due to differences in survey dates and counting methods.

[b] Klukshu River escapement = weir count minus Indian Food Fishery (IFF).

[c] Total escapement = Klukshu escapement plus aerial counts of other systems.

[d] (A) = aerial survey from fixed wing aircraft; (H) = helicopter survey; E = excellent survey conditions; N = normal conditions; P = poor conditions; - = no survey.

[e] 1993 broodstock removal of 25 fish.

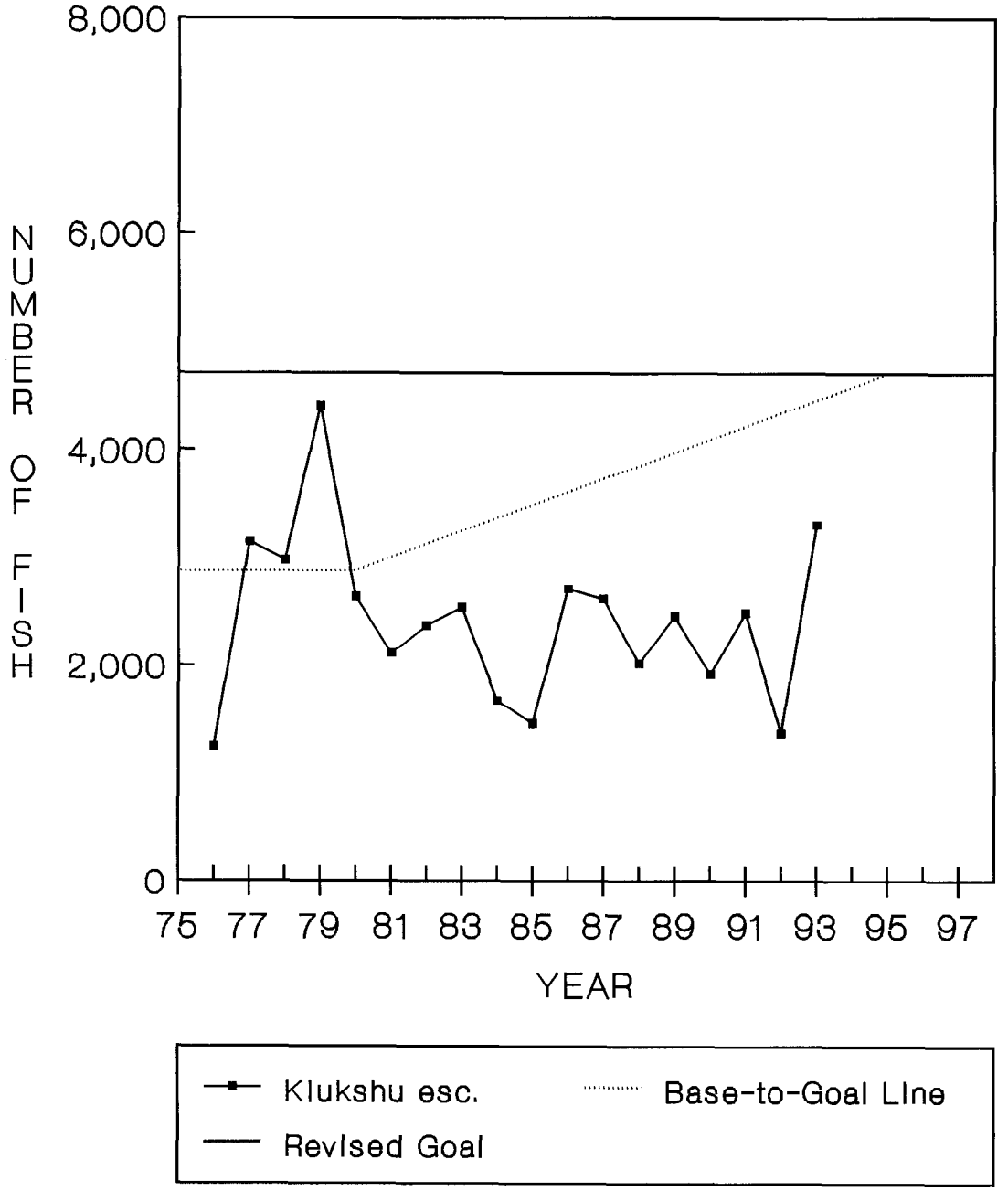


Figure 13. Escapement counts of chinook salmon to the Klukshu River tributary of the Alsek River, 1975-1993. Base-to-goal line indicates linear rebuilding trend, starting in 1981 at average escapement level during base period (1975-1980) and ending at the escapement goal of 4,700 large chinook salmon in 1995 (final year of three-cycle rebuilding program).

Table 7. Peak escapement counts of chinook salmon to index areas of the Unuk River, 1960-1993.

Year[a]	Cripple Creek	Genes Lake Creek	Eulachon Creek	Clear Creek	Lake Creek	Kerr Creek	Total
1960	-[b]	-	250 (A)	-	-	-	250
1961	3 (F)	200 (F)	270 (F)	65 (F)	-	53 (F)	591
1962	-	150 (A)	145 (A)	100 (A)	30 (A)	-	425
1963	100 (A)	750 (A)	150 (A)	25 (A)	-	-	1,025
1964	-	-	25 (A)	-	-	-	25
1965	-	-	-	-	-	-	-
1966	-	-	-	-	-	-	-
1967	-	-	60 (H)	-	-	-	60
1968	-	-	75 (H)	-	-	-	75
1969	-	-	150 (H)	-	-	-	150
1970	-	-	-	-	-	-	-
1971	-	-	30 (A)	-	-	-	30
1972	95 (A)	35 (A)	450 (A)	90 (A)	55 (A)	-	725
1973	-	-	64 (H)	-	-	-	64
1974	-	-	68 (H)	-	-	-	68
1975	-	-	17 (H)	-	-	-	17
1976	-	-	3 (A)	-	-	-	3
1977	529 (F)	339 (F)	57 (H)	34 (H)	-	15 (H)	974
1978	394 (F)	374 (F)	218 (H)	85 (H)	20 (H)	15 (H)	1,106
1979	363 (F)	101 (F)	48 (H)	14 (H)	30 (H)	20 (H)	576
1980	748 (F)	122 (F)	95 (H)	28 (H)	5 (H)	18 (H)	1,016
1981	324 (F)	112 (F)	196 (H)	54 (H)	20 (H)	25 (H)	731
1982	538 (F)	329 (F)	384 (H)	24 (H)	48 (H)	28 (H)	1,351
1983	459 (F)	338 (F)	288 (H)	24 (H)	12 (H)	4 (H)	1,125
1984	644 (F)	647 (F)	350 (H)	113 (H)	32 (H)	51 (H)	1,837
1985	284 (F)	553 (F)	275 (H)	37 (H)	22 (H)	13 (H)	1,184
1986	532 (F)	838 (F)	486 (H)	183 (F)	25 (H)	62 (H)	2,126
1987	860 (F)	398 (F)	520 (H)	107 (H)	37 (H)	51 (H)	1,973
1988	1,068 (F)	154 (F)	146 (F)	292 (H)	60 (H)	26 (H)	1,746
1989	351 (F)	302 (F)	298 (H)	128 (H)	27 (F)	43 (H)	1,149
1990	86 (F)	284 (F)	81 (H)	103 (F)	26 (F)	11 (H)	591
1991	358(W/F)	123 (F)	43 (H)	96 (F)	23 (F)	12 (H)	655[c]
1992	327(W/F)	360 (F)	57 (F)	69 (F)	31 (H)	30 (H)	874[d]
1993	448 N(F)	330 N(F)	132 E(F)	137 N(F)	8 N(F)	13 P(H)	1,068[e]

[a] Escapement counts prior to 1975 may not be comparable due to differences in survey dates and counting methods.

[b] (F) = escapement survey conducted by walking river; (A) = fixed-wing aircraft; (H) = helicopter; (W) = weir; - = no survey conducted or data not comparable. Survey conditions N = normal; E = excellent; P = poor.

[c] Total does not include 108 from Boundary Creek; Cripple Creek weir count reduced by /0.625 to be comparable with foot surveys.

[d] Total does not include 123 from Boundary Creek; Cripple Creek weir count reduced by /0.625 to be comparable with foot surveys.

[e] Total does not include 143 from Boundary Creek.

Table 8. Percent total escapements of chinook salmon to index areas of the Unuk River for years when all index areas were surveyed.

Year	Cripple Creek	%	Genes Lake Creek	%	Eulachon Creek	%	Clear Creek	%	Lake Creek	%	Kerr Creek	%	Total
1978	394	36	374	34	218	20	85	8	20	2	15	1	1,106
1979	363	63	101	18	48	8	14	2	30	5	20	4	576
1980	748	74	122	12	95	9	28	3	5	1	18	2	1,016
1981	324	44	112	15	196	27	54	7	20	3	25	3	731
1982	538	39	329	24	384	28	24	2	48	4	28	2	1,351
1983	459	40	338	30	288	26	24	2	12	1	4	0	1,125
1984	644	35	647	35	350	19	113	6	32	2	51	3	1,837
1985	284	24	553	47	275	23	37	3	22	2	13	1	1,184
1986	532	25	838	39	486	23	183	9	25	1	62	3	2,126
1987	860	44	398	20	520	26	107	5	37	2	51	3	1,973
1988	1,068	61	154	9	146	8	292	17	60	3	26	2	1,746
1989	351	31	302	26	298	26	128	11	27	2	43	4	1,149
1990	86	15	284	48	81	14	103	17	26	4	11	2	591
1991	358	55	123	19	43	7	96	15	23	4	12	2	655
1992	327	37	360	41	57	7	69	8	31	4	30	3	874
Average	489	42	336	28	232	18	90	8	28	3	27	2	1,203
1993	448	42	330	31	132	12	137	13	8	1	13	1	1,068

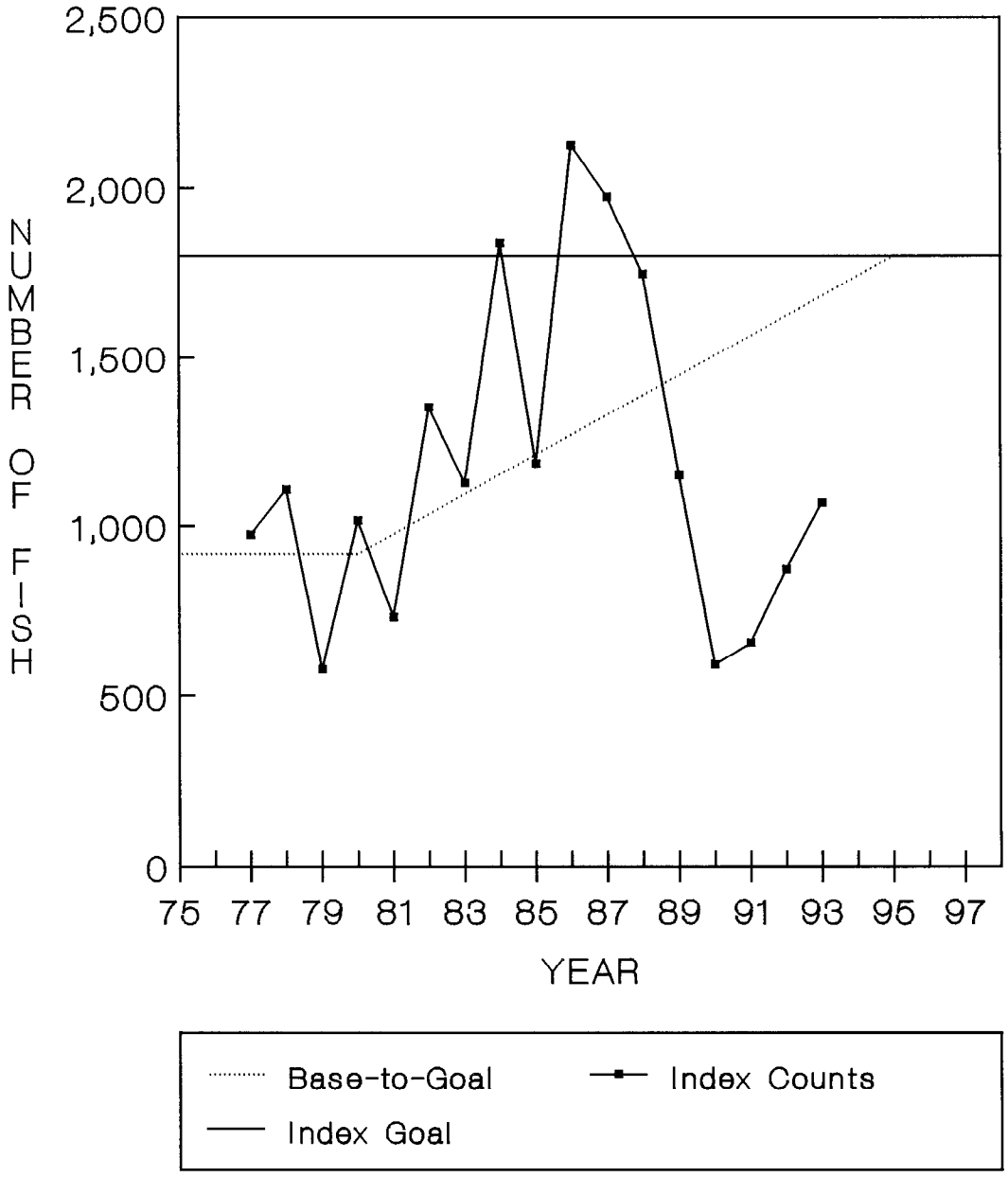


Figure 14. Escapement counts of chinook salmon to the Unuk River, 1975-1993. Base-to-goal line shows linear rebuilding schedule, starting in 1981 at average escapement level during base period (1975-1980) and ending at escapement goal of 1,800 large chinook salmon in 1995 (final year of the three-cycle rebuilding program).

Chickamin River

Chinook salmon have been counted by foot or helicopter surveys in index tributaries of the Chickamin River each year since 1977. The 1993 escapement count to the eight index tributaries of the Chickamin River was 389 large chinook salmon, compared to 346 in 1992 (Table 9). Escapements in 1993 were below average in all but one of the Chickamin River tributaries (Table 10). The survey escapement goal is 900 fish observed and the expanded goal for the system is 1,440.

Expansion of the total observed peak escapement by the survey expansion factor of 1/0.625 gave an estimated total escapement to the Chickamin River drainage of 622 chinook salmon, only 43% of the escapement goal of 1,440 large chinook salmon. The 1993 total escapement was 12% lower than in 1992 but lower yet than 1981-1985 and 1986-1990 average escapements; however, it was 84% higher than the 1975-1980 average of 338 fish. The 1993 escapement to the Chickamin River falls below both the escapement goal and the rebuilding schedule. Prior to 1990, total escapements had been above the linear rebuilding schedule since 1980, and close to or above the management escapement goal since 1984 (Figure 15).

Blossom River

The observed peak escapement of 303 large chinook salmon to the Blossom River in 1993 was twice the 1992 escapement of 150 (Table 11). The expanded escapement estimate for the Blossom River of 485 fish was approximately 38% of the escapement goal of 1,280 fish. This escapement goal was exceeded in both 1986 and 1987. Since 1988, escapements of chinook salmon to the Blossom River have fallen below the linear rebuilding schedule (Figure 16).

Keta River

Escapement to the Keta River in 1993 increased to 362 fish from 217 in 1992 (Table 11). Expanding the peak aerial count by the survey expansion factor of 1/0.625 resulted in an estimate of 579 large chinook salmon, again below the escapement goal of 800 fish. Prior to 1990, chinook salmon escapements to the Keta River had increased steadily since implementation of the rebuilding program in 1980, and had exceeded the escapement goal every year since 1983 (Figure 17).

Marten and Wilson Rivers

The Marten River is not used as a chinook salmon index stream and no escapement goals have been established. The escapements to this system have, however, been regularly monitored since 1982 (Table 11). The 1993 peak escapement count for the Marten River of 229 large chinook salmon was three times the 1992 count of 76. Sixty-three chinook salmon were observed in the Wilson River in 1993. In 1988, the U.S. Forest Service modified a barrier on Dicks Creek, a major tributary of the Marten River, with the objective of opening access to new spawning areas. Aerial surveys have documented chinook salmon above the old barrier.

Table 9. Peak escapements of chinook salmon to index areas of the Chickamin River, 1960-1993. Totals for 1975-1980, 1983 and 1986 were expanded for unsurveyed index areas by 1981-1992 average % observed to those indices.

Year[a]	South Fork Creek	Barrier Creek	Butler Creek	Leduc Creek	Indian Creek	Humpy Creek	King Creek	Clear Falls Creek	Total
1960	-[b]	-	-	-	-	3 (A)	-	-	3
1961	-	36 (A)	77 (A)	42 (A)	5 (A)	120 (A)	48 (A)	-	328
1962	400 (A)	35 (A)	-	-	-	150 (A)	-	-	585
1963	350 (A)	115 (A)	-	-	-	3 (A)	200 (A)	-	668
1964	-	-	-	-	-	-	-	-	-
1965	-	-	-	-	-	-	75 (A)	-	75
1966	-	-	-	-	-	50 (F)	-	-	50
1967	-	-	-	-	-	-	45 (H)	-	45
1968	-	-	-	-	-	30 (H)	20 (H)	-	50
1969	-	-	-	-	-	10 (H)	45 (H)	-	55
1970	-	-	-	-	-	-	-	-	-
1971	-	-	-	-	-	-	-	-	-
1972	350 (A)	25 (A)	-	85 (A)	-	65 (A)	510 (A)	-	1,035
1973	-	-	-	-	-	14 (A)	65 (A)	-	79
1974	144 (H)	-	-	-	-	-	11 (H)	-	155
1975	141 (H)	9 (H)	66 (H)	6 (H)	90 (H)	7 (H)	30 (H)	-	370
1976	46 (H)	10 (H)	15 (H)	12 (H)	9 (H)	-	-	-	157
1977	52 (H)	66 (H)	30 (H)	26 (H)	53 (H)	0 (H)	-	-	363
1978	21 (H)	94 (H)	4 (H)	42 (H)	20 (H)	-	-	-	308
1979	63 (H)	17 (H)	29 (H)	0 (H)	31 (H)	-	-	-	239
1980	56 (H)	62 (H)	104 (H)	17 (H)	22 (H)	-	-	-	445
1981	51 (H)	105 (H)	51 (H)	25 (H)	12 (H)	4 (F)	105 (F)	31 (H)	384
1982	84 (H)	149 (H)	37 (H)	36 (H)	30 (F)	37 (F)	165 (F)	33 (H)	571
1983	28 (H)	138 (H)	91 (H)	30 (H)	47 (H)	-	212 (F)	30 (H)	599
1984	185 (H)	171 (H)	124 (H)	15 (H)	103 (H)	88 (F)	388 (F)	28 (H)	1,102
1985	163 (H)	129 (H)	92 (H)	8 (H)	125 (H)	50 (H)	377 (H)	12 (H)	956
1986	562 (H)	168 (H)	203 (H)	20 (H)	120 (H)	-	564 (H)	40 (H)	1,745
1987	261 (H)	76 (H)	120 (H)	19 (H)	115 (H)	26 (H)	310 (H)	48 (H)	975
1988	280 (H/F)	82 (H/F)	159 (H)	25 (H/F)	32 (H)	19 (H/F)	164 (H)	25 (H/F)	786
1989	226 (H/F)	90 (H)	137 (H)	57 (H)	84 (H)	22 (H/F)	224 (H)	94 (H)	934
1990	135 (F)	107 (H)	27 (H)	20 (H)	24 (H)	35 (H)	163 (H)	53 (H)	564
1991	125 (H)	18 (H)	49 (H)	14 (H)	38 (H)	13 (H)	185 (H)	45 (H)	487
1992	87 (H)	4 (H)	68 (H)	4 (H)	20 (H)	8 (H)	131 (H)	24 (H)	346
1993	67 N(H)	46 E(H)	68 N(H)	11 N(H)	29 N(H)	13 N(H)	80 N(H)	75 N(H)	389

[a] Escapement counts conducted prior to 1975 may not be comparable due to differences in survey dates and counting methods.

[b] (F) = escapement surveyed by walking stream; (H) = escapement surveyed by helicopter; (A) = escapement surveyed by fixed-wing aircraft; (H/F) = escapement surveyed by combination of walking and helicopter; - = no survey conducted or data not comparable. Survey conditions N = normal; E = excellent; P = poor.

Table 10. Percent total escapements of chinook salmon to index areas of the Chickamin River for years when all index areas were surveyed.

Year	South Fork Creek	%	Barrier Creek	%	Butler Creek	%	Leduc Creek	%	Indian Creek	%	Humpy Creek	%	King Creek	%	Clear Falls Creek	%	Total
1981	51	13	105	27	51	13	25	7	12	3	4	1	105	27	31	8	384
1982	84	15	149	26	37	7	36	6	30	5	37	7	165	29	33	6	571
1984	185	17	171	16	124	11	15	1	103	9	88	8	388	35	28	2	1,102
1985	136	14	156	16	93	10	8	1	125	13	50	5	377	39	12	1	957
1987	261	27	76	8	120	12	19	2	115	12	26	3	310	32	48	5	975
1988	280	36	82	10	159	20	25	3	32	4	19	2	164	21	25	3	786
1989	226	24	90	10	137	15	57	6	84	9	22	2	224	24	94	10	934
1990	135	24	107	19	27	5	20	4	24	4	35	6	163	29	53	9	564
1991	125	22	18	3	49	9	14	2	38	7	13	2	185	33	45	8	487
1992	87	25	4	1	68	20	4	1	20	6	8	2	131	38	24	7	346
Average	157	22	96	13	87	12	22	3	58	8	30	4	221	31	39	6	711
1993	67	17	46	12	68	17	11	3	29	7	13	3	80	21	75	19	389

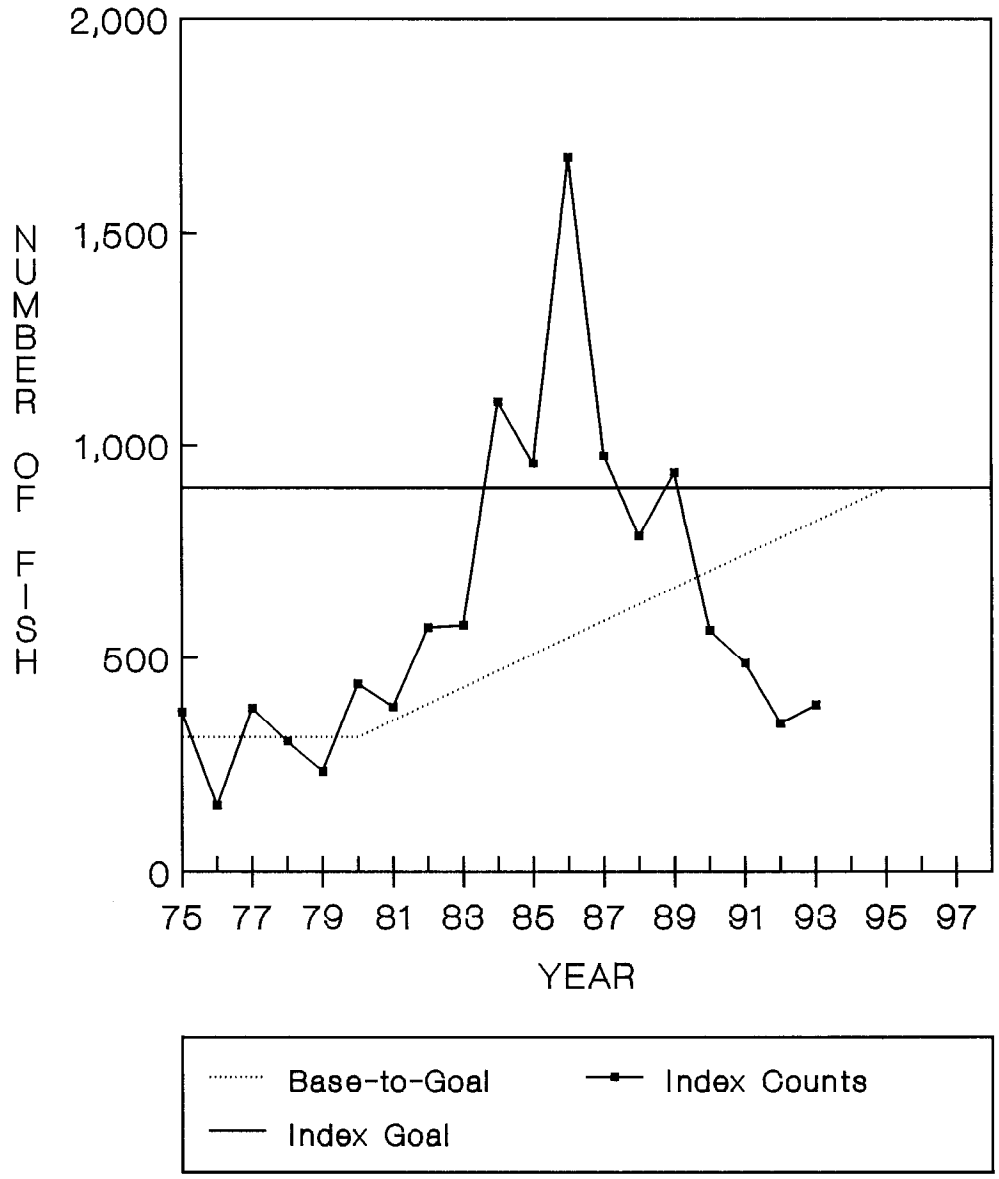


Figure 15. Escapement counts of chinook salmon to the Chickamin River, 1975-1993. Base-to-goal line indicates linear rebuilding schedule, starting in 1981 at average escapement level during the base period (1975-1980) and ending at escapement goal of 900 large chinook salmon in 1995 (final year of the three-cycle rebuilding program).

Table 11. Peak escapement counts of chinook salmon for selected rivers in Behm Canal, 1948-1993.

Year[a]	Keta River	Blossom River	Wilson River	Marten River	Grant Creek	Klahini River	Total
1948	500 (F)[b]	-	-	-	-	-	500
1949	-	-	-	-	-	-	-
1950	210 (F)	-	-	-	-	-	210
1951	120 (F)	-	-	-	-	-	120
1952	462 (F)	-	-	-	-	-	462
1953	156 (F)	-	-	-	-	-	156
1954	300 (A)	-	-	-	-	-	300
1955	1,000 (A)	-	-	-	-	-	1,000
1956	1,500 (A)	-	-	-	-	-	1,500
1957	500 (A)	-	-	-	-	-	500
1958	-	-	-	-	-	-	-
1959	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-
1961	44 (F)	68 (F)	-	22 (F)	40 (A)	-	174
1962	-	-	-	-	6 (A)	100 (A)	106
1963	-	450 (A)	375 (A)	-	15 (A)	-	840
1964	-	-	-	-	-	-	-
1965	-	-	50 (A)	43 (H)	-	-	93
1966	75 (A)	200 (A)	60 (A)	10 (A)	100 (A)	3 (A)	448
1967	86 (H)	-	8 (H)	7 (H)	15 (H)	-	116
1968	-	-	-	-	4 (H)	-	4
1969	200 (A)	-	10 (A)	10 (A)	69 (H)	3 (H)	292
1970	-	100 (H)	-	-	-	-	100
1971	-	-	-	-	-	-	-
1972	255 (A)	225 (A)	275 (A)	-	25 (A)	150 (A)	930
1973	-	-	30 (A)	-	38 (A)	7 (H)	75
1974	25 (H)	166 (H)	-	-	-	-	191
1975	203 (H)	146 (H)	7 (H)	15 (H)	-	-	371
1976	84 (H)	68 (H)	-	-	-	-	152
1977	230 (H)	112 (H)	-	-	-	-	342
1978	392 (H)	143 (H)	-	2 (A)	-	-	537
1979	426 (H)	54 (H)	36 (H)	-	-	-	516
1980	192 (H)	89 (H)	-	-	-	-	281
1981	329 (H)	159 (H)	76 (F)	-	25 (H)	42 (F)	631
1982	754 (H)	345 (H)	300 (B)	75 (F)	33 (F)	79 (F)	1,586
1983	822 (H)	589 (H)	178 (B)	138 (F)	8 (A)	10 (H)	1,745
1984	610 (H)	508 (H)	133 (F)	12 (B)	124 (F)	54 (F)	1,441
1985	624 (H)	709 (H)	420 (H)	69 (F)	55 (F)	20 (F)	1,897
1986	690 (H)	1,278 (H)	-	-	-	-	1,968
1987	768 (H)	1,349 (H)	-	270 (H)	33 (A)	-	2,420
1988	575 (H)	384 (H)	-	543 (H)	-	40 (H)	1,542
1989	1,155 (H)	344 (H)	-	133 (H)	-	-	1,632
1990	606 (H)	257 (H)	-	283 (H)	-	-	1,146
1991	272 (H)	239 (H)	-	135 (H)	-	-	646
1992	217 (H)	150 (H)	109 (H)	76 (H)	25 (H)	19 (H)	596
1993	362 E(H)	303 N(H)	63 P(H)	229 E(H)	-	-	957

[a] Escapement counts prior to 1975 may not be comparable due to differences in survey dates or methods.

[b] (F) = escapement surveyed by walking stream; (A) = escapement surveyed from fixed-wing aircraft; (H) = escapement surveyed from helicopter; (B) = escapement surveyed from boat; - = no survey conducted or data not comparable. Survey conditions N = normal; E = excellent; P = poor.

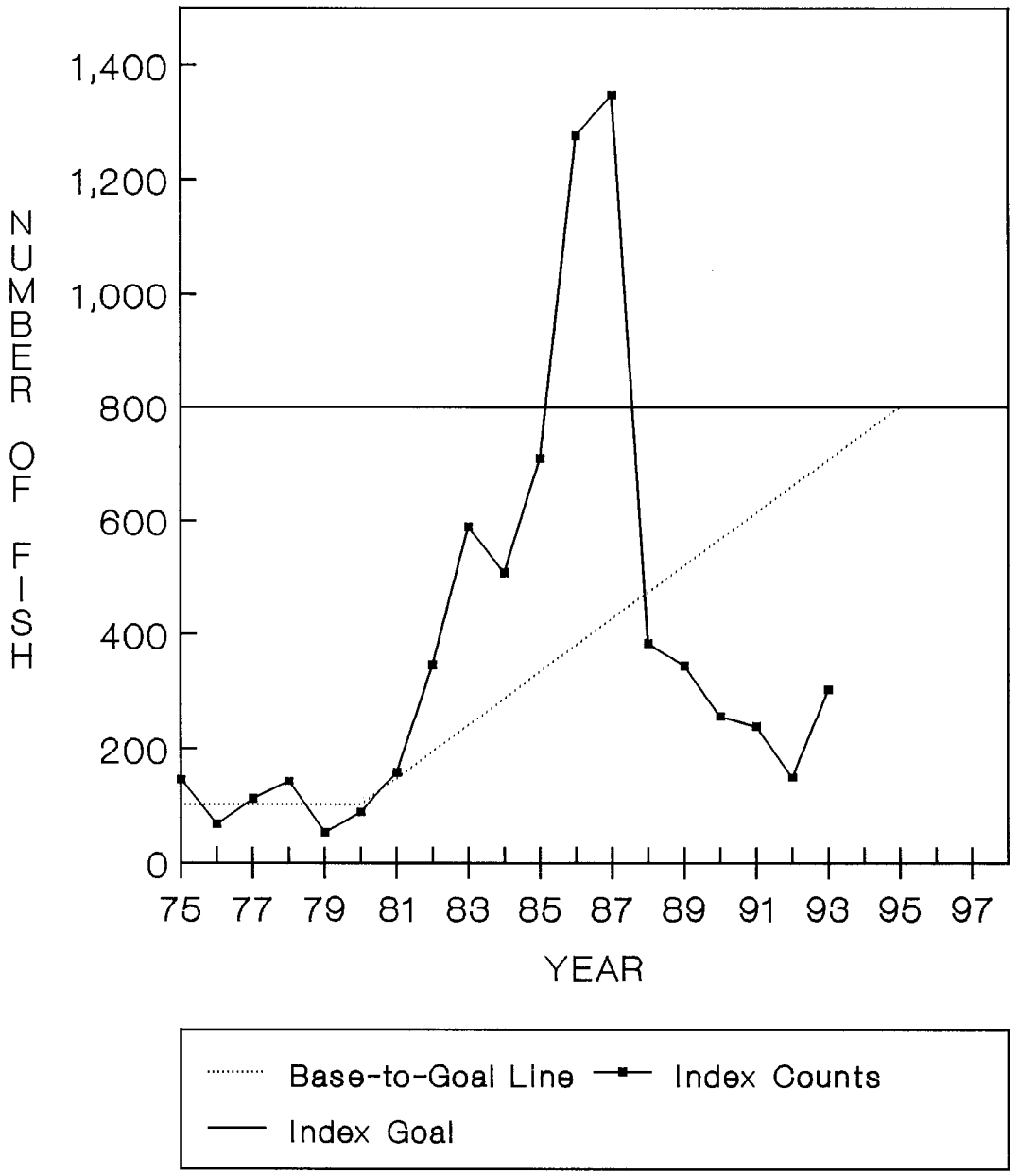


Figure 16. Escapement counts of chinook salmon to the Blossom River, 1975-1993. Base-to-goal line shows linear rebuilding schedule, starting in 1981 at average escapement level during the base period (1975-1980) and ending at escapement goal of 800 large chinook salmon in 1995 (final year of the three-cycle rebuilding program).

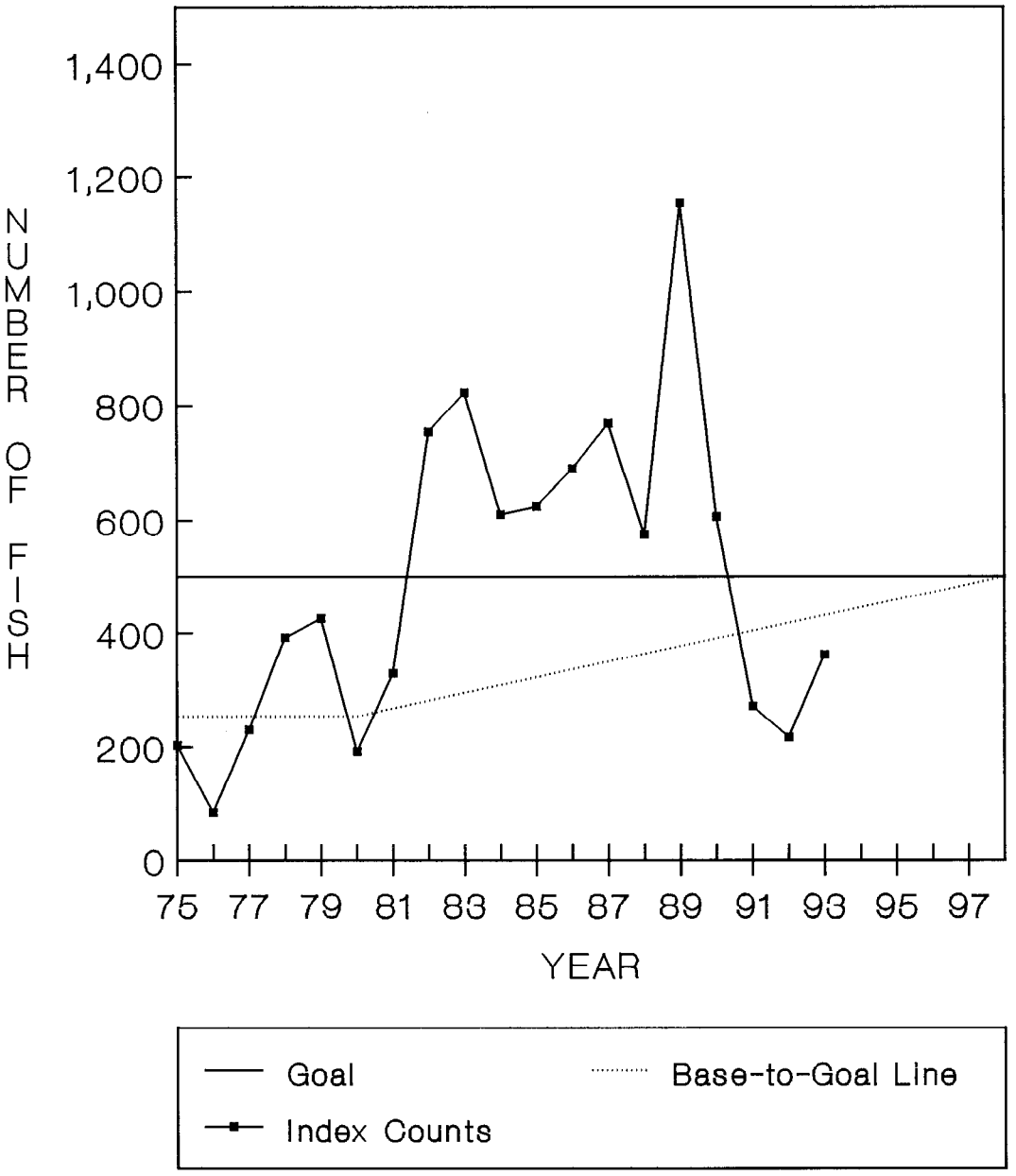


Figure 17. Escapement counts of chinook salmon to the Keta River, 1975-1993. Base-to-goal line shows linear rebuilding schedule, starting in 1981 at average escapement level during the base period (1975-1980) and ending at escapement goal of 500 large chinook salmon in 1995 (final year of the three-cycle rebuilding program).

King Salmon River

Although no weir was operated on the King Salmon River in 1993, a foot survey and a helicopter survey were conducted. The peak helicopter count was 175 large chinook and the foot count conducted 4 days later was 147 (Table 12). Since 1983, chinook salmon escapements to the King Salmon River have been slightly below the management escapement goal of 250 large chinook salmon, and since 1990 have been below the linear rebuilding schedule (Figure 18).

Situk River

Escapements of chinook salmon to the Situk River in 1993 decreased to 790 large chinook salmon from 1,618 in 1992 (Table 13). In 1991, the chinook salmon escapement goal to the Situk River was reduced to 600 large fish (ADF&G 1991) Escapements have exceeded the revised escapement goal since 1984 (Figure 19).

DISCUSSION

The estimated total escapement of chinook salmon for Southeast Alaska and transboundary rivers increased from 68,953 fish in 1992 to 101,797 fish in 1993. This was the highest escapement since the start of the program in 1975. The total escapement of chinook salmon in 1993 was 48%, or 32,844 fish, more than in 1992 and exceeded the revised escapement goal of 82,140 by almost 20,000 fish. The 1993 escapement is three times the 1975-1980 base period average of 32,455 chinook salmon, over twice the 1981-1985 average of 47,177, and 160% of the 1986-1990 average of 63,573 fish (Appendix Table A2).

Total escapements of chinook salmon in Southeast Alaska have exhibited a strong trend towards rebuilding since 1984 and actually exceeded the combined goal for the first time in 1993 (Figure 20). This is due primarily to the Taku and Stikine rivers. These two rivers make up 70% of the total Southeast Alaska escapement goal and made up 80% of the total 1993 escapement. In addition to the Taku and Stikine, only the Situk River and Andrew Creek index systems are classified by the CTC as above goal or rebuilding.

The Alsek and Blossom rivers have lagged behind the linear rebuilding schedule, and since 1990, the other three Behm Canal systems slipped below the schedule.

Fluctuations in the annual escapement into an index area are expected. Water and weather conditions, pilot or observer experience and/or a change in the actual escapement can all affect the count. Multi-year trends are more significant than a given escapement count, and that is why the PSC concentrates on whether a stock's escapement trend is above or below the linear rebuilding schedule as shown in Figures 11-20.

The index expansion method relies on the assumption that escapements to the index areas are a constant proportion of the total escapement and are, therefore, "indicative" of the total escapement to all systems. This assumption was determined to be invalid for index areas of the Chilkat River (Johnson et al. 1992); however, I believe the assumption to be valid for the remaining index systems. On the Chilkat River the observable clear water spawning areas were very small in proportion to the size of the river and the chinook run. The remaining index areas are much larger in proportion to the systems they represent.

Table 12. Peak escapement counts and weir counts of chinook salmon for the King Salmon River, 1957-1993.

Year[b]	Aerial count[a] Below weir	Aerial count[a] Above weir	Aerial count as percent of weir count[c]	Total Snettisham egg take	Total weir count (adults)[d]	Total weir count (jacks)[e]	Spawners below weir (foot count)	Total return[f]	Total natural spawning[g]
1957	-	200 (F)	-	-	-	-	-	200	200
1960	-	20 (F)[h]	-	-	-	-	-	20	20
1961	-	117 (F)	-	-	-	-	-	117	117
1971	-	94 (F)	-	-	-	-	-	94	94
1972	-	90 (F)	-	-	-	-	-	90	90
1973	-	211 (F)	-	-	-	-	-	211	211
1974	-	104 (F)	-	-	-	-	-	104	104
1975	-	42 (H)	-	-	-	-	-	42	42
1976	-	65 (H)	-	-	-	-	-	65	65
1977	-	134 (H)	-	-	-	-	-	134	134
1978	-	57 (H)	-	-	-	-	-	57	57
1979	-	88 (H)	-	17	-	-	-	88	71
1980	-	70 (H)	-	-	-	-	-	70	70
1981	-	101 (H)	-	11	-	-	-	101	90
1982	-	259 (F)	-	30	-	-	-	259	229
1983	25	183 (H)	0.85	37	252	20	30	282	245
1984	14	184 (H)	0.77	61	299	82	12	311	250
1985	12	105 (H)	0.65	33	194	45	10	204	171
1986	9	190 (H)	0.83	36	264	72	17	281	245
1987	19	128 (H)	0.74	34	207	62	20	227	193
1988	5	94 (H)	0.50[i]	37	231	54	12	243	206
1989	34	133 (H)	0.64	40[j]	249	71	29	278	238
1990	34	98 (H)	0.61	30	190	32	8	198	168
1991	6	91 (H)	0.72	20	146	89	8	154	134
1992		58 (H)	0.59[k]	18	47	16	70	117	99
1993		175 E(H)	-no weir or egg take-		147 E(F)	18 E(F)			175

[a] (F) = escapement surveyed by walking stream; (H) = escapement surveyed from helicopter; - = no survey conducted or data not comparable.

[b] Escapement counts prior to 1975 may not be comparable due to differences in survey dates and counting methods.

[c] (Total aerial count above weir)/(total weir count excluding jacks-egg take).

[d] Includes adult spawners used for egg take.

[e] Minimum count as jacks could pass through weir.

[f] Total return (adults) = weir count + spawning below weir.

[g] Natural spawning (adults) = (weir count - egg take & mortality) + spawners below weir (83-89).

[h] Accuracy of count questionable (minimal number of spawners).

[i] Four females and two males were held but not spawned for egg take; % = 94/(231-37-6) = 50%

[j] Includes holding mortality of four males and six females for egg take.

[k] Peak survey was after weir was removed.

Table 13. Harvest, escapement, and minimum total run of Situk River chinook salmon, 1915-1993.

Year	Commercial chinook harvests					Escapement			Total run size[a]	
	Yakutat Bay	Situk River		Recreational		Large chinook	Small chinook	Total	Large only	All chinook
		Commercial	Subsistence	Large	Small					
1915	-	836	-	-	-	-	-	-	-	836
1916	-	931	-	-	-	-	-	-	-	931
1917	-	2,499	-	-	-	-	-	-	-	2,499
1918	-	1,036	-	-	-	-	-	-	-	1,036
1919	-	316	-	-	-	-	-	-	-	316
1920	-	782	-	-	-	-	-	-	-	782
1921	-	1,952	-	-	-	-	-	-	-	1,952
1922	-	2,118	-	-	-	-	-	-	-	2,118
1923	-	1,761	-	-	-	-	-	-	-	1,761
1924	-	1,351	-	-	-	-	-	-	-	1,351
1925	-	1,087	-	-	-	-	-	-	-	1,087
1926	-	1,851	-	-	-	-	-	-	-	1,851
1927	-	1,687	-	-	-	-	-	-	-	1,687
1928	-	-	-	-	-	-	-	1,224	-	1,224
1929	-	-	-	-	-	-	-	3,559	-	3,559
1930	-	-	-	-	-	-	-	1,455	-	1,455
1931	-	-	-	-	-	-	-	2,967	-	2,967
1932	-	-	-	-	-	-	-	1,978	-	1,978
1933	-	267	-	-	-	-	-	-	-	267
1934	-	450	-	-	-	-	-	1,486	1,936	1,936
1935	-	558	-	-	-	-	-	638	1,196	1,196
1936	-	-	-	-	-	-	-	816	-	816
1937	-	-	-	-	-	-	-	1,290	-	1,290
1938	-	1,220	-	-	-	-	-	2,668	3,888	3,888
1939	-	495	-	-	-	-	-	2,117	2,612	2,612
1940	-	164	-	-	-	-	-	903	1,067	1,067
1941	-	390	-	-	-	-	-	2,594	2,984	2,984
1942	-	430	-	-	-	-	-	2,543	2,973	2,973
1943	-	947	-	-	-	-	-	3,546	4,493	4,493
1944	-	844	-	-	-	-	-	2,906	3,750	3,750
1945	-	692	-	-	-	-	-	1,458	2,150	2,150
1946	-	1,468	-	-	-	-	-	4,284	5,752	5,752
1947	-	885	-	-	-	-	-	5,077	5,962	5,962
1948	-	694	-	-	-	-	-	3,744	4,438	4,438
1949	-	410	-	-	-	-	-	1,978	2,388	2,388
1950	-	378	-	-	-	-	-	2,011	2,389	2,389
1951	-	948	-	-	-	-	-	2,780	3,728	3,728
1952	-	225	-	-	-	-	-	1,459	1,684	1,684
1953	-	378	-	-	-	-	-	1,040	1,418	1,418
1954	-	314	-	-	-	-	-	2,101	2,415	2,415
1955	-	740	-	-	-	-	-	1,571	2,311	2,311
1956	-	1,867	-	-	-	-	-	-	-	1,867
1957	-	1,796	-	-	-	-	-	1,500	-	3,296
1958	-	187	-	-	-	-	-	300	-	487
1959	-	426	-	-	-	-	-	-	-	426
1960	24	312	-	-	-	-	-	500	-	812
1961	28	367	-	-	-	-	-	400	-	767
1962	99	337	-	-	-	-	-	1,000	-	1,337
1963	141	466	-	-	-	-	-	-	-	466
1964	115	706	-	-	-	-	-	725	-	1,431
1965	86	442	-	-	-	-	-	1,500	-	1,942
1966	43	411	-	-	-	-	-	800	-	1,211
1967	241	203	-	-	-	-	-	200	-	403
1968	31	312	-	-	-	-	-	700	-	1,012
1969	29	1,089	-	-	-	-	-	2,500	-	3,589

-continued-

Table 13. (Page 2 of 2).

Year	Commercial chinook harvests: Yakutat Bay	Commercial chinook harvests: Situk River Commercial	Commercial chinook harvests: Situk River Subsistence	Recreational: Large	Recreational: Small	Escapement: Large chinook	Escapement: Small chinook	Escapement: Total	Total run size[a]: Large only	Total run size[a]: All chinook
1970	119	927	-	-	-	-	-	1,100	-	2,027
1971	106	473	-	-	-	-	-	964	-	1,437
1972	115	303	-	-	-	-	-	400	-	703
1973	79	752	-	-	-	-	-	510	-	1,262
1974	64	791	-	-	-	-	-	702	-	1,493
1975	41	562	27	-	-	-	-	1,180	-	1,769
1976	69	1,002	41	200	-	1,433	509	1,942	2,676	3,185
1977	53	833	24	244	-	1,732	148	1,880	2,833	2,981
1978	108	382	50	210	-	814	289	1,103	1,456	1,745
1979	51	1,028	25	282	-	1,400	367	1,767	2,735	3,102
1980	164	969	57	353	-	905	220	1,125	2,284	2,504
1981	151	858	62	130	-	702	105	807	1,752	1,857
1982	419	248	27	63	0	434	177	611	772	949
1983	371	349	50	42	10	592	257	849	1,033	1,300
1984	145	512	50	146	5	1,726	475	2,201	2,434	2,914
1985	240	484	81	294	217	1,521	461	1,982	2,380	3,058
1986	211	202	87	0	37	2,067	505	2,572	2,356	2,898
1987	329	891	22	76	319	1,884	494	1,884	2,873	3,192
1988	196	299	81	185	3	885	193	1,078	1,450	1,646
1989	297	1	29	0	0	652	1,217	1,869	682	1,899
1990	304	0[b]	na	0	0	700	631[c]	1,331	923	1,741
1991	392	786	110	88	8	875	716[d]	1,591	1,859	2,583
1992	147	1,504	331	200	9	1,618	367[g]	1,985	3,625	3,992
1993	148	790	175[e]	190[f]	na	790	3,220	4,091	1,945	5,165

[a] Total run = chinook escapement + Situk commercial, sport, and subsistence harvests; an unknown portion of the Yakutat Bay catch is Situk fish.

[b] Non-retention regulation in effect for commercial fisheries in 1989 and 1990; estimated harvest of 223 large chinook in 1990.

[c] Small chinook includes 486 medium fish (>450 mm <660 mm MEF).

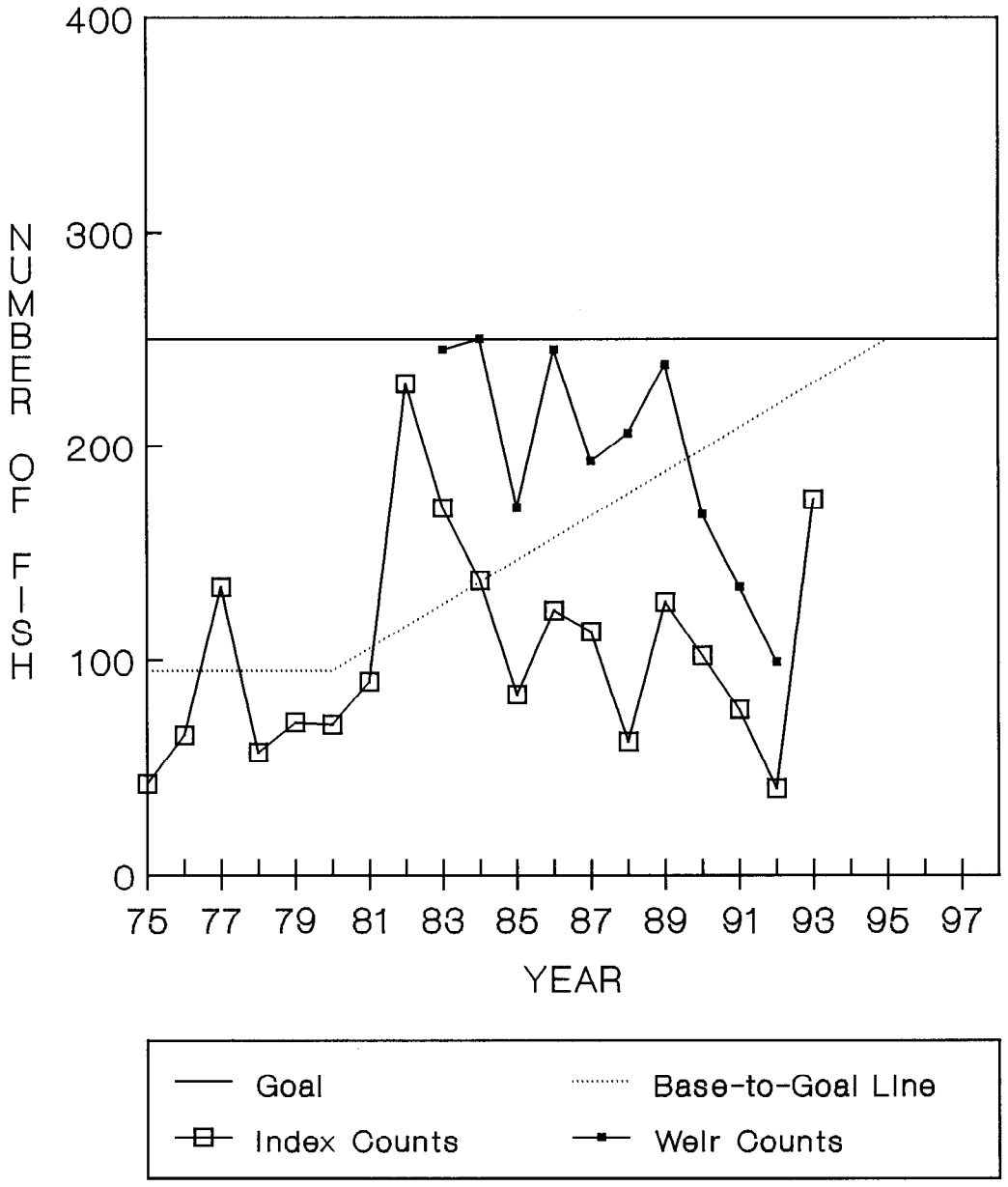
[d] Small chinook 1991 includes 132 medium fish.

[e] Preliminary count total subsistence catch Situk/Ahrnklin.

[f] Preliminary estimate of recreational harvest.

[g] Small chinook includes 236 medium fish in 1992.

[h] Small chinook includes 490 medium fish in 1993.



minus eggtakes

Figure 18. Escapement counts and weir counts of chinook salmon to the King Salmon River, 1975-1993. Base-to-goal line shows linear rebuilding schedule, starting in 1981 at average escapement level during base period (1975-1980) and ending at management escapement goal of 250 large chinook salmon in 1995 (final year of the three-cycle rebuilding program).

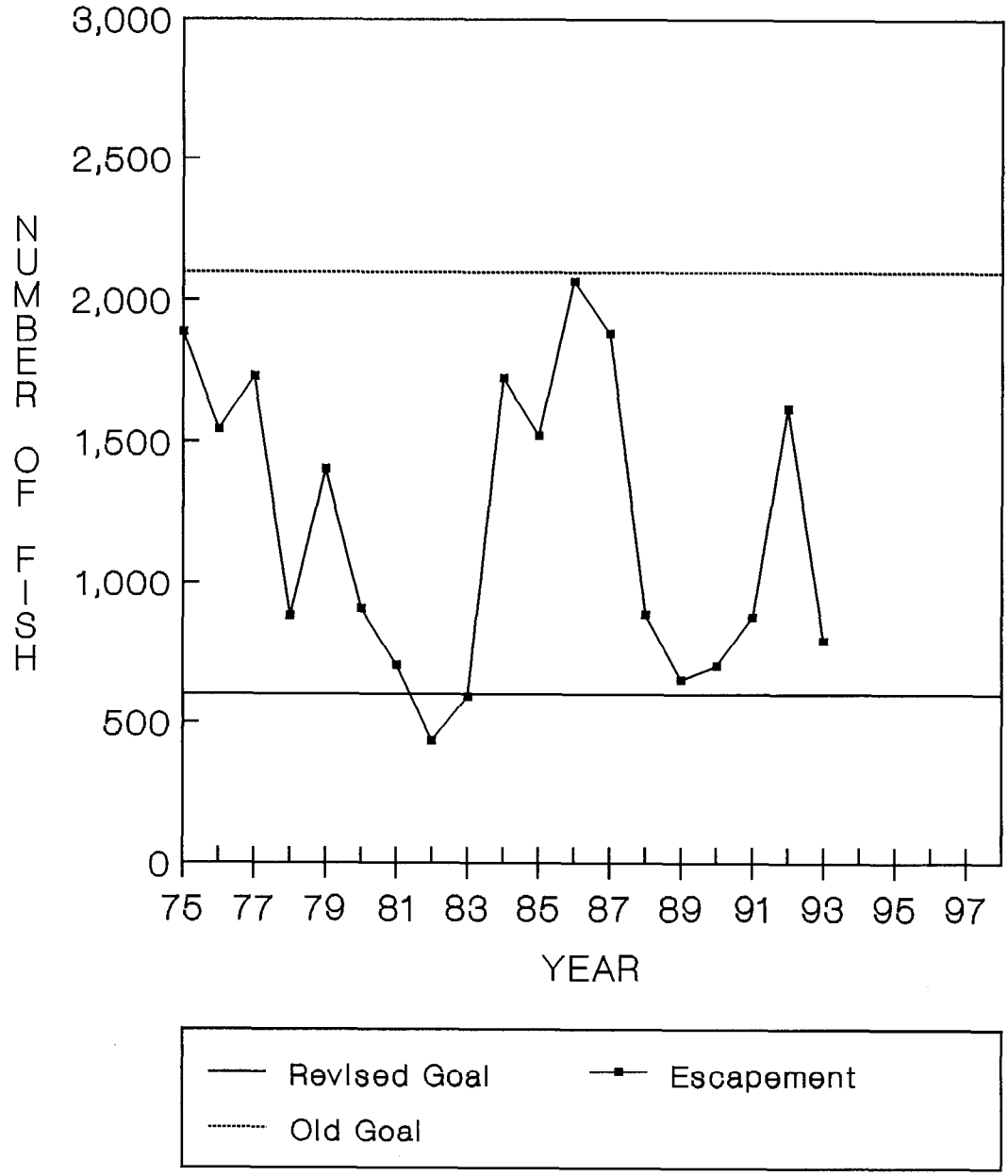


Figure 19. Escapement counts of chinook salmon to the Situk River, 1975-1993. 1981 management escapement goal of 2,100 large chinook salmon was revised in 1991 to 600.

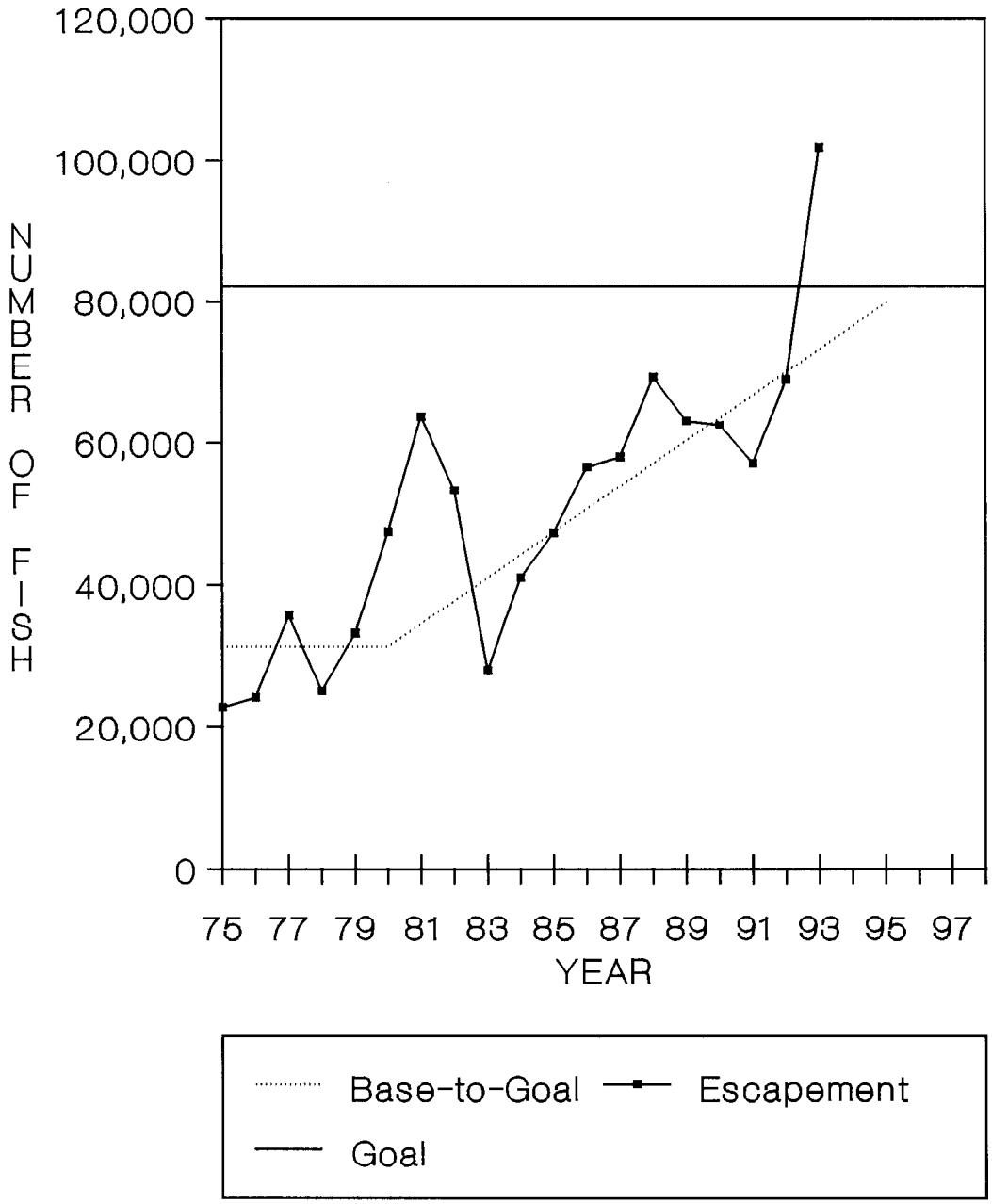


Figure 20. Estimated total escapement of chinook salmon to Southeast Alaska and transboundary river index systems, 1975-1993. Observed counts expanded by survey and tributary expansion factors. Base-to-goal line shows linear rebuilding schedule, starting in 1981 at average escapement level during base period (1975-1980) and ending at management escapement goal of 82,140 large chinook salmon in 1995 (final year of the three-cycle rebuilding program).

The Transboundary River Technical Committee of the PSC agreed in 1991 to a new Taku River escapement goal for the combined counts of all six index tributaries (PSC 1991b). This goal incorporates no expansion factors and refers to chinook actually observed on the surveys. Since terminal catches at this time are insignificant compared to escapement levels, the TBTC recommends that only escapement counts for the six index tributaries be used in assessing rebuilding. Expansion factors are necessary to compare different survey escapements with total weir counts, and total escapements are necessary to calculate exploitation rates and spawner/recruit relationships. However, since the accuracy of the expansion factors is unknown in most cases, the unexpanded counts are shown in Figures 11-19 and the expanded estimates of total escapement are shown only in Figure 20 and Appendix Table A2.

Modified expansion factors based upon the preliminary results of a two-year tagging study were used to expand the Taku River counts. These new expansion factors result in an increase in the escapement goal from 25,500 to 36,500 large chinook salmon.

Any change in survey methods must also take into account the comparability of historical data with new data. Year to year consistency and repeatability of index counts may be more important than their absolute accuracy to agencies that compare escapement estimates between years.

The failure of Alsek River stock to respond to the rebuilding program is perplexing, particularly since harvests of this stock in terminal net and recreational fisheries has been greatly reduced in recent years. Gmelch (1982) hypothesized that increased siltation and subsequent changes in channel morphology in the lower Alsek River estuary in Dry Bay may be contributing to the slow rebuilding progress of this stock. Other possible factors include: (1) the management escapement goal for the Alsek River is higher than it should be to achieve optimum sustained production; (2) Alsek River chinook salmon may be harvested to a greater extent in mixed stock domestic or high seas foreign gill net fisheries than previously believed; or (3) some combination of all of the factors listed above (Mecum and Kissner 1989). Recently initiated coded-wire tagging studies on the Alsek (Mecum 1989) and Situk rivers have not indicated any mixed stock harvest of these stocks.

Based on spawner-recruit analysis, ADF&G in 1991 revised the management escapement goal for chinook salmon in the Situk River to 600 large fish, with a range of 450 to 900 (ADF&G 1991). This revised goal has been adopted by the PSC and was therefore used for assessment of rebuilding. The Alaska Board of Fisheries approved a Situk River management plan in 1991 that incorporated the revised escapement goal through the Situk River weir of 600 large chinook salmon.

Chinook salmon escapements to the Unuk, Chickamin, Blossom, and Keta rivers have declined substantially since 1987. Before 1987, the four stocks had been rebuilding and were above the linear rebuilding schedules for each river. The cause of the recent decline in these stocks is unknown. The four rivers make up the major wild stocks of chinook salmon in southern Southeast Alaska. Several large Ketchikan area hatcheries use brood stock from the Unuk and Chickamin Rivers. These hatcheries provide significant returns of adult salmon which rear and migrate in similar areas as wild donor stocks (Mecum and Kissner 1989). Recent analysis of coded-wire tagging data has indicated that the escapement goals to these systems may be unreasonably high (McPherson and Carlile *In prep.*).

In 1991 and 1992, a mark/recapture experiment on the Chilkat River estimated an escapement seven times that indicated by expansion of index area surveys (Johnson et al. 1992). Many of the spawning areas in the Chilkat system are glacial and can not be surveyed. A large tributary expansion factor was developed to reflect those uncounted fish, but in 1991 and 1992 it greatly underestimated the escapement. The Chilkat River aerial survey index program was discontinued in 1993. Continued research is required to determine if alternative methods can be developed.

The King Salmon River is unique in being the only island chinook system in Southeast Alaska, and it may not best represent the 21 other small mainland chinook systems. However, small systems are expensive to survey for very few fish and constitute a fairly small portion of the total escapement.

In 1992, surveys were flown on the Wilson, Grant, and Klahini rivers to check the feasibility of adding some more small systems. Those rivers are all close to existing index areas and could be added without greatly increasing flight time or expenses. The other medium and small unsurveyed systems are more difficult to address. Seven are in Yakutat, where no chinook surveys are flown, and the others are located between the Taku and the Unuk Rivers.

Run timing and fuel limitations make it difficult to "piggyback" any more surveys onto the existing program. Without additional funding it is unlikely that more small systems will be surveyed regularly. It may be more reasonable to expand the small systems by some proportion of the nearest surveyed systems, rather than using only the King Salmon River. However, almost no information exists for most of the unsurveyed systems and it is impossible to say if their run strength tracks that of other systems in the same geographic area.

ACKNOWLEDGMENTS

Several ADF&G employees provided valuable assistance in this study. David Magnus, Dave Dreyer, Scott Kelly and Will Bergman conducted foot surveys on selected index systems; Scott Walker conducted several surveys in the Behm Canal area; Keith Weiland provided the Situk River counts; Scott McPherson and Bob Marshall critically edited draft manuscripts; Iris Frank furnished base maps and Alma Seward provided computer cartography. Pat Milligan and Pete Etherton of DFO provided weir counts from transboundary systems. Jerry Koerner and Phil Doherty provided logistical support for Behm Canal surveys. Russ Kaufman flew most of the surveys.

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APPENDIX A

Appendix A1. Management escapement goals and survey and tributary expansion factors for Southeast Alaska and transboundary rivers. Category escapement goal equals sum of the survey escapement goal times survey and tributary expansion factors times the category expansion factor.

River system	Index tributaries surveyed	Survey escapement goal[a]	Survey expansion factor	Tributary expansion factor	System escapement goal	Category expansion factor	Category escapement goal
			Major Production Systems (Total = 3)				
Alsek	Klukshu	4,700 (W)	1/1	1/.64	7,344		
Taku	4 tributaries	5,155 (H)	1/0.625	1/.52	15,862		
Taku	Nakina/Nahlin	8,055 (H)	1/.75	1/.52	20,654		
Stikine	Little Tahltan	5,300 (W)	1/1	1/.25	21,200		
Major category subtotal		23,210			65,060	3/3	65,060
			Medium Production Systems (Total = 9)				
Situk	All	600 (W)	1/1	1/1	600		
Chilkat	Big Boulder/Stonehouse	Removed from index system					
Andrew Cr.	All	470 (A)	1/0.625	1/1	752		
Unuk	All	1,800 (A)	1/0.625	1/1	2,880		
Chickamin	All	900 (A)	1/0.625	1/1	1,440		
Blossom	All	800 (A)	1/0.625	1/1	1,280		
Keta	All	500 (A)	1/0.625	1/1	800		
Medium category subtotal		5,070			7,752	9/6	11,628
			Minor Production Systems (Total = 22)				
King Salmon	All	250 (W)	1/1	1/1	250		
Minor category subtotal		250			250	22/1	5,500
All systems total		28,520			70,830		82,185

[a] (W) = weir count; (A) = aerial survey peak escapement estimate. Survey escapement goal = number of fish actually counted on survey, or through weir.

Appendix A2. Estimated total escapements of chinook salmon to escapement indicator systems and to Southeast Alaska and transboundary (T) rivers, 1975-1993. Index escapements are expanded for survey counting rates and unsurveyed tributaries, using 1993 expansions and escapement goals.

Revised: 2/22/94 USING REVISED TRANSBOUNDARY GOALS AND 1993 NJS TAKU EXPANSIONS

	MAJOR SYSTEMS				MEDIUM SYSTEMS									MINOR SYSTEMS			TOTAL
Year	Alsek (T)	Taku (T)	Stikine (T)	Major Subt.	Situk	Andrew	Unuk (T)	Chick-amin(T)	Blos-som	Keta	Behm Subt.	Medium Unsurv.	Medium Subt.	King Salm.	Minor Unsurv.	Minor Subt.	ALL SYSTEMS
1975	4,214	5,854	5,800	15,868	1,510	416	1,469	592	234	325	2,620	2,273	6,819	53	1,113	1,166	23,853
1976	1,672	12,729	3,300	17,701	1,433	404	1,469	251	109	134	1,963	1,900	5,700	81	1,701	1,782	25,183
1977	4,363	15,259	6,600	26,222	1,732	456	1,558	581	179	368	2,686	2,437	7,311	168	3,528	3,696	37,229
1978	4,050	9,168	5,200	18,418	814	388	1,770	493	229	627	3,119	2,161	6,482	71	1,491	1,562	26,462
1979	6,101	11,353	9,328	26,782	1,400	327	922	382	86	682	2,072	1,900	5,699	89	1,869	1,958	34,439
1980	3,770	20,275	17,096	41,141	905	282	1,626	712	142	307	2,787	1,987	5,961	88	1,848	1,936	49,038
Average	4,028	12,440	7,887	24,355	1,299	379	1,469	502	163	407	2,541	2,110	6,329	92	1,925	2,017	32,701
1981	2,837	25,856	26,672	55,365	702	536	1,170	614	254	526	2,564	1,901	5,703	113	2,373	2,486	63,554
1982	3,078	12,810	22,640	38,528	434	672	2,162	914	552	1,206	4,834	2,970	8,910	286	6,006	6,292	53,730
1983	3,352	5,621	4,752	13,725	592	366	1,800	958	942	1,315	4,979	2,969	8,906	245	5,145	5,390	28,075
1984	2,038	10,748	10,352	23,138	1,726	389	2,939	1,763	813	976	6,491	4,303	12,909	250	5,250	5,500	41,547
1985	1,853	19,580	12,456	33,889	1,521	510	1,894	1,530	1,134	998	5,556	3,794	11,381	171	3,591	3,762	49,032
Average	2,632	14,923	15,374	32,929	995	495	1,993	1,156	739	1,004	4,885	3,187	9,562	213	4,473	4,686	47,187
1986	3,966	20,231	11,564	35,761	2,067	1,131	3,402	2,792	2,045	1,104	9,234	6,216	18,648	245	5,145	5,390	59,963
1987	3,598	15,530	19,132	38,260	1,884	1,261	3,157	1,560	2,158	1,229	8,104	5,625	16,874	193	4,053	4,246	59,380
1988	2,891	23,334	29,168	55,393	885	760	2,794	1,258	614	920	5,586	3,616	10,847	206	4,326	4,532	70,772
1989	3,399	25,481	18,860	47,740	652	848	1,838	1,494	550	1,848	5,730	3,615	10,845	238	4,998	5,236	63,821
1990	2,722	32,622	17,568	52,912	700	1,062	946	902	411	970	3,229	2,496	7,487	168	3,528	3,696	64,095
Average	3,315	23,440	19,258	46,013	1,238	1,012	2,427	1,601	1,156	1,214	6,377	4,313	12,940	210	4,410	4,620	63,606
1991	3,165	27,318	18,024	48,507	875	640	1,048	779	382	435	2,644	2,080	6,239	134	2,814	2,948	57,694
1992	1,950	30,142	26,508	58,600	1,400	1,245	1,400	554	240	347	2,541	2,593	7,779	117	2,457	2,574	68,953
1993	4,811	36,208	45,796	86,815	790	1,696	1,709	622	485	579	3,395	2,941	8,822	280	5,880	6,160	101,797
Average	3,309	31,223	30,109	64,641	1,022	1,194	1,386	652	369	454	2,860	2,538	7,613	177	3,717	3,894	76,148
1993 CHANGE FROM 1992																	
Number	2,861	6,066	19,288	28,215	(610)	451	309	68	245	232	854	348	1,043	163	3,423	3,586	32,844
Percent	147%	20%	73%	48%	-44%	36%	22%	12%	102%	67%	34%	13%	13%	139%	139%	139%	48%
Goals	7,344	36,515	21,200	65,059	600	750	2,880	1,440	1,280	800	6,400	3,875	11,625	250	5,250	5,500	82,184
AVERAGE PERCENT OF GOAL																	
1975-80	55%	34%	37%	37%	217%	51%	51%	35%	13%	51%	37%	52%	52%	37%	37%	37%	40%
1981-85	36%	41%	73%	51%	166%	66%	69%	80%	58%	126%	76%	82%	82%	85%	85%	85%	57%
1986-90	45%	64%	91%	71%	206%	135%	84%	110%	90%	152%	100%	111%	111%	84%	84%	84%	77%
1991-95	45%	86%	142%	99%	170%	159%	48%	45%	29%	57%	45%	65%	65%	71%	71%	71%	93%

1/ Prior to Little Tahltan weir in 1985, Stikine estimate is 8 times aerial survey.
2/ Using CTC calculations of Alsek Escapement: Escapement = (weir count/0.64)-sport and IFF harvest.
3/ Andrew Creek revised to include North Fork counts, egg takes excluded, weir counts not expanded.
4/ Situk escapement goal revised downward from 2,100 to 600 in 1991.
5/ Chilkat excluded from medium goals.
6/ Taku counts expanded for missing tributaries when all six not surveyed.

Appendix A3. Detailed 1993 Southeast Alaska chinook salmon escapement surveys as entered into Commercial Fisheries Division Integrated Fisheries Database (IFDB).

"Detailed Salmon Escapement Surveys"
IFDB-SET-01 on 2/22/94 at 14:01

Number	Stream Name	Date	Type	Dist.	Species	Mouth	Tidal	Live	Dead	Total	Obs.	Visib.	Water	Tide	Remarks
101-30-030	Keta River	08/17/93	H	L	Chinook	0	0	362	0	362	KAP	E	L		294 below Hill Cr
101-30-030	Keta River	08/20/93	H	L	Chinook	0	0	167	0	167	SW				
101-30-030	Keta River	08/24/93	H	L	Chinook	0	0	140	0	140	KAP	P	H		
101-30-030	Keta River	08/30/93	H	L	Chinook	0	0	187	4	191	KAP	E			
101-30-060	Marten River	07/21/93	A	L	Chinook	0	0	30	0	30	SW	N	L	I	
101-30-060	Marten River	08/20/93	H	L	Chinook	0	0	92	0	92	SW				lots seals
101-30-060	Marten River	08/30/93	H	L	Chinook	0	0	224	5	229	KAP	E			Dicks Cr 42, included
101-45-078	Carroll Creek	07/08/93	A	I	Chinook	75	0	10	0	85	PD	E	L	L	
101-45-078	Carroll Creek	07/20/93	A	L	Chinook	0	100	100	0	200	PD	E	L	I	
101-45-078	Carroll Creek	08/01/93	A	L	Chinook	0	0	50	0	50	SW	P	N	L	
101-45-078	Carroll Creek	08/12/93	F	L	Chinook	0	0	89	13	102	SW	E	L	L	
101-45-078	Carroll Creek	09/03/93	F	L	Chinook	0	0	173	0	173	SW	E	L	I	
101-45-081	Falls Creek	07/08/93	A	I	Chinook	25	0	0	0	25	PD	E	L	L	
101-45-081	Falls Creek	07/12/93	A	I	Chinook	20	0	0	0	20	PD	E	L	I	
101-45-081	Falls Creek	08/01/93	A	I	Chinook	0	0	0	0	0	SW	P	N	L	no fish seen
101-45-081	Falls Creek	08/09/93	A	I	Chinook	0	0	100	0	100	PD	E	L	I	
101-45-081	Falls Creek	08/12/93	A	I	Chinook	0	150	0	0	150	PD	N	L	I	
101-55-020	Wilson River	08/24/93	H	L	Chinook	0	0	63	0	63	KAP	P			
101-55-040	Blossom River	08/17/93	H	L	Chinook	0	0	303	0	303	KAP	N			
101-55-040	Blossom River	08/20/93	H	L	Chinook	0	0	139	0	139	SW	N			
101-55-040	Blossom River	08/30/93	H	L	Chinook	0	0	223	0	223	KAP	E			
101-71-004	Chickamin River	08/30/93	H	L	Chinook	0	0	389	0	389	KAP				total peak
101-71-04A	Barrier Creek	08/06/93	H	L	Chinook	0	0	45	1	46	KAP	E			
101-71-04A	Barrier Creek	08/13/93	H	L	Chinook	0	0	13	0	13	SW	N			
101-71-04A	Barrier Creek	08/17/93	H	L	Chinook	0	0	25	0	25	KAP	N			
101-71-04A	Barrier Creek	08/20/93	H	L	Chinook	0	0	22	0	22	SW				
101-71-04B	Butler Creek	08/06/93	H	L	Chinook	0	0	65	0	65	KAP	N			
101-71-04B	Butler Creek	08/13/93	H	L	Chinook	0	0	68	0	68	SW				
101-71-04C	Clear Creek	08/06/93	H	L	Chinook	0	0	75	0	75	KAP	N			
101-71-04C	Clear Creek	08/13/93	H	L	Chinook	0	0	26	0	26	SW				
101-71-04H	Humpy Creek	08/20/93	H	L	Chinook	0	0	6	0	6	SW	N			black with humpys
101-71-04H	Humpy Creek	08/24/93	H	L	Chinook	0	0	8	0	8	KAP	N			
101-71-04H	Humpy Creek	08/30/93	H	L	Chinook	0	0	13	0	13	KAP	N			
101-71-04I	Indian Creek	08/06/93	H	L	Chinook	0	0	29	0	29	KAP	N			
101-71-04I	Indian Creek	08/13/93	H	L	Chinook	0	0	10	0	10	SW				
101-71-04I	Indian Creek	08/17/93	H	L	Chinook	0	0	19	0	19	KAP	N			
101-71-04K	King Creek	08/20/93	H	L	Chinook	0	0	55	0	55	SW				
101-71-04K	King Creek	08/24/93	H	L	Chinook	0	0	80	0	80	KAP	N			LOTS WHITETAILS
101-71-04K	King Creek	08/30/93	H	L	Chinook	0	0	66	0	66	KAP	N			
101-71-04L	Leduc River	08/06/93	H	L	Chinook	0	0	10	0	10	KAP	N			
101-71-04L	Leduc River	08/13/93	H	L	Chinook	0	0	11	0	11	SW				
101-71-04S	South Fork Chickamin	08/06/93	H	L	Chinook	0	0	11	0	11	KAP	N			
101-71-04S	South Fork Chickamin	08/13/93	H	L	Chinook	0	0	27	0	27	SW	P			
101-71-04S	South Fork Chickamin	08/17/93	H	L	Chinook	0	0	57	10	67	KAP	N			
101-71-04S	South Fork Chickamin	08/20/93	H	L	Chinook	0	0	36	0	36	SW				
101-75-015	Eulachon River	08/03/93	A	L	Chinook	0	0	300	0	300	EDH	N	N	H	top end of stream
101-75-015	Eulachon River	08/12/93	F	0.8	Chinook	0	0	63	0	63	DD	P			partial
101-75-015	Eulachon River	08/13/93	H	L	Chinook	0	0	21	0	21	KAP	E			
101-75-015	Eulachon River	08/17/93	H	L	Chinook	0	0	83	0	83	KAP	N			58 below fork
101-75-015	Eulachon River	08/18/93	F	L	Chinook	0	0	123	9	132	DD	E			89 below forks
101-75-015	Eulachon River	08/24/93	H	L	Chinook	0	0	62	0	62	KAP	N			11 left fork
101-75-015	Eulachon River	08/25/93	F	L	Chinook	0	0	77	16	93	DD	N			23 below forks
101-75-030	Unuk River	08/30/93	H	L	Chinook	0	0	1068	0	1068	KAP				total peak
101-75-03B	Boundary Cr.- Unuk R	08/04/93	F	L	Chinook	0	0	73	0	73	DM	E			2/3 below Hell Roaring Cr
101-75-03B	Boundary Cr.- Unuk R	08/06/93	H	0.5	Chinook	0	0	100	0	100	KAP	N			incomplete
101-75-03B	Boundary Cr.- Unuk R	08/08/93	F	L	Chinook	0	0	143	0	143	DM	E			116 below HR cr
101-75-03B	Boundary Cr.- Unuk R	08/13/93	H	L	Chinook	0	0	45	0	45	SW	N			
101-75-30C	Clear Creek-Unuk R	08/05/93	H	0.5	Chinook	0	0	58	0	58	KAP	N			incomplete, didnt survey pool
101-75-30C	Clear Creek-Unuk R	08/05/93	F	L	Chinook	0	0	135	2	137	DD	N			early
101-75-30C	Clear Creek-Unuk R	08/10/93	F	L	Chinook	0	0	113	8	121	DD	N			
101-75-30C	Clear Creek-Unuk R	08/13/93	H	L	Chinook	0	0	38	1	39	SW	N			
101-75-30G	Genes Lake CreekUnuk	08/06/93	F	L	Chinook	0	0	325	5	330	DD	N			130 in lake, helicopter survey
101-75-30G	Genes Lake CreekUnuk	08/13/93	F	L	Chinook	0	0	253	7	260	DD	N			

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Number	Stream Name	Date	Type	Dist.	Species	Mouth	Tidal	Live	Dead	Total	Obs.	Vis.	Water	Tide	Remarks
101-75-30K	Kerr Creek-Unuk R	08/13/93	H	L	Chinook	0	0	13	0	13	SW	P			
101-75-30K	Kerr Creek-Unuk R	08/17/93	H	L	Chinook	0	0	3	2	5	KAP	P			murky
101-75-30L	Lake Creek-Unuk R	07/22/93	F	L	Chinook	0	0	1	0	1	DM	P			
101-75-30L	Lake Creek-Unuk R	08/05/93	H	L	Chinook	0	0	4	0	4	KAP	N			
101-75-30L	Lake Creek-Unuk R	08/05/93	F	L	Chinook	0	0	3	0	3	DD	P			
101-75-30L	Lake Creek-Unuk R	08/23/93	F	L	Chinook	0	0	8	0	8	DM	N			
101-75-30Q	Cripple Ck-Unuk R	08/06/93	F	L	Chinook	0	0	448	0	448	DM	N			+21 above index area
101-75-30Q	Cripple Ck-Unuk R	08/14/93	F	L	Chinook	0	0	301	0	301	DM	P			
101-80-070	Hatchery Ck-Yes Bay	08/09/93	F	L	Chinook	0	0	28	1	29	TZ	E	L		
101-80-070	Hatchery Ck-Yes Bay	08/23/93	F	L	Chinook	0	0	34	13	47	TZ	E	L		1 ad clip king dead
101-80-070	Hatchery Ck-Yes Bay	08/31/93	F	L	Chinook	0	0	22	14	36	TZ	E	L		Water level extremely low
101-80-070	Hatchery Ck-Yes Bay	09/09/93	F	L	Chinook	0	0	4	13	17	TZ	E	L		3 ad clip dead king
101-80-070	Hatchery Ck-Yes Bay	09/20/93	F	L	Chinook	0	0	0	3	3	TZ	E	L		3 kings dead, no ad clips
101-80-070	Hatchery Ck-Yes Bay	09/28/93	F	L	Chinook	0	0	0	1	1	TZ	E	N		
106-44-031	Crystal Creek	07/12/93	A	L	Chinook	260	50	210	0	520	BLL	N	L	L	H20 EXTREMELY LOW
106-44-031	Crystal Creek	07/16/93	A	IT	Chinook	650	250	0	100	1000	WB	E	L	L	IT IN POOL ABV RAPIDS-DEAD
106-44-031	Crystal Creek	07/20/93	A	L	Chinook	20	1250	0	0	1270	WB	E	L	I	250 FLOATING RKS, 950 ABVRAPIDS
106-44-031	Crystal Creek	07/22/93	A	L	Chinook	0	400	0	0	400	WB	N	L	L	FISH WENT UP-NONE IN FLOATING RKS
106-44-031	Crystal Creek	07/30/93	A	L	Chinook	0	40	0	0	40	WB	P	H	L	ALL FISH AT RAPIDS-3 WOLVES
107-40-024	Aaron Creek	08/10/93	A	L	Chinook	0	0	0	0	0	WB	P	L	H	
107-40-038	Marten Ck Bradfield	08/11/93	F	1.0	Chinook	0	0	2	0	2	RT	P	L	L	BOTH IN UPPER CR
107-40-049	Harding River	07/16/93	A	L	Chinook	0	0	40	0	40	WB	N	N	L	MIXED W/CHUMS COULD BE MORE
107-40-049	Harding River	08/10/93	A	L	Chinook	0	0	11	0	11	WB	N	L	I	
107-40-052	Bradfield River N Fk	08/10/93	A	L	Chinook	0	0	33	0	33	WB	P	L	I	MOSTLY GLACIAL
107-40-053	Bradfield River E Fk	08/10/93	A	L	Chinook	0	0	118	0	118	WB	P	L	I	MOSTLY GLACIAL-COULD BE 5X AS MUCH
107-40-055	Eagle R Bradfield	08/10/93	A	L	Chinook	0	1	0	0	1	WB	N	L	I	
107-40-078	Earl West Creek	08/10/93	A	M	Chinook	100	0	0	0	100	WB	N	L	H	LOOK LIKE KINGS, VERY BIG
107-40-082	Channel Island Creek	08/18/93	F	1.2	Chinook	0	0	4	0	4	RT	E	L	H	LOWER CAMP TO IT, 2 ABV UPPER FLS
107-40-082	Channel Island Creek	08/18/93	F	1.2	Chinook	0	0	0	0	0	RT	E	L	H	UPPER FALLS
108-40-010	North Arm Creek	08/16/93	F	L	Chinook	0	0	46	7	53	RT	E	L		
108-40-020	Andrews Creek	08/04/93	A	L	Chinook	0	0	130	0	130	RT	N	L		LOW COUNT
108-40-020	Andrews Creek	08/12/93	H	L	Chinook	0	0	825	40	865	KAP	N	L		most low in river
108-40-020	Andrews Creek	08/16/93	F	L	Chinook	0	0	899	161	1060	WB	E	L		396L, 73D N. ARM, 503L, 88D S. ARM
108-40-040	Blind Slough Sumner	07/16/93	A	IT	Chinook	20	0	0	0	20	WB	N	L	L	
108-40-050	Ohmer Creek	07/16/93	A	IT	Chinook	30	25	0	0	55	WB	N	L	L	
108-40-050	Ohmer Creek	07/22/93	A	0.1	Chinook	30	80	0	5	115	WB	N	L	L	POOR VIS @ MTH COULD BE MORE
108-80-100	Tahltan River	08/05/93	H	L	Chinook	0	0	1499	750	2249	KAP	P			
108-80-115	Beatty Ck Tahltan R	08/05/93	H	L	Chinook	0	0	505	252	757	KAP	E	L		Excellent survey
108-80-120	Little Talhtan River	08/04/93	H	L	Chinook	0	0	1800	1885	3685	KAP	N	L		Late, 240 below weir
108-80-120	Little Talhtan River	08/15/93	W	L	Chinook	0	0	11449	0	11449	DFO				weir
110-14-007	Farragut River	08/20/93	A	L	Chinook	0	0	70	0	70	WB	P	L	L	57 LAKE FRK, 13 BLW FKS, 0 RT FK
110-32-009	Chuck R Windham Bay	07/08/93	A	0.1	Chinook	0	0	4	0	4	WB	N	N	I	200 YDS BELOW GORGE
110-32-009	Chuck R Windham Bay	07/20/93	A	L	Chinook	0	0	33	0	33	WB	N	L	L	25 SCHLS HERRING INNER BAY
110-32-009	Chuck R Windham Bay	07/29/93	A	L	Chinook	0	0	27	0	27	WB	N	N	H	
110-32-009	Chuck R Windham Bay	08/03/93	A	L	Chinook	0	0	11	0	11	WB	N	L	L	
111-17-010	King Salmon River	07/08/93	A	L	Chinook	0	0	10	0	10	DJI				
111-17-010	King Salmon River	07/23/93	H	L	Chinook	0	0	175	0	175	KAP	E			
111-17-010	King Salmon River	07/27/93	H	L	Chinook	0	0	144	0	144	KAP	N			
111-17-010	King Salmon River	07/27/93	F	L	Chinook	0	0	147	0	147	KAP	N			18 jacks, 10 below weir

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Appendix A3. (Page 3 of 3).

Number	Stream Name	Date	Type	Dist.	Species	Mouth	Tidal	Live	Dead	Total	Obs.	Vis.	Water	Tide	Remarks
111-32-210	King Salmon Creek	07/22/93	H	2	Chinook	0	0	60	0	60	KAP				partial survey
111-32-220	Nakina River	07/29/93	H	L	Chinook	0	0	1810	0	1810	KAP	N	H	IA1	
111-32-220	Nakina River	07/29/93	H	L	Chinook	0	0	1050	0	1050	KAP	N		IA2	
111-32-220	Nakina River	07/29/93	H	L	Chinook	0	0	2030	0	2030	KAP	N		IA3	
111-32-220	Nakina River	07/29/93	H	L	Chinook	0	0	590	0	590	KAP	N		IA4	
111-32-220	Nakina River	08/04/93	H	L	Chinook	0	0	1860	0	1860	KAP	N		IA1	
111-32-220	Nakina River	08/04/93	H	L	Chinook	0	0	790	0	790	KAP	N		IA2	
111-32-220	Nakina River	08/04/93	H	L	Chinook	0	0	3110	0	3110	KAP	N		IA3	
111-32-220	Nakina River	08/04/93	H	L	Chinook	0	0	730	0	730	KAP	N		IA4	
111-32-220	Nakina River	08/04/93	H	L	Chinook	0	0	6490	0	6490	KAP				peak total
111-32-240	Kowatua Creek	08/12/93	H	L	Chinook	0	0	1097	0	1097	KAP	N	L		probably more
111-32-240	Kowatua Creek	08/20/93	H	L	Chinook	0	0	1534	50	1584	KAP	E	L		lots whitetails
111-32-255	Tatsamenie River	08/20/93	H	L	Chinook	0	0	1392	0	1392	KAP	E			374 above weir,+ 273 above index
111-32-255	Tatsamenie River	08/20/93	W	L	Chinook	0	0	576	0	576	DFO				incomplete count
111-32-255	Tatsamenie River	08/20/93	W	L	Chinook	0	0	87	0	87	DFO				
111-32-255	Tatsamenie River	08/26/93	H	L	Chinook	0	0	1381	110	1491	KAP	E			491 above weir, +231 above index
111-32-270	Nahlin River	07/22/93	H	L	Chinook	0	0	1600	0	1600	KAP	P		IA1	500 pooled below weir
111-32-270	Nahlin River	07/22/93	H	L	Chinook	0	0	74	4	78	KAP	P		IA2	
111-32-270	Nahlin River	07/22/93	H	L	Chinook	0	0	292	0	292	KAP	N		IA3	lots sockeye
111-32-270	Nahlin River	07/29/93	H	L	Chinook	0	0	911	40	951	KAP	P		IA1	
111-32-270	Nahlin River	07/29/93	H	L	Chinook	0	0	158	0	158	KAP	N		IA2	
111-32-270	Nahlin River	07/29/93	H	L	Chinook	0	0	989	30	1019	KAP	N		IA3	lots sockeye
111-32-270	Nahlin River	07/29/93	H	L	Chinook	0	0	2128	0	2128	KAP				total peak
111-32-270	Nahlin River	08/03/93	W	L	Chinook	0	0	2546	0	2546	CAN				TRFN weir
111-32-270	Nahlin River	08/03/93	W	L	Chinook	0	0	277	0	277	CAN				jacks
111-32-275	Tseta Creek	07/29/93	H	L	Chinook	0	0	491	0	491	KAP	N			lots jacks
111-32-275	Tseta Creek	08/04/93	H	L	Chinook	0	0	281	25	306	KAP	E			
111-32-280	Dudidontu River	07/29/93	H	L	Chinook	0	0	671	40	711	KAP	P	H		30 Matatsu, many whitetails
111-32-280	Dudidontu River	08/04/93	H	L	Chinook	0	0	816	204	1020	KAP	E	L		
111-50-042	Auke Creek	11/18/93	W	L	Chinook	0	0	269	0	269	JT				from net pen release, all killed
111-50-052	Montana Creek	08/16/93	F	1.0	Chinook	0	0	8	3	11	LD	E	L		2 cwt recovered, 2 other ad clips observed
111-50-069	Fish Creek-Douglas I	07/21/93	F	1.5	Chinook	0	2	354	0	356	LD	N	L	L	seen in the side pond
111-50-069	Fish Creek-Douglas I	07/23/93	F	1.2	Chinook	0	1	0	0	1	JM	E			est.50-100 kings in pond
111-50-069	Fish Creek-Douglas I	08/19/93	F	L	Chinook	0	0	265	4	269	LD	E	L		
115-32-054	BIG BOULDER CREEK	08/05/93	F	L	Chinook	0	0	14	0	14	RPE				+3jacks
182-30-020	KLUKSHU RIVER (CAN)	08/02/93	H	L	Chinook	0	0	1058	0	1058	KAP	N			few carcasses, 7 bears
182-30-020	KLUKSHU RIVER (CAN)	10/13/93	W	L	Chinook	0	0	3302	0	3302	DFO				weir
182-30-043	TAKHANNI RIVER (CAN)	08/02/93	H	L	Chinook	0	0	281	70	351	KAP	E			
182-30-045	GOAT CREEK	08/02/93	H	L	Chinook	0	0	25	25	50	KAP	N			
182-30-051	BLANCHARD LAKE (CAN)	08/02/93	H	L	Chinook	0	0	301	25	326	KAP	N			61 above bridge
182-40-010	AKWE RIVER	06/21/93	A	10M	Chinook	0	0	4	0	4	GFW	P	L	L	
182-40-010	AKWE RIVER	08/28/93	F	0.5	Chinook	0	0	9	6	15	KW,	E	N		
182-70-010	SITUK RIVER	07/16/93	A	1.5	Chinook	0	15	0	0	15	KW	N	L	I	Below weir
182-70-010	SITUK RIVER	08/28/93	B	7.0	Chinook	0	0	700	64	764	SJ	E	N		22,32,43
182-80-030	TAWAH CREEK	06/27/93	A	L	Chinook	0	0	1	0	1	GFW	N	L		

Restrictions selected: year = 1993 AND species_code in ('411','410')