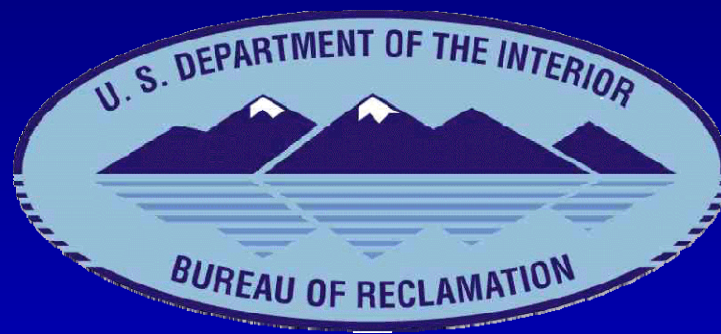


Working Towards the Future: Handling Fish, Water and Debris



U.S. Bureau of Reclamation
Technical Service Center

Leslie Hanna,

Hydraulically Cleaning Positive Barrier Screens

Sweeping Velocity: Approach Velocity Ratios (Perforated Plate and Wedge wire)						
	20:1 (completed)		10:1		5:1	
Screen Length/Angle	20 ft/2.5 degrees		10 ft/5.0 degrees		5 ft/10 degrees	
Screen Sweeping Velocity	4.0	8.0	2.0	4.0	1.0	2.0
Screen Approach Velocity	0.2	0.4	0.2	0.4	0.2	0.4
Ratio of Through Screen Flow /Bypass Flow	2.35	2.35	2.35	2.35	2.35	2.35

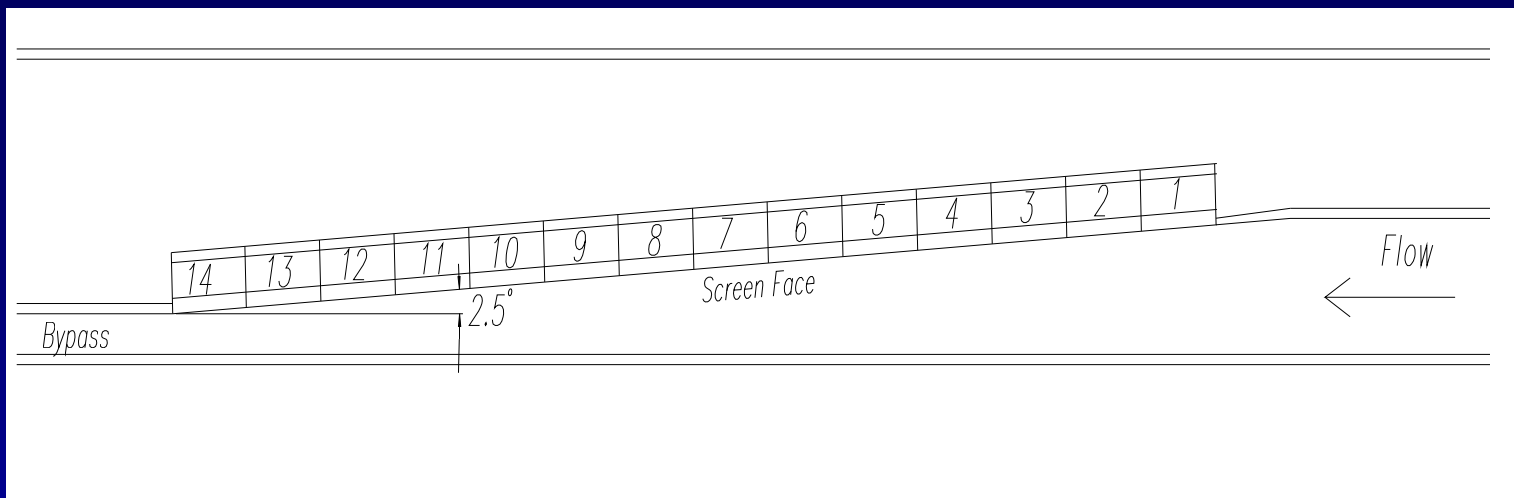


Figure 1. Screen layout for 20:1 velocity ratio

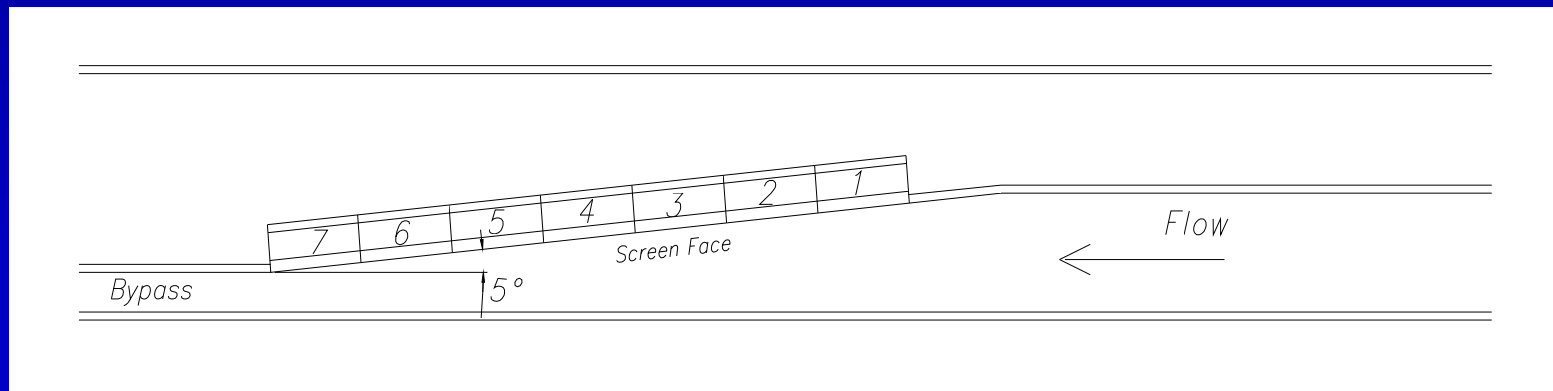


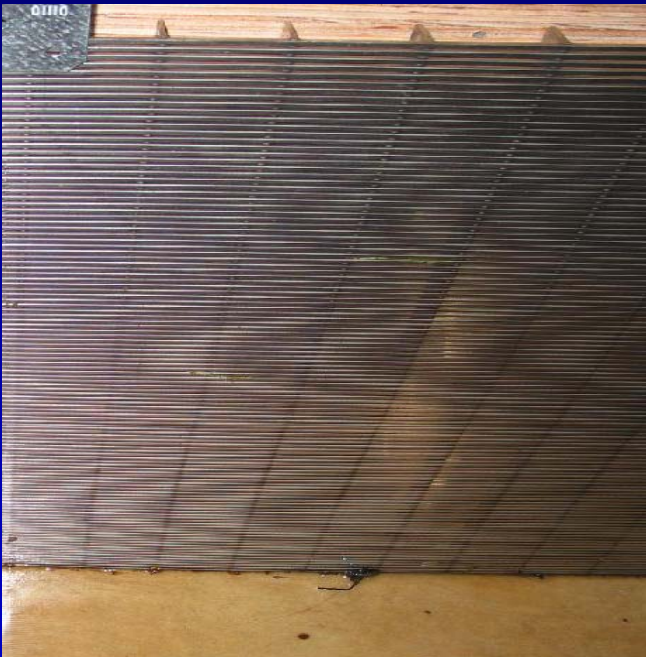
Figure 2. Screen layout for 10:1 velocity ratio

Test Methods

- Three trials each were conducted with two types of debris (Duckweed and Elodea) for each flow condition tested.
- Five to seven pounds of debris, drained and weighed before each trial, were introduced into the flume for each trial;
- Debris is left in flume for an additional 10 minutes before the flow was shut down.
- At the completion of each trial, debris collected from the return channels was weighed and documented. Video and photos were also used to document each trial.

Wedgewire and Perforated Plate Screens Tested at a 20:1 Ratio

$V_{\text{sweep}} = 4 \text{ ft/s}$, $V_{\text{approach}} = 0.2 \text{ ft/s}$



Wedgewire screen tested with Elodea at a velocity ratio of 20:1.



Perforated plate screen tested with Duckweed at a velocity ratio of 20:1.

Perforated Plate Tested at a 10:1 Ratio

$V_{\text{sweeping}} = 4.0 \text{ ft/s}$, $V_{\text{approach}} = 0.4 \text{ ft/s}$



Figure 5. Perforated plate screen is covered by a thin mat of Duckweed at a velocity ratio of 10:1.

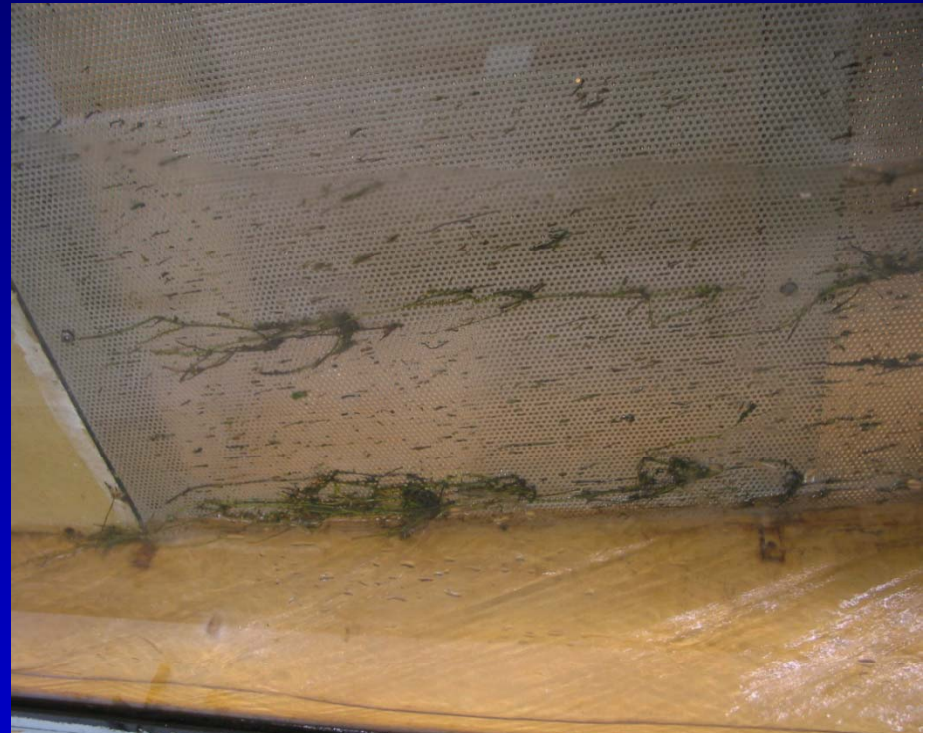
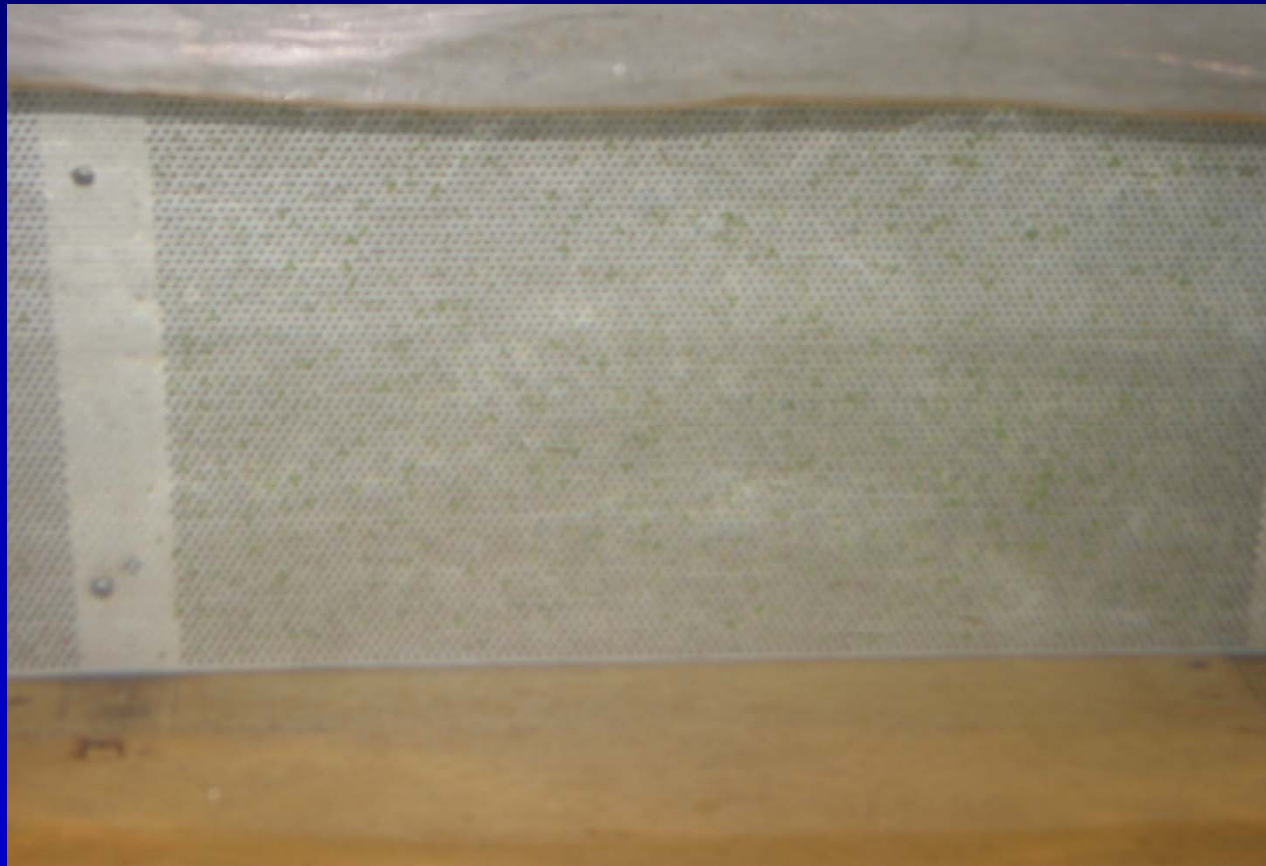


Figure 6. Perforated plate screen tested with Elodea at a velocity ratio of 10:1.

Perforated Plate Tested at a 10:1 Ratio

$V_{\text{sweeping}} = 2.0 \text{ ft/s}$, $V_{\text{approach}} = 0.2 \text{ ft/s}$



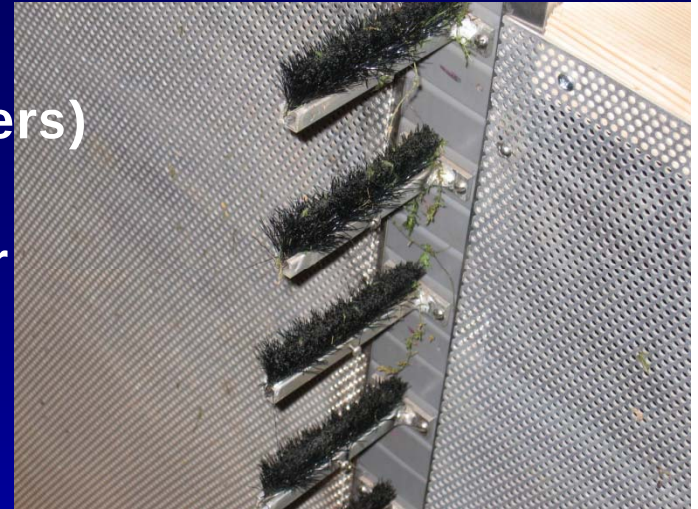
Large Debris Removal from Positive Barrier Screens



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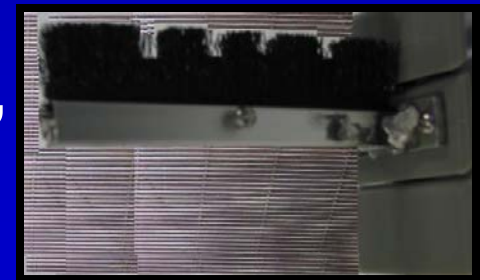
Debris removal

- Vertically rotating conveyor (with fingers) is positioned between screen panels to remove large debris along positive barrier screens



Model Study Objectives

- Determine most effective finger configuration (i.e. geometry, positioning and material) and conveyor speed for removing large debris, while not interfering with fish migration



END