

WHOOSH

YOUR PATH TO FISH TRANSPORT SUCCESS



66th Annual NW Fish Culture Concepts



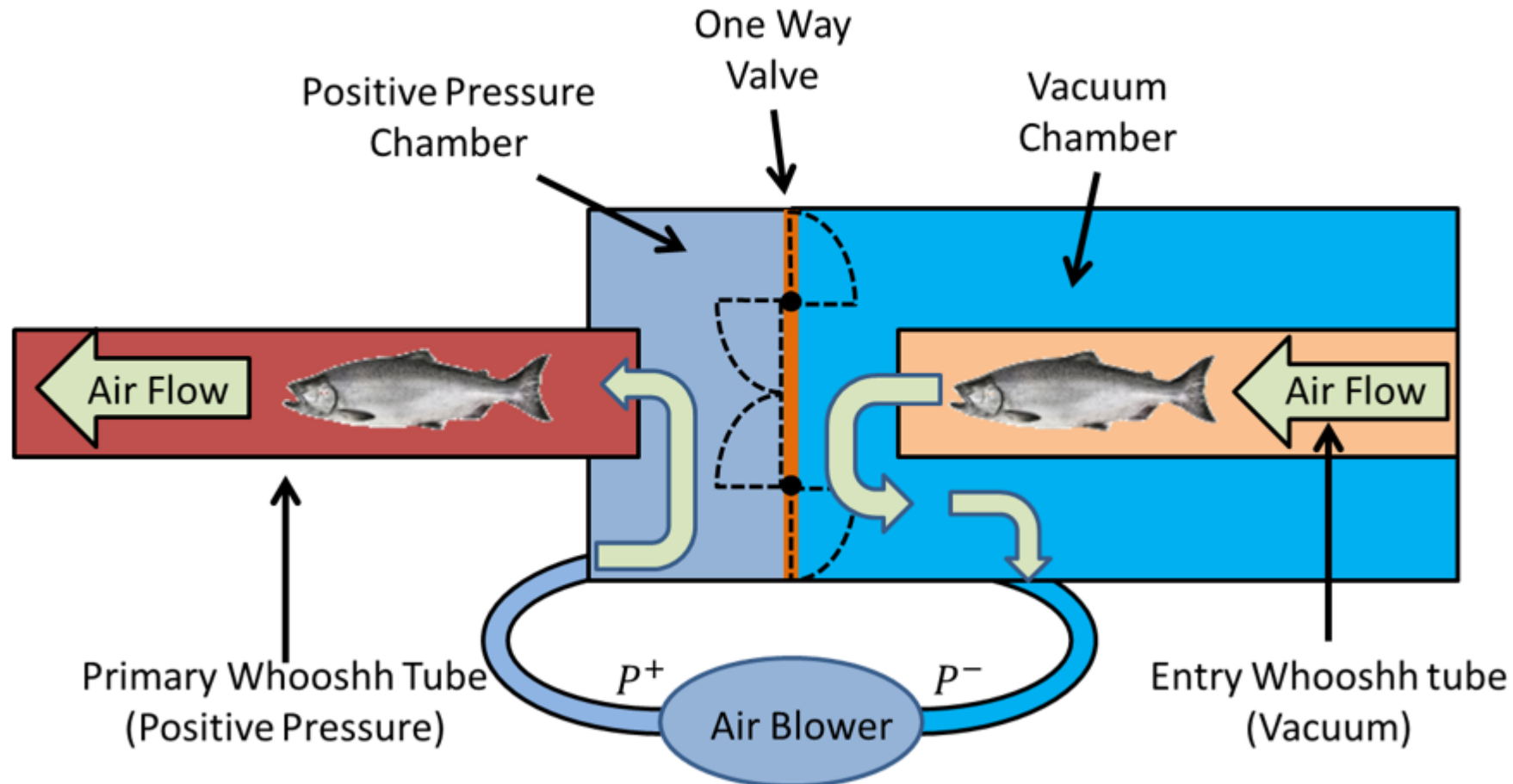
WHOOSH UPDATE – 2014-2015



- Eric Kinne at 65th NWFCC
- Yakama Nation testing results
- PNNL testing results
- Volitional entry testing
- RAS testing
- White River installation
- Hatchery testing
- Washougal second year
- Sturgeon/carp testing

WHO ARE WE AND HOW DOES IT WORK

Accelerator



Length	>230 m or 750 FT
Maximum Incline	~40 deg
Height	>100 m (328ft)
Minimum Corner Radius	3 m (9.8ft)
Maximum Throughput	1 per sec (i.e., 86,400 per 24 hrs) *
Minimum Throughput	10 per min (i.e. 8,640 per 24 hrs)*
Tube Sizes	T- 123 (Ex. Pink) T- 147 (Ex. Steelehead) T- 158 (Ex. Coho) T- 195 (Ex. Chinook)
Average Pressure around Each Fish	0.069 bar/1 psi
Maximum Pressure around Each Fish	0.275 bar/4 psi
Power Consumption (3 Phase, 240, 56 Amp)	5-20 kW, depending on length of tube
Water Used for Lubrication	0.5 liters/minute average
Flow Master (Attraction Flow)	5 Ft Head & 10 CFS

WASHOUGAL WEIR MOBILE SYSTEM: SEPARATION OF WILD FISH FROM HATCHERY FISH

“The process is much easier on fish than the old method.” - Eric Kinne, WDF&W Hatchery Reform Coordinator

“It’s definitely much more efficient. It’s less handling for the fish, too.” - Elise Olk, WDF&W Scientific Tech



ROZA DAM: YAKAMA NATIONS CONTROLLED STUDY



“The fish fly right through without so much as a scratch. Also, you won’t have to divert water, as you do in a ladder system. Out here, the economy is all about agriculture, and water is gold. That’s what makes Whooshh such a great concept.”

--Mark Johnston, Research Scientist – Yakama Nation Fisheries



ROZA DAM STUDY RESULTS

Summary:

40' Whooshh Fish Transport System

554 Spring Chinook
(Wild & Hatchery Control)

Collected: May - June

Held: May - October

Spawned: September - October

Results:

Mortality rate of “whooshed” fish
= half of traditional method

CHINOOK	H&H	WHOOSH
Mortality Females	4.2%	2.3%
Mortality Males	14.6%	9.1%
Mortality Total	8.8%	4.6%

Egg survival percentage statistically
equivalent (783,495 eggs)

CHINOOK	H&H	WHOOSH
Hatchery Control	98.3%	98.7%
Wild/Natural	94.6%	92.1%



PACIFIC NORTHWEST NATIONAL LABORATORY STUDY RESULTS

PNNL Study:

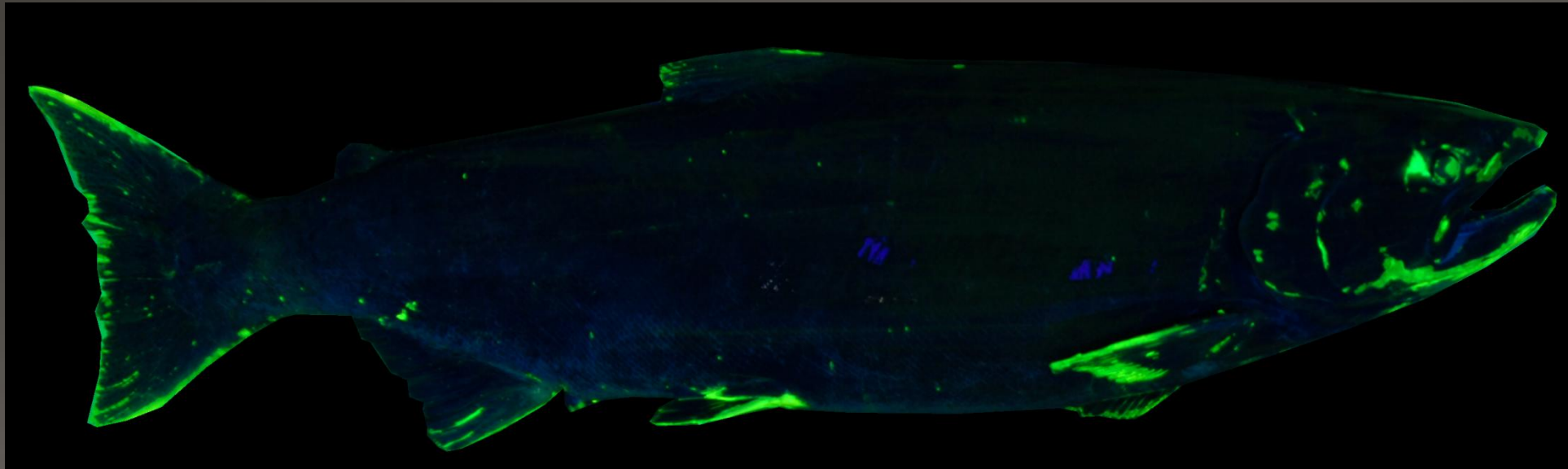
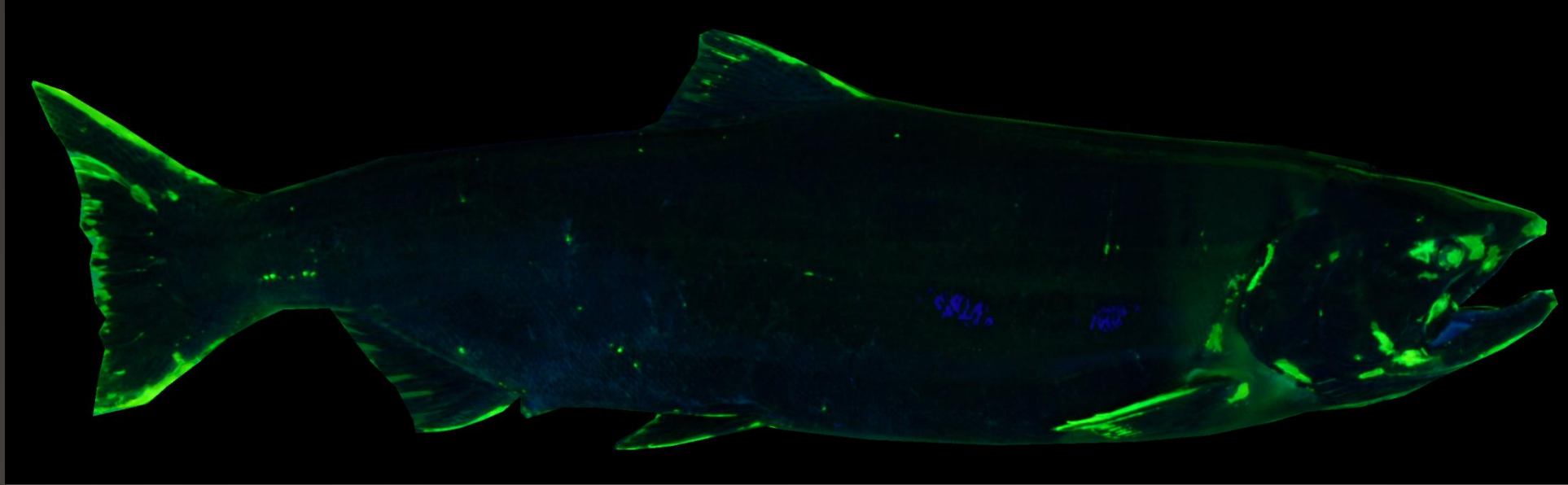
PNNL evaluated the efficacy of this technology with adult fall Chinook Salmon (*Oncorhynchus tshawytscha*) by comparing the physical, physiological, and reproductive effects of passage through two different lengths (40' and 250') of the Whooshh Fish Transport System (WFTS) to trap and haul, a standard method used to move fish around in-river barriers.



Key Findings:

- ✓ No mortalities or obvious signs of injury to fish.
- ✓ Immune responses and egg survival similar between Whooshh and trap and haul.
- ✓ Effects of Whooshh comparable or better to that of a trap and haul.

PNNL FLUORESCCEIN COMPARISON WHOOSH V CONTROL – FINDINGS VIRTUALLY SAME



PNNL WEBINAR

Presenters: Allison Colotelo (PNNL), Mark Johnston (Yakama Nations) and Steve Smith (UCUT)

- ✓ PNNL Results mentioned above
- ✓ Findings from the Roza Dam study
- ✓ Discussed using Whooshh for Chief Joseph & Grand Coulee and optimistic that a distance feasibility study to occur in near future.

<https://pnnl.eventbuilder.com/view?eventid=y6s5l5>

*Please Register and then Presentation will begin



BUCKLEY DIVERSION DAM: WHITE RIVER (WASHINGTON)



<http://youtu.be/OGWT0eggBVM>

BUCKLEY DIVERSION DAM & SIDE CHANNEL

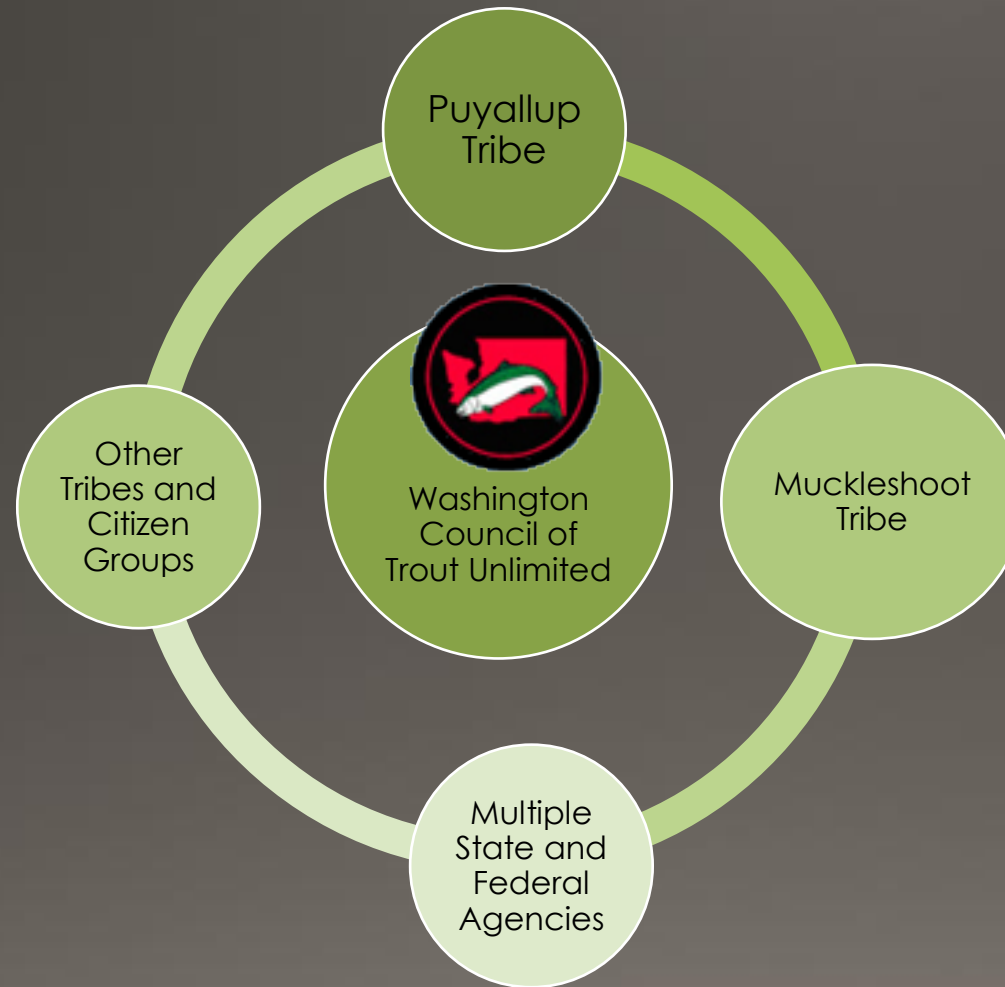


BUCKLEY PROJECT PARTICIPANTS

OPERATION DATE 8/19/15

“Additionally, NMFS
can approve testing
at Buckley.

Aaron Beavers, NMFS



SPECIES – TO DATE

TROUT, SALMON, STURGEON, INVASIVE CARP

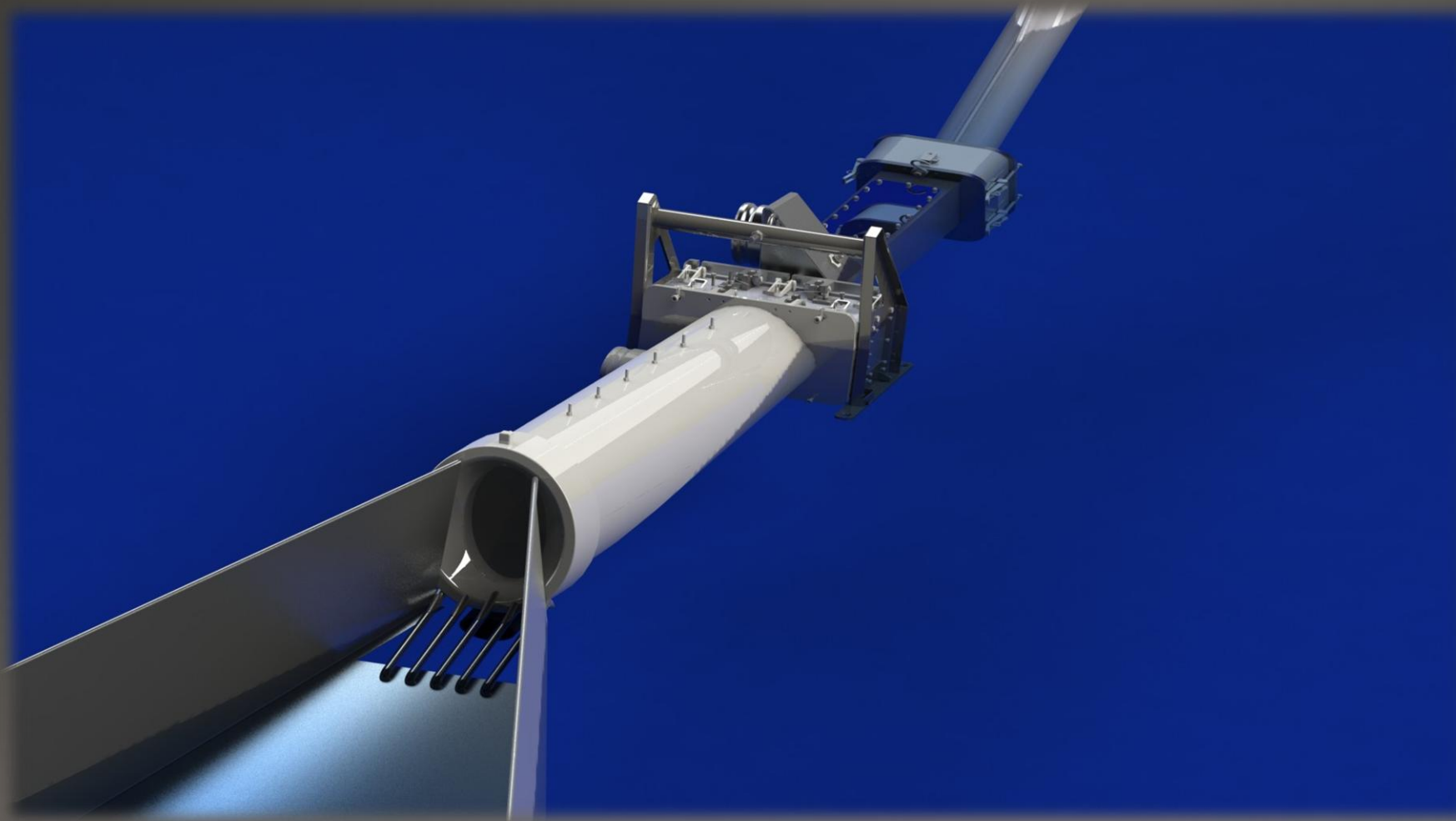


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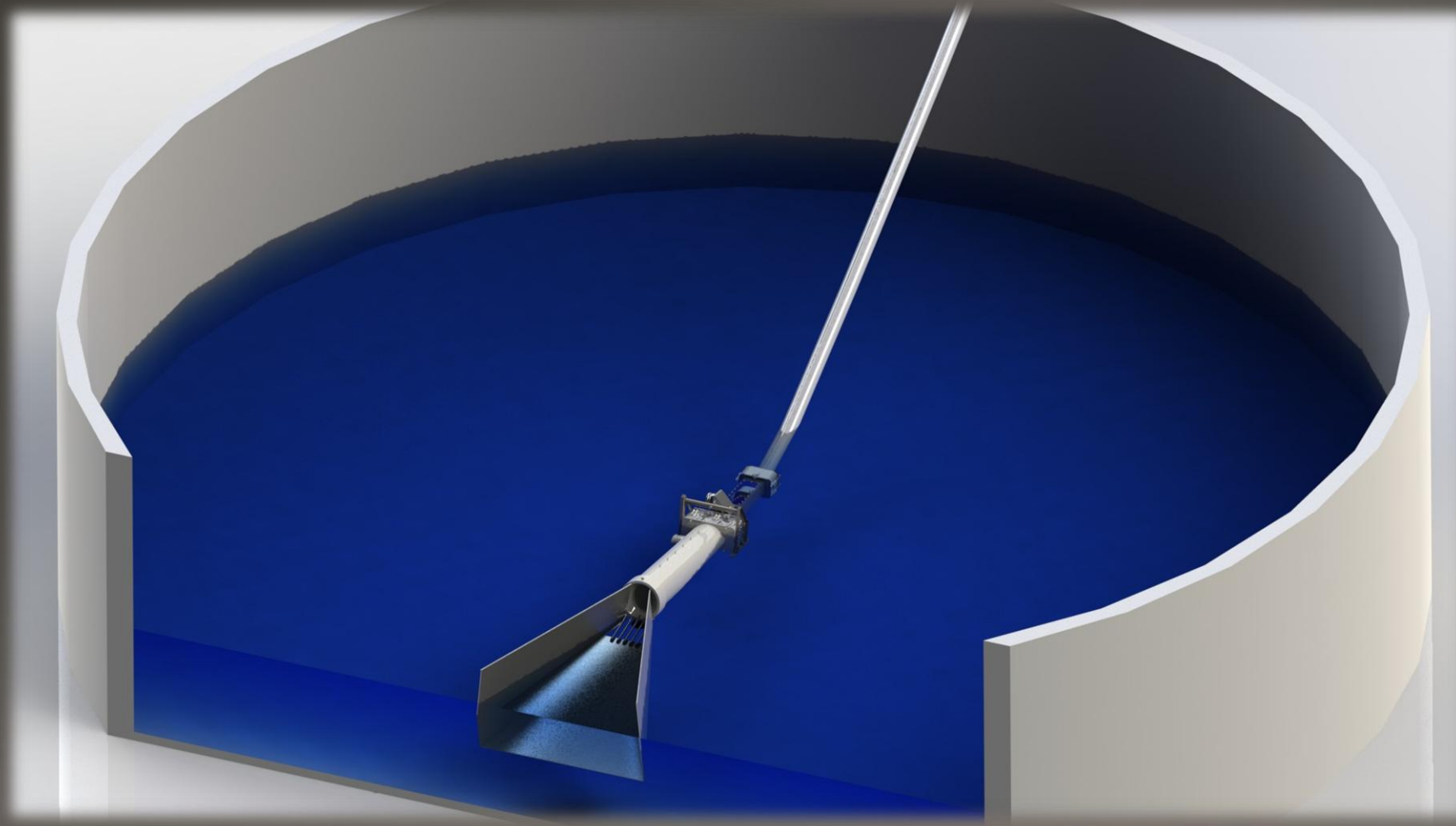
PERMANENT INSTALLATION DESIGN



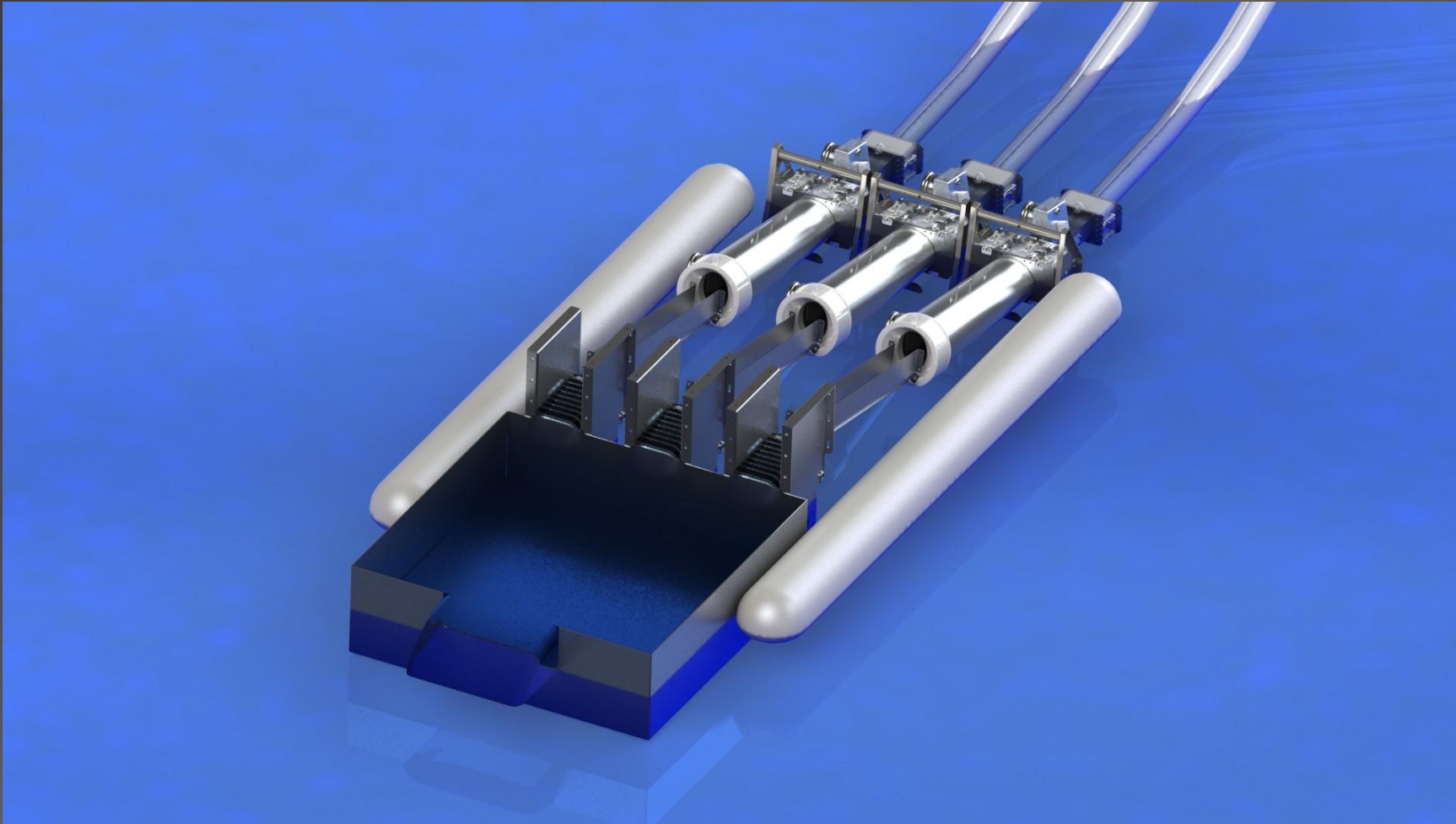
ASSISTED ENTRY DESIGN



TANK ASSISTED ENTRY DESIGN



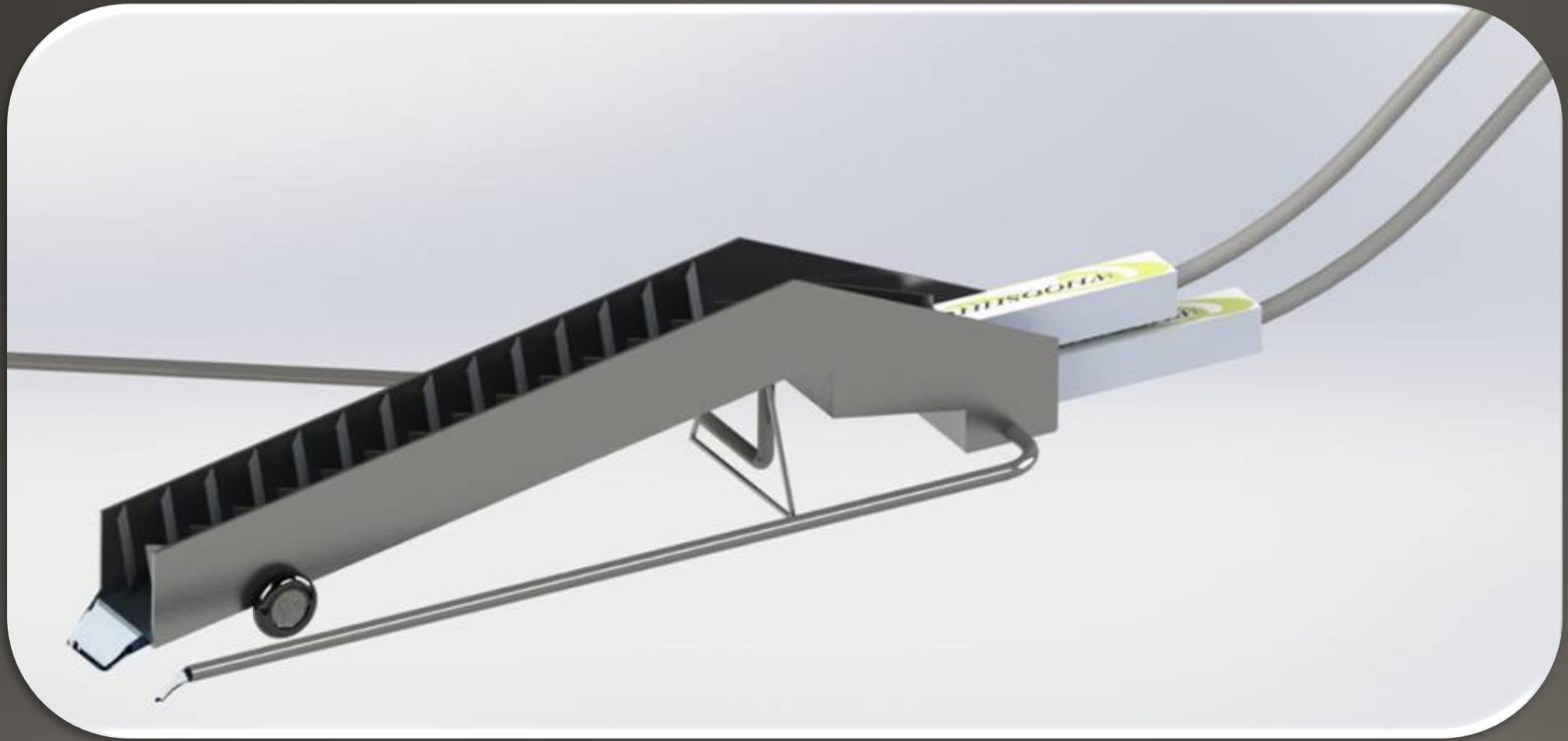
PEN ASSISTED ENTRY DESIGN



MOBILE SYSTEM



VOLITIONAL SEASONAL ENTRY DESIGN

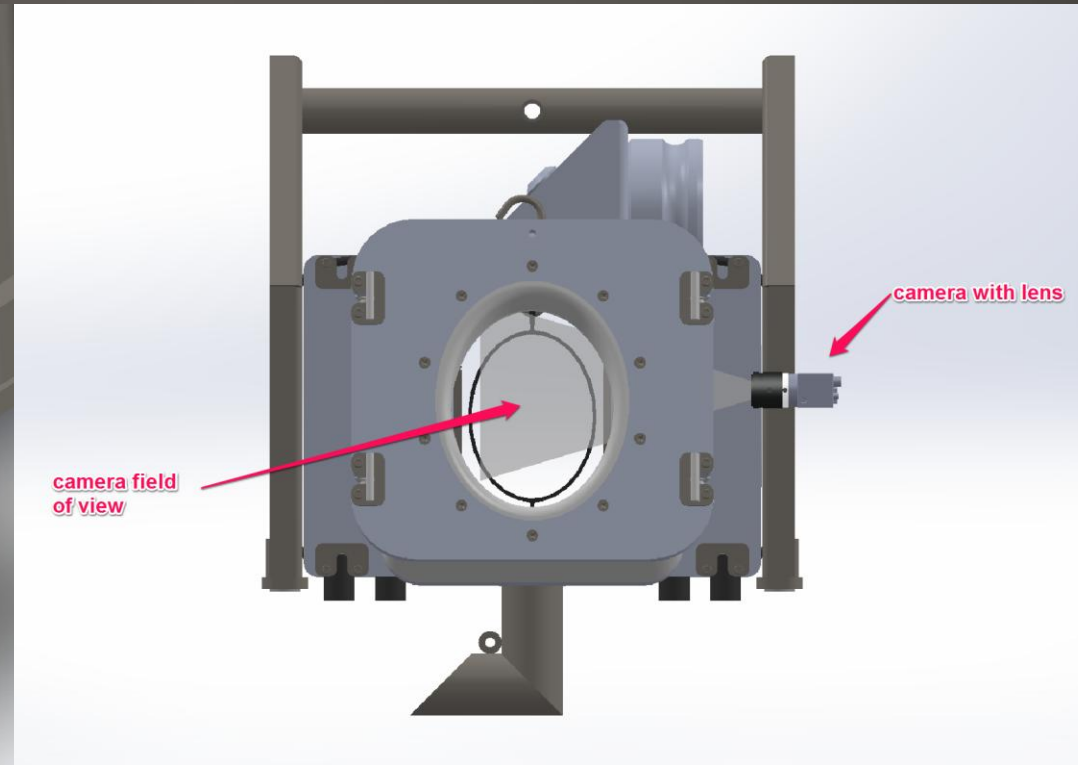
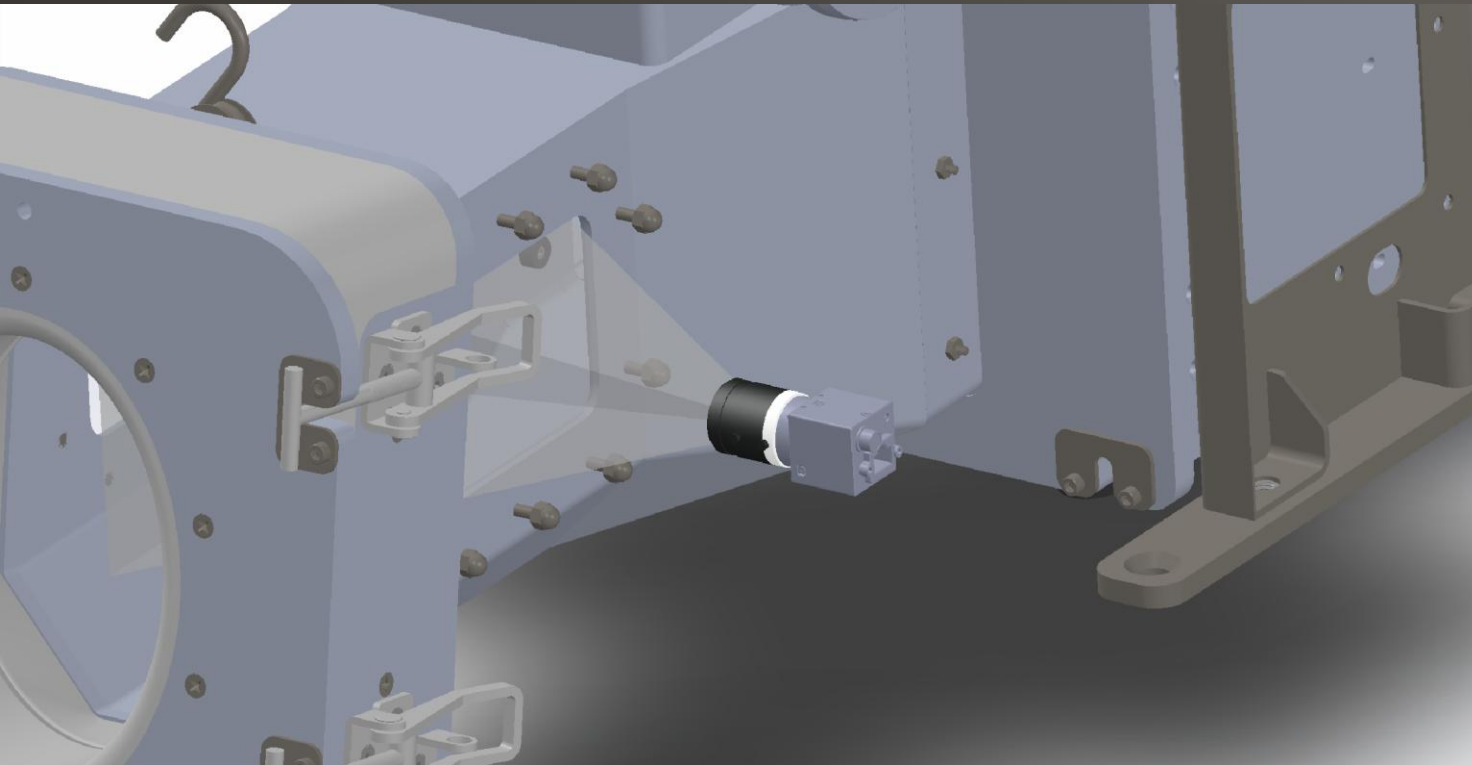


More Success Ahead

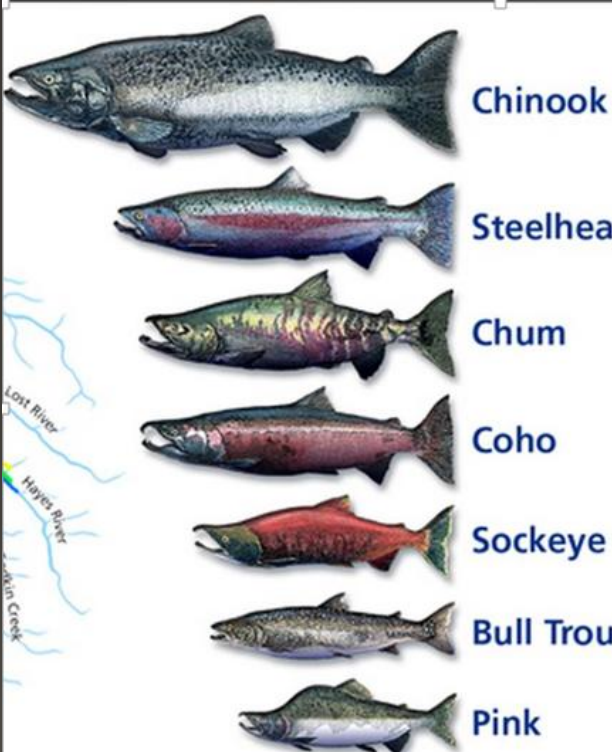
PROJECT DESIGNS IN DEVELOPMENT



OTHER COMPONENT OPTIONS: SCANNING SORTING DATA COLLECTION



OTHER COMPONENT OPTIONS: SIZE SORTING - WIDTH & LENGTH



Chinook

Steelhead

Chum

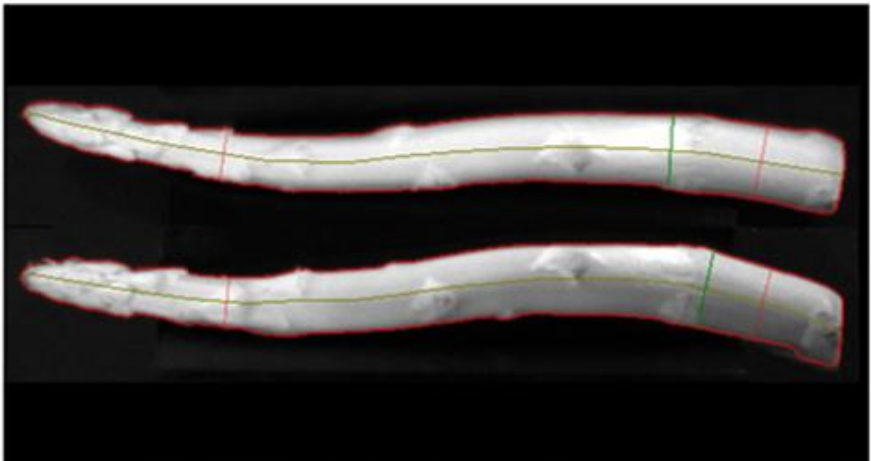
Coho

Sockeye

Bull Trout

Pink

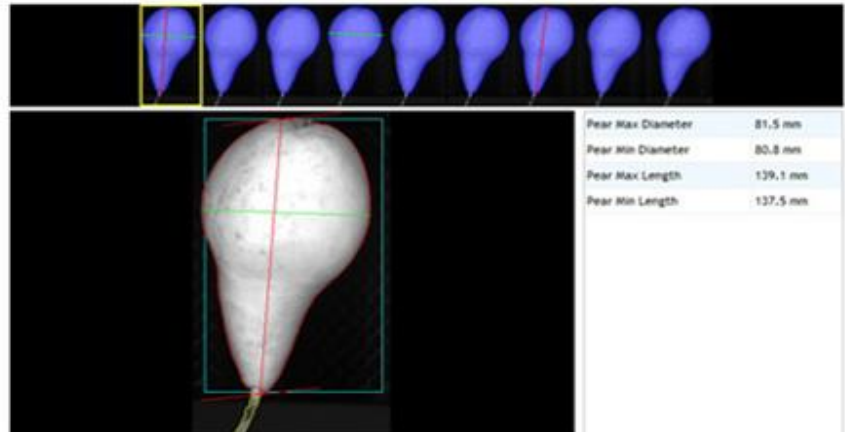
Size result



☒ Show filtered contour ☐ Show centerline with crosses ☐ Show coarse centerline

	Asparagus length	Asparagus diameter	Asparagus S-factor	Asparagus curvature	Asparagus spreading
Total result	218.9 mm	20.8 mm	477.7	43.5	2
Show	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Image 1	218.9 mm	19.8 mm	477.7	34.7	1
Image 2	216.5 mm	20.8 mm	462.7	43.5	2

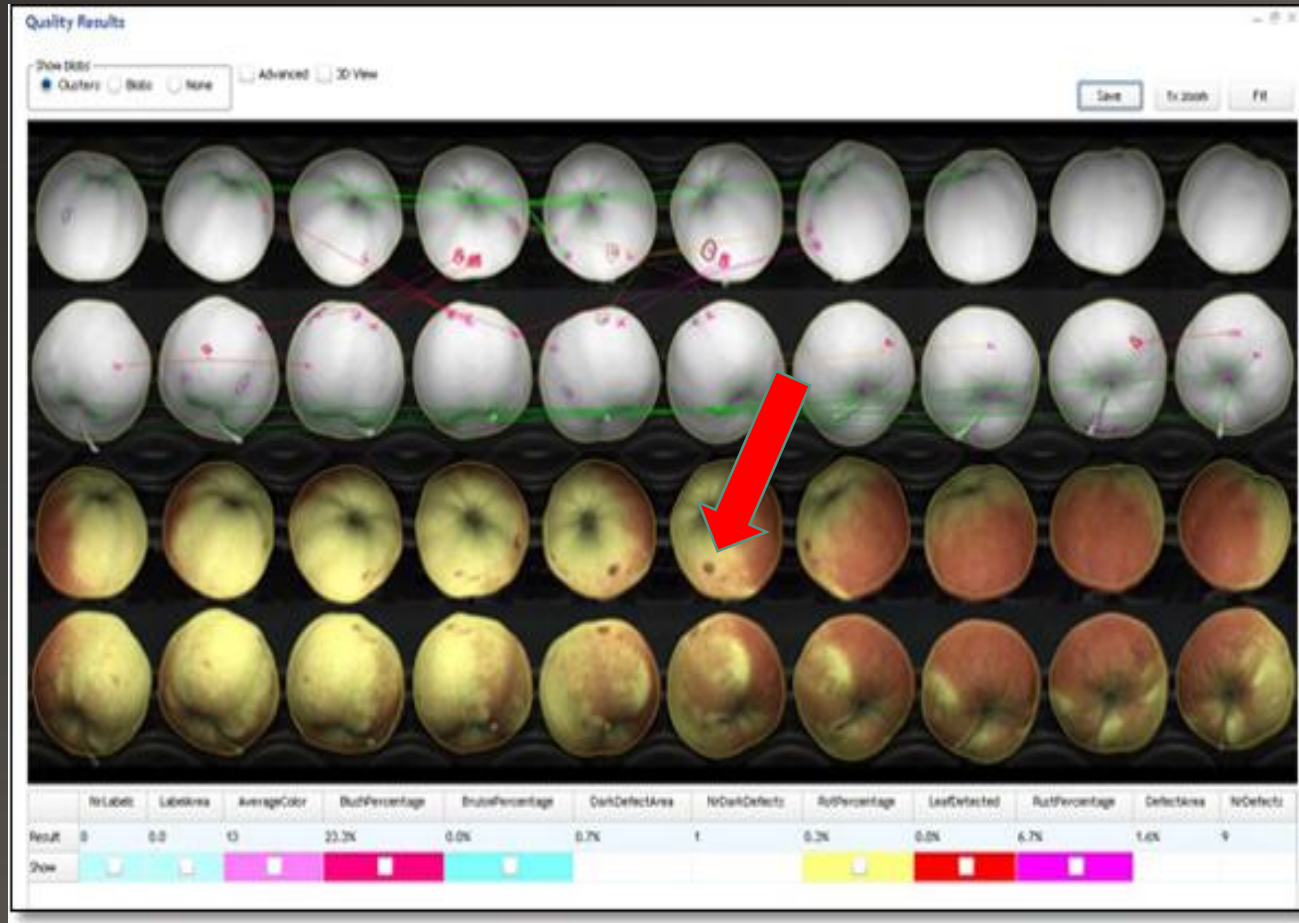
Size results



Pear Max Diameter 81.5 mm
Pear Min Diameter 80.8 mm
Pear Max Length 139.1 mm
Pear Min Length 137.5 mm

	Included	Diameter	Length
Show	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Image 1	<input checked="" type="checkbox"/>	80.8 mm	137.5 mm
Image 2	<input checked="" type="checkbox"/>	81.2 mm	138.0 mm
Image 3	<input checked="" type="checkbox"/>	81.2 mm	138.3 mm
Image 4	<input checked="" type="checkbox"/>	81.5 mm	138.6 mm
Image 5	<input checked="" type="checkbox"/>	81.5 mm	138.8 mm
Image 6	<input checked="" type="checkbox"/>	81.5 mm	138.8 mm
Image 7	<input checked="" type="checkbox"/>	81.5 mm	139.1 mm
Image 8	<input checked="" type="checkbox"/>	81.5 mm	138.7 mm
Image 9	<input checked="" type="checkbox"/>	81.5 mm	138.5 mm

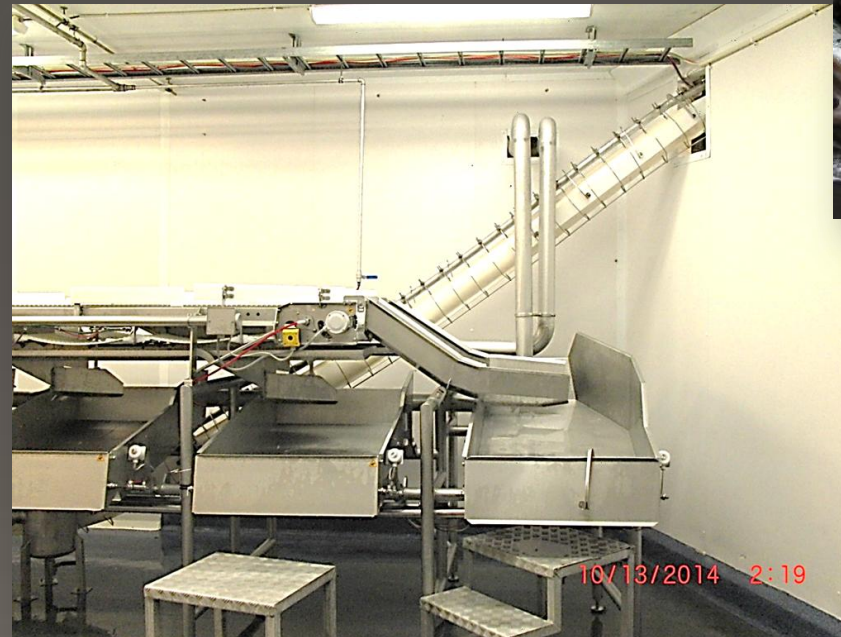
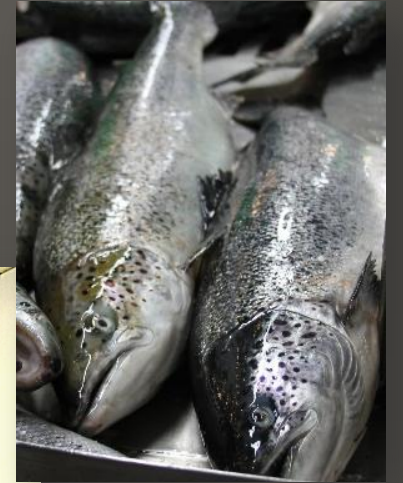
OTHER COMPONENT OPTIONS: ADIPOSE FIN CLIP RECOGNITION OR LICE SORTING?



NORWAY: AUSTEVOLL AUTOMATED PROCESSING INSTALLATION

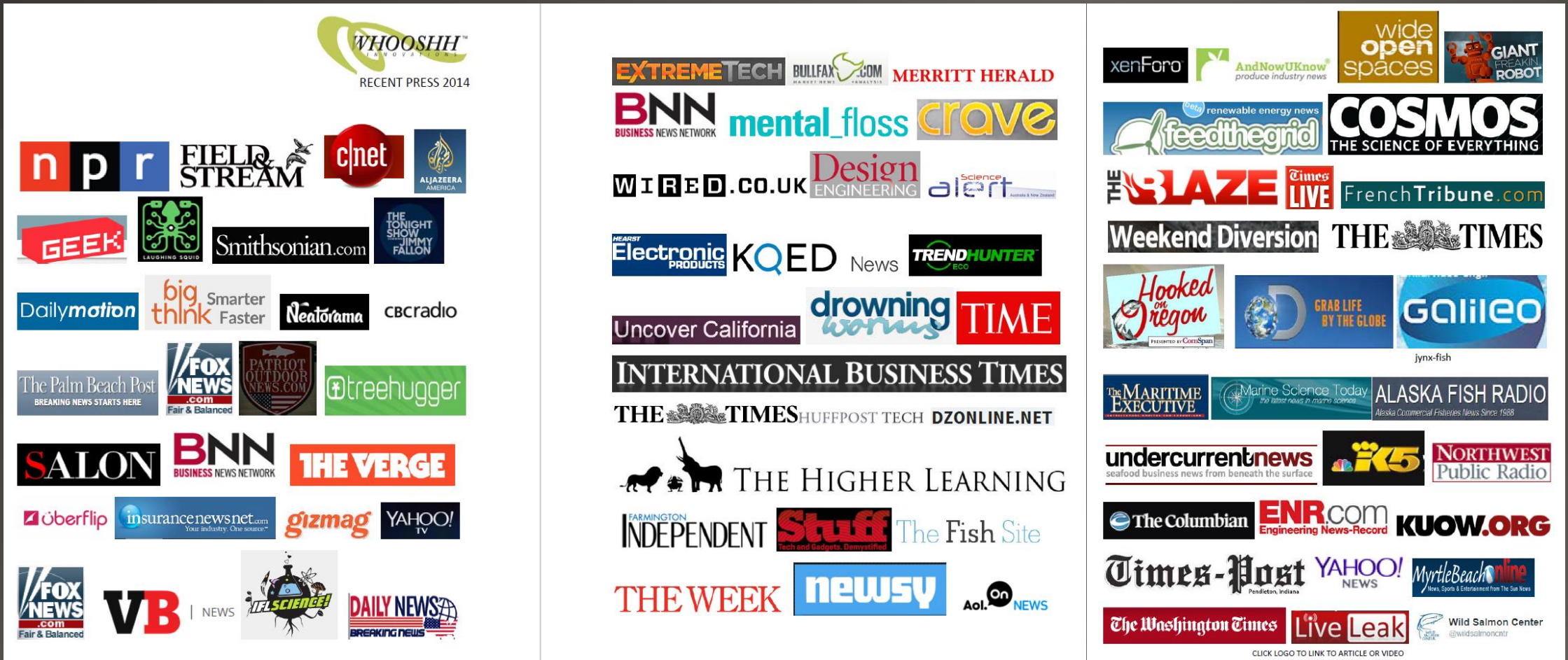


- ✓ Atlantic salmon (*Salmo salar*)
- ✓ 20-40 tons fish/day
- ✓ Installing a second line in Nov.



<http://youtu.be/n24fKC6ffn0>

GLOBAL PRESS COVERAGE



https://www.youtube.com/watch?v=I9qA8c-E_oA#t=139



THANK YOU!

WHOOSH.H.COM

