

# A PURSE SEINE FOR SAMPLING JUVENILE SALMONIDS

Joseph T. Durkin and Donn L. Park  
Bureau of Commercial Fisheries  
Fish-Passage Research Program, Seattle, Washington

DURING RECENT STUDIES OF THE MIGRATIONS OF JUVENILE SALMONIDS in Brownlee Reservoir on the Snake River, special purse-seine gear was developed to collect live juvenile salmonids in the limnetic zone in numbers sufficient for assessing migratory behavior. The need for this sampling equipment arose after conventional floating traps—used successfully along the shorelines of the upper and middle reservoir—failed to take fish in quantity at the lower end of the impoundment. Samples also were required from offshore areas of the 57.5-mile-long impoundment. Trawling was attempted, but catches were small and fish were often in poor condition for marking or tagging. Unsatisfactory results with trawls led to consideration of the purse seining technique,

Purse seines are commonly used for commercial harvesting of marine food fish and have been described and illustrated by Snake (1950), McNeely (1961), and Dumont and Sundstrom (1961). Craddock<sup>1</sup> explored the possibility of using a commercial bait seine to capture fingerling sockeye salmon (*Oncorhynchus nerka*). A barge and a small skiff were used, but the attempt was unsuccessful, largely because of the lack of auxiliary power equipment for handling the seine. Based in part on Craddock's experience, a lightweight, small-mesh model of a commercial purse

seine with accessory gear was designed and constructed for use in Brownlee Reservoir. The cost of the unit, including seine and mobile gear, was approximately \$5,000.

## Description of Equipment

### Purse Seine

The purse seine, 600 feet long by 35 feet deep (600 meshes from floatline to leadline), was constructed principally of 3/8-inch (bar measure) knotted nylon webbing (thread size, 210-6). To reduce cost, the lower 10 feet was made of a cheaper synthetic material of the same mesh size. The bunt end of the seine (figure 1) was made of 1/4-inch (bar measure) knotless nylon to retain salmonids as short as 50 millimeters. Sponge floats, spaced 15 inches apart on a floatline, supported the net in water. About 20 percent hang-in was made along the floatline and leadline. Purse rings, spaced 18 feet apart, were suspended on polypropylene dropper lines from the leadline. The purse line consisted of two 325-foot lengths of 1/2-inch nylon rope joined by a 1/4-inch figures eight clamp to permit a quick removal from the rings after a set had been completed.

### Depressor Weight

An aluminum cylinder (10- by 16 -inch) filled with concrete was used to hold the wing and bunt ends of the seine together to minimize loss of fish during pursing,

<sup>1</sup> Donovan R. Craddock, Fishery Research Biologist, Seattle Biological Laboratory, Bureau of Commercial Fisheries. (Personal communication.)

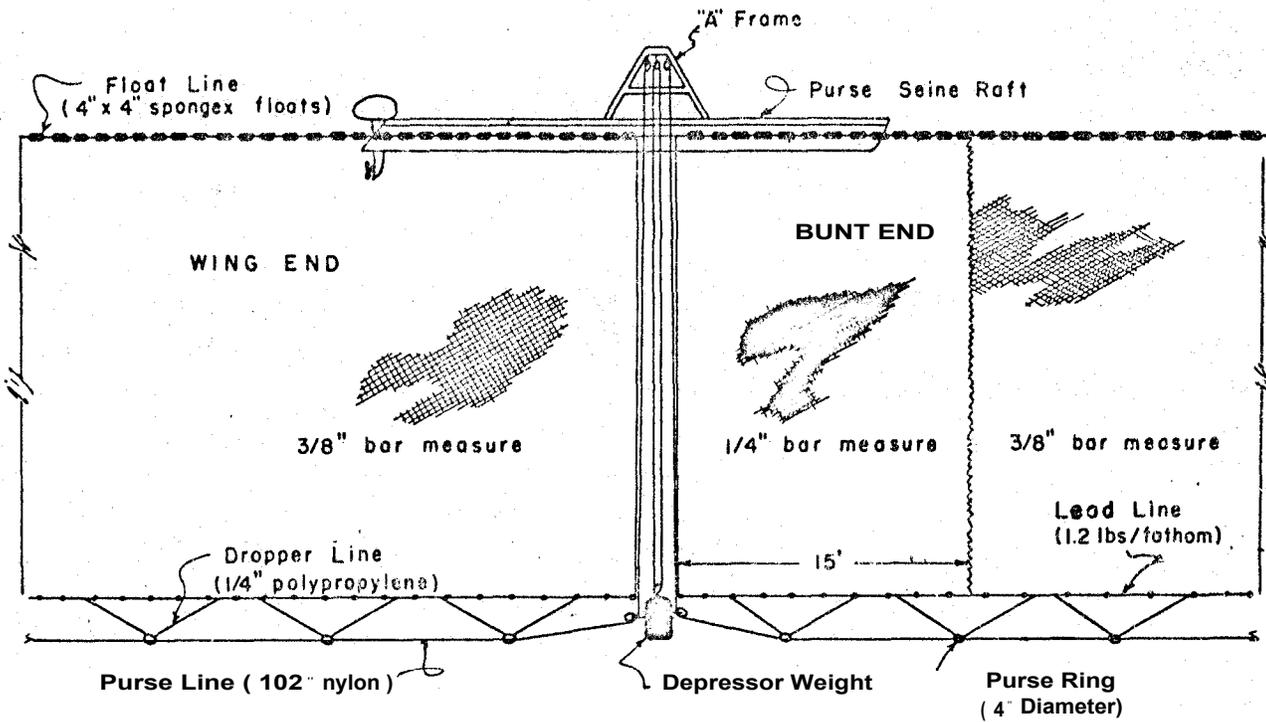


FIGURE 1.--Details of the purse seine. Depressor weight ensures tight closure of wing and bunt ends.

Two eyebolts (3/8- by 6-inch) protruding at right angles from opposite sides of this depressor weight provided attachments for the single-block pulleys which accommodated the purse lines. A third single-block pulley was attached to an eyebolt on the top of the depressor to facilitate the lowering and raising of the weight.

#### Raft

A 10- by 20-foot raft (figure 2) supported equipment used to set and retrieve the seine. Two styrofoam-filled aluminum pontoons, 24 feet long, 18 inches wide, and 16 inches deep, provided flotation. The two pontoons were connected by aluminum I-beams which supported the

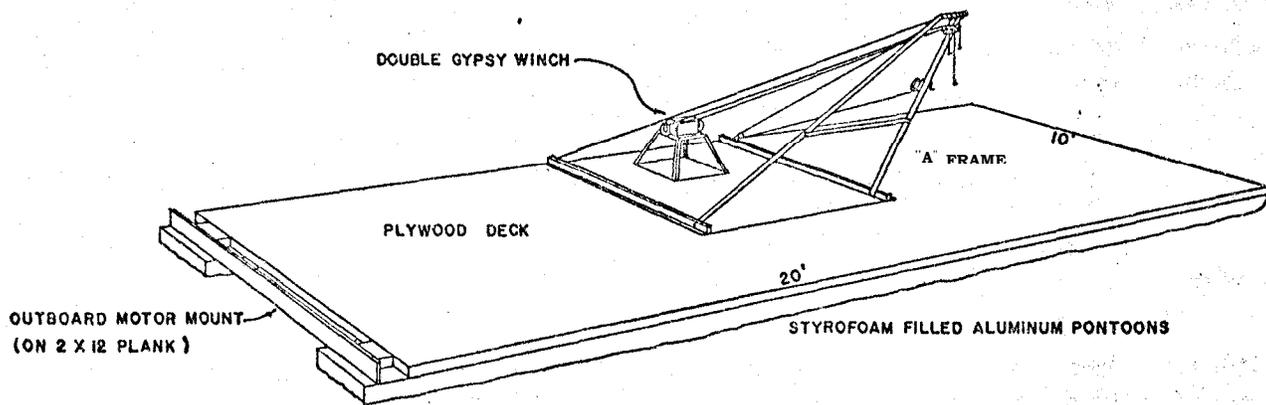


FIGURE 2.--Basic purse seine raft and auxiliary equipment.

1/2-inch marine plywood decking. The deck area was trimmed with beveled 2- by 6-inch lumber to minimize abrasion of the net.

The raft was powered by a 28-horsepower outboard motor mounted at the stern on a 2- by 12-inch plank between the pontoons. The motor was placed off center to allow unobstructed passage of the net over the stern.

#### A-Frame and Winch

An A-frame and double gypsy winch (figure 3) were mounted on the raft to facilitate pursing the net and lifting or lowering the depressor. The winch was powered by a 6-horsepower air-cooled gasoline engine. Although there was no clutch assembly, the manual throttle on the engine could be used to control turning speed of the winch.

The frame extended over the starboard side of the raft and supported three pulleys that accommodated the purse lines and the line to the depressor. A hand winch and cable system were used to adjust the A-frame, which pivoted on bolts through the base of the legs.

#### Seine Skiff

A 14-foot flat-bottom aluminum boat powered by a 28-horsepower outboard engine was used as a seine skiff. The end of the seine was attached to a single-block pulley placed on a line across the stern of the skiff. This arrangement, basically the same as that described by Chapoton (1964), allowed the skiff operator to steer more easily.

#### Operation

After the bunt end of the floatline and the purse line were attached to the stern of the skiff, the raft circled *away* from the skiff in a clockwise direction. When the two craft were abreast, the floatline was secured to the raft and the purse line was strung through the depressor-weight block and the A-frame block and finally around the gypsy heads on the winch. Pursing of the net was begun after the depressor was lowered into position on the purse line.

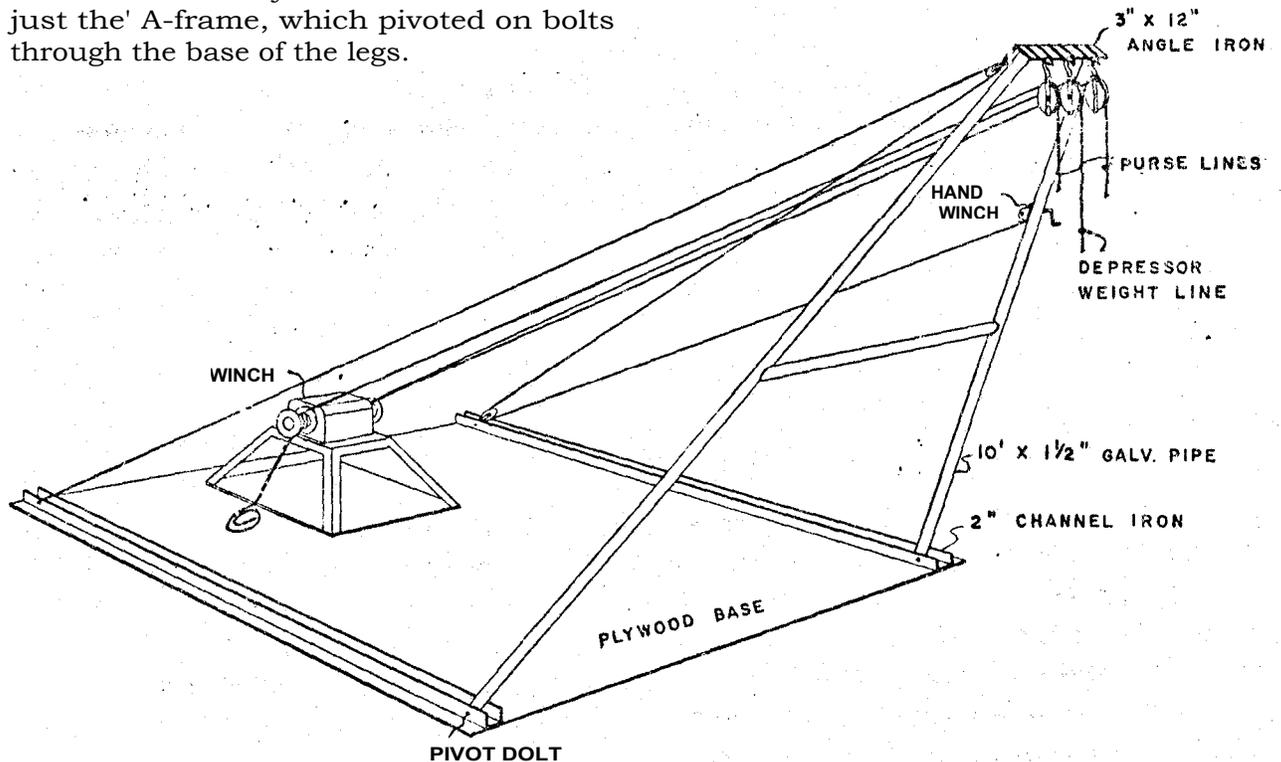


FIGURE 3.-- A-frame assembly used in pursing operation.

The raft and skiff drifted along with the current during pursing,

When the pursing of the seine was completed, the depressor was drawn aboard the raft and detached from the purse line. The purse rings and leadline were lifted clear of the water, and the net was stacked on deck until the fish were concentrated in the bunt end of the seine. The purse was usually held open with the skiff to facilitate removal of the fish with a dip net. A crew of four could complete the entire operation, including removal of the fish, in about 1 hour .

#### Size and Species of Fish Taken

The purse seine was successfully used to capture juvenile chinook salmon (Onco-rhynchus tshawytscha) that were as short as 50 millimeters. The seine was equally successful with yearling coho salmon (O. kisutch) and sockeye salmon (O. nerka). Numbers taken depended on seasonal abundance, schooling habits, and other factors contributing to the availability of the fish. Three to four sets usually produced all the salmon that could be measured and tagged in a day. Although fish were never densely concentrated in Brownlee Reservoir, occasionally more than 800 salmonid migrants were captured in a single set. Best results were obtained by towing the seine with the water current before it was closed and pursed. Even though water velocities seldom exceeded 0.25 foot per second, sets made against the current were less effective than those made with the current because of difficulty in moving the seine into the flow.

Other species (juveniles and adults) were also captured in the seine. Carp (Cyprinus carpio) and crappie (Pomoxis nigromaculatus) were most frequently captured; chiselmouth (Achrocheilus alutaceus), catfish (Ictalurus punctatus), suckers (Catostornus macrocheilus, C. columbianus), perch (Perca flavescens), bass (Micropterus dolomieu), shiner (Richardsonius balteatus), and whitefish (Prosopium williamsoni) were also taken. Catch composition suggests that a purse seine of

this type could be successfully used to obtain samples of virtually any species that concentrates at or near the surface.

This equipment was adequate for the sampling of downstream-migrating salmonids during favorable weather, but some improvements would be necessary for its use throughout the year. Protection for the crew from adverse weather, especially during the winter, would be essential. Also, tanks could be inserted in the raft for holding fish during examination and marking. These improvements could be made easily by enlarging the raft.

#### Acknowledgments

Joe Dunatov designed and constructed the purse seine, devised the depressor-weight system, and instructed biologists in operating the equipment. Eugene Wilkerson contributed substantially to development of auxiliary equipment. Zenas Beach advocated use of a purse seine in Brownlee Reservoir and demonstrated the practicability of the method.

#### Literature Cited

- Chapoton, Robert B.  
1964. Surface trawl for catching juvenile American shad. *Progressive Fish-Culturist*, vol. 26, no. 3, p. 143-144.
- Dumont, Wm. H., and G. T. Sundstrom.  
1961. Commercial fishing gear of the United States. U.S.D.I., Fish and Wildlife Service, Circular 109, 61 p.
- Knake, Boris O.  
1950. Atlantic coast mackerel purse seine. U. S.D.I., Fish and Wildlife Service, Fishery Leaflet 373, 9 p.,
- McNeely, Richard L.  
1961. The purse seine revolution in tuna fishing. *Pacific Fisherman*, vol. 61, no. 6, p. 27-58.