

Appendix 1.

Building a Salmon Friendly Fishwheel

One purpose of installing video equipment on the Y-5A Test Fishwheel Project in 2000 was to eliminate the holding and handling of salmon associated with live boxes. The equipment improved the Project and it also stimulated further thought about reducing stress on salmon.



A new fishwheel was built in 2002 using features and materials that are ‘softer’ on salmon; the design also provided a more consistent rotation speed than the old design. The fishwheel is hexagonal with 3 baskets mounted 120 degrees apart.

The baskets were made of peeled spruce poles fastened together with stainless steel bolts. The mounting Plates were made of two pieces of $\frac{3}{4}$ inch plywood laminated and painted with marine epoxy and fastened to the axle with angle iron and lag bolts.



The baskets were built on the plates one at a time and then removed for transportation to the riverbank.



The chutes were made short and wide to minimize the chance of injury as the salmon slide out of the basket.

Salmon accelerate to escape capture as the basket emerges from the water, so the catch areas of the fishwheel baskets were tapered to confine the fish to a smaller area.



Coated nylon seine webbing was used to cover the basket sides. Plastic coated wire mesh was used on the basket bed so that the fish would slide easily.



The stable rotation speed of the three-basket fishwheel and the predictable location of each captured fish worked well to ensure that the salmon were accurately delivered into the video camera chute.

The improvements to the fishwheel produced results that were immediately noticeable; far less salmon were observed with split noses as a result of hitting the basket sides, or with gill bleeding from impact damage that occurred in the chutes. The use of video capture allows for the close inspection of individuals; in this case 12 frames were captured of each fish throughout the season. Split noses are probably not fatal to salmon because the cut is in cartilage and does not result in blood loss. However, any damage is likely to create stress related problems which have unknown consequences. Covering the basket sides with nylon webbing is very effective in reducing this problem. Gill bleeding, on the other hand, which appeared as a red smear on the white bed of the video chute, is serious enough to be considered fatal. Most gill damage probably occurs in the basket chutes when the fish slap their heads against the boards. This is supported by the observations of the tagging crew at the Rapids fishwheels who see large numbers of salmon caught daily. Stan Zuray, the operator of the Raids tagging project, applied durable, closed-cell foam padding to the chutes of one fishwheel in 2002 with good results. The short-wide chutes were an improvement because they reduced the time that the fish were actually in the chute, and the possibility of salmon hitting their heads was limited because there was more space available.



There are no past records kept by the Project of the percentages of salmon that have been harmed in any of these ways, but it is the impression of the operator that the numbers have always been very low. Nevertheless, any improvements that result in less damage to the resource will also help refine fishwheels as tools for low-impact data collection.