

Jun 21st, 2:15 PM - 2:30 PM

Fish Passage Studies I: Evaluation of Lake Sturgeon Passed through the Whooshh Fish Transport System

Steve Amaral
Alden

Tim Grant
Alden

Steve Dearden
Whooshh Innovations

Jeremy Pyatoskowitz
Menominee Nation

Paul Jacobson
Electric Power Research Institute

Follow this and additional works at: https://scholarworks.umass.edu/fishpassage_conference

Amaral, Steve; Grant, Tim; Dearden, Steve; Pyatoskowitz, Jeremy; and Jacobson, Paul, "Fish Passage Studies I: Evaluation of Lake Sturgeon Passed through the Whooshh Fish Transport System" (2016). *International Conference on Engineering and Ecohydrology for Fish Passage*. 18.

https://scholarworks.umass.edu/fishpassage_conference/2016/June21/18

This Event is brought to you for free and open access by the Fish Passage Community at UMass Amherst at ScholarWorks@UMass Amherst. It has been accepted for inclusion in International Conference on Engineering and Ecohydrology for Fish Passage by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.

Evaluation of Lake Sturgeon Passed through the Whooshh Fish Transport System



Steve Amaral
Tim Grant

ALDEN

Solving flow problems since 1894

Steve Dearden



Jeremy Pyatskowitz



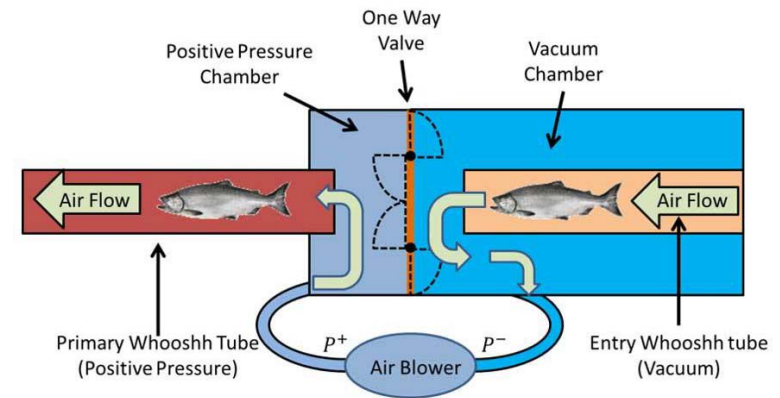
Paul Jacobson, PhD





Background

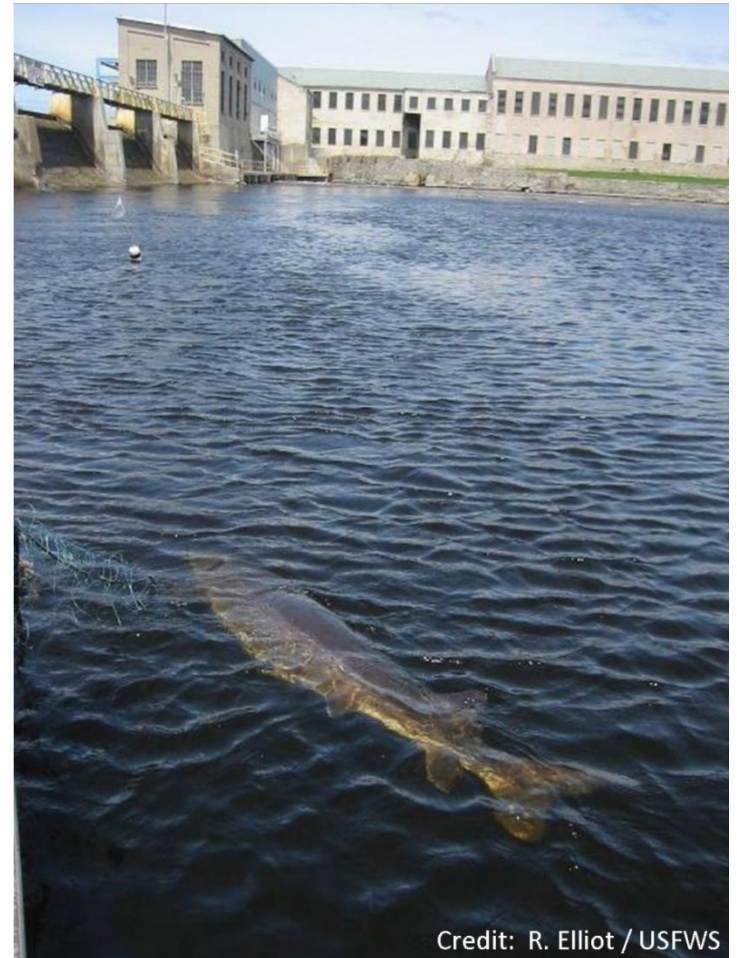
- The Whoosh transport technology is new alternative for passing fish upstream at dams.
- Relatively low cost and low impact compared to conventional upstream fish passage facilities.
- Design has flexibility for use at many different sites.
- Originally designed for and tested with adult salmonids.
- Salmonid studies indicate the Whooshh system can pass fish as safely as conventional technologies.
- Possibility for use with other important diadromous and potamodromous species?





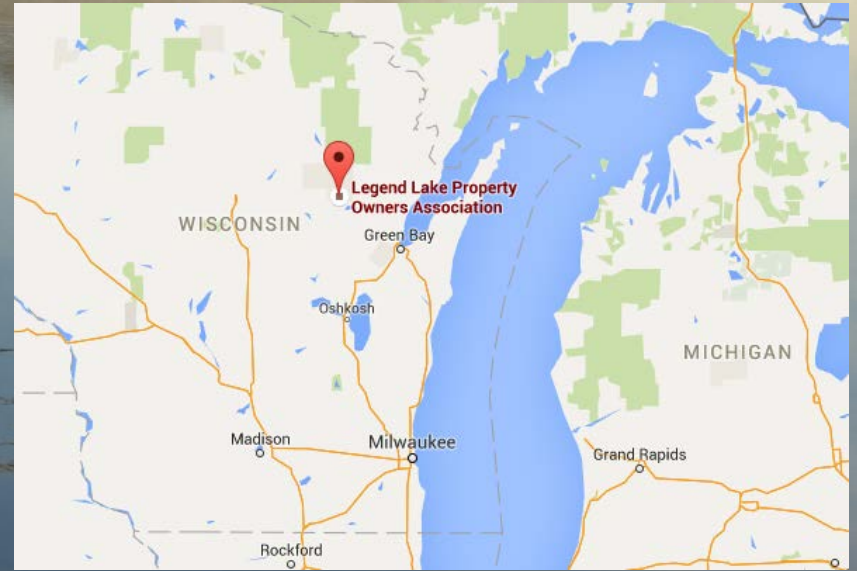
Study Goals and Objectives

- **GOAL:** Determine whether the Whooshh system is a viable option for passing sturgeon upstream at dams.
- **OBJECTIVES:**
 - Evaluate the ability of sturgeon to successfully pass through the Whooshh system.
 - Assess injury and mortality of sturgeon that pass through the system.



Credit: R. Elliot / USFWS

Study Location





Study Methods

Test Facility Design





Study Methods

Challenges

- The rigid suction portion of the accelerator was optimized for the oval profile of salmonids.
- Although the girths of the sturgeon used were similar to that of salmon previously passed through the Whooshh, a larger size of tube was needed accommodate the shape of the sturgeon.

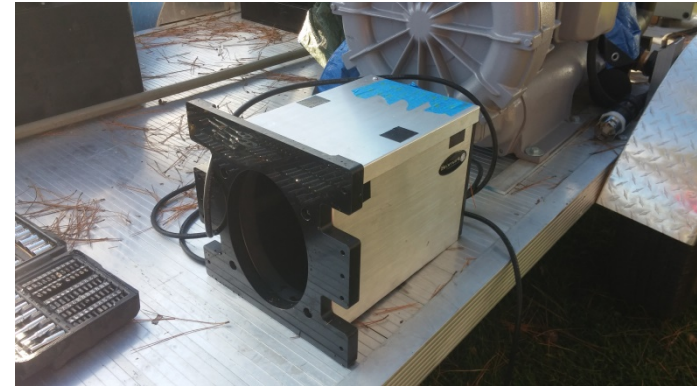




Study Methods

Experimental Design

- Test fish were gill-netted from Legend Lake in by MITW biologists.
- Mean fish length = 856 mm; range = 635 - 1016 mm
- 20 treatment passed through the Whooshh system; 20 control fish placed directly into the receiving tank.
- Placed each fish into fluorescein/anesthetic bath after recovery.
- Recorded white light and black light images.
- Measured length and girth.
- Examined fish for visible external injuries.
- Held most fish for 24 hours to assess latent mortality.





Study Methods

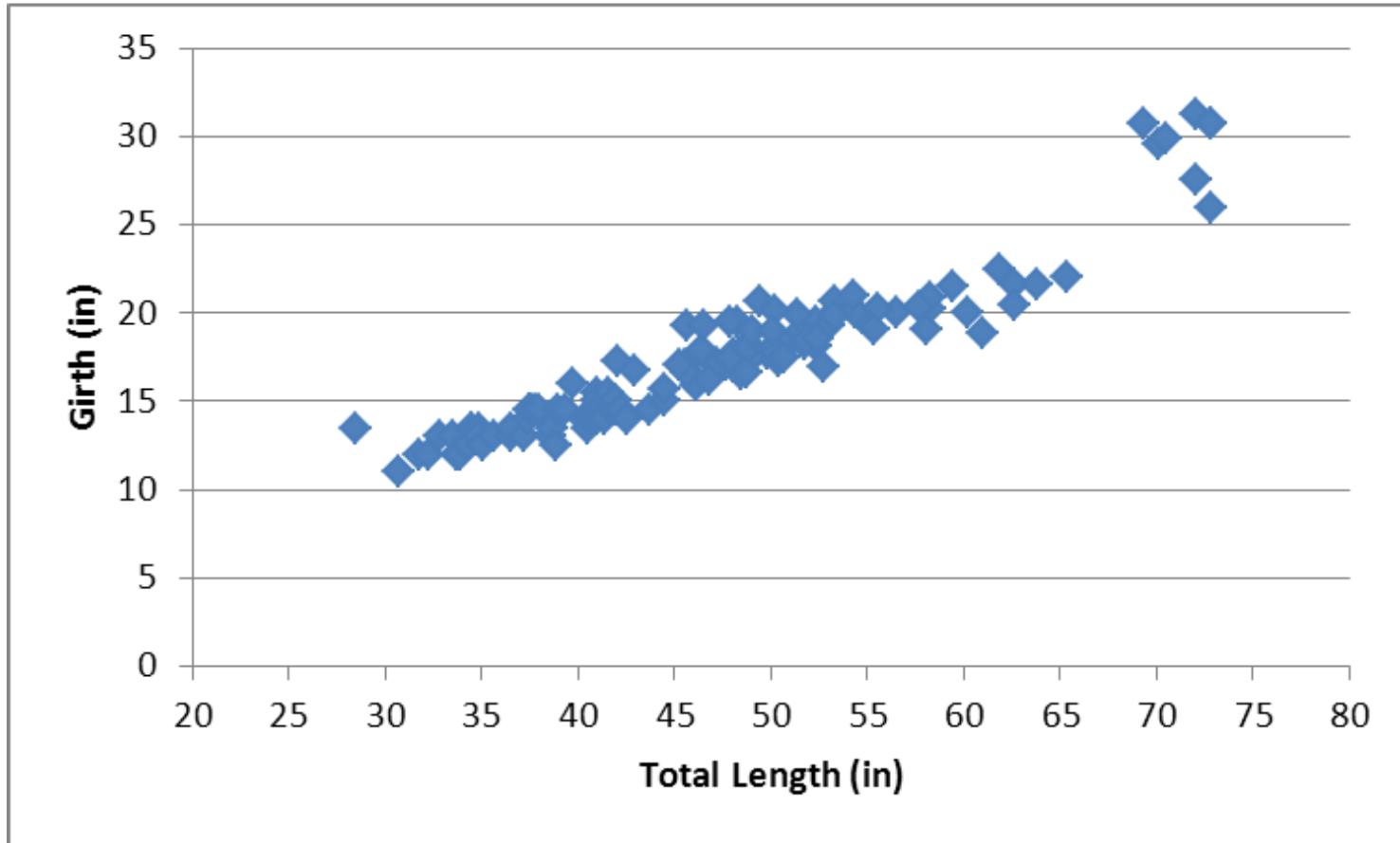
Epithelial Damage Assessment

- Filled holding tank with 100 gal of water and added 76g of Fluorescein Sodium Salt and 100 mL of clove oil mixture (9:1 ethanol/eugenol).
- Placed tested fish in Fluorescein/anesthetic bath for 6 minutes.
- Rinsed fish in clean water bath.
- Placed fish on black background and examined for external injuries under white light.
- Turned off white light and illuminated fish with UV light placed at a 45 degree angle to fish.
- Photographed both sides of each fish.
- Place fish into a recovery tank for 24-hr post-test observation.
- Images used to examine for non-visible epithelial damage.



Results

Girth and Length





Results

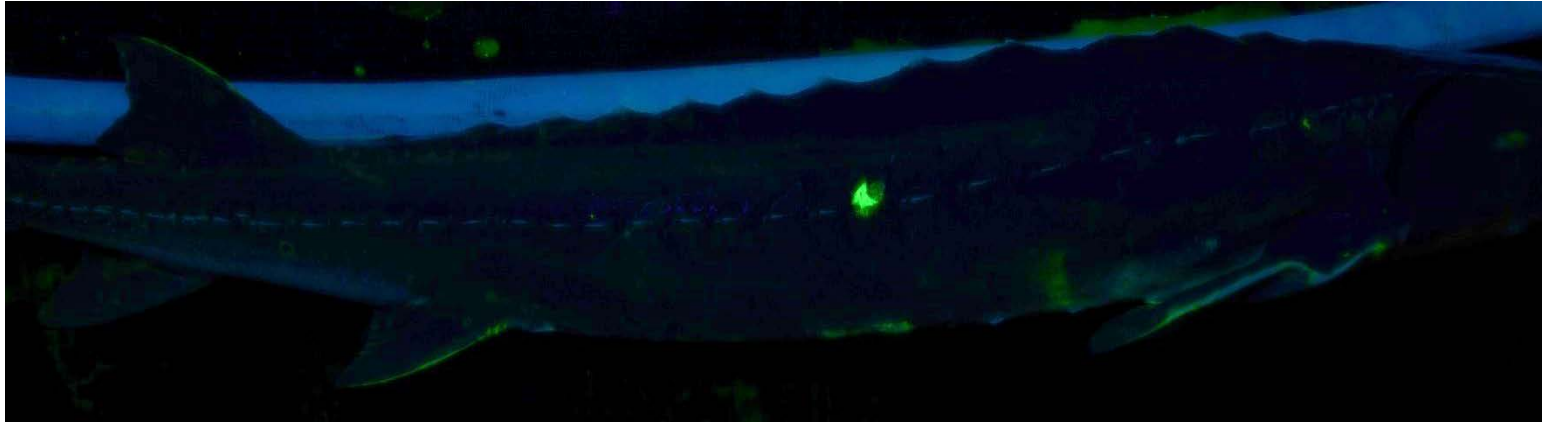
Epithelial Damage Assessment

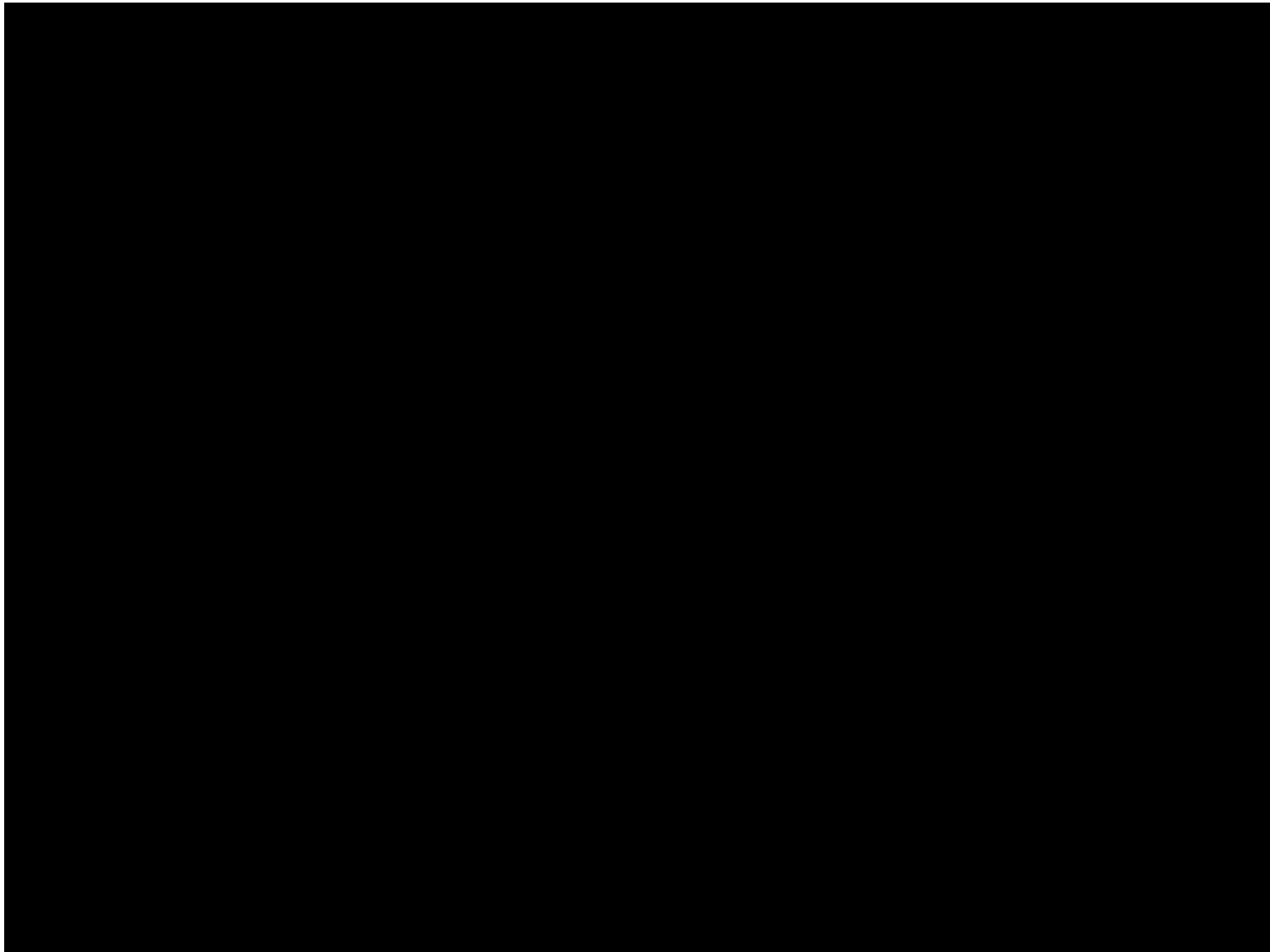


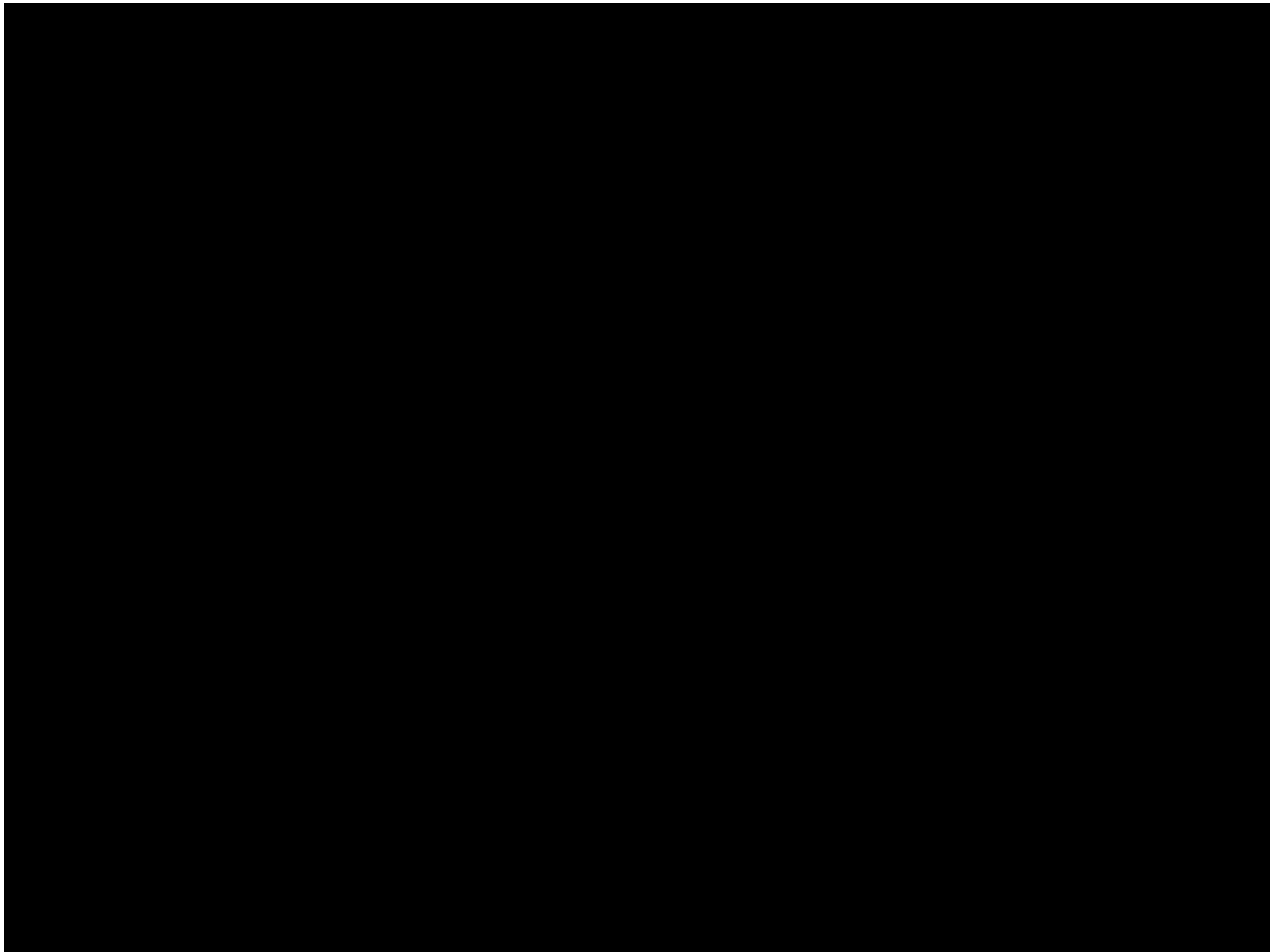


Results

Epithelial Damage Assessment









Results and Conclusions

- Successful passage of all test fish.
- 100% survival (24 hr).
- No external injuries that could be attributed to Whooshh passage.
- Fluorescein technique used to assess epithelial damage was not effective with sturgeon.
- Modifications to the entrance/introduction system are needed for compatibility with the sturgeon body shape (modified tube shape may also be beneficial).

