M.L. 2013 Minnesota Aquatic Invasive Species Research Center Subproject Abstract
For the Period Ending June 30, 2019

SUBPROJECT TITLE: MAISRC Subproject 12: Characterizing spiny water flea impacts using sediment records
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SUBPROJECT BUDGET AMOUNT: $212,266
AMOUNT SPENT: $211,708
AMOUNT REMAINING: $558

Sound bite of Subproject Outcomes and Results
This project found that spiny waterflea have been present in Lake Mille Lacs and Lake Kabetogama since the 1930s, about 80 years before they were first detected. Evidence shows they were in low abundance until around the year 2000. This tells us that traditional detection methods may be inadequate.

Overall Subproject Outcome and Results
Although aquatic invasive species threaten Minnesota's environment, economy, and recreation, we still know little about the colonization histories and ecosystem impacts of some of the state's invaders such as spiny water flea. This project made large advances in understanding the colonization and impact of spiny water flea in Lake Mille Lacs, Lake Kabetogama, Lake Winnibigoshish, and Leech Lake through the collection and analysis of organism remains in lake bottom sediments over about a 120 year period from present (2017 or 2018) back to the year 1900. The results provide replicated evidence that spiny water flea was resident continuously in Lake Mille Lacs and Lake Kabetogama since the 1930s, or about 80 years before it was first detected in the open waters of either lake. Evidence demonstrates that spiny water flea had a prolonged history of low abundance in both lakes before about the year 2000 at which time it began to increase rapidly. Zooplankton that are prey and competitors of spiny water flea often declined in abundance after spiny water flea increased in abundance. There was no evidence of spiny water flea in the sediments of Lake Winnibigoshish. There was evidence of a small population of spiny water flea in the sediments of Leech Lake that dated to the year 2001, possibly representing a failed invasion. To date, Leech Lake has never been known to contain this organism. The data allow us to test hypotheses about the timing and impact of spiny water flea on the food webs of Minnesota lakes. The results re-cast our understanding of the timeline of spiny water flea invasion in Minnesota and underscore the value of lake sediments to study invasive species. The results suggest that traditional methods of spiny water flea detection with nets, as carried out by academic units and management agencies in Minnesota, may be inadequate to detect spiny water flea when it is low or transient in abundance.

Subproject Results Use and Dissemination
We have disseminated our project results at a variety of conferences and meetings as summarized below.

1) MAISRC Research & Management Showcase (St. Paul, MN) – two platform presentations (September 12, 2016)
2) MAISRC Research & Management Showcase (St. Paul, MN) – four laboratory presentations (September 12, 2016)

3) Coe College Wilderness Field Station (Ely, MN) – platform presentation (July 22, 2017)
4) MAISRC Research & Management Showcase (St. Paul, MN) – two platform presentations (September 13, 2017)
5) MAISRC All Members meeting (St. Paul, MN) – platform presentation (November 28, 2017)
6) MAISRC Science-In-Seconds competition (St. Paul, MN) – platform presentation (May 30, 2018)
7) MAISRC Research & Management Showcase (St. Paul, MN) – poster presentation (September 12, 2018)
8) Upper Midwest Invasive Species Conference (Rochester, MN) – poster presentation (October 15-18, 2018)
9) Association for the Sciences of Limnology and Oceanography Conference (San Juan, Puerto Rico) – poster presentation (Feb 23 – Mar 2, 2019)
10) Rainy-Lake of the Woods Watershed Forum Conference (International Falls, MN) – poster presentation (March 13-14, 2019)
11) Minnesota Department of Natural Resources meeting (St. Paul, MN) – skype presentation (May 14, 2019)

We have included images of two poster presentations that were displayed at science conferences.