Natural Resources Research Institute
University of Minnesota Duluth
Driven to Discover

# 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:

You're not just looking at a simple boardwalk. You're looking at potential.

The tamarack wood for this boardwalk was thermally modified -- a chemical-free, heat-treatment process that improves the properties of the wood so that it resists decay in outdoor applications.

This demonstration project at the Sax-Zim Bog in northern Minnesota showcases the potential for new markets for low value wood species. It expands the potential wood resources available to regional wood manufacturers. It opens up new potential for tamarack threatened by the Eastern Larch beetle.

And here's a bonus: Increased harvesting of tamarack and other low-value or underutilized species can reduce the potential of wildfires.

We hope you're finding potential in many unexpected places.

*June Breneman*
Manager, External Affairs



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## House deconstruction keeps valuable material out of landfills

Identifying the valuable materials in old homes has become second nature to Steve Thomas, founder of Better Futures Minnesota, a social enterprise out of Minneapolis. He's been doing it for 10 years now.

"You see this wood? It was harvested in 1906. The grain on it is so tight. It's beautiful," he gushed excitedly. "There's a gold mine in this house. People will buy this up like crazy."

The wood was being carefully dismantled from one of three old houses in West Duluth that have been targeted for deconstruction by St. Louis County. The work crew is a team of specially trained men, recently released from incarceration, who are learning job skills and turning their lives around. The materials are sold to the public as close to the site as possible, or at the Better Futures Reuse Warehouse in Minneapolis.

NRRI Materials Scientist Victor Krause has been working with this organization since 2015 to help them get the most value from the resources.

"Many people don't realize that the amount of waste generated from construction and demolition is increasing at an alarming rate – nearly as much now as municipal solid waste," Krause explained. "Landfills that aren't designed to contain these materials are finding it difficult to keep hazardous compounds away from groundwater sources."

A study by Ecotone Analytics found that a reusing and recycling a typical deconstructed house versus demolition and landfilling has a carbon off-set of about 116 tons.

NRRI Wood Shop Supervisor Scott Johnson made a wood species display to help the work crews identify wood and developing how-to manuals to upcycle the materials and make the deconstruction site more efficient.

The St. Louis County deconstruction projects are funded by the Environmental Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission for Minnesota Resources. The goal is to remove the tax-forfeited homes and make the land available for new construction, returning the property to the tax rolls and divert up to 85 percent of the materials from landfills.

*Better Futures crew members methodically take apart a tax-forfeited home in West Duluth in September to save valuable materials for resale.*

Projects that NRRI has worked on with Better Futures include:

- Development of bench and table designs to upscale old Douglas fir materials & new outdoor chair design to make out of other recycled wood
- Test recycling opportunities of old books
- Process development for recycling the copper in old compressor motors
- Ecotone partnership to calculate the greenhouse gas emissions being diverted by the deconstruction process.
- Identify potential harmful effects from landfilled materials leaching and entering the environment.
- Assist deconstruction process improvements
- Design improved production jigs for plexiglass dividers to meet requirements for local school

## NRRI receives $3M grant to analyze contaminants in Great Lakes

In September, the U.S. Environmental Protection Agency announced significant federal investments in Great Lakes research. The funds include $3 million to the Natural Resources Research Institute for collecting and analyzing legacy and emerging chemical contaminants in lake sediments.

This Great Lakes Sediment Surveillance Program will entail collecting sediment samples throughout the entire Great Lakes system, including Canadian waters. Not only is it a massive project by size, there are hundreds of contaminants to analyze – some introduced decades ago and some emerging more recently. Scientists are keen to understand more about the interactions of these contaminants with the environment.

"We'll analyze over 250 different contaminants, including new contaminants such as pesticides and PFASs – known as 'forever chemicals' -- as well as legacy contaminants like lead and mercury," explained Bridget Ulrich, NRRI Aqueous Geochemist.

"Beyond just surveillance, we're interested in understanding more about what is controlling the way the contaminants are dispersed in the sediment and how they impact the ecology of the lakes."

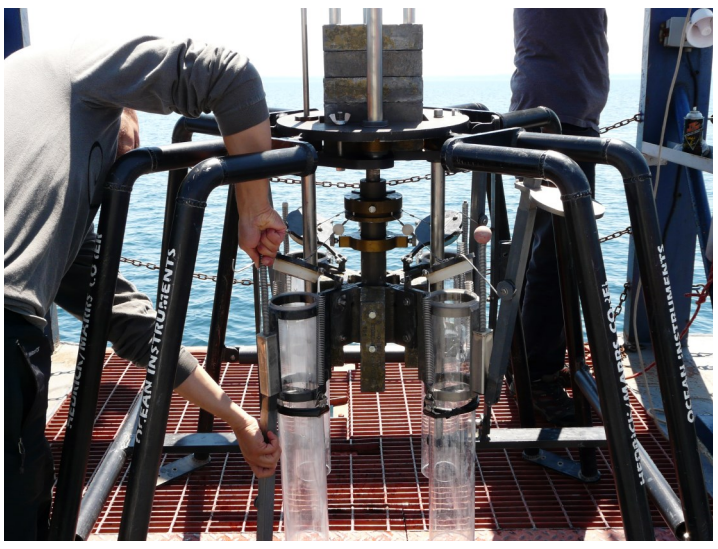
These toxic contaminants are harmful to aquatic life in the Great Lakes. They also don't break down in the environment and can remain in sediments for decades. For example, PFASs are widely used in consumer products such as nonstick cookware and grease-resistant food packaging.

NRRI's paleolimnology scientists will study sediment deposited as far back as 200 years to understand the historical contaminant record. They'll also collect surface sediment samples to understand how the contaminants are distributed in the lakes today.

"Layers of sediment are deposited in lakes continuously, leaving us a record of past activity in and around the lakes," explained Senior Scientist Euan Reavie, a co-principal investigator on the program.

To deliver on this expansive research effort, NRRI has pulled together a large team within the institute and the University of Minnesota Duluth's Large Lakes Observatory and Swenson College of Science and Engineering.

"The Great Lakes provide critical ecosystem services that coastal communities rely on, like drinking water, fisheries and water for industry," said the project's Principal Investigator Christopher Filstrup. "We want to better understand the contaminants, while recognizing that the lakes themselves are changing through time. Understanding these processes is important to ensuring that these services are available for future generations."



*Miranda Galey holds a bat captured during research field work.*

The findings of this five-year project will lead to improved management strategies that more effectively target potentially harmful contaminants and protect ecosystem health.

**Meet the Team:**

**Principal Investigator and Project Manager Dr. Christopher Filstrup (NRRI)**

**Co-Principal Investigator Dr. Euan Reavie (NRRI)**

**Co-Principal Investigator Dr. Bridget Ulrich (NRRI)**

**Co-Principal Investigator Dr. Kathryn Schreiner (Large Lakes Observatory and UMD Dept of Chemistry & Biochemistry)**

**Co-Principal Investigator Dr. Chan Lan Chun (NRRI and UMD Civil Engineering)**

**Mercury and Heavy Metals Expert Dr. Nathan Johnson (UMD Civil Engineering)**

**Analytical Chemist Dr. Brian Barry (NRRI)**