

NRRI Now

A monthly newsletter from the
Natural Resources Research Institute

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NRRI Now is a 2021 CASE V Award Winning Newsletter!

Set Sail. Monthly news from NRRI.

First the good news: After a year in lockdown due to COVID-19, the Environmental Protection Agency's largest research vessel [Lake Guardian](#) has set sail.

NRRI Scientist Elizabeth Alexson joins 11 scientists living and working aboard the ship over the next month. She'll be collecting water samples that contain critters at the bottom of the lake food webs to monitor for changes and invasive species.

Now the bad news: That year off was hard on the science. It was the first time since the EPA started the monitoring program in 1993 that no data were collected.

Here's what my colleague, Euan Reavie, lead on this project, had to say about it:

"We lost an entire year of field work. That means a big lull in data and publication output in the years ahead."

Back to some good news: Out of 16 nominees, NRRI was awarded the University's Professional & Academic Senate [Outstanding Unit Award for 2021](#). It's an amazing honor given all the great work at colleges, institutes and centers of research throughout all five campus.

Get vaccinated. Stay safe!



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Duluth scientists play lead role in monitoring coastal wetlands



April 26, 2021

NRRI receives \$2.33M from the EPA to support research teams that monitor shorelines from Thunder Bay to Green Bay

"In essence, we're asking 'How are you doing? Are the humans taking care of your wetlands?'"
- Valerie Brady

The Environmental Protection Agency announced in April \$10 million in continued funding for the Great Lakes Coastal Wetland Monitoring Program through 2025. NRRI received \$2.33 million as one of ten teams in this effort.

NRRI has three teams of specially trained technicians and scientists that will travel from Thunder Bay, Ontario, through northern Wisconsin and across the Upper Peninsula of Michigan to Green Bay in Lake Michigan to monitor the wetlands. Specifically, they're documenting changes to fish, bug, plant, bird and amphibian communities and whether changes are caused by human activities or natural cycles. Monitoring the plants and animals helps the scientists provide data to natural resources managers to keep protection and restoration efforts on track and help detect changes to the system.

NRRI Senior Aquatic Scientist Valerie Brady is co-principal investigator with lead investigator Don Uzarski at Central Michigan University. Brady is charged with coordinating this large program, including the details of the sampling effort to ensure each scientist and technician – from Duluth to the St. Lawrence Seaway – are collecting data in exactly the same way, every time.

“And that’s a real challenge,” she said. “We have to have consistency to be able to legitimately compare data from Lake Ontario to Lake Superior, right down to the angle of the fish nets.”

With 10 years of data on some 1,000 wetlands across the Great Lakes basin – the biggest coastal wetland dataset of its kind on earth – scientists can effectively monitor and document ecological improvement and degradation. Using these data, web-based tools have been developed for agency managers to use in making well-informed decisions.

Field season underway

The bird crew, led by NRRI Ornithologist Annie Bracey, travels before the sun rises to be at one of 35 wetland sites each spring so they’re in place when the birds first start their morning calls. They listen and document which bird species are present within each wetland.

The amphibian crew, also led by Bracey, does the same on spring evenings when frogs and toads begin their evening calls. The team members can recognize the calls of over 100 different bird species and 8 different frogs and toads.

Aquatic vegetation researchers document the changes in plant communities in the wetlands. New invasive plants are reported to the Department of Natural Resources, or equivalent agency in each state, so they can be mitigated before they spread.

The fish and bug crews will head out in the mid-summer to carefully net, document and release fish and the aquatic insects they eat. The NRRI crew will visit 25 sites each year to collect the data. They also collect water samples to be analyzed by the water quality team led by NRRI Limnologist Chris Filstrup.

“We’re checking in with the wetland plants and animals every year,” said Brady. “In essence, we’re asking ‘How are you doing? Are the humans taking care of your wetlands?’ But sometimes it’s just the changing water levels stressing them out.”

This year, the lake water levels are coming down from several years of near historic high levels that makes collecting samples difficult for the crews. Crews have had to adjust their equipment, and some have traded their waders for wet suits to accommodate.

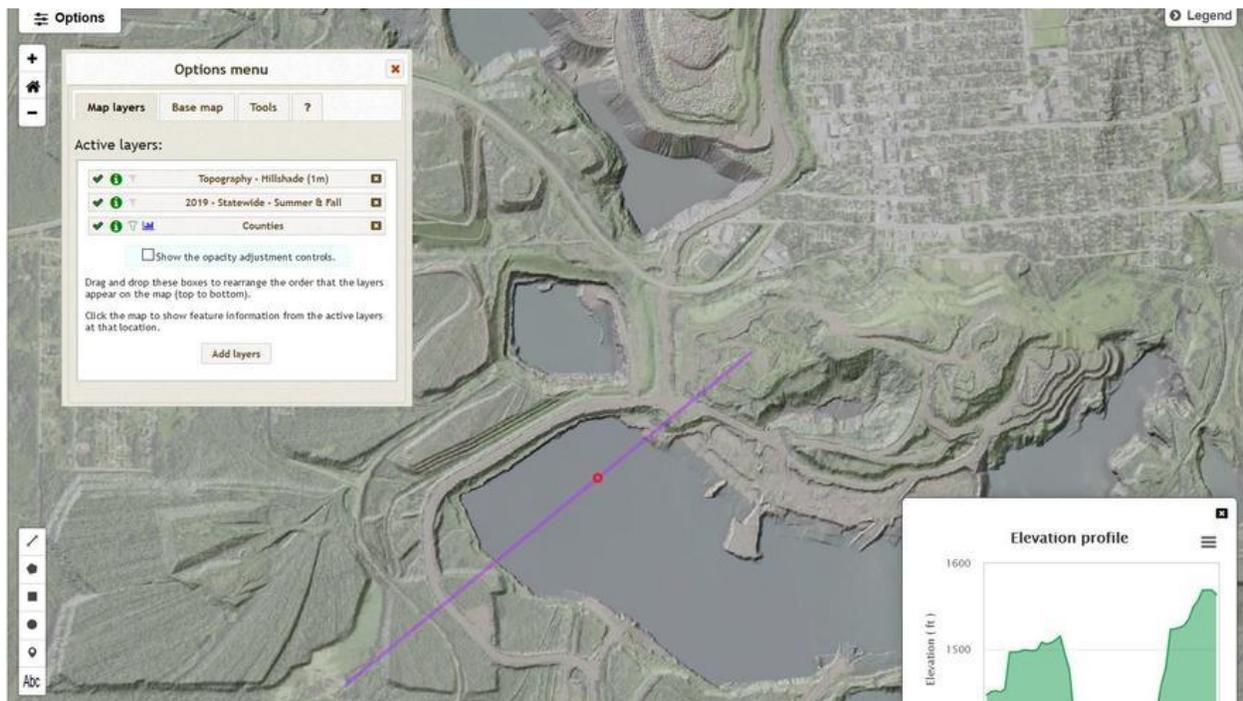
Ecosystem loss

Coastal wetlands are vital to the health of the Great Lakes because they trap and filter pollutants and provide critical habitat for wildlife and spawning areas for fish. But in some areas of the Great Lakes, 95 percent of these important ecosystems have been destroyed.

“People can forget that the Great Lakes water levels will rise and fall over decade cycles,” said Brady. “So, in a low water year, people will move in and put up sea walls. But when the lake level rises again and the water is too deep for the wetland plants, wetland plants are then blocked from the shallower water they need.”

The EPA funding is through the Great Lakes Restoration Initiative, part of a larger effort to restore and protect the Great Lakes.

Online Atlas launches to cover Minnesota



Map of Eveleth, Minn., made on the statewide atlas using aerial imagery and a hillshade option to accentuate land cover and topography with an elevation profile.

May 12, 2021
June Breneman

State funds development of a GIS tool that puts 400 layers of information at finger tips for better planning, management

“It’s designed for people that have limited or no GIS skills... to remove technical barriers that can get in the way of good decision-making and planning.”

- Will Bartsch

Mapping tools – think, GoogleMaps or MapQuest – have become indispensable for people navigating an unfamiliar neighborhood.

But to get deeper, detailed landscape, resource and demographic information, professionals turn to powerful geographic information system programs that create maps, compile geographic data, and analyze mapped information, while allowing for discovery and information sharing.

That level of detail is critical in resource management, planning and development. But the expense and training needed to use these robust tools is out of reach for many municipalities, non-governmental units, non-profits or businesses – and the rest of us.

The Natural Resources Research Institute at the University of Minnesota received state funding to take some of the functionality of the powerful GIS tools and make it accessible and free. The [Minnesota Natural Resource Atlas](http://mnatlas.org) (mnatlas.org) is now launched statewide and ready to use.

It could help a city planner better understand different land use issues, societal demographics, and watershed boundaries.

A natural resources manager could find detailed landscape information to develop smart restoration efforts.

Town councilors might need infrastructure and land cover data to plan new development.

Data with a click

The Atlas provides users access to nearly 400 layers of data in 10 categories: agriculture, biota, boundaries, climate, environment, geology & topography, imagery & land cover, infrastructure, society & economy and water.

“Our goal was to build a tool that anyone could use,” said Will Bartsch, NRRI senior research scientist and lead researcher on this project. “It’s designed for people that have limited or no GIS skills. Ultimately, it removes some of the technical barriers that can get in the way of good decision-making and planning.”

Principal Investigator Lucinda Johnson assembled a large team of NRRI, Minnesota Sea Grant, and University of Minnesota researchers, computer programmers and educators to plan, develop and deliver the Atlas. And outside expertise was brought into the project through the formation of multiple advisory committees.

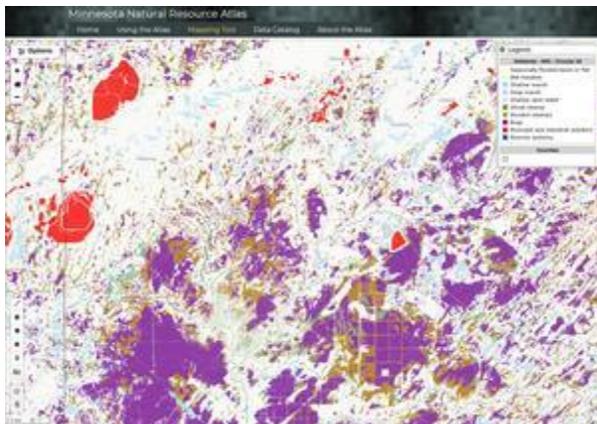
During its development, the team worked closely with individuals and organizations that work on natural resource issues. Kari Hedin, a watershed specialist with the Fond du Lac Band of Lake Superior Chippewa, took part in the effort. She especially appreciated being able to give input into the new tool.

“Specifically, we wanted the 1854 Treaty Authority’s map of wild rice lakes data in the Atlas.” she said. “And when we all started working from home, I didn’t immediately have access to my curated maps on my work computer. I could quickly get the data I needed on the Atlas on an even broader scale.”

Getting the word out

But potential users need to know how to access it and what it can do for them.

That’s why Bartsch and outreach coordinator Cindy Hagley spent the past year giving online training courses. It was a format that worked especially well during the pandemic lock-down.



Left: Atlas generated map of wetlands in Minnesota.

Planning for natural resources management is often done at the local – township, city or county – level. To reach those local organizations, NRRI collaborated with the Minnesota Board of Soil and Water Resources (BWSR) to deliver multiple training sessions, providing these new users with a unique tool for

accessing, exploring and sharing data. Natural resource conservation is at the core of BWSR’s mission, along with coordinating those efforts across multiple stakeholders – from agency partners to private landowners.

“What’s really helpful to us is that you can compile the data layers you need for a project and then make a link that you can share,” said Jon Sellnow, training and program coordinator at BWSR. “We can show a landowner the maps and they can see exactly what you’re seeing. It’s easy to use and free.”

Access for all

While the target audience for the Atlas is communities, industries and smaller governmental and non-governmental organizations that might not have access to a robust and expensive GIS team, it’s gaining popularity with the general public, as well. Anyone can access information on

public fishing sites, lake depths, wetlands and wild rice lakes. Or maybe a new park or trail to explore.

The Minnesota Natural Resource Atlas started in 2016 by covering Northeast Minnesota. An additional 2019 legislative appropriation from the state through the Legislative-Citizen Commission on Natural Resources (LCCMR) funds allowed Bartsch and the Atlas team to expand it statewide.

“It wasn’t just a matter of taking the data we had and expanding it,” said Bartsch. “We relied heavily on our advisory committee members from all over the state to find out what data were needed in each region. We had a good handle on mining and forest issues, but we really had to work with partners to get more information on other issues, especially agriculture.”

Professor David Mulla, UMN Department of Soil, Water and Climate, is leading the development of new datasets relevant to agriculture that will be useful for implementing best management practices for farming.

The Natural Resources Atlas is a unique tool for Minnesota, with Vermont being the only other state to have something similar. And as more people use it, Bartsch hopes to continue getting feedback for ongoing improvements.

The mission of NRRI is to deliver integrated research solutions that value our resources, environment and economy for a sustainable and resilient future.

Advisory Board Spotlight: Q&A with Brendan Jordan



May 6, 2021

June Breneman

Shared goals of a bioeconomy for Minnesota drives relationship between Advisory Board member and NRRI.

“I am learning about new areas where Minnesota could play a leadership role on climate while supporting new jobs and investments.”

As Vice President, Transportation and Fuels, at the Great Plains Institute, Brendan Jordan is a leader in initiatives aimed at decarbonizing the transportation sector. Specifically, he’s advocating for transportation electrification, low carbon fuels, biogenic carbon capture and advancing the bioeconomy. He holds a Master of Science degree in Science, Technology and Environmental Policy from the University of Minnesota.

NRRI: You’ve been on the NRRI Advisory Board for more than five years. Have you observed changes in research focus or intent? Is NRRI adapting to the changing economy?

Brendan Jordan: I have certainly seen NRRI’s work become more focused during the time I have served on the advisory board. My main area of overlap with NRRI is with the bioeconomy, and NRRI is a member of a Great Plains Institute-convened Bioeconomy Coalition of Minnesota. The Coalition supports the development of biobased technologies in Minnesota.

NRRI has helped to narrow the Coalition's focus, and vice versa. Investments are made on technologies where Minnesota can have unique leadership, that utilize and add value to Minnesota's wood resource, and have environmental and climate benefit. NRRI focuses in areas like gasification to produce fuels and chemicals, biochar, thermally modified wood, and evaluation of carbon storage in forest ecosystems. These areas are consistent with both of our stakeholders' priorities.

How does your background help inform Advisory Board discussions?

I offer a few perspectives to the Advisory Board. One is my connection with national trends in the energy, climate, and environmental sector, to advise on how NRRI's work can have national significance. Second is my connection with Minnesota stakeholders in the Bioeconomy sector through my convening of the Bioeconomy Coalition of Minnesota. Third, my relationships with policymakers in Minnesota and elsewhere. I can bring NRRI's research to new audiences and aid in the policymaking process.

Have you gained a new perspective or learned something because of your participation on the Board?

I have learned a lot by being a part of NRRI's board. In particular, I have enjoyed learning about emerging trends in mining and minerals. This is an area of interest nationally as we seek ways to decarbonize carbon-intensive industries like mining and steel manufacturing. There are also intriguing ideas like iron ore-based batteries to meet increased demand for energy storage. I am learning about new areas where Minnesota could play a leadership role on climate while supporting new jobs and investments.

What are the major benefits that NRRI can deliver to industry, the environment and our Minnesota communities?

I think that NRRI's targeted approach of focusing on translational research and identifying opportunities to add value to natural resources is uniquely valuable.

If money was not a limiting factor, what should NRRI do that we're not doing?

There are always more good ideas than funding, and certainly there are more ideas that could be pursued with more funding. Some important areas for increased focus include:

- evaluating forest management practices that enhance carbon storage,
- developing products from wood with strong greenhouse gas reduction benefits (such as engineered wood products and biochar),
- opportunities to link bioenergy with carbon capture and storage to achieve net-negative greenhouse gas impact, and
- lifecycle greenhouse gas assessment of energy and products.

All of those areas align environment and economy for the benefit of the people of Minnesota and beyond.

Meet the Researcher: Alexis Grinde



Alexis Grinde and her 4-year-old son, Kai, enjoy spending time outdoors.

May 6, 2021

June Breneman

NRRI ornithologist helps forest managers help wildlife with research and conservation.

“These technologies provide a wonderful opportunity to learn about birds during critical time periods in their life cycle.” - Alexis Grinde

From wild pigs in California to wild birds in Minnesota – Alexis Grinde’s career as a wildlife ecologist has introduced her to some interesting critters.

After leaving California in 2004, birds quickly became her focus, even as she taught biology courses at Pine Technical and Community College in Pine City, Minn. Grinde began a doctorate degree at UMD in 2011 under the guidance of Jerry Niemi, NRRI’s lead ornithologist and then-director of NRRI’s Center for Water and the Environment.

Today, Grinde leads six ornithologists in the Forest and Land Group at NRRI. But like a kid with new toys, she’s especially excited that her team will get to use new tools to track birds this field season.

“We are deploying a variety of tags on different species – sharp-tailed grouse, American woodcock, golden-winged warbler and boreal chickadee,” Grinde explained. “Some send

information via satellite, others send data via cell phone towers. We will also continue to use traditional radio-telemetry methods for the smaller birds too.”

With a focus on ecology and conservation, Grinde and her team use birds and bird communities as indicators of environmental change. The information gathered is critical for long-term conservation of biodiversity and informing land management conservation efforts.

The new technologies will gather information previously unobtainable. Scientists will be able to know what habitats are important at different life stages, also how and when the birds move locally and across the continent. This basic information is needed to make science-based decisions promoting environmental sustainability for humans and wildlife.

“It’s an exciting time to study birds,” said Grinde. “These technologies are relatively new and provide a wonderful opportunity to learn about birds during critical time periods in their life cycle.”

Partnering

Because birds move great distances, relying on the environment to sustain them, they encounter human impacts – resource extraction, buildings, pollution – that can harm them. Research partners, like the Minnesota Land Trust, Minnesota Department of Natural Resources and the U.S. Forest Service, work with Grinde and her team to look at the ecosystems holistically and translate the information to on-the-ground impact.

“We can ask questions such as, how can forest management improve habitat for this species, or how environmental pollutants might impact a species of concern,” she said.

Supported

The Avian Ecology Research Lab has field projects year-round, purchasing a lot of supplies and equipment and using the vehicle fleet often to collect data across the state and region. Grinde relies on the support of Central Administrative Specialist Tammy Thomasson-Ehrhart to keep it all straight.

“She is a wonderful resource and makes sure we’re following all of the proper procedures,” said Grinde. “Tammy is also kind and thoughtful. She’s the best.”

Post-pandemic plans

Grinde and her sisters were planning a trip to Scotland as the coronavirus lock-down and travel restrictions were put in place a year ago. She wants to see the unique Puffin colonies and a sip a wee bit of Scottish whiskey.

“As soon as they’ll let us in, we are headed to Scotland!” she exclaimed.

Around the University



The innovative work of a NRRI scientist is highlighted in this post by the Office of Technology Commercialization:

[Bridget Ulrich: An innovator restoring the earth:](#)