Natural Resources Research Institute
University of Minnesota Duluth
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NRRI *Now*

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NRRI Mission:
Deliver research solutions to balance our economy, resources and environment for resilient communities.

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From the Editor:

At NRRI, we talk a lot about the "economy of the future" because that's our focus. We anticipate future trends to provide the R&D Minnesota needs to stay in — and ahead of — the game.

NRRI researchers explain what they anticipate in their future research and why they're excited in a video you can view on our website.

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"NRRI celebrates 35 years with a focus on the future!"

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Getting to the root of wild rice to help restoration

Big Rice Lake, northeast of Virginia, Minn., could be called Pickerel Weed Lake. The wild rice stands that likely gave the lake its name are thin and scattered. Large portions of the lake are thick with pickerel weed.

"I assume the water level has been altered at some point, giving the pickerel weed an opportunity to get established," said NRRI plant ecologist Carol Reschke. "There are still areas of wild rice on the lake, but it's sparse. Not enough get out there and harvest."

Efforts in Minnesota to restore wild rice haven't been consistent. In some lakes it came back beautifully, in other places competing perennial plants – mainly pickerel weed and narrow-leaf cattails – have won out. Why? That's what Reschke and NRRI environmental engineer Chanlan Chun are trying to figure out.

"What makes a healthy environment for an annual plant like wild rice to outcompete perennial plants?" Reschke asked. "Wild rice has to produce seeds and start over each year, while the weeds have big root systems and just grow back each year."

To get a better understanding, the science team heads out by air boat or canoe to six sites – some with healthy wild rice stands, some with sparse stands. University Water Resources Science graduate student Tyler Untiedt is charged with gathering sediment around root systems of both the competing plants and the wild rice plants at each site. The chemistry of the sediment and microbes associated with the roots are carefully analyzed, along with water quality.

"Microbes have dynamic relationships with plants," explained Chun. "They're studied extensively for their roles in agriculture, for instance. But little is known about microbes' role in aquatic native and invasive plants."

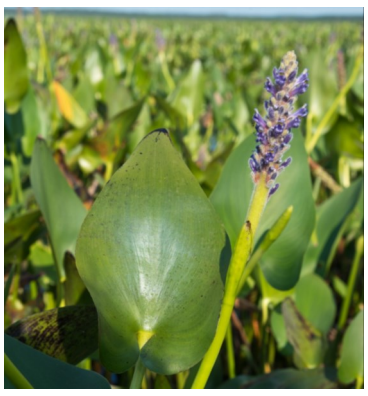
Surrounded by pickerel weed, Carol Reschke examines wild rice strands at Big Rice Lake.

Reschke and her crew are going to the same six sites to document what plants are growing there and the density of wild rice. Placing her floating, rectangular meter plot, she writes down what plants are present and counts the individual rice stems in the plot. Wild rice managers consider 30 stems per half square meter enough to go out and harvest. Some healthy wild rice sites are producing almost 70 stems per half meter, while others have only one or two stems, like on Big Rice Lake.

By comparing the microbial community, sediment chemistry and plant communities of the dense wild rice stands to the sparse sites, this three year study, now in its second year, will provide data to wild rice managers, state agencies and the public.

"Wild rice is culturally significant, it's Minnesota's state grain, but it's also ecologically important as food for wildlife and habitat," said Chun. "We hope to find out why some of the restoration efforts worked, while others didn't."

Funding for this research is provided by the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR).



Beavers: Good or bad for stream ecosystems?

Steelhead trout are a fun sport fish. That's why they were introduced to Minnesota's North Shore streams in the early 1950s.

The inland sea of Lake Superior works well as their adult home and the streams up the watershed give them a place to spawn. But their progress often gets thwarted by a busy woodland critter: the beaver.

"Minnows and brook trout can live and reproduce each year above beaver dams, but steelhead need an open connection from spawning grounds to Lake Superior to thrive", said NRRI scientist Josh Dumke.

The Minnesota Department of Natural Resources has been managing the problem by regular removal of the beavers. But many local landowners and the DNR want to know the other impacts of removing dams. On the one hand, the pools hold water, releasing it slowly through dry periods and raising groundwater levels. On the other, the pools heat up water and are subject to evaporation.

"Many people like the dams because it provides habitat for a lot of other species," said Karen Gran, UMD science professor and project lead. "Generally, the beavers are removed to help the local fishery, but it's not clear what removing the dams does to the overall hydrology of the basin."

Dammed streams hold more water, allowing for replenishment of the ground-water supplies. But the water is also susceptible to excessive warming.

This year, the first of the two-year study, the DNR will not remove beaver dams from any of the study sites. Four pairs of watersheds on the Knife River will be compared; all eight have active beaver populations. The UMD scientists will collect streamflow data, evaporation rates, rainfall, air and water temperature data. NRRI will conduct the fish study to determine how dams are affecting steelhead spawning migrations. Next year, beaver management will resume on four of the eight streams and data will again be collected and compared.

This study is funded by Minnesota Sea Grant.