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What Is the Whooshh Salmon Cannon? - Flylords Mag

Will Poston

8-10 minutes

Since the invention of the dam, the movement of migratory fish has been impeded. Until recently, fish ladders have been the main means of getting around the problem of a giant concrete wall in a river, but that's where [Whooshh](#) comes in. This system safely moves salmon and other migratory fish over dams in less time and with fewer resources than a traditional fish ladder. Over the last few weeks a video of [Whooshh's](#) "Salmon Cannon" has gone viral, so we got in touch with the team behind the invention to find out how they work, and how this ingenious system developed!



A view from the scanner
at Feather River





Flylords: How did the idea for the Whoosh Salmon Cannon come about?

Whooshh: The company has its roots in agriculture, interestingly enough. The technology was first developed to mechanically and automatically harvest tree fruit without damaging it. There were a couple of “a-ha” moments, however, that helped underscore the need for this technology as it applies to fish: A few years back, Whooshh employees were testing the agricultural equipment in orchards in Washington State and saw helicopters flying overhead with buckets. When they asked what was happening, they were told that fish were being moved over a nearby dam. That began the wheels turning toward considering that there must be a better way. The other “a-ha” moment came after Whooshh employees had visited a citrus orchard two summers in a row. During the second summer, everything was dying because the water had been redirected due to conservation requirements. Based on these and other factors, our company’s founder, Vince Bryan, wound up pivoting toward developing the technology for moving live fish safely and efficiently over barriers like dams, and toward saving water in the process.





Image of the Whooshh Passage Portal(™) currently being deployed on the Columbia River. This one is poised to move to the base of the Chief Joseph Dam next week. Chief Joe is the farthest point along the Columbia that fish can go.

Flylords: How did the current design come to be?

Whooshh: The Whooshh Passage Portal™ is new this year, and it is a full-system, all-in-one assembly of several components we have created over the last few years. This combines our attraction flow features, scanner, sorter, and transport systems onto one barge-mounted system.



Flylords: What was the testing process like?

Whooshh: Arduous; though it should be in order to prove that no harm comes to the fish. There have been approximately 20 independent studies done to show things like no stress, no scale loss, eye damage, etc. Please visit our web site at www.whooshh.com and see our [Studies](#) page.

Flylords: Where was the first Salmon Cannon installed? How many are running today?

Whooshh: The first unit we sold was to the Washington State Dept. of Fish & Wildlife and they use it within their hatchery system. Different versions of the system have run in 20 different locations since. Some of our systems are with WA tribal entities and we have others in use in Norway and just shipped to Sweden, as well. We are planning to implement our full Passage Portal™ system at the Chief Joseph Dam later this month, which will demonstrate volitional entry, scanning, sorting, transport, and exit.

Flylords: How to the salmon utilize the cannon? Are people needed to load the fish into it?

Whooshh: Contrary to what many think, people are not needed. The systems can run autonomously. I'll explain in a moment, but first some context in light of some recent video that has circulated. Earlier this week, a video of our system

went viral, gaining over 24M views and generating media coverage from all over the world. While that has been great PR, the video that was put together used footage showing a scientist hand-feeding the fish into the system. That was five years ago, and we've come a *loooooong* way since then. Our systems now feature volitional entry, and it works like this: The salmon swims into the system, usually via a denil, which is a short ramp, which features an attraction flow and is somewhat like the first step of a fish ladder. Upon cresting the denil, they then slide back down a slight slope and through a scanner, where 18 rapid-fire images are made which can measure length, girth, hatchery vs. wild, etc. That half-second of data-gathering drives a quick sorting decision which then routes the fish into the appropriate lane for transport based on size (or completely out if invasive species, or bypassed if it doesn't fit the programmed criteria for that site). Upon being routed, they are gently accelerated, using the principle of pressure differential, and gently glided through a soft flexible tube that is misted every 5 feet. The mist is important so that the fish can glide, still, exchange oxygen through its gills, and have the colder water they typically seek. There are sensors throughout and toward the end of the transport, they can then be decelerated to deposit them into the forebay on the other side of the dam.

It is important to recognize that the salmon are on a migratory journey to spawn. For a salmon carrying anywhere from 3000-5000 eggs, a calm ten-second glide is far superior to a day straining to climb a concrete fish ladder or being handled

by humans to be transferred into a truck. This has broader ramifications for fisheries recovery, as well. The more fish you can get safely upriver to spawn, the more fish that you can get coming back down to embark on their own migratory cycles (exponentially more, actually, remember 3-5000 eggs each). Yes, there are obstacles all along the way, but if even if half of the smolt make it back down, you're still ahead of the game as compared to if the fish was not able to get up to spawn in the first place.

Incidentally, one of those obstacles for smolt are invasive species. I briefly touched on the fact that the scanning/sorting technology can identify and sort out invasive species. One of our scanners is currently making the rounds in the Midwest, gathering images of the various fish in the waters throughout. These images will be used to build the algorithms that go into our scanning/sorting components. The goal will then be to take on the invasive carp issues in the Midwest. Walleye? You may pass. Asian carp? Out!



Flylords: Does the trip have any effects on the fish?

Whooshh: Yes. They have more energy to continue farther, faster toward their spawning grounds. A study that was done at the Priest Rapids Dam compared tagged fish and fish that were passed using Whooshh. The Whooshh fish clearly outdistanced the tagged fish. In addition, cortisol levels (indicators of stress) were analyzed in a study conducted by SINTEF in Norway. This showed no elevated levels. Again, please visit the [Studies](#) page of our web site. If you view a video of the fish in the tube, you can see them behaving as though they are swimming. Since they are channeling water through their gills and moving forward, they appear to believe they are swimming, moving their tails as they glide forward.

As a “fish first” company, we’ve tried to think of everything to help resolve issues for fish. From gentle passage to culling out invasive predators, to making it easy and affordable for humans to implement, we’re proud to bring technology to benefit nature in this way. So, if you know of sites that have fish passage or invasive species issues, let us know, we’d love to help!

What I think is important to note overall is that new ways of thinking are needed for this problem. While we have seen so many other fields benefit from clever design and technological innovation when it comes to fish passage, the technology has remained the same: fish ladders and trucks are still being used just as they were 60 years ago. Henry Ford once said, “If you always do what you’ve always done, you’ll always get what you’ve always got.” For fisheries restoration, that’s not good. Technology is available to really make a difference in

bringing benefit to nature. Seems we owe them one.

Big thanks to Whoosh Innovations for sharing their story and more details about their revolutionary system. To learn more, head to their webpage: Whooshh.com!

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