We have two similar projects, one funded by St. Louis County AIS and one funded by the Environment and Natural Resources Trust Fund through MAISRC. The information in this presentation is based on the results from the work funded by St. Louis County AIS.
As of 2015, the spiny water flea (Bythotrephes) has been found in about 35 lakes in the northern half of Minnesota. These lakes include some of the largest basins such as Rainy, Lake of the Woods, Vermilion, and Mille Lacs. But other than Mille Lacs, the invasion is relatively confined to the arrowhead region. It seems to do better in lakes that have fewer nutrients.
While spiny water flea are small, they are visible to the naked eye if you look closely. They can build up to relatively high numbers in lakes.
Bythotrephes disrupts food webs by annihilating tiny native zooplankton, which should be the food for young fish and fish that preferentially eat zooplankton. These fish can’t easily eat spiny water flea because of the long spine. Thus, spiny water flea disrupt the food web by eating the tiny zooplankton while they themselves are not very edible.
Unfortunately, humans are the most likely spreader of spiny water flea to other lakes. We all know to clean, drain, dry. But is everyone paying attention to ALL their fishing gear? What gear create the most risk of spreading spiny water flea? That’s the primary question this project set out to answer.
The clean, drain, dry message is particularly important to prevent the spread of spiny water flea. The resting eggs produced by the mature females (the microscopic round yellow balls in her brood pouch) can withstand quite a lot. But they can't survive drying and heat. Because the temperature has to be hotter than what would easily be available for cleaning equipment, drying is the best option to prevent accidental spread of these eggs.
But the question remains, which gear accumulates spiny water flea the most? Which should anglers start with when cleaning their gear? Using the St. Louis County AIS grant and our MAISRC grant we have set out to answer this question.
Angling gear use being simulated:

- 3 stationary anchors (nylon [twisted or braided] or polypropylene line 3/8" diameter)
- 3 moving fishing lines (monofilament, braided, or fluorocarbon, 0.011 inch diameter, equivalent to 10 lb test monofilament and fluorocarbon, but 30 lb test braided)
- 1 moving downrigger, steel cable and monofilament lead
- 1 moving bait bucket
- 1 live well simulation (continuous pumping into a net)
To do the work, we use two teams of researcher in two boats. The lead boat deploys the angling gear and the tender boat collects information on the actual number of Bythotrophes in the water the angling gear is being towed through.
This is a bathymetric image of our field site. Each time we sample, we pull the angling gear along 3 transects, each 1 km in length. Samples for densities of Bythotrephes in the lake water are collected at the ends and mid-transect using plankton nets. The anchor ropes are left to soak at points A, C, and E for 1-2 hrs while the angling gear is being towed.
Densities of *Bythotrephes* were determined with vertical tows of \( \frac{1}{2} \)-meter diameter nets in triplicate at each transect tow start and end and the transect mid-point.
Perhaps evening fishing is more risky for spiny water flea transport than is daytime fishing, so we have tested this as well.
We are repeating the testing in two different lakes: Island Lake is a stained-water lake (dark water because of plant tannins); Lake Mille Lacs is a clear water lake. We don’t know how much spiny water flea change their behavior due to water clarity, so that is why we are repeating the tests in a second lake.
We are researching these questions:

1) What gear is most prone (at risk) to accumulate spiny water flea?

2) Are there differences in spiny water flea accumulation between daytime and twilight?
Preliminary results:

1) Downrigger line collects the most spiny water flea.

2) Other fishing line, especially monofilament, collect a lot of spiny water flea.

3) Daytime and twilight differences are highly apparent for livewell accumulation – twilight is a larger risk.

4) The more spiny water flea present in a lake, the larger the risk that they will collect on and in angling gear.

5) When cleaning and drying gear:
   DRAIN ALL WATER; CLEAN FISHING LINES FIRST!
Spiny water flea tend to accumulate at the last eyelet at the tip of the rod. They can often be easily removed, but another option is to clip the line and discard it in the trash.
The clean, drain, dry message is particularly important to prevent the spread of spiny water flea. The resting eggs produced by the mature females (the microscopic round yellow balls in her brood pouch) can withstand quite a lot. But they can't survive drying and heat. Because the temperature has to be hotter than what would easily be available for cleaning equipment, drying is the best option to prevent accidental spread of these eggs.
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