

Answers to Questions Asked During the Whooshh Webinar

Does the Whooshh system always require someone to hand feed the fish into the tube or can the fish enter the tube volitionally?

There are both hand-fed and volition options available – a demonstration of a volitional entry system is currently being tested at Buckley Dam on the White River near Buckley, Washington.

What are the slope limitations for this system?

According to Todd Deligan at Whooshh, they like to operate the WFTS at a maximum of 40–45 degrees.

Specifications on current and proposed systems are available on the Whooshh website.

On the graph showing the acceleration through the Whooshh, are these in hundredths? Otherwise it shows 14g

The data shown are accurate. Please refer to the memo titled “Sep 23 2015 Memo_Aproved.pdf” that provides a detailed explanation on the results of the measured acceleration within the WFTS.

I was wondering how many g's fish can experience before it becomes a problem?

Please refer to the memo titled “Sep 23 2015 Memo_Aproved.pdf” that provides a detailed explanation on the results of the measured acceleration within the WFTS.

Alison mentioned species and size in her conclusions... Any early testing for pacific lamprey or white sturgeon? Are there size constraints?

According to Todd Deligan at Whooshh, Alden Labs and EPRI will be doing a test of the system on sturgeon this October. Testing of lamprey and American eel passage will be next.

Alison, you mentioned three pressure sensors on the fish (including two external and one internal pressure sensor). The graph showed the two external sensors. Did the internal sensor show similar results?

The pressures shown on the graph presented in the presentation were from Sensor Fish that were externally attached; however, the acceleration values are only from the internal Sensor Fish. Please refer to the memo titled “Sep 23 2015 Memo_Aproved.pdf” that provides a detailed explanation on the results of the Sensor Fish study.

I am curious if there is a proposed method for cleaning the Whooshh so to decontaminate any potential diseases of passed fish?

Per Todd Deligan at Whooshh: “We clean every day in the seafood processing application and this is something that is part and parcel of each system.”

Per Mark Johnston: Most diseases that fish carry are internal, so there is not much of a concern of fish passing diseases. They only pass wet foam balls through the tube to wet it, but nothing to decontaminate it. They do know that decontamination techniques are used on Whooshh systems that are used in the food processing industry, because of food regulations.

Per Brian Bellgraph: This would be a good follow-up study to look at the potential for disease transmission, especially if there are open sores on passing fish, that could lead to potential exposure.

Have there been any cost comparisons between the Whooshh system and traditional fish handling techniques?

As far as we (PNNL) know, there has not yet been a thorough, formal cost comparison examining all aspects that are needed for fish attraction, passage, etc.

Per Casey Baldwin, it's likely that there would be significant cost savings.

Per Stephen Smith, the UCUT salmon reintroduction proposal has a task in it to compare costs of various options of passage of adults and juveniles past Grand Coulee and Chief Joseph dams.

What is being done to coordinate a pilot project to test the system at a high head dam that would benefit all interested agencies?

Per Stephen Smith, a more robust test of the system is being proposed and if results are promising, then they would like to propose it for use at Grand Coulee Dam with cooperation among all interested agencies in that project.

Is each Whooshh system designed to be site specific or can a single system be used in a mobile application at multiple sites?

Per Todd Deligan at Whooshh: "Systems can be used at various locations", and "Sizing of a mobile system is also flexible as we can use different size tubes".

Just some clarification...were the PNNL studies conducted with a flat Whooshh tube?

Yes, the PNNL studies were done with a Whooshh tube that did not have elevation gain (or decrease).

How was the acceptable accelerations and shear stresses determined for the test fish? More than a few g's of acceleration seems detrimental. It can be for humans, for example in high acceleration airplane flights humans require G-suits to sustain blood flow to the brain and maintain control.

Please refer to the memo titled "Sep 23 2015 Memo_Aproved.pdf" that provides a detailed explanation on the results of the measured acceleration within the WFTS.

Are there differences in the effects of Whooshh on "green" vs "ripe" females?

Per Alison Colotelo, all females were very close to ripe, or were ripe, so we were not able to test that.

Per Mark Johnston, all fish that they Whooshh are green – they are Whooshh'ed in June, but do not spawn until September or October. They did not see any impact of the Whooshh on green fish pre-spawn mortality.

If there is less water needed for the Whooshh system compared to a fish ladder what is used to attract fish the entrance of the system.

Per Brian Bellgraph: Water would still be used to attract fish to the entrance of the system, but in Whooshh's case, the water could first be routed through the dam to produce electricity, and then used to attract fish into an attraction area where they would then be Whooshh'ed. Conversely, in a typical fish ladder system, the water used in the fish ladder is not able to produce electricity.

Per Stephen Smith: Water could also be pumped from the tailrace of a dam and used as attraction flow for Whooshh, which would use less energy than if water were routed through a fish ladder.

Per Mark Johnson: 5 cubic feet per second is used to attract fish to the Whooshh system in the Yakima River.

How often (number of fish) does the Whooshh tube need to be cleaned?

Per Todd Deligan at Whooshh: "We clean it everyday in the seafood processing application and this is something that is part and parcel of each system."

Per Alison Colotelo there is no known standard for cleaning.

Per Mark Johnston, the sponges were run through the tube once at the beginning of the day, and once at the end of the day. No cleaning agents were used.

I question the scale of the acceleration. 10 G's of acceleration can be detrimental for humans. 25 G's for fish seems very high to only have moderate impacts.

The data on acceleration presented in the webinar are accurate. Please refer to the memo titled "Sep 23 2015 Memo_Aproved.pdf" that provides a detailed explanation on the results of the measured acceleration within the WFTS.

Do the current cost and operating estimates include the attraction, collection, and sorting facilities the Whooshh will require for large volumes of fish at high head dams?

As far as we (PNNL) know, there has not yet been a thorough, formal cost comparison examining all aspects that are needed for fish attraction, passage, etc.

Per Casey Baldwin: For the upper Columbia reintroduction proposal, their first desire is to understand the effects on fish of long passage through the tube, etc., and looking at cost comparisons will be a subsequent step.

Regarding the checks for injury on the fish, were there comparisons made pre and post using the ultraviolet light test or just post?

Per Alison Colotelo, fish were only examined after passage through the WFTS. However, the control fish were also examined (with no Whooshh transport) and were the basis of comparison with the fish that had passed through the tube.

Will there be a cost analysis of Whooshh versus trap-and-haul versus fish ladder?

Per Stephen Smith, the UCUT salmon reintroduction proposal has a task in it to compare costs of various options of passage of adults and juveniles past Grand Coulee and Chief Joseph dams.

Will the 2014 tests be replicated (fluorescein dye, length of tube)?

Per Alison Colotelo, and assuming this question has to do with testing the volitional-entry system, then this study, including the use of fluorescein dye and length of tube, would ideally be replicated in the future.