U.S. Fish & Wildlife Service

Cost effective sampling techniques to detect the presence of the non-native zebra mussel, *Dreissena polymorpha,* within the Delta.

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CONSERVING AMERICA'S fisheries

INTRODUCTION

• The zebra mussel (*Dreissena polymorpha*) was first detected in the Great Lakes in 1988 and has become established throughout much of the eastern U.S. causing a great deal of economic and ecological harm. (Fig. 1)

• Introduction and spread of this species has been linked to trailered boats, bilge water, ballast water, and downstream dispersal through veliger drift and/or adults being dislodged.

• Presently, the zebra mussel has not been documented in California waters, however, has been detected on trailered vehicles entering California (Fig. 2, Mangin 2001).

• The zebra mussel is a threat to the reliability of water conveyance and operation (choking intake pipes, decreasing water availability) and the aforementioned observations and lack of inspection stations support the need for a proactive zebra mussel monitoring program in California which would trigger a rapid response team if adults or veligers were confirmed.

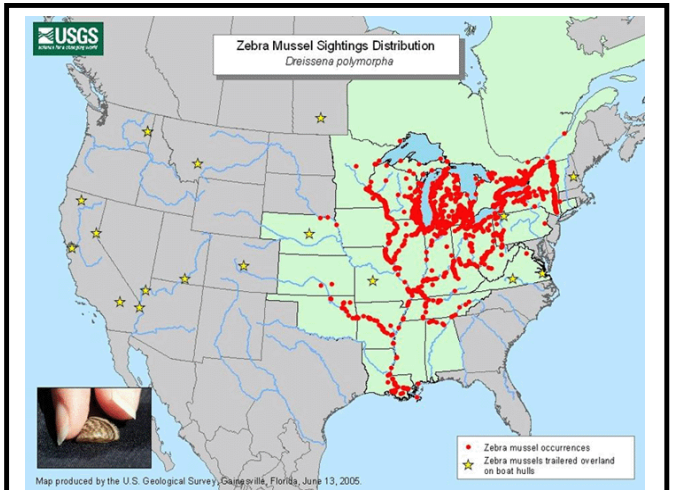

Figure 2. Locations of zebra mussel occurrences within US waters.

OBJECTIVES

The U.S. Fish and Wildlife Service, Delta Juvenile Fish Monitoring Program (DJFMP), Stockton, California, designed a limited, short-term pilot study, funded by Non-native Invasive Species Project (NIS), based on long-term fisheries monitoring stations to: 1) examine the cost-effectiveness of various monitoring techniques, 2) provide recommendations based on cost and risk assessments to develop a zebra mussel early detection program within the Sacramento-San Joaquin rivers and Delta (SSJRD).

Figure 1. An adult zebra mussel and its planktonic larval stage known as a veliger.

NO ZEBRA MUSSELS WERE DETECTED DURING THIS STUDY!

METHODS

• A full description of the methods is available upon request (Marshall and Blalock-Herod, 2006). The pilot study was conducted between September 2005 and February 2006. Sites were sampled once per month.

• Five sites at existing long-term fisheries monitoring stations near high risk areas (i.e., boat ramps or marinas, shipping channels, and/or water operations facilities) within the Delta were selected for the pilot study (Figure 3).

• Three techniques were selected to detect the presence or absence of adult and veliger life stages: 1) examination of artificial substrate samplers (Figure 4); 2) infrastructure observations (rip-rap, pilings, docks); and 3) examination of zooplankton samples.

• Water quality parameters (DO, pH, conductivity, salinity, and temperature) were recorded at each site on each sample date.

• Cost was determined from staff time assembling and deploying gear at each sampling event and time used for field and laboratory examination of samples.

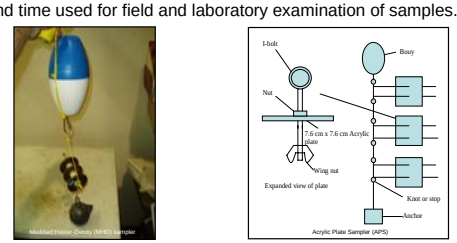

Figure 4. Two types of artificial substrate samples used in this study

RESULTS and SUMMARY

• No zebra mussel veligers, juveniles, or adults were detected in zooplankton tows, on artificial substrate samplers, or on infrastructure at the five southern Delta sites.

• These methods did detect other organisms which have been used in the eastern U.S. to monitor zebra mussel populations. We recommend hiring a Full Time Employee (FTE) with zooplankton identification expertise to gain the most data from samples.

• Several plate samplers were "lost" during this study. We recommend conducting only zooplankton tows and infrastructure observations unless the samplers are well hidden.

• The three methods used in this study, in conjunction with existing fisheries sampling, would provide the ability to capture different life stages of zebra mussels at a minimal cost per sampling event ($50.00 – $150.00/site depending on personnel used). Infrastructure observations required only a few extra minutes per site and the additional cost was negligible per site. Cost of each plate sampler (MHD $33.67; APS $72.42) and zooplankton net ($59.12) was relatively low, compared to costs associated with eradication.

• We believe that, the use of these methods throughout the SSJRD, would provide a cost effective means to detect the presence of zebra mussels.

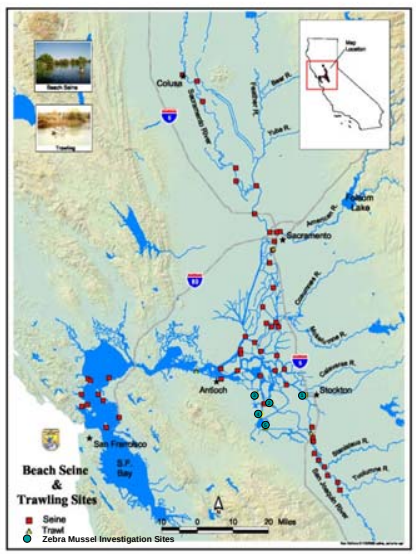

Figure 3. USFWS Long-term fishery monitoring stations in the SSJRD and San Francisco Bay with zebra mussel monitoring stations identified.