

Invasive Mussel Detection and Monitoring Program for Reclamation Reservoirs

Contact: Denise Hosler, Mussel Detection Program Manager, 303-445-2195

The Threat: Invasive quagga and zebra mussels pose a significant threat to the costs of operation of Reclamation dams, power plants, pumping plants, and other water infrastructure. Starting in January 2007, adult quagga mussels appeared at Lake Mead, AZ/NV, and since have fully infested the lower Colorado River and Reclamation's Hoover, Parker, and Davis Dams and associated power plants. This has necessitated significant installation of protective technology and increased the maintenance activities needed to keep mussels from clogging critical piped systems including the systems that cool generator bearings for hydroelectric turbines.

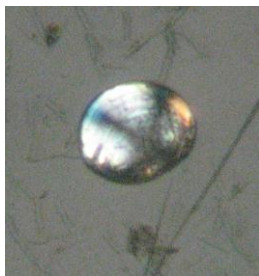
The Goal: In order to stay ahead of mussel infestations and to help guide preventative and mitigation measures, in 2009 Reclamation began a monitoring and detection program for many of its reservoirs determined most at risk of mussel exposure and infestation. The aim is to detect the earliest stages of mussel exposure or infestation at Reclamation reservoirs, so that response planning and budgeting for protective measures can be initiated. If microscopic mussel larvae are detected early in a reservoir, potentially several years may be available for response actions to be taken prior to full infestation of facilities. Early actions may also be taken to prevent the spread of mussels to other water bodies.

The Program: Currently, Reclamation, in partnership with western states and other agencies, is monitoring over 200 water bodies, including approximately 160 Reclamation reservoirs. Reclamation regional and area offices have selected target reservoirs based on:

1. The potential for a mussel infestation to complicate, impair, or significantly increase the cost to provide critical Reclamation mission activities.
2. The annual number of boats and other crafts or equipment that are moved into this reservoir from other locations.

Monthly water samples from each water body are subjected to multiple tests to determine whether microscopic mussel larvae are present. This testing includes:

- Cross-polarized light microscopy, to highlight microscopic mussel shells.
- Scanning Electron Microscopy, to provide very high magnification images for taxonomic identification.
- Polymerase Chain Reaction (PCR) and gene sequencing tests, to confirm the presence of mussel DNA



Left and Middle: Quagga larva photographed using cross-polarized light microscopy and scanning electron microscopy. Right: Standard PCR gel demonstrating positive sample DNA match.

Test results are shared with Reclamation facility managers and State Invasive Species Coordinators. Once a mussel population is fully established in a large reservoir, there is no known means to completely eradicate it. Instead, protective measures must be implemented to keep mussels off, or out of, critical systems. The Research and Development Office is supporting intensive research in technologies for mussel detection and control.

More details, and a map of locations where adult mussels and mussel larvae have been found, can be accessed at www.usbr.gov/mussels.