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TANANA RIVER SONAR PROGRESS REPORT

by

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INTRODUCTION

Tanana River chinook salmon (Oncorhynchus tshawytscha) and chum salmon (Oncorhynchus keta) support commercial and subsistence harvests for the entire length of the Tanana River. Effective management of the fisheries resource requires knowledge of wild stock escapement. Currently two indices of escapement are available to managers: daily catch data from two fishwheels at Manley Hot Springs and Nenana, and results from aerial surveys of clear-water spawning areas. Silty water prevents visual counts of migrating salmon.

This project was designed to assess the feasibility of using hydroacoustic techniques to count migrating Tanana River chinook and chum salmon. Objectives for 1990 included establishing an operable sonar camp, fitting the sonar beam to the cross section of the river, and determining if drift gill-netting would be possible. If feasible, sonar estimates of daily fish passage would provide timely in-season escapement information to fishery managers. In addition, annual escapement estimates would be used along with other information to predict run strength and establish escapement goals.

METHODS

Site Selection

The Tanana River flows northwest approximately 912 km from its headwaters to the confluence of the Yukon River (Barton, *in press*). Two areas were surveyed in 1988, one around Manley Hot Springs (km 93) and the other around Nenana (km 259). The Manley area was re-surveyed in June 1990. A site at km 72 was chosen in 1990 because of the single channel, favorable bottom profiles, and proximity to the mouth and to Manley Hot Springs (Figure 1.). At km 72, the river is approximately 448 m wide and 6.5 m deep and has a relatively steep, constant slope from the right bank. There is a sand bar extending 50 m offshore of the left bank, after which the slope of the bottom is relatively shallow and undulating. The right bank is composed of hard rock substrate while the left bank is a soft, silty substrate.

Camp Construction

Beginning on 07 July, construction of crew living quarters was begun on the left bank in an alder stand 1.5 m above the river flood plain. Wall tent/wood frame construction included two sleeping tents, one mess tent and one storage tent. A single sonar tent of the same construction was built on the steep slope of the right bank. Each bank was equipped with a 3.5 kw generator for 110 VAC power. Camp construction was completed by 19 July and sonar equipment was operational by 23 July.

Sonar Data Acquisition

Sonar equipment deployed on the right bank of the Tanana River included a 420 kHz Biosonics model 102 transceiver; International Transducer Corporation (ITC) 4° x 7° dual-beam transducer; Biosonics model 111 thermal chart recorder; and a Hewlett Packard model 54501 oscilloscope. The transducer was mounted on an underwater steel tripod placed 5 m offshore from the right bank; aiming was accomplished using a remote-control dual-axis pan and tilt unit manufactured by Remote Ocean Systems (ROS).

Sonar data acquisition was monitored during three five-hour sampling periods throughout the day. Each shift (0001-0500, 1000-1500, 1830-2330) was monitored by a Fish and Wildlife Technician. The technician operated and monitored the sonar equipment and recorded the time every fifteen minutes on the chart recording. Technicians followed a standard operating procedure and notified the project leader in the event of non-standard incidents. Sonar data were acquired within a 40 m range from the right bank between 23 July and 03 August (Figure 2).

Test-netting

Two sizes of drift gill nets were deployed between 18 and 31 July:

1) 127 mm mesh (84.8 m long by 4.9 m deep)
2) 134 mm mesh (84.8 m long by 4.9 m deep)

Both drift gill nets were reduced to 42.4 m long by 4.9 m deep on 19 July for safe deployment in the fast-moving current. Test-netting was done twice daily (0800-1000 and 1500-1700). One size gill net was drifted six times during one of the test-netting periods. Both banks were included in drifting up until 25 July, at which time left bank drifts were discontinued due to too many bottom snags. Three right bank drift locations were 1) inshore, 2) 50 m offshore, and 3) 100 m offshore. Each net was drifted for 5 to 10 minutes in each drift location.

Vertical Transects

Bank to bank, vertical looking sonar data were collected from the right bank sonar site directly across to the left bank camp site. A transect was sampled six times during each of two daily periods between 16 and 25 July, after which the number of sample periods was reduced to one per day. A Lowrance model X 16 fathometer with a 22 degree transducer was used to determine fish distribution within each transect.

RESULTS AND DISCUSSION

Hydroacoustic Data

Sonar data were collected from 23 July to 03 August. A total of 658 targets were counted. The highest day of counts was 01 August when 106 targets were counted (Figure 3.). Most targets were present within a 0-30 m range from the right bank (Figure 4.). No dual-beam data was collected due to factory mis-wiring of the ITC transducer. It should also be noted that dual-beam data collection was not an objective for this year.

Test-netting

Fifty-four gill net drifts were made between 18 and 31 July. A total of nine summer chum salmon were captured. Seventy-eight percent of all fish caught were within 47 m offshore of the right bank. No fish were caught after 25 July. Periods of high debris load and low water levels contributed to increased bottom snags on the left bank only. Left bank test-netting was discontinued on 25 July due to the presence of too many bottom snags.

Vertical Transects

Vertical-looking sonar data were collected between 16 July and 03 August. A total of thirteen discernible fish traces were recorded. No conclusions were drawn regarding spatial distribution due to the lack of an adequate number of passing targets.

Tanana Sonar Outlook

The feasibility of enumerating wild salmon stocks hydroacoustically on the Tanana river appears to be good. Further evaluation should be done with a more timely operating season for either chinook or fall chum salmon, or both. This would entail operating the sonar system from at least 01 July to 15 July for chinook salmon and 15 August to 15 September for fall chum salmon.

A greater complement of varying gill net mesh sizes should be used if test-netting is to be used for species apportionment. These nets should also be deeper in order to reach the bottom of the river on the right bank. It is recommended to use three separate gill nets that are 25 fathoms (42.4 m) long and 72, 55, and 43 meshes deep (9.5 m) for 127 mm, 165 mm, and 216 mm (5.0, 6.5, and 8.5 inch) strech mesh to sample chinook and chum salmon.

LITERATURE CITED

Barton, L. *In Press*. Tanana River fall chum salmon radio telemetry study, 1989. Fishery Research Bulletin. Alaska Department of Fish and Game, Division of Commercial Fisheries. Juneau.

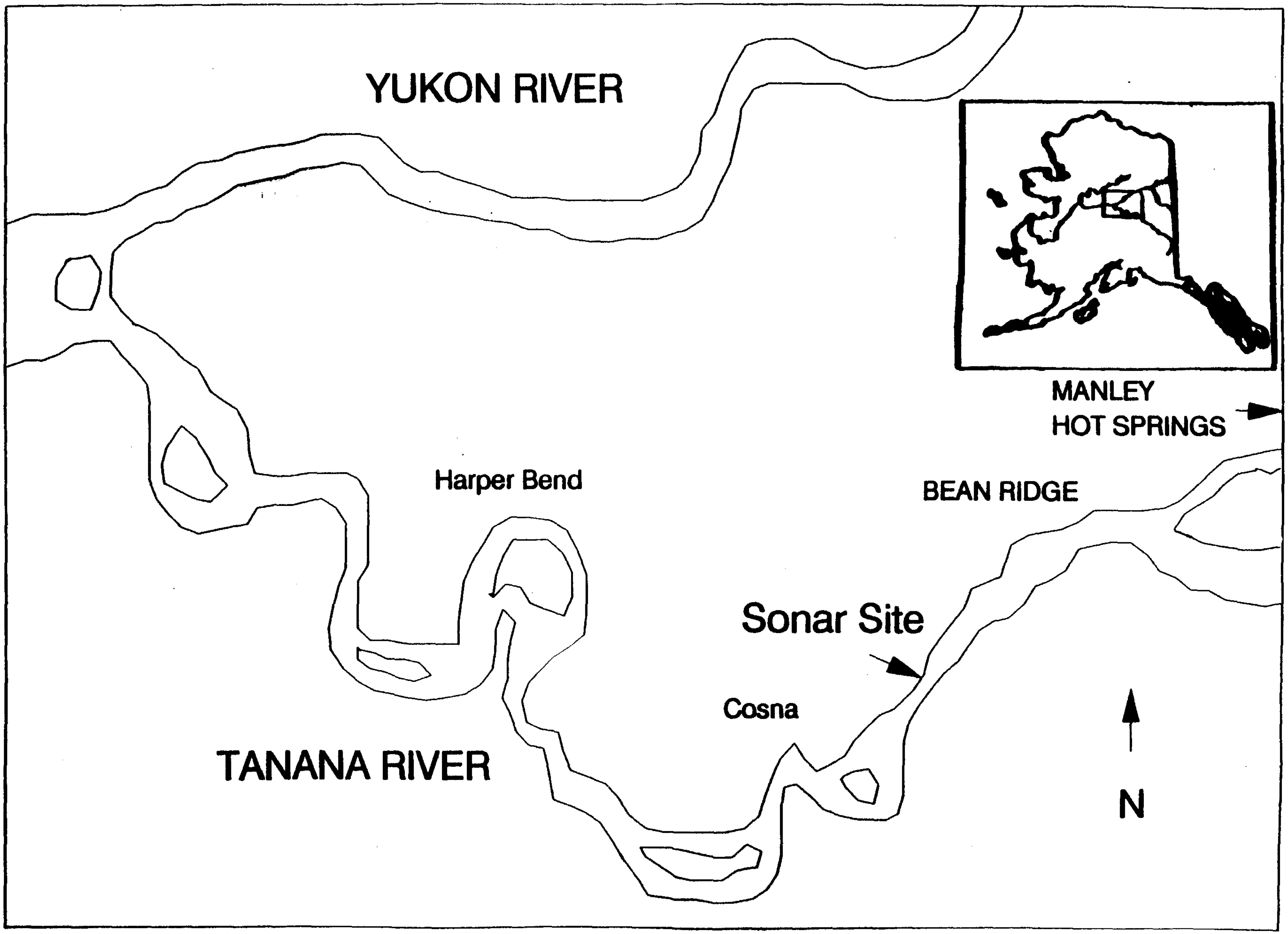

Figure 1. Location of sonar site at km 72, Tanana River.

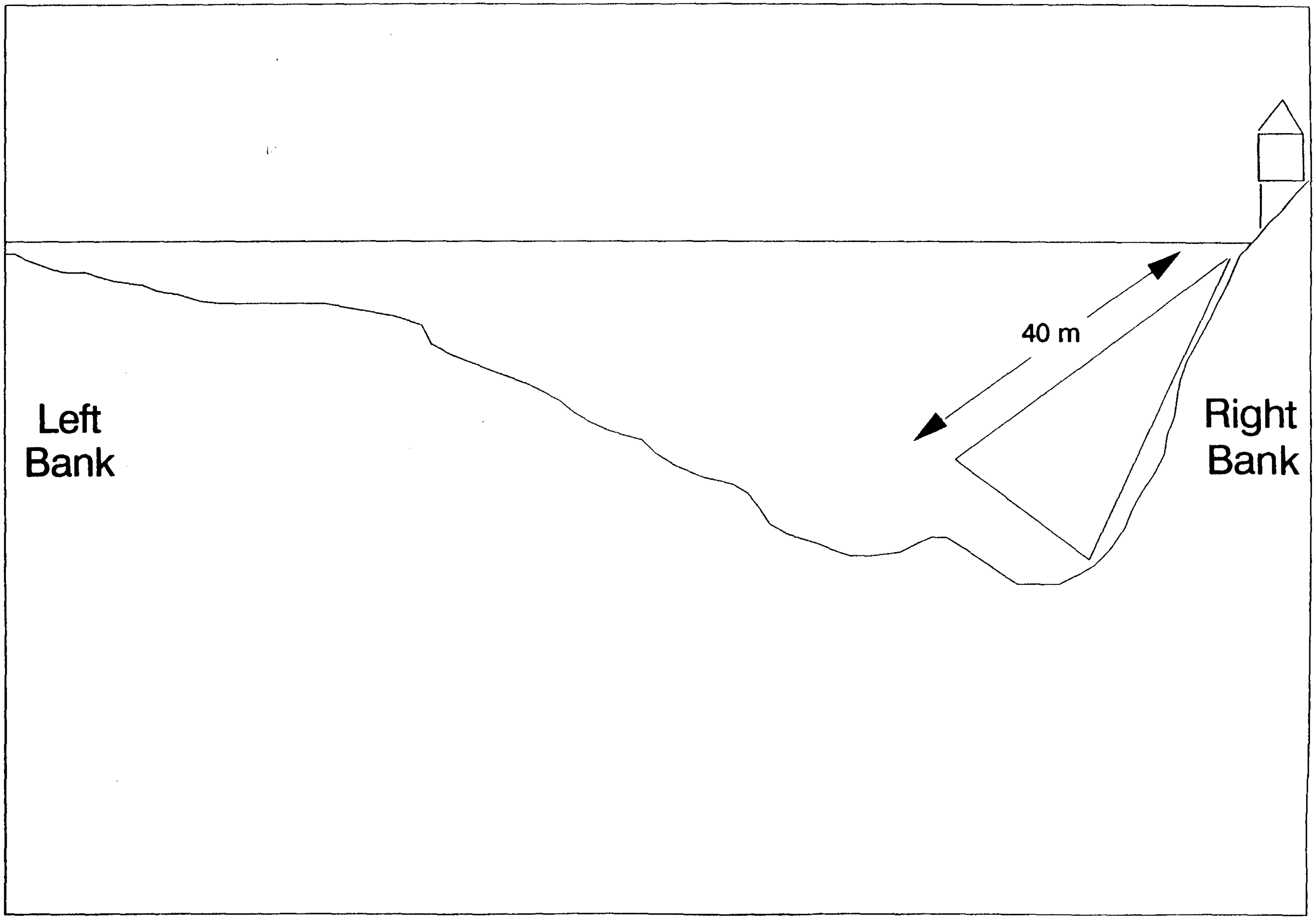

Figure 2. Hydroacoustic range for counting on the right bank at km 72, Tanana River.

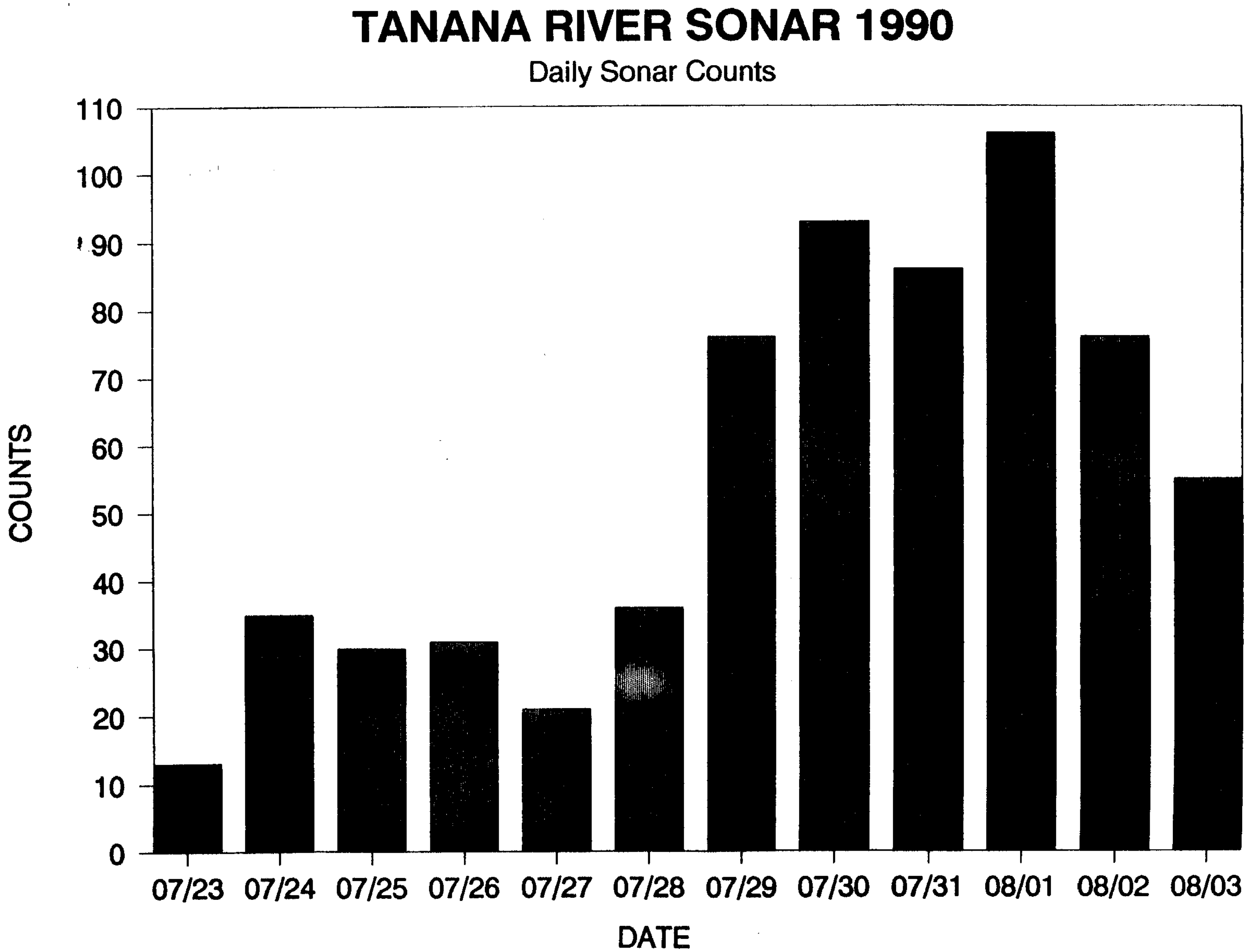

Figure 3. Sonar counts on the right bank, Tanana river Sonar, 1990.

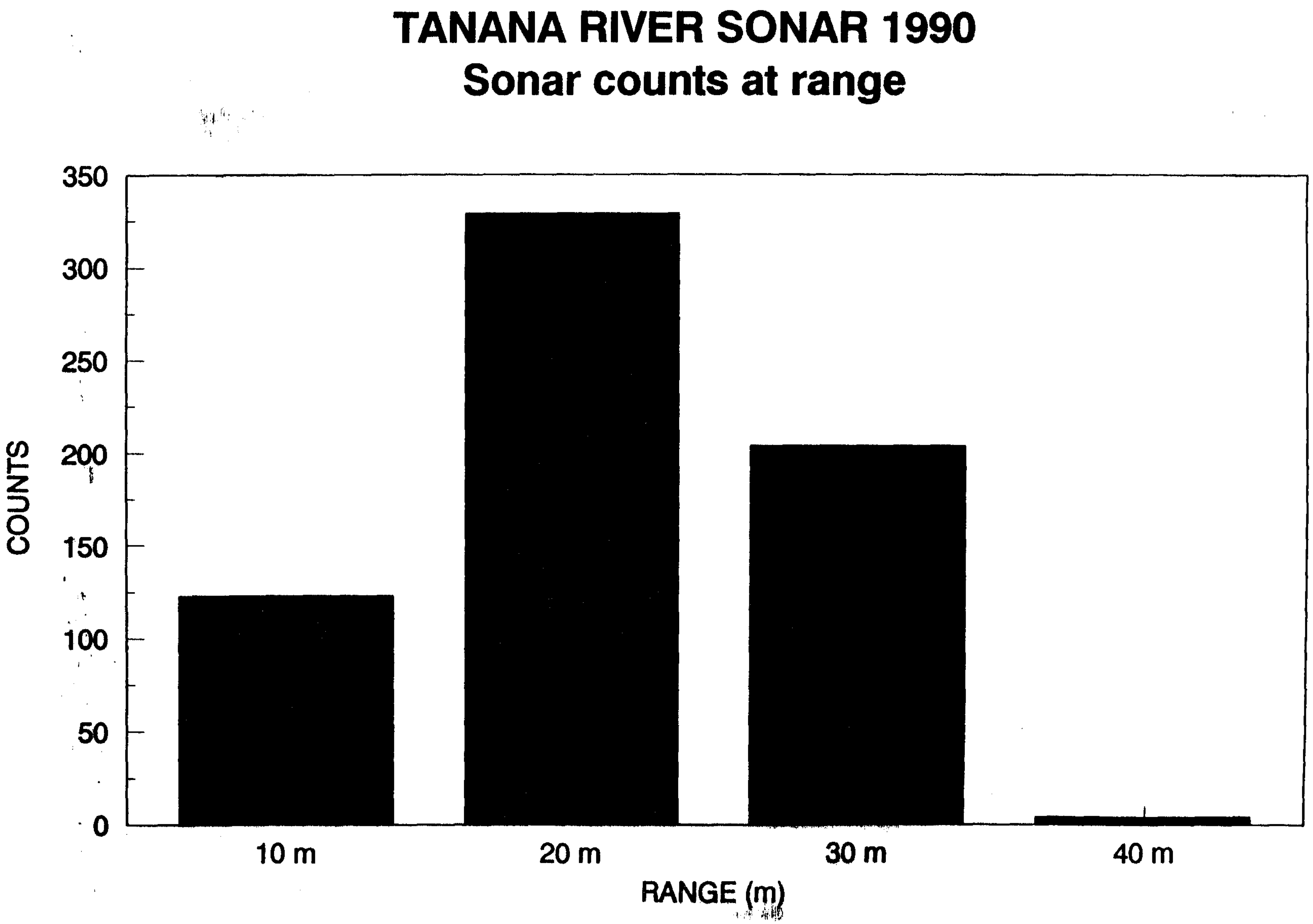

Figure 4. Sonar counts at range, Tanana River Sonar, 1990.