



Run timing and spawning distribution of coho salmon (*Oncorhynchus kisutch*) in the Kenai River, Alaska and their relation to harvest strategies  
by Jeffrey Allan Booth

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Fish and Wildlife Management  
Montana State University  
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**Abstract:**

To determine run timing and spawning distribution of coho salmon (*Oncorhynchus kisutch*) in the Kenai River, Alaska, 216 fish were captured by fishwheel and drift netting and externally tagged with low-frequency (40-41 MHz) radio transmitters in 1988 and 1989. Eighty-nine fish were tagged during the early run (July through August) and 127 fish were tagged during the late run (September through December). Seventy-three percent of early-run fish were tracked to spawning sites in tributaries of the Kenai River and spawned in September and October. Ninety-six percent of late-run fish selected main-stem spawning sites and spawned October through March. The migration rate for early-run fish was 2.6-3.5 km/day compared to 3.8-4.9 km/day for late-run fish. Early-run coho salmon were harvested locally in commercial and sport fisheries while late-run fish were primarily harvested in sport and personal-use fisheries. Early-run coho salmon appear more susceptible to commercial and sport fishery harvest due to earlier run timing and slower migration rates. The differential run timing and migration rate between early and late-run coho salmon should be taken into consideration by harvest managers to ensure adequate escapement.

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## ABSTRACT

To determine run timing and spawning distribution of coho salmon (*Oncorhynchus kisutch*) in the Kenai River, Alaska, 216 fish were captured by fishwheel and drift netting and externally tagged with low-frequency (40-41 MHz) radio transmitters in 1988 and 1989. Eighty-nine fish were tagged during the early run (July through August) and 127 fish were tagged during the late run (September through December). Seventy-three percent of early-run fish were tracked to spawning sites in tributaries of the Kenai River and spawned in September and October. Ninety-six percent of late-run fish selected main-stem spawning sites and spawned October through March. The migration rate for early-run fish was 2.6-3.5 km/day compared to 3.8-4.9 km/day for late-run fish. Early-run coho salmon were harvested locally in commercial and sport fisheries while late-run fish were primarily harvested in sport and personal-use fisheries. Early-run coho salmon appear more susceptible to commercial and sport fishery harvest due to earlier run timing and slower migration rates. The differential run timing and migration rate between early and late-run coho salmon should be taken into consideration by harvest managers to ensure adequate escapement.

## INTRODUCTION

The coho salmon (*Oncorhynchus kisutch*) is one of the most important species in recreational, commercial, and personal use fisheries in Alaska. The Kenai River supports a substantial run of coho salmon, which attracts one of the State's most popular sport fisheries and contributes from 20,000 to over 100,000 salmon annually to the Cook Inlet commercial fishery.

Existing management of coho salmon is based on catch per unit effort data of commercial fisheries as compared with historical averages. This has been effective in maintaining stocks, and providing an important food source for brown bears (*Ursus arctos*) and bald eagles (*Haliaeetus leucocephalus*). However, it is unclear whether recent increases in sport and commercial harvest reflect proportional increases in abundance (run strength), and whether optimum production is being achieved.

Data on commercial harvest and from Alaska Department of Fish and Game (Department) creel census and postal survey estimates indicate both effort and harvest have increased in sport and commercial fisheries in recent years (Table 1).

Table 1. Harvest of Kenai River coho salmon in commercial and sport fisheries, Alaska.

Fishery	Historical	Harvest			
		1986	1987	1988	1989
Sport	25,523 <sup>a</sup>	48,621	26,056	35,776	43,401
Commercial <sup>b</sup>	47,588 <sup>c</sup>	77,922	74,977	55,419	81,744

<sup>a</sup> 1976-1985

<sup>b</sup> Eastside set gill net

<sup>c</sup> 1966-1985

Sport harvest estimates indicate a bimodal return of coho salmon to the Kenai River. Harvest rates peak in early August (early run) and then decline until another peak (late run) occurs in late August and early September (Hammarstrom 1989). If these runs represent two discrete populations, the possibility of differential exploitation exists.

Because of recent increases in effort and harvest, more information is needed by managers to ensure long-term maintenance of populations. Basic biological data are needed to assess production models, to determine status of populations, and to establish escapement goals for Kenai River coho salmon. Specific objectives in this 2-yr study include: 1) determine run timing, to ascertain when these fish are susceptible to harvest, 2) determine spawning distribution and timing, to identify which tributaries and main-stem spawning sites are major contributors to the overall run of coho salmon in the Kenai River drainage, 3) determine migration rate, which is needed to determine how long fish are susceptible to harvest in the sport fishery, and 4) evaluate harvest potential to determine possible impact on discrete runs of fish.

## STUDY AREA

The Kenai River (Figure 1) is located in southcentral Alaska on the Kenai Peninsula. This glacial river originates from Kenai Lake, 132 km from saltwater and has a drainage area of 5,563 km<sup>2</sup>. Twenty-seven kilometers below Kenai Lake, the river traverses Skilak Lake, about 24 km in length and flows another 80 km to Cook Inlet. Kenai River discharge is dependent on the outflow of Kenai and Skilak lakes and lacks the flow extremes characteristic of streams without glacial lakes in their headwaters. Although glacial melt produces turbid conditions throughout the year, water clarity increases during low-flow conditions (November through May). Mean annual flow in the Kenai River is approximately 142 m<sup>3</sup>/s with peak discharges of 550 to 850 m<sup>3</sup>/s occurring in late summer (Scott 1982). Winter flows range from 37 to 50 m<sup>3</sup>/s.

Several tributary streams enter the Kenai River from the Kenai National Wildlife Refuge including the Russian River (Figure 1). Major tributaries to the upper, middle and lower Kenai River include the Killey, Funny, and Moose rivers, and Slikok and Beaver creeks.



































































































































































































































