

Notes by Mary Reetz

Session 1: Musseling out Mussels- Mike McCartney

Zebra mussels are native to southern Russia. They produce .5 million eggs/female!

After hatching, the larvae are called veligers. (pronounced villagers) They develop tiny hairs which help them to move around in the water. They use these threads to attach to plants or objects and then they start to form beds on top of each other.

Experts think they came in the ballast water of ships entering the great lakes. **There are now Veligers found in 114 lakes in MN and 16 rivers in MN.**

Boat inspections/decontamination systems must be working and should be expanded.

Experts can tell where veliger's have come from by their genetic makeup.

They naturally spread in waterways and ditches. They then flow into connected lakes.

In small streams, they only travel a short way and then settle down. In larger rivers with Greater flow, there are billions moving/day. Headwater lakes should be targeted first.

In boats, the problem is any residual water containers. **The good news is that 90% of them die after 6 hrs. They can survive in ballast water a long time however.**

Chemical controls usually work esp. on veligers. It keeps them from landing on the things or The bottom of the lake. They use 1/16 the usual dose of EarthTeqQZ.

Biotech controls – They have modified the genes in mosquitoes and it spreads to mussels Making them 100% sterile. Probably within 5 years away before commercial use.

Byssal thread attachments that form beds are inhibited by low calcium concentrates.

Shows some promise. **Mussels have a 3 year lifespan. They are NOT spread by birds**

So that's good. **If attached to docks, lifts etc, 21 days of freezing temperatures will kill them.**

Session 2: Little Bugs to Big Fish by Bethany Bethke

We know that on the big lakes- walleye is king. Cass, Leech, Woods, Rainy Lakes, Vermillion, Red, Mille Lacs and Ossawinamakee, along with perch and northerns.

The size of a fish's mouth dictates what they can eat. Large fish eat small fish. Very small Fish eat invertebrates.

So do zebra mussels or spiny waterfleas affect fish populations? Research shows that there is more carbon 13 near the shore than in the center of lakes. How about Nitrogen? The higher you go up the food chain, the more N you have. So let's compare the two.

If there are less fish in the Cisco family, like tulibeets, there are less walleyes in the lake. If invasives are killing the zooplankton, clarity and weeds can contribute to the problem.

Actually Sheepshead, Drum and Sunnies will eat zebra mussels at the early stages, before the Shell starts to form. Ducks and muskrats eat them also. Spiny waterfleas choke animals.

The biomass production of lakes determines the number of fish available. You can check this on the DNR websites. Historical data on larger lakes. Researching this further on Lake Vermillion.

Session 3: What Can We Learn from Lake Mud Sampling Donn Branstrator & Euan Reavie

We have learned that spiny waterfleas dry out in about 6 hrs. To get all of them on a dock or boat or trailer,

It should be out of the water for 5 days. SWF is a carnivore and eats zooplankton. It can eat 40-60% Of the zooplankton over the summer in a small lake. They are considered Bythotrephites.

What is in a sample of mud? Allochthonous/autochthonous, fly ash, carbon, metals, pollen, insect remains, Pollutants, diatoms, chrysophytes and chironomids.

Researchers look for the tail spines of the SWF. Just like algae leave behind pigments, the tails of SWF remain.

They compare this mud sample to a control lake mud sample.

Why do this? It shows scientists the dynamics of environmental response to an invasion. SWF role in the food Web, and can predict possible future outbreaks. They check the isotopes to particular years @ 1982, 1973 etc and link densities in the sediment to densities in the water as sampled by DNR(or some lab) those years.

SWF are found in the entire water column but at twilight they go upward in the column and large fish can eat them then.

Session 4: No Guts, No Glory Steve McComas, Blue Water Science

This workshop featured Eurasian Milfoil and Quagga Mussels. There are particular bacteria that associate with specific Plants and animals which provide them with the majority of the nutrients bacteria need.

Many varieties of *Pseudomonas fluorescens* are specific to carp. It is very difficult to grow specific microorganisms in The lab and just need to be found wild.

Metagenomics is the science of using DNA to reproduce microorganisms. These naturally occurring microbes (bacteria) may be able to be raised in order to produce lethal toxins to kill milfoil and mussels.

These researchers divide consumers of microbes(eaters) into 2 categories: EM who select particular things to take out Of the water and ZM who take in a lot of water and then their bodies filter out what they need.

One test is fecal indicators. The EM's has/likes high ecoli counts. The ZM eat everything and are not so specific about the bacteria around them. This part of the study is considered Phase 1. Phase 2 will look for diseased EM and ZM so they can grow the particular enzymes and toxins that are affecting them and evaluate what works. It must be safe and specific for milfoil and Quagga.

Ecoli – there is non-point source ecoli in the environment all the time, it can come from sewers that overflow or whatever.

But there is only 1 species of ecoli out of 738 known species, that can survive in the human gut. Ecoli is a good indicator to use for research.

Session 5: CARP

Carp are destructive because they eat the insects on vegetation in the lake. They grab them when they root out the plants. This clouds the water and adds phosphorous into the water column.

Carp have seasonal migrations, like salmon. They want to go into shallow areas to lay eggs because there are no enemies there. Bluegills like to eat carp eggs, but they cannot eat them all. One control would be to try to remove all the adult carp from lakes with gates and artificial obstacles. They have tried artificial aeration in the winter in hopes of keeping a lot of bluegills alive.

Scientists have tried to add antimycin to the corn and poison only the carp, but it only killed about 35% of the carp in lakes tested.

Session 6: Something Old Something New Mike Verhoeven

Curley Leaf Pondweed and Starry Stonewort

Stonewort has been found in Lake Koronis, near St. Cloud. It is a native of Asia. It forms dense beds and mats and kills native plants, but provides no food for our native fish. It seems to tolerate everything.

SS has no vascular system. It has bulbils and it reproduces asexually. Experts have tried using Cultrine plus on it, a granular application so it settles down on them. Did not seem to work very well. Mechanical or algicide treatments killed the most of them but It could not kill the roots. They still continued to sprout. Sediment in the lake protects these roots and sprouts. Some internal signal tells it to reproduce bulbils faster. It may be a response to the algicide. Less biomass = more sun for them.

Curley Leaf It gets a good start under the ice especially when there is little snow cover. Turions are growing before other sunlight-needing plants start coming. The depth of the ice makes no difference, it is the snowcover that determines how well they do- deeper snow means less curleyleaf.

Scientists wonder if the Curley Leaf is improving clarity of the water or not. You can treat it and eventually it will get less and less but you never really get rid of it all because those turions can lie dormant for 17 years! Scientists are trying to coordinate data from many studies to see what can be done.