

Zebra & Quagga Mussel Research Program

Research Note

Preliminary Evaluation of Quagga Mussel Fouling Potential for Cu-Ni (90-10) Wedge Wire Screen

Background

The effectiveness of alternative materials of construction for preventing zebra and quagga mussel settlement is of interest for a wide range of applications across Reclamation. In particular typical construction materials for positive barrier wedge wire fish screens (i.e., stainless steel, Fig. 1) are not expected to perform well when exposed to zebra and quagga mussel infestation. Mussel fouling of positive barrier fish screens has the potential to significantly impact the ability to maintain reliable water deliveries and protect endangered fish species. Other materials of construction have been suggested as effective in preventing settlement of mussels. One such alloy is Copper Nickel (90-10). Many wedge wire screen manufacturers currently supply Cu-Ni products as an alternative to stainless steel for applications where biofouling is expected to be severe. However Cu-Ni alloys are considerably more expensive than conventional materials.

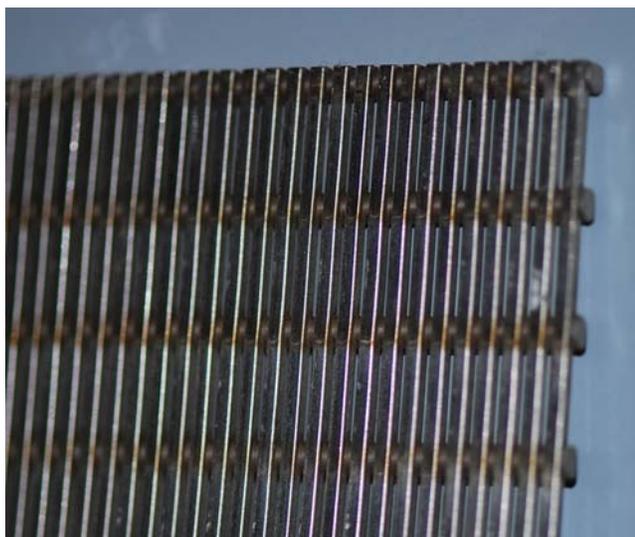


Figure 1. - Typical stainless steel wedge wire construction.

Project Description

To preliminarily evaluate Cu-Ni (90-10) wedge wire screen performance in the context of quagga mussel fouling potential, two flat 1-ft square test panels were exposed to mussels at Reclamation's Parker Dam which impounds Lake Havasu and has been infested with quagga mussels since 2007. The panels were suspended from the dam face at a depth of approximately 50 ft for the duration of approximately 4 months (September – December, 2008). Following this 4-month initial test period the panels were retrieved for inspection.

Preliminary Findings

Figure 2 show the extent of fouling that was observed. Both screen panels were heavily fouled, suggesting that Cu-Ni (90-10) does not prevent settlement and in fact is susceptible to nearly complete occlusion in a very short period of time for the conditions at Lake Havasu.



Figure 2. - Quagga mussel settlement on Cu-Ni (90-10) wedge wire screen sample.

It is recognized that the conditions for mussel colonization in Lake Havasu are very favorable. Whether other regions of the western U.S. will be as susceptible to such extensive infestation remains to be determined. It should also be noted that this study was not conducted under actual service conditions.

However, considering the velocity criteria for which typical fish screens are designed, the results would likely remain unchanged. Although anecdotal at this point, these preliminary findings suggest that Cu-Ni (90-10) may not be an effective control solution for fish screens under all conditions.

Future Direction

The next steps toward identifying solutions for fish screens exposed to mussel infestation will involve follow on wedge wire screen panel testing at Parker dam and include the use of coatings.

In addition to static testing of coated screen panels, testing of various fish screen configurations and cleaning technologies under typical service conditions will be conducted. That project, lead by Reclamation Fishery Biologist Steve Hiebert, is expected to identify the most effective commercially available fish screening technologies, establish direction in the development of new technologies, and assist in providing guidance for existing fish screen facilities retrofit and future fish screen facilities design.

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