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TUTKA CREEK WILD SALMON FRY, 1978-1981

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September 1982

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ADF&G TECHNICAL DATA REPORTS

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ABSTRACT

A floating trap was designed with the ability to sample emigrating Pacific salmon *(Oncorhynchus)* fry under intertidal fluctuations up to 6 m in height. Floatation allowed the trap to fish the upper 1.2 m of the water column or as shallow as 0.1 m when resting on the bottom. Catches were as high as 100,000 fry per day. Chum salmon *(Oncorhynchus keta)* fry remained in the intertidal area longer than the pink salmon *(O. gorbuscha)* fry.

INTRODUCTION

A salmonid fry trap was designed to sample seasonal emergence of wild pink *(Oncorhynchus gorbuscha* Walbaum*)* and chum *(O. keta* Walbaum*)* salmon fry from Tutka Creek, an intertidal tributary to the Tutka Bay system. Tutka Creek is a small nonglacial stream located in the Kachemak Bay area near the south end of the Kenai Peninsula in southcentral Alaska (Figure 1). Though pink salmon spawn naturally in Tutka Creek, the Tutka Lagoon Hatchery, a 20 million egg pink and chum salmon facility, is situated adjacent to the creek just above tidal influence. Most of the 4,000 m^2 pink salmon natural spawning area is intertidal where fluctuations from high tides can increase the creek depth by as much as 6 m.

The primary purpose of the trap design and its utilization was to capture live emergent wild fry to compare their conditions factors with those of fry incubated at the nearby Tutka Lagoon Hatchery. Secondarily, it provided a method to obtain a representative sample of wild fry to fin mark and release for comparison with hatchery-produced marked fry when they returned as adults. This marking program was the basis for comparison of ocean survival rates and adult quality of wild and hatchery fry. In addition, monitoring the numbers of pink and chum fry collected by the traps will help develop a relative index to compare year to year emergence levels and pre-emergent fry pumping information. This information will assist in forecasting adult returns to Tutka Bay and Lagoon.

Previously, emergent fry traps designed after Porter (1973) were used to monitor fry emergence timing, however, with very limited results. The intertidal nature of the lower reaches of Tutka Creek where the primary salmon spawning habitat is located, provided extreme problems in fishing efficiency. Consequently, we designed an intertidal trap which incorporated the ideas of biologists (Davis, personal communication) to compensate for these extreme tidal ranges. The trap was constructed in the winter of 1977-78 and was initially fished in the spring of 1978.

METHODS

The fry trap consisted of two components: the trap frame and a collection box which was connected downstream by a flexible hose. The "v"-shaped trap, made of 5 mm mesh tarred netting, was mounted inside a rectangular frame made of 51 mm aluminum tubing. The frame was 1.8 m wide, 2.1 m long, and 1.2 m high. The trap extended from the four corners at the entrance to bottom center at the rear of the frame. Chicken wire (25 mm mesh) was placed over the opening of the trap to keep large debris out of the throat.

The trap was supported by a styrofoam and wood frame float which lifted the entire trap during high tides and allowed the trap to rest on the stream bottom during ebbtide (Figure 2). When floating, the trap fished the upper 1.2 m of the water column; when resting on the bottom, it fished effectively in water depths as shallow as 10 cm.

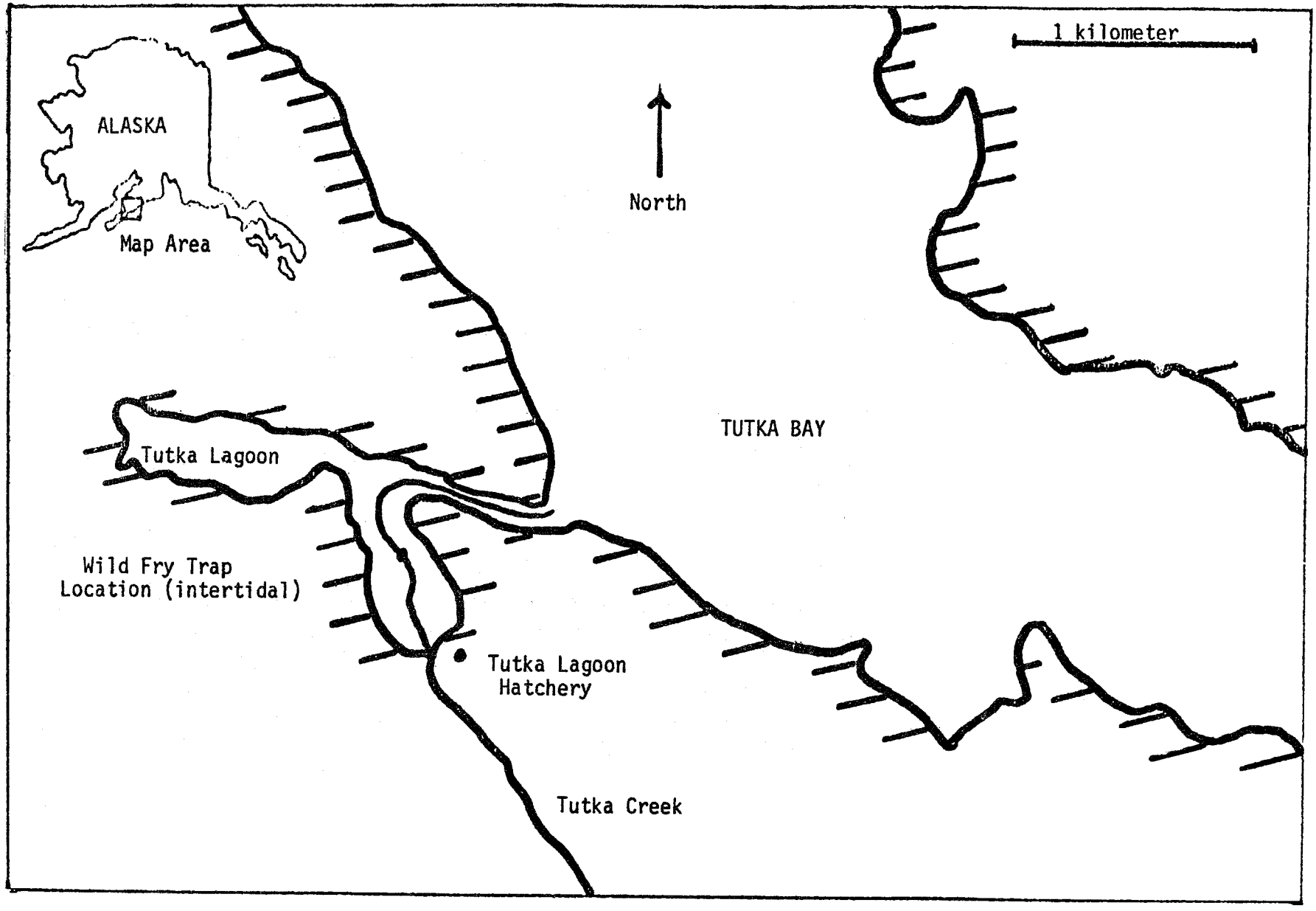

Figure 1. Location of wild fry traps in intertidal area of Tutka Lagoon, Alaska.

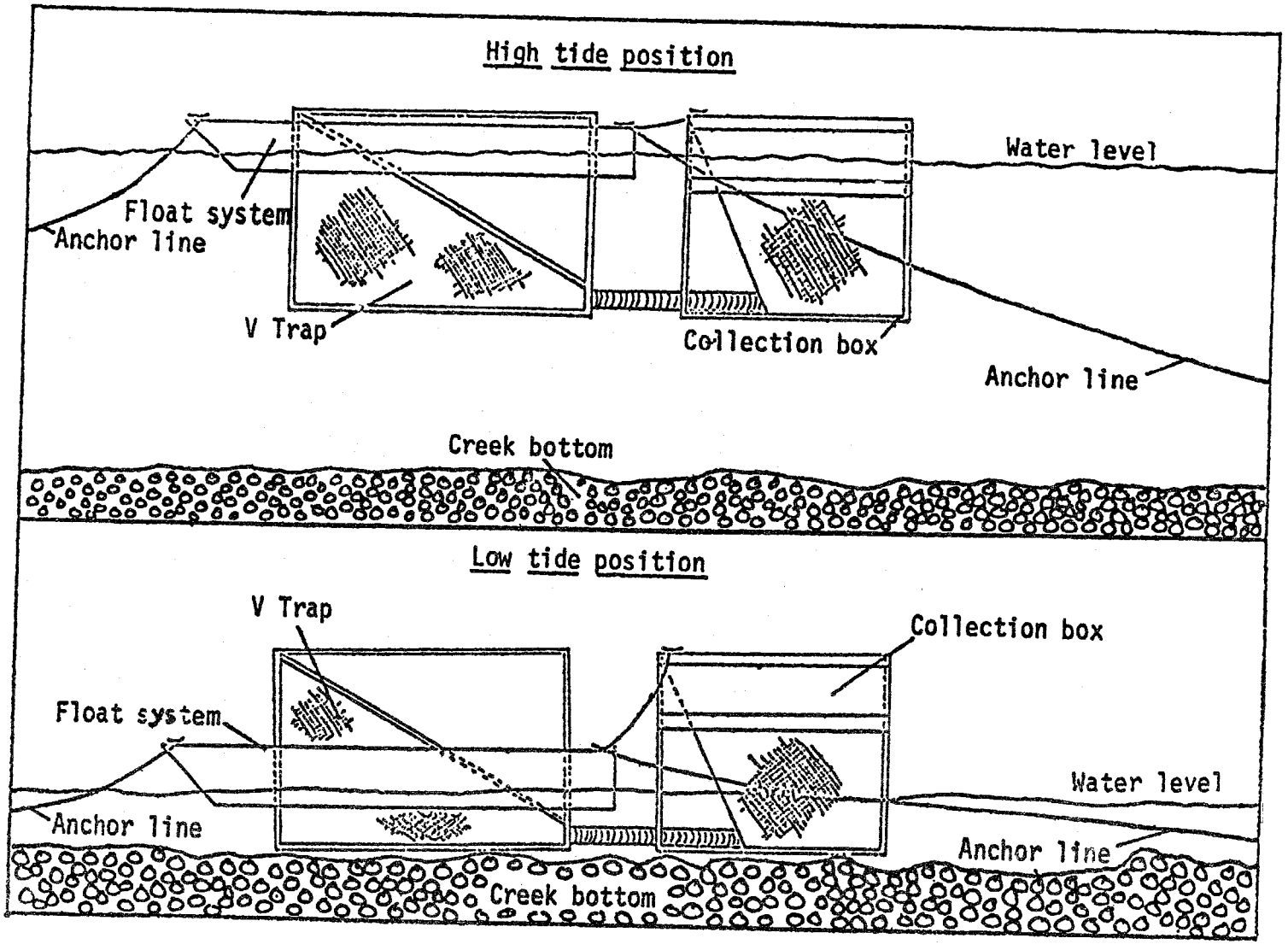

Figure 2. Intertidal wild fry traps used in Tutka Creek to capture wild fry at the Tutka Hatchery.

The fry collection box was connected to the trap by a 152 mm O.D., 1.2 m long, flexible hose which entered the box at the front center near the bottom. The collection box frame was constructed of 25 mm angle aluminum and measured 0.6 mm wide, 1.2 m long, and 1.1 m high. This frame was covered by 3 mm mesh tarred nylon netting. The fry collection box was supported by styrofoam floats which were positioned to maintain the flexible hose in a level attitude between trap and collection box.

Three of these units were assembled in parallel to fish a width of 9.75 m (Figure 3). These were positioned in the stream by eight anchors and lines, so the complex was held between the stream banks during low tide and over the streambed during high tide. Anchor lines had sufficient slack to compensate for the 7 m tides, but they retained the trap complex in the main current of the stream at low tide. During the low tides, the traps fished approximately 70% of the stream width, but only 4.8% of the inundated estuarine width was fished during high tides.

RESULTS

The intertidal wild fry traps designed specifically for the Tutka Creek system have proven very efficient and highly successful in their first 4 years of use. Typically, these traps were fished 2-1/2 to 3 months each year and catches ranged from 71,523 in 1981 to 213,466 pink salmon in 1980 (Table 1). The chum salmon catch ranged from 65 fry in 1981 to 25,659 in 1979. Nearly 100,000 pink salmon fry have been caught in a day of fishing and the trap continued to function properly when the water temperature was as cold as 0.0 C.

The low numbers of pink salmon fry collected in 1978 and 1981 were attributed to poor overwinter survival because of severe scouring of the streambed from flooding conditions.

Pink and chum salmon fry emergence generally peaked between the last week in April and the second week in May (Figures 4 and 5, and Table 1). It is a common observation to find chum salmon fry remaining in the intertidal pools and backwaters of Tutka Creek after the pink salmon fry have peaked. Chum salmon fry appeared to utilize these places as nursery areas longer than the pink salmon fry for food preference and salinity acclimation requirements. Table 1 indicates water temperatures during peak emergent periods for pink and chum salmon fry from 1978 through 1981. There seemed to be no apparent relationship of peak emergence to water temperature at the time of peak emergence. Water temperature ranges during the entire emergence period throughout the 4 years were similar indicating a fairly stable stream system.

DISCUSSION

Some problems experienced with the trap design included occasional plugging, the collection of the fry out of the collection boxes and inadequate anchoring cleats on the float collars. The trap mouths also often plugged with floating

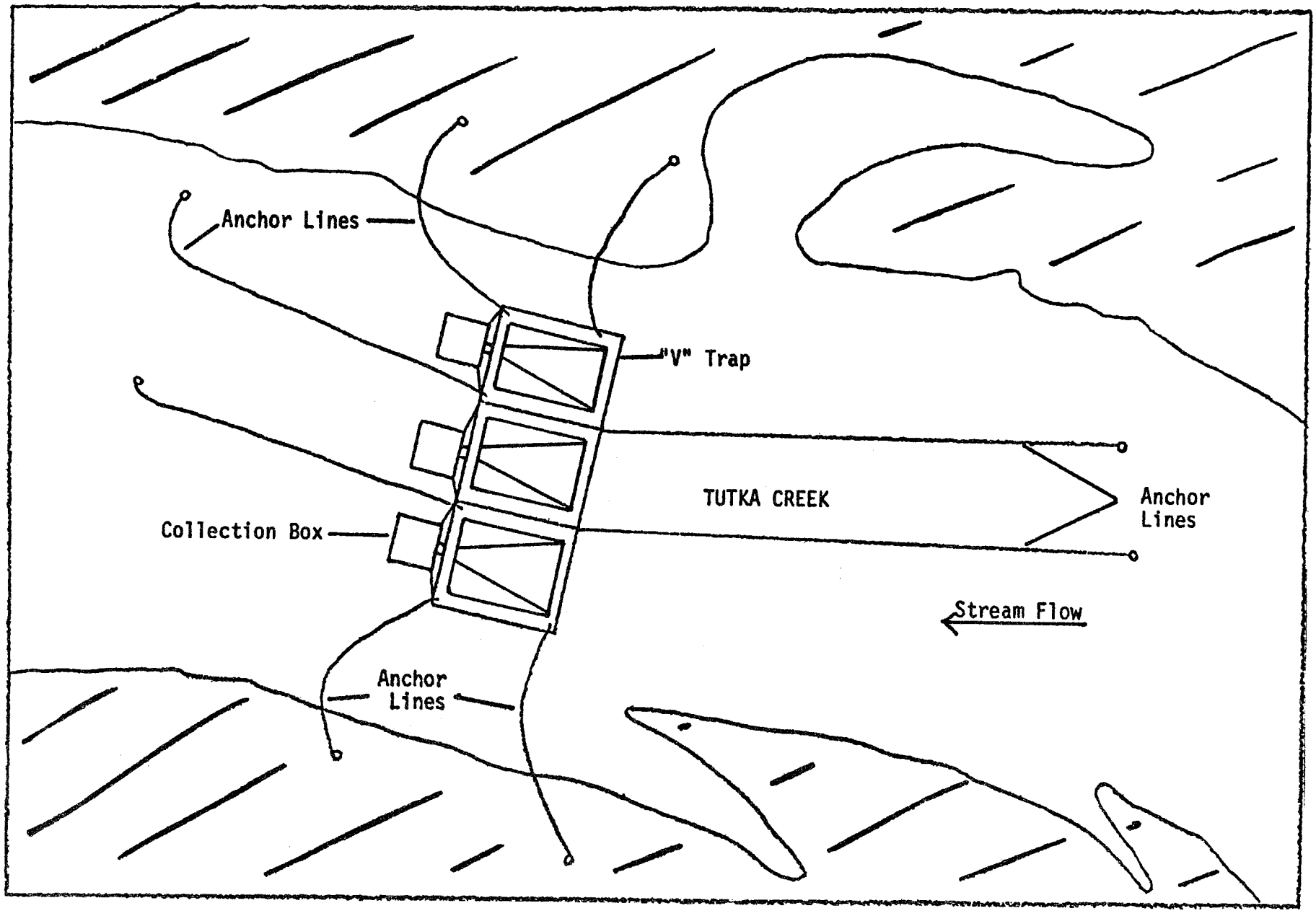

Figure 3. Schematic of wild fry traps positioned in intertidal area of Tutka Creek in Tutka Lagoon (not drawn to scale).

Table 1. Wild fry trap results, Tutka Creek, 1978-81.

	Year			
	1978	1979	1980	1981
PINK	80,841	212,252	213,466	71,523
Size (mm)	32 mm	32 mm	32 mm	33 mm
Total fishing period (days)	97	90	90	76
Peak emergence week	4/25-5/2	4/25-5/2	5/2-5/9	5/2-5/9
Maximum number caught in 1 day	25,521	56,257	98,237	6,325
Total caught	80,841	212,252	213,466	71,523
Water temperature during peak emergence	2.2°C	3.2°C	4.5°C	2.8°C
Water temperature range during entire emergence	1.0°C-4.0°C	0.0°C-4.5°C	1.0°C-6.0°C	1.0°C-6.0°C
CHUM	1,068	25,659	1,288	65
Size (mm)	36 mm	36 mm	38 mm	[1]
Total fishing period (days)	97	90	90	76
Peak emergence week	5/9-5/16	5/2-5/9	5/2-5/9	5/9-5/16
Maximum number caught in 1 day	244	7,341	500	11
Total caught	1,068	25,659	1,288	65
Water temperature during peak emergence	2.2°C	3.0°C	4.5°C	3.2°C
Water temperature range during entire emergence	1.0°C-4.0°C	0.0°C-4.5°C	1.0°C-6.0°C	1.0°C-6.0°C

[1] No fry sampled due to low numbers captured.

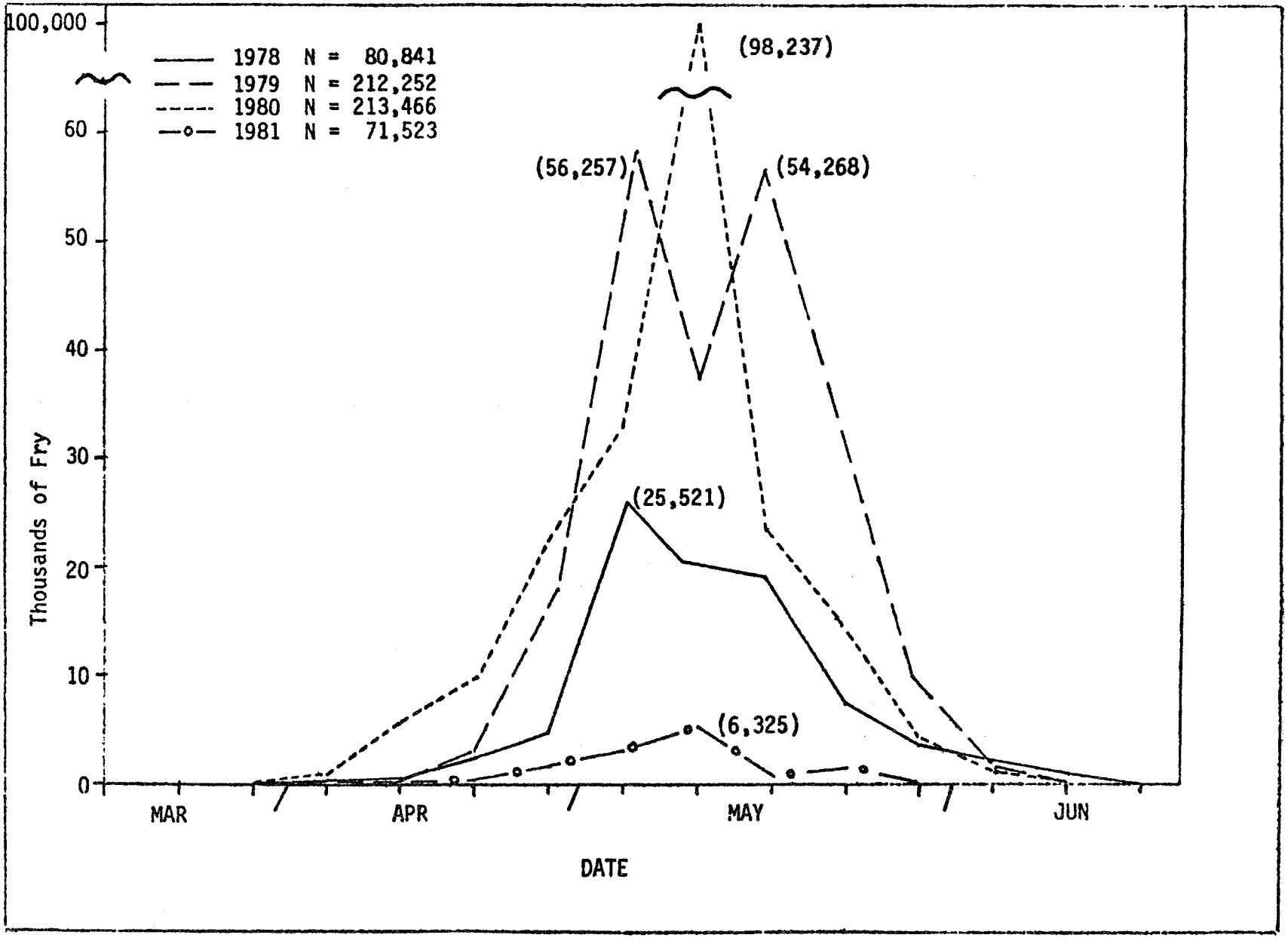

Figure 4. Wild pink salmon fry trap catch, Tutka Creek, 1978-81.

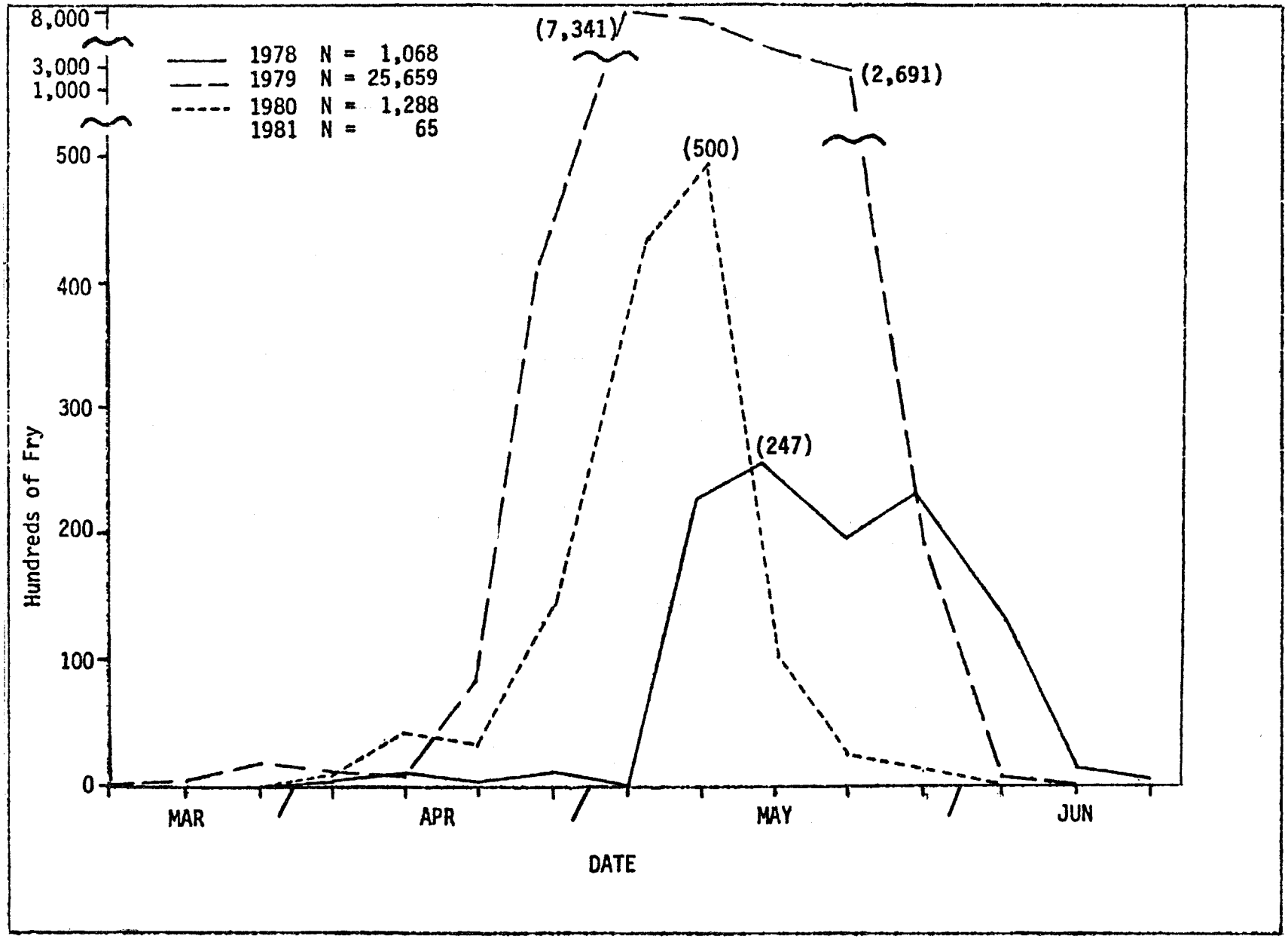

Figure 5. Wild chum salmon fry trap catch, Tutka Creek, 1978-81.

debris such as *Fucus* sp., leaves, and marshgrass. Most of this debris is deterred by the 25 mm mesh chicken wire stretched over the trap mouths, but smaller pieces were forced through the mesh. Small access doors in the throat of the traps facilitated cleaning, but it still remained a problem.

Dipping fry out of the collection boxes posed a problem since fry often evaded the dipnet in the corners and net bindings around the frame. A removable insert liner may be a solution. When the float systems are rebuilt in the future, stronger and larger anchoring cleats will be mounted on the collars to accommodate the anchor lines.

ACKNOWLEDGMENTS

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