

# Looking for Novel Parasites to Control Invasive Mussels

## Use of Novel Hypervirulent Parasites to Control Naïve North American Dreissenid Populations

### Research Bulletin Science and Technology Program 1625

Finding a hypervirulent parasite that can control invasive Dreissenid populations in North America could be an important way of controlling these organisms. This will enable us to better protect Reclamation facilities and waters from these highly invasive organisms.

### Mission Issue

Parasites offer a potentially novel, inexpensive and new way of controlling invasive mussels once their populations have become established. If we can control the invasive mussels then it will save Reclamation on both the control and mitigation that has to be done to keep our facilities fully operational.

### Principal Investigators

Jacque Keele  
Biologist  
jkeele@usbr.gov

Yale Passamanek  
Biologist  
ypassamanek@usbr.gov

Hydraulic Investigations and Laboratory Services  
Reclamation's Detection Laboratory for Exotic Species (RDLES)  
Technical Service Center

### Research Office Contact

Sherri Pucherelli  
S&T POC for Environmental Issues for Water Delivery and Management  
spucherelli@usbr.gov

### Problem

The identification of novel hypervirulent parasites to control dreissenid populations in North America is the central goal of this project. This research project was initiated in 2017 by Denise Hosler and Dan Molloy to start looking for possible dreissenid parasites. There is currently no practical large-scale method for the control of invasive quagga and zebra mussels. This means that once the invasive mussels establish themselves in a new body of water it is difficult and expensive to remove them.

There have only been two successful open-water eradication treatments, both of which used the chemical treatment potash, but to treat all the waters in the Western United States would be expensive and impractical. Thus, there needs to be a better method of treatment that does not rely on chemicals. Using a parasite would be an ideal option because it would be specific to the invasive mussels, would be self-replicating, and would only require a single or few applications.

### Solution

For the last 2 years this project has worked to lay the groundwork for the identification and testing of possible novel parasites to quagga and zebra mussels. The first step of this process was to go to locations in the Balkans to hunt down isolated populations of dreissenid cousins and identify their parasites. Reclamation's collaboration with Molloy & Associates has in the last 2 years been productive, and a follow-on project was submitted to the Research Office to continue this project. The final report details the problem, team members, details on the trips that were made to Eurasia, summarizes the research goals and progress, includes images of some of the parasites that have been identified, and future research directions.

Reclamation's participation in this project has been to provide funds to Molloy & Associates so that the research could be performed. Staff from Reclamation's Detection Laboratory for Exotic Species (RDLES) have also traveled to Montenegro in April 2017 to participate in a sampling trip and learn how to dissect mussels to find parasites. RDLES has also taken the lead on using molecular techniques to identify the parasites. This has involved determining the best extraction methods for these single celled organisms, optimizing primers and polymerase chain reaction (PCR) methods, and sequencing PCR products. The collaboration between RDLES and Molloy & Associates has been very productive over the last 2 years. The amount of effort that Molloy & Associates has given the project far exceeds the amount of funds that were provided to this company. The next 3 years will hopefully continue to be productive and enable us to eventually find possible candidate parasites that can be used to control invasive mussels in North America.

***“The potential of a hypervirulent parasite to control and impact invasive mussel populations in North America is a research question that has to be addressed. It could be a viable control method to an issue that is ongoing and will only continue to grow for Reclamation facilities and waters.”***

Jacque Keele  
Biologist  
Reclamation

### **Collaborators**

Dan Molloy  
Molloy & Associates

### **More Information**

<https://www.usbr.gov/research/projects/detail.cfm?id=1625>

<https://www.usbr.gov/research/projects/researcher.cfm?id=2509>

## **Application and Results**

The goal of this research is to look for novel parasites that could one day be used to control invasive mussel populations in North America. There are many steps in this process that still need to be accomplished. During this 2-year project new parasites were found in the Balkans. A network of collaborators who are willing to contribute their time and effort to this project were made. Thousands of *D. carinata* were examined for parasites. New parasites were discovered in *D. carinata* that could potentially be hypervirulent to quagga and zebra mussels. RDLES staff was able to isolate DNA and use molecular methods to obtain DNA sequences from over 50 parasites. We also provided molecular analysis to confirm the visual identification of the mussels. This work will enable us to clearly describe these parasites. The goals of the project were accomplished and the ground work for next steps were laid.

## **Future Plans**

The goal of this research is to look for novel parasites that could one day be used to control invasive mussel populations in North America. There are many steps in this process that still need to be accomplished. During this 2-year project new parasites were found in the Balkans. A network of collaborators who are willing to contribute their time and effort to this project were made. Thousands of *D. carinata* were examined for parasites. New parasites were discovered in *D. carinata* that could potentially be hypervirulent to quagga and zebra mussels. RDLES staff was able to isolate DNA and use molecular methods to obtain DNA sequences from over 50 parasites. We also provided molecular analysis to confirm the visual identification of the mussels. This work will enable us to clearly describe these parasites. The goals of the project were accomplished and the ground work for next steps were laid.



*Dr. Dan Molloy dissecting dreissenid mussels to look for parasites in Montenegro, April 2017.*