Project Factsheet for:
Zebra Mussels in the Upper Mississippi River System (UMRS)

Date Last Updated: 08/26/2008 16:48

Project Location Information

Location: Upper Mississippi River System
River Basin(s): Mississippi
State(s): IA , IL , MN , MO , WI
Congressional District(s): IA-1 , IA-2 , IA-3 , IA-4 , IA-5 , IL-11 , IL-13 , IL-14 , IL-15 , IL-16 , IL-17 , IL-18 , IL-19 , IL-2 , IL-3 , MN-1 , MN-7 , MO-6 , MO-9 , WI-1 , WI-2 , WI-3 , WI-5 , WI-6

Status

The Corps leads a multi-agency panel known as the Mussel Coordination Team that has developed a conservation plan to try to save the endangered Higgins Eye Pearlymussel (Lampsilis higginsii) from possible extinction from zebra mussels. This panel was formed to carry out the reasonable and prudent measures as guided by the Endangered Species Act jeopardy Biological Opinion (BO) issued by the FWS on May 15, 2000. In 2007 this group was involved with the propagation, relocation, and cleaning of these endangered mussels. In 2006, the Corps also began a national effort called the Invasive Species Leadership Team to examine agency strategies for dealing with invasive species like the zebra mussel on Corps lands. This effort led to the development of draft guidance on invasive species in 2008.

Description

Since their initial introduction in 1985, zebra mussels have spread from the Great Lakes into several major river systems, including the Mississippi, Ohio, Illinois, Tennessee, and Arkansas, and are now spreading to numerous inland lakes and reservoirs. Zebra mussels attach to hard substrates on the bottom of the river, encrusting water intakes and smothering native mussels. Zebra mussel larvae (veligers) float passively in the water column while adults can move upriver or overland by attaching themselves to recreational or commercial vessels.

Within one or two years of their colonization of a new area, zebra mussels typically undergo explosive population growth attaching in mass to a variety of substrates (i.e. plants, rocks, mussels, woody debris, etc.). For example, zebra mussel populations in the Illinois River exploded in 1993, reaching densities of nearly 100,000/m2. Since then Illinois River populations have experienced high mortality, resulting in greater than 99% reduction at most sites and have not returned. Researchers believe this decline is due to less than ideal temperature, flow, and suspended sediment levels. In comparison, zebra mussel populations in the Upper Mississippi River (UMR) have developed more gradually. During 2000, researchers in Wisconsin described zebra mussel colonies in Pools 8-10, which formed mats four inches thick with densities estimated at 90,000/m2. In August of 2001 zebra mussels experienced a significant and unexplained die-off in much of the Mississippi River. This occurred again in the summer of 2003, but zebra mussel returned in 2004. Native mussels were unaffected by these die-offs.

Authority

SI - Special Interest --

Additional Information

Transport and Spread - Many human-related transport mechanisms exist on the Upper Mississippi River including watercraft, buoys, marina and boatyard equipment, fishing equipment, fish cages, fish stocking water, bait and bait bucket transfer, marker buoys and floats, amphibious planes, recreational equipment, and litter. The abundant Lake Pepin population of zebra mussels is believed to be self-sustaining and a significant source of veligers (immature zebra mussels) that settle and mature downstream. Preliminary research performed by the Mussel Coordination Team indicated that control of zebra mussels within Lake Pepin might reduce the abundance of zebra mussels below Pool 4.

Control Strategies - The conservation plan outlines four broad goals for implementing feasible zebra mussel control measures:

1) No Action - Under the no action alternative, zebra mussels would continue to be transported throughout the UMRS via transport on barges and recreational vessels. This alternative would jeopardize the continued existence of endangered mussel species. In light of the jeopardy BO, this is not considered a feasible alternative.

2) Natural/Environmental Control Measures - Measures being investigated include the restoration of riverine conditions in the navigation pools and/or the mechanical removal of zebra mussel from native endangered species. The efficacy of zebra mussel specific toxicants (chemical molluscidcides: chlorine, chlorine dioxide) and/or diseases is also being investigated. The key to the success of any of these measures is gaining an understanding of biological controls such as natural cycles of abundance and habitat preferences of the zebra mussel.

3) Transport/Dispersal Control Measures - Methods for controlling upriver transport of zebra mussels fall into two categories: passive and active.

A. Passive control methods would include treatments that prevent zebra mussels from attaching to barge hulls. The use of toxic coatings (e.g. copper, zinc) or non-stick surfaces (silicone based) is being investigated.

B. Active control methods would include manual removal (scraping, high pressure wash), thermal treatments (steam injection, hot water >32 degrees C), electrical currents, dewatering, desiccation (freezing, heated air), acoustical vibration, ultraviolet light, etc. Active measures could be employed on individual barge hulls or on a larger scale, for instance on a lock and dam or lock chamber.

4) Barriers to Introduction of Exotics - A final alternative to be investigated would be the installation of thermal, electrical or other barriers to prevent the introduction of zebra mussels and other exotics to the UMRS. Additionally, methods for preventing the overseas transport of exotics to the US are being examined. The Chicago District of the Corps of Engineers has developed two electrical fish barriers and has discussed the feasibility of adding more barrier mechanisms (e.g. ultrasound, hydraulic water-jets, pulsed plasma charge, chemical, thermal, etc.). These barriers are located in the Chicago Sanitary and Ship Canal near Romeoville to slow the invasion of Asian (bighead and silver) carp.

Project Manager Information

Name: Mark A. Cornish, Biologist, CEMVR-PM-A
Phone: (309)794-5385
E-mail: mark.a.cornish@usace.army.mil
Additional Contact Information:

Member of the HQ Invasive Species Leadership Team