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Two Adjustable Waterfalls for Evaluating Fish Jumping Performance

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Abstract

Instream obstacles such as low-head dams and waterfalls are important in fisheries management because they can restrict the movement of fishes. This can have detrimental or beneficial effects on a fish population, depending on whether a particular structure operates as a barrier to migration or as a barrier to invasion. We developed flashboard-type and flume-type adjustable waterfalls in the laboratory to study the effects of waterfall height and plunge pool depth on fish jumping performance. Our ultimate goal was to provide a quantitative method of evaluating pool-and-weir fish passage structures and waterfall barriers that could be applied to field situations. The adjustable waterfalls were successfully tested using adult Rio Grande cutthroat trout *Oncorhynchus clarkii virginalis*. The flashboard waterfall worked well in experiments where the combined waterfall height and plunge pool depth were less than the depth of the raceway. The flume waterfall worked well for the same

conditions, but as designed, its minimum waterfall height was 30 cm. The flume-type waterfall also worked well for tests where the waterfall height exceeded the maximum depth of the raceway. Of the two waterfalls developed, we recommend using the flume-type for future studies because of its greater flexibility, even though it has a higher construction cost and is slightly more difficult to operate.

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