

RESEARCH PROJECT SEGMENT

State: Alaska

Project No.: F-9-4 *Name:* Sport Fish Investigations of Alaska.

Study No.: G-11 *Study Title:* Sport Fish Studies.

Job No.: G-11-D *Job Title:* Salmonid Rearing and Migration Study:
Ship Creek System.

Period Covered: July 1, 1971 to June 30, 1972.

ABSTRACT

During 1971, a total of 30,400 silver salmon, Oncorhynchus kisutch, and 182,000 king salmon, O. tshawytscha, smolts were fin-marked with an adipose clip and released into Ship Creek.

Returning adult salmon were enumerated at the Chugach power plant dam fish ladder facility. Of the 1,206 silver salmon counted approximately 85% (1,024) were identified as fin-marked fish. A total of 123 king salmon were enumerated, with 15% (18) being hatchery released fish.

The 1971 king salmon sport catch was relatively poor. During the four day season, creel census results indicated 14 salmon caught. An estimated 500 silver salmon were harvested by anglers during the September fishery.

Sampling of catches from the commercial fishery revealed a moderate incidence of Ship Creek fin clipped silver salmon.

The Ship Creek egg-takes for 1971 were comprised of 193,900 king and 604,600 silver salmon eggs.

RECOMMENDATIONS

Retain the present objectives of the study with emphasis directed towards the following:

1. Evaluation of the new Elmendorf steppass fish ladder and modifications of the Chugach Power Plant fish passage facilities.
2. Expand sampling coverage of commercial harvested fin-marked king and silver salmon to the South Central fishing district.
3. Evaluate the hatchery released salmon in the Cook Inlet commercial fishery.

OBJECTIVES

1. To evaluate the abundance, timing and biological characteristics of native stocks of returning adult Ship Creek king and silver salmon.
2. To evaluate the contribution of hatchery reared and marked king and silver salmon smolt releases in Ship Creek to the returning adult run.
3. Evaluate the desirability of creating a fall run of king salmon in Ship Creek.
4. To determine the sport fish catch of king and silver salmon and to evaluate trends in angling effort.
5. To provide recommendations for the management of anadromous fish in Ship Creek.

TECHNIQUES USED

King and silver salmon smolts were anesthetized with tricaine methane-sulfonate (MS-222), marked with an adipose fin clip and released into Ship Creek.

Returning adult king and silver salmon were enumerated at the Chugach power plant dam fish ladder facility. All fish were checked for fin marks. Several adult king and silver salmon were captured and held for the procurement of eggs.

A creel census was conducted during the king and silver salmon seasons to accumulate angling harvest data. Biological sampling consisted of obtaining the fork length, sex, and scales (for aging) from a small percentage of the harvest.

Sport Fish personnel monitored segments of the commercial fish harvest in upper Cook Inlet (northern district) by checking a local cannery, Whitney-Filadgo Seafoods, for fin-marked king and silver salmon.

FINDINGS

Mark & Release

A total of 182,000 king salmon, Oncorhynchus tshawytscha, smolts (1970 brood year) from local Ship Creek stocks, averaging 18.0 per pound were released from the Fort Richardson cooling pond into Ship Creek in May, 1971. Silver salmon, O. kisutch, smolts (30,500) of Kodiak Island, Alaska, origin at 14.5 per pound, were also planted in Ship Creek during May. Both species were fin-marked by the adipose fin.

A problem that continues to plague the Ship Creek program of releasing hatchery-reared fish is the difference in numbers, size, and origin of both king and silver salmon smolts at the time of release (Table 1). These inconsistencies were previously mentioned (Kubik, 1971) as being one of the causative factors for the low returns of hatchery fish to date. Introduction of non-Alaskan stocks so far have been unsuccessful in terms of appreciable returns.

Marked Returns

Silver Salmon:

The 1971 adult escapement of fin-marked silver salmon represented the first significant return since the hatchery rearing program began in 1968. Sampling determined that the adult escapement was an estimated 1.73% (3,075) of the total fish (177,240) released during 1970. With the contribution to the sport and commercial fisheries of 0.7%, the total adult return was 2.4% of the hatchery release.

Adult fin-marked silvers ranged in size from 510 - 681 with a mean of 606 mm, and averaged 6.4 pounds.

The 1970 jack return was a good indicator of the adult returns to Ship Creek for 1971. The 1968 brood silver salmon, marked and previously liberated in the spring, 1970, appeared in the fishery as jacks during the fall, 1971. Approximately a 0.3% return was noted at the trap facility and a 0.3% return occurred in the sport fishery for a total return of 0.6%.

Predicted adult marked returns for 1972 do not look encouraging due to the low number of smolts released into the creek during 1971 (Table 1).

TABLE I Ship Creek King and Silver Salmon Smolt Releases, Ft. Richardson Cooling Pond, 1964 - 1971.

<u>Year</u>	<u>No. of Kings</u>	<u>No. of Silvers</u>	<u>Origin</u>	<u>Dates Released</u>	<u>Size</u>	<u>Mark</u>
1971	181,638		Ship Creek	5/19 - 5/28	15.8/lb to 21/lb	Adipose
1970	45,690	30,465	Kodiak	5/19 - 5/28	14.5/lb	Adipose
			Ship Creek	5/18 - 5/27	29/lb	Adipose
1969	95,900	177,240	Bear Lake	5/18 - 5/27	10 to 11/lb	Adipose
			Ship Creek	5/ 5 - 5/16	16.6/lb	Adipose
			Oregon	5/ 5 - 5/16	13.7/lb	Adipose
1968	81,316	101,300	Ship Creek	5/23 - 5/24	28.5/lb	Adipose
			Oregon	4/15 - 4/22	19.9/lb	Adipose
1967	474,516	129,318	Green River	5/22 - 6/21	58.4/lb	Adipose
	63,852		Ship Creek	5/ 8 - 5/12	18.6/lb	Adipose
1966	166,870		Green River	July	98/lb	Half-dorsal
1965	8,432		Green River	8/ 6	99 mm	Left pectoral
	352		Ship Creek	3/18	76 mm	Adipose
1964	428		Ship Creek	6/ 3	76 mm	Right pelvic & adipose

King Salmon:

Returns of hatchery reared king salmon to Ship Creek during 1971 were low. A total of 25 fin-marked fish representing three separate release years were recovered (Table 2).

TABLE 2 Marked King Salmon Returns, Ship Creek, 1971.

<u>Release Year</u>	<u>No. Return</u>	<u>Size Range (mm)</u>	<u>Percent (25)</u>
1970	7	394- 457	28
1969	4	580- 762	16
1968	14	762-1,047	56

The 1971 release of 181,638 adipose clipped king salmon smolts into Ship Creek is the largest release of local stocks since the program started. Hopefully 1973 and 1974 will show promising results from this release.

Sport Fishery

King Salmon:

The 1971 king salmon season was unsuccessful. An estimated 1,000 anglers participated in a two weekend (June 19 - 20, and 26 - 27) fishery in which only 14 king salmon were creel checked.

Ship Creek was open to king salmon fishing from its mouth upstream to a marker 300 feet below the Chugach power plant dam, a distance of approximately 1/2 mile. A king salmon punch card was required of all anglers, and the same bag limits set in 1970 were in effect for 1971: one king salmon over 508 mm in length per day, and two king salmon per season.

Four of the sport harvested kings were fin-marked fish ranging in size from 610 - 749 mm. Scale analysis showed two saltwater annuli indicating that these fish were from the 1969 release. Of the 10 natural returning fish that were harvested, 6 were measured, sexed and scale sampled. Five females ranged from 940 - 1,176 mm; four were aged as 6-year-olds, one as a 5-year-old fish. The single male checked, 813 mm, was a 5-year-old fish.

Silver Salmon:

The 1971 silver salmon catch was better than in previous years, and this could be attributed to returning hatchery released fish which vastly outnumbered the natural run.

An estimated 500 adult silver salmon were sport harvested with 85% (425) of the total catch comprised of fin-marked fish.

Since 1960, Ship Creek has had a very restrictive silver salmon fishery. During an 11-year period (1960-1970), closures have extended from 300 feet below the Chugach dam to the creek headwaters to provide maximum protection. During the 1971 silver salmon season, Ship Creek was opened to fishing in its entirety except for two small closed areas. The majority of the harvested fish, however, were caught below the Chugach dam.

Escapement

King Salmon:

King salmon returns to Ship Creek were below expectations and the 1971 run appears to be the lowest since 1967 (Table 3). A total of 123 king salmon were enumerated through the Chugach dam live trap, and an additional 98 were observed during the escapement counts. King salmon captured at the ladder facility were marked with a Floy tag and released to preclude recounting on the spawning grounds.

TABLE 3 King Salmon Escapement Counts, Ship Creek, 1967-1971.

<u>1971</u>	<u>1970</u>	<u>1969</u>	<u>1968</u>	<u>1967</u>
221*	1,746**	710**	500**	200**

*Actual count.
**Estimated.

A total of 35 king salmon carcasses checked on Ship Creek ranged in size from 406 - 1,194 mm. The males, excluding jacks, averaged 1,084 mm, while females averaged 1,016 mm. The low carcass sample consisted primarily of 5- and 6-year-old adults with a female:male ratio of 1.8:1.

Although escapement counts in Ship Creek were hampered by high, turbid water conditions during the peak of spawning, counts made at the trapping facility in the Chugach ladder indicated a low 1971 run.

Silver Salmon:

The 1971 silver salmon escapement into Ship Creek appeared quite strong. A total of 3,618 silvers were estimated to have passed the Chugach power plant dam. Hatchery reared salmon contributed significantly to the run with approximately 85% being fin-marked fish.

Natural runs of adult silver salmon normally enter Ship Creek in mid-July, but since large numbers of hatchery released fish have been returning, a significant difference in timing has occurred which can be attributed to non-local stocks being used for releasing. The adult silver run peaked in mid-August during 1971, while the silver salmon jack migration peaked in mid-September during 1970.

Chugach Dam Fish Trap

From June 19 through September 24, a total of 1,370 salmon were enumerated at the trap facility. Catch by species and number is presented in Table 4.

TABLE 4 Numbers and Species of Fish Captured in the Chugach Trap, 1969-1971.

Year	Fish Species*					Total
	KS	SS	PS	CS	RT	
1971	123	1,206	0	41	0	1,370
1970	247	747	148	39	3	1,184
1969	459	142	211	62	0	874
1969-71 Avg.	276	698	120	47	1	1,143

*KS-King salmon
 SS-Silver salmon
 PS-Pink salmon
 CS-Chum salmon
 RT-Rainbow trout

Recommendations were made during 1969-70 to modify the Chugach fish ladder to provide adequate fish passage facilities for returning adult salmon. Funds were allocated for the project in 1970, but due to excessive bids by local building contractors, the work contract was not awarded.

Egg-Take Investigation

Approximately 193,900 king salmon eggs were obtained from Ship Creek stocks. The 24 females used for spawning ranged in size from 864 - 1,143 mm, with a mean length of 1,027 mm. Males averaged 1,105 mm, with a length range of 914 - 1,232 mm. The age composition of the kings was 5- and 6-year-old fish; no 4-year-olds were used.

A total of 604,600 silver salmon eggs were obtained from 166 females captured in Ship Creek. The females ranged in size from 510 - 681 mm, with an average of 614 mm. Except for four unmarked females, the silver salmon egg-take was almost entirely comprised of hatchery released fish.

King Salmon Fall Run Stocks

Recommendations were made during 1970-71 to evaluate the possibility of creating a fall run of king salmon in Ship Creek. Fall run stocks of king salmon from Green River, Washington, were introduced to Ship Creek in 1966 and 1967. Some adult returns from these releases were observed in both 1969 and 1970.

Periodic foot surveys and surveillance of Ship Creek during the 1971 fall months indicated no return of fall run king salmon. Because fall run king salmon stocks (eggs) were not available to the Department's Fire Lake Hatchery during 1970-71, this segment of the project is being discontinued. Instead, every effort will be made to improve the rearing and mark-and-recovery program of local Ship Creek summer stocks. It is anticipated that production from local stocks will be considerably greater than from non-local stocks.

Commercial Fishery

King Salmon:

The occurrence of marked Ship Creek fish in the Cook Inlet commercial fishery has been established through sampling of catches at a local cannery.

According to commercial fish tickets the 1971 Cook Inlet king salmon harvest totaled 19,806. Of these 9,598 (48.5%) were taken in the northern district. Salmon harvested from the northern district are bound for the Susitna River drainage or other upper Cook Inlet streams, including Ship Creek (Figure 1).

The number of fin-marked king salmon in the upper Cook Inlet (northern district) fishery cannot be evaluated due to inadequate sampling. On several occasions, commercially harvested king salmon were processed by the cannery before Department personnel could sample the catch.

During 1971, 12 fin-marked adult kings from the 1968 release were checked at the cannery. These fish ranged from 864 - 978 mm.

Silver Salmon:

Sampling of catches from the commercial fishery revealed that a moderate percentage of the total harvest was Ship Creek fin clipped silver salmon.

During the 1971 season, a total of 8,575 silver salmon representing approximately 38.8% of the total silver salmon harvest (22,094) for the northern district were examined for fin-marks at the Whitney-Fidalgo Cannery. Of the sample, 204 were fin marked silver salmon, all from the 1968 brood fish released into Ship Creek during May, 1970. Extrapolation of harvest data for the northern district indicates an estimated 526 fin-marked adult silver salmon were harvested.

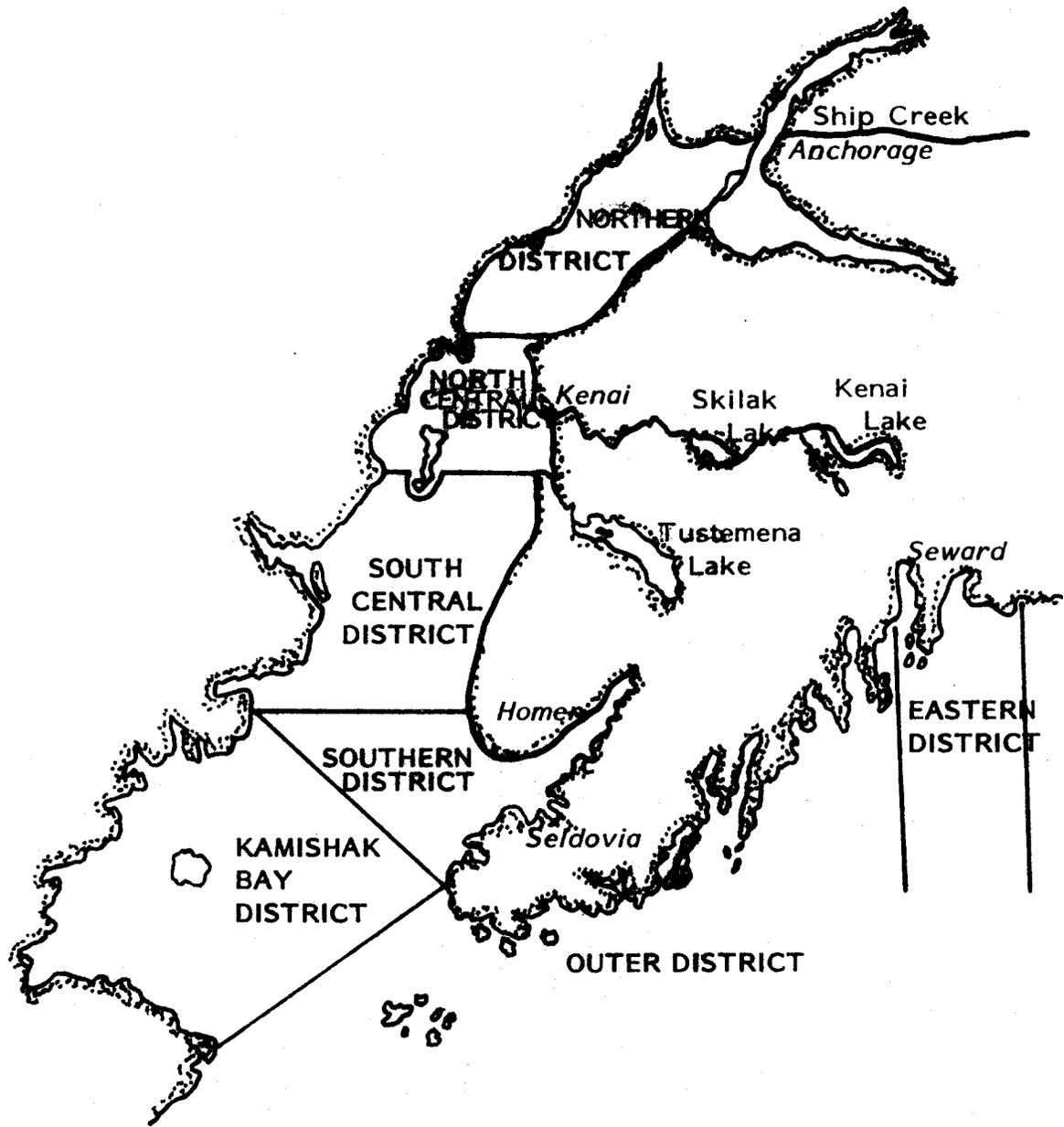


FIGURE 1

COOK INLET COMMERCIAL FISHING DISTRICTS.

During the commercial fishing season there were verified reports of fin-marked silver salmon harvested in the southcentral district of the Inlet and processed at a cannery in that area. Unfortunately, sample data was not obtained, consequently the overall contribution of hatchery-released salmon from Ship Creek to all Cook Inlet commercial fishing districts cannot be evaluated. The 1971 silver salmon catch for Cook Inlet was reported to be 104,065.

LITERATURE CITED

Kubik, Stanley W. 1971. Salmonid Rearing and Migration Study: Ship Creek System. Alaska Department of Fish and Game. Federal Aid In Fish Restoration, Annual Report of Progress, 1970-1971, Project F-9-3, 12(G-11):55-64.

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