

## Zebra & Quagga Mussel Research Program

### RESEARCH NOTE

#### *Field Evaluation of Filtration to Exclude Quagga Mussels from Power Plant Raw Water Systems*

#### Background

New self-cleaning filtration technology is being developed for preventing the introduction of aquatic invasive species from ship ballast water. To explore the possibility for application of this technology at Reclamation facilities, a field demonstration was recently completed at Parker dam.

The filtration system was sized for in-line installation with a flow capacity of 450 GPM, consists of interchangeable 40- and 80-micron woven mesh screens, and was installed on the domestic raw water supply line at Parker dam as shown in Figure 1.



**Figure 1.** – 450 GPM filter installed at Parker dam.

At Parker dam, raw water is delivered from the Parker dam forebay to the power plant via a 300-ft-long 8-in-diameter pipeline. The pipeline travels through the dam and into the power plant for multi-purpose use.

The filter was located just downstream of an existing 3/16-in strainer and is intended to protect downstream raw water supply system components from mussel fouling. The primary advantage of filtration for facilities protection is that it potentially replaces costly chemical methods for control of zebra and quagga mussels.

#### Project Description

Parker Dam was chosen for the test site because it is heavily infested with quagga mussels and there is an urgent need to maintain operation of the raw water supply system. In February 2009, RNT Consulting under contract with the filter supplier conducted the initial performance evaluation while Reclamation staff independently observed the testing.

1,000L water samples were collected immediately upstream and downstream of the filter during testing of both the 40- and 80-micron screens. These samples were then analyzed under a microscope to determine the number and size of veligers present.

#### Preliminary Findings

The 40 micron screen (57 microns absolute) allowed passage of some veligers up to 100 microns in size. The reason for passage of sizes larger than the screen opening is because the shell of a veliger is somewhat flexible such that when it is optimally orientation, it can squeeze through the mesh opening.

The 80 micron screen (120 micron absolute) allowed passage of some 220-micron sized veligers, but appeared to be effective at excluding all ready-to-settle veligers in the size range of 250-450 microns. However, there appeared to be very few individuals in this size range present during testing.

In general, the 40-micron screen exhibited 100% exclusion of veligers greater than 100 microns in size. Alternatively, the 80-micron screen excluded 95% of veligers greater than 200 microns in size. These results, although preliminary, suggest that filtration is an effective means of excluding the target sizes of veligers that are physically able to settle.

#### Future Work

Recognizing the limited opportunity to fully evaluate performance due to low numbers of ready-to-settle veliger sizes present during this initial evaluation, further testing will be performed in the coming year when larger veliger numbers and size ranges are expected as water temperatures increase throughout the spring and summer months.

## **Acknowledgements**

Thanks to staff from Reclamation's Parker dam for providing filter installation support and access to the facilities; Leonard Willett ([lwillett@usbr.gov](mailto:lwillett@usbr.gov)), LC Dams Office for coordinating with Parker staff; Fred Nibling ([fnibling@usbr.gov](mailto:fnibling@usbr.gov)) and Denise Hosler ([dhosler@usbr.gov](mailto:dhosler@usbr.gov)) from Reclamation's Technical Service Center in Denver, CO; and Renata Claudi from RNT Consulting for performing the initial performance evaluation.

## **Further Program Information**

Curt Brown, PhD  
Director  
Research & Development Office  
[cbrown@usbr.gov](mailto:cbrown@usbr.gov)

Joe Kubitschek, PhD, PE  
Program Manager  
Technical Director - Engineering  
[jkubitschek@usbr.gov](mailto:jkubitschek@usbr.gov)

Fred Nibling, MS  
Program Coordinator  
Technical Director – Biology  
[fnibling@usbr.gov](mailto:fnibling@usbr.gov)