Device for Measuring Length and Girth of Fish[1]

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Continued improvement in fish-measuring devices is necessary in fishery science. A length and girth measuring device was developed that will make multiple measurements rapidly on live fish with accuracies to 1 mm. Construction plans are available.

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En biologie des pêches, on doit sans cesse améliorer les appareils de mesure des poissons. Nous avons mis au point un appareil pouvant effectuer rapidement sur des poissons vivants de multiples mesures de longueur et de circonférence, précises au millimètre près. Les intéressés peuvent se procurer les plans de cet appareil.

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THE accuracy of fish measurements has been a historical problem in fishery science. Girth measurements are especially important in gillnet fisheries for defining the fish size–mesh size relation. The sizes and shapes of target fishes are important in many fishing gear studies (e.g. Templeman 1963; Hodder and May 1965; Regier and Robson 1966; Shestov 1966; and Swartz and van Engel 1968), making it necessary to use a device which accurately and rapidly measures length and girth. Two girthometers have been described in the literature (Berst and McCrimmon 1961; Wydoski and Wolfert 1968). Both machines used the same principle (constant tension) for measuring the girth, but the one by Wydoski and Wolfert was more refined and was equipped with a length-measuring scale.

While conducting a gillnet study on sockeye salmon (*Oncorhynchus nerka*) during 1968–70, a measuring device was required that would make multiple girth and length measurements accurately and quickly on live but narcotized fish. The above described machines were limited in measuring live fish rapidly. An improved length and girth measuring device (Fig. 1) was developed with the help of our engineering and design staff. It consisted of a shallow, stainless steel, U-shaped cradle with a scale of 0.5-cm divisions engraved on the bottom. This scale was used to measure fork lengths up to 89 cm. A sliding pointer, mounted on one side with another metric scale, was used to measure lengths from the tip of the fish's snout to intermediate points on the body. A .0625-inch (1.5875-mm) stainless steel cable passed through a slot in the cradle (Fig. 1) to form a loop in which the fish was placed. One end of this cable was secured to another pointer moving along a metric scale; when the loop was tightened around the body of the fish, the girth was indicated by the sliding pointer. The loop became larger or smaller by moving the pointer in the appropriate direction. Girths up to 47 cm could be thus measured. In the process of measuring live fish, especially in an experiment in which the results may be affected by physical stress, the amount of handling and the time the fish is out of water are very important. In this particular study, there was concern about the degree of stress placed on each fish since fish survival was the principal criterion in the study. Therefore, to increase the measuring speed, accuracy was limited to the nearest 5 mm. Measurements to the nearest 5 mm were considered adequate for both length and girth of mature sockeye salmon (these fish averaged about 300 mm for dorsal girth and 600 mm for fork length). This device, however (with a 1.0-mm scale), is capable of 1.0-mm accuracy. Seven measurements (Fig. 2) required between 20 and 30 sec/fish. A three-man team was employed — one to hold the fish, one to make and call out the measurements, and the third to record the data.

Accuracy to 1.0 mm was obtained on trial measurements of rigid cylinders of 161–335-mm circumference. Comparative measurements of sockeye salmon were made with a metric tape. Of 100 comparisons, 39 measured the same, 43 had a difference of 5 mm, 17 had a difference of 10 mm, and 1 differed by 15 mm. This measuring device

[1]Detailed construction plans are available upon request from the authors at the Northwest Fisheries Center, National Marine Fisheries Service, 2725 Montlake Blvd. E., Seattle, Wash. 98112.

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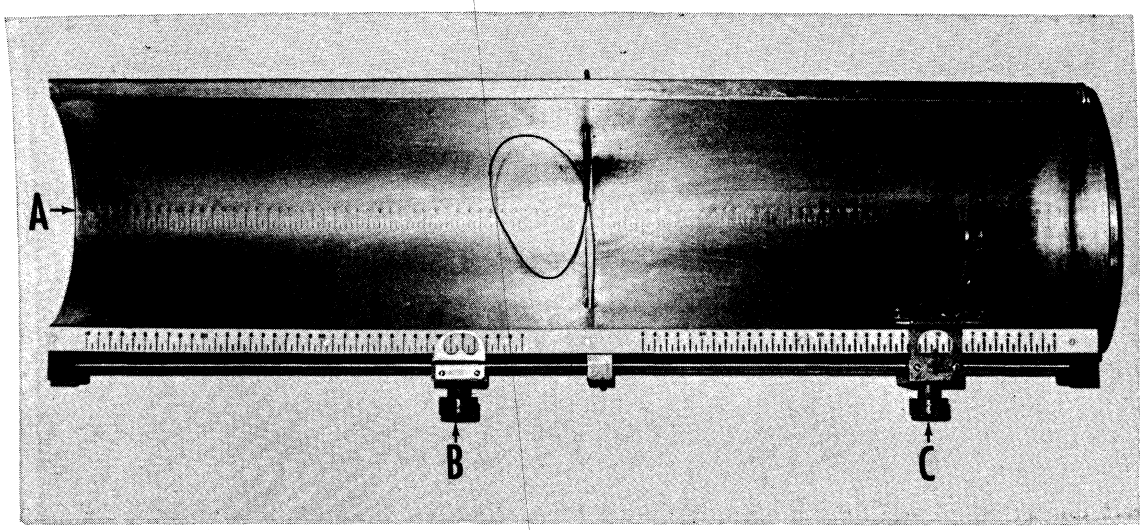

FIG. 1. Fish length and girth measuring device: A, fork length scale; B, girth scale; C, intermediate length scale.

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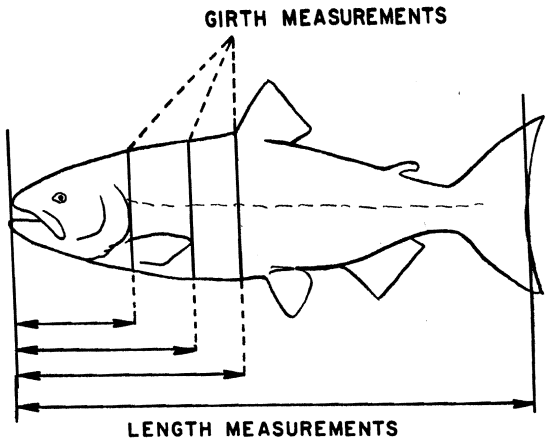

FIG. 2. Location of length and girth measurements recorded for each specimen.

recorded the same or smaller measurements in all cases except 12 which measured 5 mm larger. Replicate length and girth measurements at various body marks of six fish were not more than 5 mm different. However, because the measurement was interpolated to the nearest whole or half centimeter mark, the actual error was probably less than 2.5 mm. Only 18% of girth and 17% of length replicate measurements differed. This device, built to withstand severe corrosive conditions, can be used to measure lengths and girths with considerable speed and consistency. It is capable of a wide range of measurements on both live and dead fish.

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