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  Borthwick, S.M., and C.R. Liston. 2003. Survival and External Condition of 200 - 300 mm Rainbow Trout Passed through an Archimedes Lift and a Hidrostal Pump at Red Bluff Research Pumping Plant. Tracy Fish Collection Facility Studies. Volume 25. U. S. Bureau of Reclamation, Mid-Pacific Region and Denver Technical Service Center. 33 pp.

Survival, descaling, and injury rates were determined for 200 – 300 mm fork length rainbow trout, *Oncorhynchus mykiss,*passed through an Archimedes lift and a Hidrostal pump at the Bureau of Reclamation’s Red Bluff Research Pumping Plant, Red Bluff, California. Treatment fish were compared to control fish (released into the lift and pump discharges) for sixteen paired trials conducted with the Archimedes lift and 25 paired trials with the Hidrostal pump during April, May, and June 2002. For the Archimedes lift, there were no detectable differences in immediate or 96-h survival between treatment and control fish, with average scale loss less than 10 percent for > 88 percent of the fish, and percent of surviving fish with injuries (mostly abrasions) less than 10.4 percent. The Hidrostal pump trials showed immediate survival from 96.4 percent to 94.4 percent for the three speeds tested, while average 96-h survival ranged from 94.0 percent to 88.0 percent. Average scale loss for Hidrostal trials was less than 10 percent and fish injuries averaged from 2.5 to 9.8 percent. Statistically significant increases in injuries (abrasions and bruises) were observed at the 321-rpm Hidrostal pump trials. Both the Archimedes lift and the Hidrostal pump can pass small and large fish with ≥ 90 percent survival and injuries ≤ 10 percent. Fish passed through the Archimedes lift had slightly higher survival rates than fish passed through the Hidrostal pump. The results of this study support previous work suggesting that these devices can safely transport fish at diversion structures.