

## What Makes a Fishwheel “Fish Friendly”

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For 20 years now the concept of a fish friendly wheel for releasing fish back into the river “unharmful” has been developed, studied and fine-tuned at Rampart Rapids (mile 731) on the Yukon River. Just as we found problems with what was standard practices in 1996 using fishwheels to run abundance and run timing studies so in the future new and critical problem areas may be found. The areas of concern below however have withstood the test of time through many years of observation by USFWS biologists and technicians, numerous studies (USFWS and NMFS), and finally fishermen in the Rampart/Tanana area on a continuous yearly basis between 1996 and 2014.

### *Listed in order of importance:*

1. **Livebox** - Any use, no matter how short, of a livebox in a fishwheel catch and release fishery has to be prohibited. Proven harmful in multiple studies even under the best of circumstances.
2. **Seine Webbing and no Poles on Sides** - Normally wire is used to cover the **sides** of fishwheel baskets and pole bracing is used in this area to strengthen the sides. Wire (welded wire mesh, “chicken wire” and chain link) needs to be replaced with heavy seine webbing so as to reduce (basically eliminate) nose and head cuts. Elimination of pole bracing and the then required use of stronger perimeter basket poles, eliminates the busted up noses commonly seen. These two injuries are much too numerous for any catch and release situation because of the common practice of fish to dart sideways, mostly towards the river or outside of the fishwheel basket, when being caught.
3. **Fishwheel Basket Bed** - Here the fish need to slide on their sides quickly without any gill plates getting ripped open or off. Chain link is the extreme example of lots of gill hooking damage. Loose baggy seine webbing here is the worse for delayed sliding and subsequent long hard drops to basket chutes (cause of most bloody gills). Best bed found so far to be 1x1 welded wire used in the lobster/crab pot industry.
4. **Padded Chutes** – This is extremely important as it is the main cause of bloody ruptured gills in fish. Basket chutes need to have minimum 5/16” closed cell foam contact cemented to all surfaces of the basket chutes. This should also be done to the sides of the release or video chute and any other areas the fish will contact on their travels back into the river.
5. **Lined up Basket and Release chutes** – Many fishwheels have axles that can be raised or lowered for different running conditions. When doing so a fish friendly wheel must have the ability to raise or lower the release or video chute to line up with the basket chute so the fish are

transferred from one to the other without damage (mostly bloody gills) due to dropping to much from one to the other.

***Some things of note:***

In the beginning of 1996, modifications were done to 2 different designed fish wheels to try to make the first and most obviously needed fish friendly changes. Looking back at those traditional fishwheels now and being familiar with traditional designs on the river today I must say it would be very hard to correctly apply the fixes for the 5 problem areas mentioned to many of them. Some fishwheels have baskets mounted in a way that it makes it virtually impossible to direct fish in a consistent manner out of the baskets and into a single release chute safely. My point here is fish friendly really needs to be thought about before a wheel is built and the wheel built around the features. We need to get this right. We don't need new fisheries on the river that are going to do more harm to an already devastated species.

***Links of relevance:***

[http://rapidsresearch.com/html/capture\\_mortality\\_.html](http://rapidsresearch.com/html/capture_mortality_.html) - Here is some of the studies done on mortality in liveboxes and other information.

[http://rapidsresearch.com/html/fish\\_friendly.html](http://rapidsresearch.com/html/fish_friendly.html) - This webpage has more in depth information on the categories of concern listed in this condensed paper. Also there are pictures of the fish friendly features in use and wheel operation comments plus two short videos of fish friendly wheels operating.

<http://rapidsresearch.com/html/fishwheels.html> - Many fishwheel pictures - some fish friendly.

***Research and work on this issue has been the accumulation of numbers of individual's efforts - some main people:***

- Tevis Underwood, Dave Daum (retired) and Randy Brown with the USFWS in Fairbanks for long term development of the fish friendly concept and work which continue to this day.
- John Eiler with the National Marine Fisheries Service for a conducting a two year radio telemetry studies into livebox harm with the USFWS.
- Stan Zuray has been operator of the test wheels at Rampart Rapids since 1996 and is present CEO of Rapids Research Center.