

Dip Basket for Collecting Juvenile Salmon and Trout in Gatewells at Hydroelectric Dams

Collection of juvenile Pacific salmon (*Oncorhynchus* sp.) and steelhead trout (*Salmo gairdneri*) from turbine intake gatewells of hydroelectric dams in the Columbia River system has provided considerable information on the timing and survival of downstream migrants. A special net described by Bentley and Raymond (1968) was used to evaluate the use of gatewells as fish collectors. The procedure proved to be effective and fish have been dipped from the gatewells of many Columbia River dams.

In 1971, vertical barrier screens (Smith and Farr 1975) were installed in gatewells at Little Goose Dam on the Snake River. These screens confined fingerlings to the upstream half of the gatewells, where they were more likely to encounter the orifices of the fingerling bypass system. The design and operation of a "dip basket" for collecting fingerlings from these modified gatewells is described in the present report.

Design — The dip basket is a rectangular, open-topped box with folding bottom and end panels (Figs. 1,2). The basket is made of a square steel tubing frame covered with perforated aluminum plate, and is designed to fit the shape of the modified gatewell. The upper support structure is made of angle iron. A floor made of nylon netting is attached to the perimeter of the hinged bottom. A rubberized bag to hold the collected fish in a

water sanctuary is sewn to a hole in the center of the netting floor. Rubber belting is attached to the upper sides of the frame end panels so as to brush against the

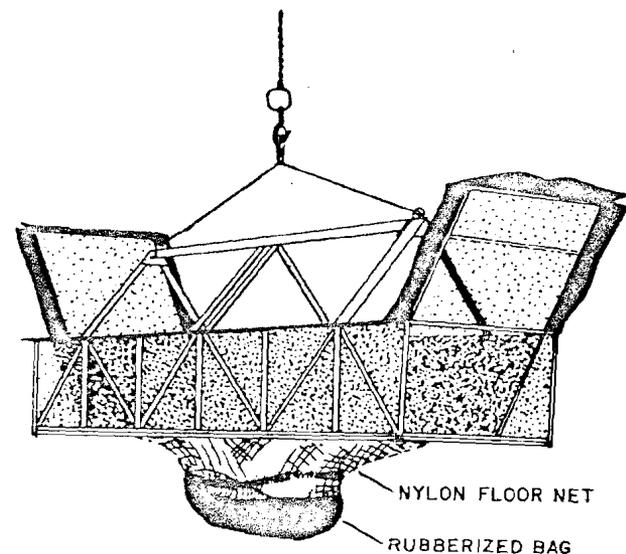


Fig. 1. Sketch of dip basket in fishing configuration.

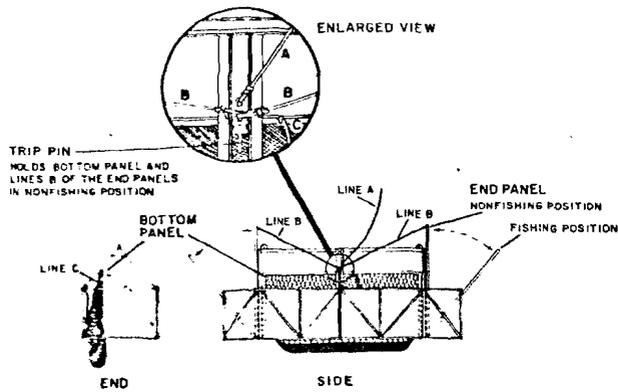


Fig. 2. Sketch of dip basket in nonfishing (or set) configuration, showing arrangement of lines and trip pin to set the basket: line A pulls trip pin to release end panels and bottom panels into fishing position; lines B (2) hold end panels in (vertical) nonfishing position; line C pulls floor up to nonfishing position.

gatewell walls and form a moving seal between the basket and the walls of the gatewell. The belting also acts as a cushioning device that prevents the basket from becoming lodged within the gatewell. The dip basket is suspended on a cable and two lines are attached to each end of the basket so that the basket can be controlled when raised above the deck level of the dam.

Operation and Use — The dip basket is lowered and raised by a warehouse crane. A crane operator and one man can operate the dip basket except during high winds, when an additional man is needed to control the basket when it is raised above the deck level.

Before the dip basket is lowered into the gatewell (Fig. 3), the bottom and two end panels are pulled up to the vertical position by the attached lines (Fig. 2, B and C), and locked into place by passing the pin of the trip line A through both loops of the end panel lines and pinning the side member of the bottom panel to the frame. The weight of the end panels keeps the trip pin in its locked position; however, rope length, trip pin diameter, and latch holes may have to be adjusted occasionally to obtain satisfactory release when the trip line is pulled. The basket is lowered into the gatewell slowly while the trip line (A) is played out freely to prevent accidental release of the trip pin, which would prematurely deploy the end panels and bottom panel into the fishing configuration.

By measuring and marking the crane hoist cable or the trip line, a predetermined fishing depth may be accurately monitored. The dip basket is lowered to the desired depth and may be left in the nonfishing configuration for any desired length of time to allow fish to pass upward through it (Fig. 3). When the trip line is pulled, the end panels and bottom fall to their respective positions against the ends and floor supports. The basket is then raised slowly and collects fish from the entire area of the gatewell.

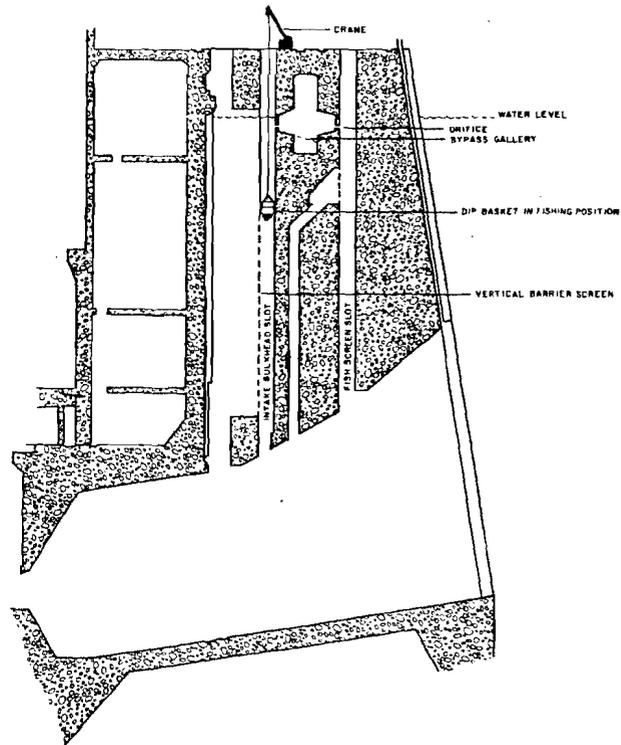


Fig. 3. Cross-sectional view of turbine intake, showing the dip basket in a gatewell.

When the dip basket is raised above the water surface, all fish drain into the water-filled sanctuary bag. The dip basket is raised above the deck level, where fish and water are released through a zippered opening directly into holding tanks or trucks for transport. Care must be taken to avoid overloading the sanctuary bag; we found that 400 to 500 fingerlings could be accommodated in the bag without overloading.

References

- Bentley, W.W., and H.L. Raymond. 1968. Collection of juvenile salmonids from turbine intake gatewells of major dams in the Columbia River system. *Trans. Am. Fish. Soc.* 97(2):124-126.
- Smith, J.R., and W.E. Farr. 1975. Bypass and collection system for protection of juvenile salmon and trout at Little Goose Dam. *Mar. Fish. Rev.* 37(2):31-35.

—George A. Swan,¹ Richard F. Krzema, and Winston E. Farr, Northwest and Alaska Fisheries Center, National Marine Fisheries Service, NOAA, 2725 Montlake Boulevard East, Seattle, Wash. 98112.

Accepted 18 August 1978

¹ Present address: NMFS, NOAA, Big Pasco Industrial Park, Building 900, Pasco, Wash. 99301.