

NRRI *Now*

Winter 2014

Natural Resources Research Institute

UNIVERSITY OF MINNESOTA DULUTH
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NRRI collaborates!

*NRRI helps reverse damage done
in the St. Louis River estuary*

~ Growing Strong Industries

~ Developing New Ideas

~ Nurturing Natural Resources

St. Louis River gets a make-over

Concern about pollutants in estuary leads to research, restoration

It made sense, back in the day, to fill in swampy coastal areas of Duluth's bustling harbor when more solid land was needed to support industry. But today we want them back. A huge effort is underway – with NRRI lending critical expertise – to restore some of those lost wetlands, improving habitat for fish, wildlife and people.

And that's just the beginning. The entire St. Louis River estuary is undergoing a make-over on a grand scale to reverse damage from decades of logging, milling, steel-making and poor sanitation practices. The estuary is one of 38 harbors currently listed as an official Area of Concern on the Great Lakes. With 1,700 acres targeted for restoration, it's also one of the most challenging to get removed from that infamous list. But it's not for lack of trying.

"Back in 1948 there was the Federal Water Control Pollution Act which, in the 1970s, became the Clean Water Act. But originally it was all about point sources of pollution – what's coming out at the end of a pipe," explained Diane Desotelle of the Minnesota Pollution Control Agency. Desotelle's job is to coordinate the efforts of about a dozen organizations working – each in its own way – to clean up the estuary.

"So in 1978 the wastewater treatment plant [Western Lake Superior Sanitary District] came on line and that really helped with water quality, but there were still legacy issues," she said. Those issues, dating back to unregulated industry practices of the late-1800s and through the 1960s, include sediment contaminated with PAHs (polycyclic aromatic hydrocarbons), PCBs (polychlorinated biphenyls) and mercury. There are also submerged areas of aquatic habitat that are thick with century-old wood waste.

In 2008, the U.S. Environmental Protection Agency established the Great Lakes Restoration Initiative to provide funding to address the environmental problems that persist in the Areas of Concern. That same year,



Minnesota taxpayers voted for the Legacy Amendment which allocates a portion of state revenue to the Clean Water Fund. It's a clear message that Minnesotans support environmental restoration and are willing to pay for it.

"We hate to say it, but it's about funding. We have to have the money to get this stuff done," said Dan Breneman, MPCA project manager. "Those Legacy dollars are vital because we can go to the EPA with projects funded 35 percent upfront that they can match with federal dollars. That's very attractive to the EPA."

The challenge for Desotelle and Breneman is keeping the communication channels open and clear between some 70 people representing all of the agencies and organizations working in the estuary. These biologists, engineers, hydrologists and chemists contributed expertise to develop a Remedial Action Plan that defines the actions required to reach targeted goals that will remove the estuary's Area of Concern designation.

"We have a number of sites with objectives for restoring habitat, but we're trying to get our arms around what it means to restore a site," said Desotelle. "What is necessary and sufficient? How can we do what we need to do but be economically wise with taxpayer dollars? When have we done enough?"

To further complicate things, each organization – from Departments of Natural Resources to tribal bands to grassroots citizen groups – has different interests, different internal processes and different levels of perspective for restoration.

"And over the last 20 years, there have been a lot of people doing good work in the estuary but it hasn't been coordinated. We're trying to pull together that older information, too," Breneman added.

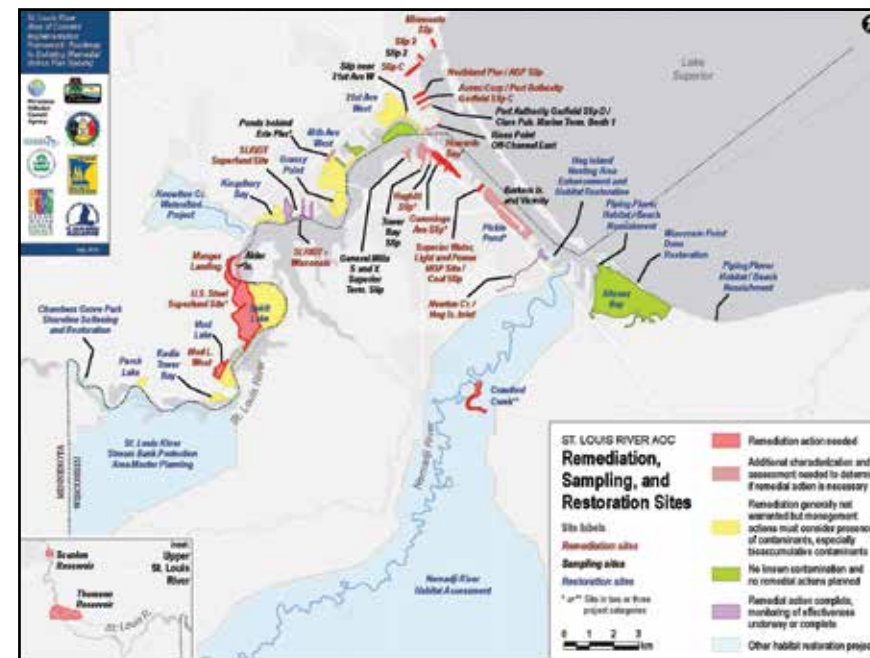
NRRI is a good example of an organization doing research in the estuary over the years – 17 projects since 1976 – as sporadic funding opportunities came along. (See sidebar)

Thanks to past efforts, some progress has already been made in the estuary, motivating the current ramped-up efforts. A Minnesota Superfund Site has been remediated and restored, 6,500 acres of geologically sensitive habitat have been protected in Wisconsin, habitat was created for colony-nesting waterbirds, and more.

"People who grew up in this area talk about the days when there were fish kills, and how you couldn't swim in the water," said Breneman. "Now we have a prime fishery here."

Over the last 35 years, more than \$400 million has been invested in restoring the St. Louis River. The goal is to remove the Area of Concern designation by 2025.

"This just shows how important it is to protect areas from degradation," said Desotelle. "It's really expensive and a lot of work to clean it up."



NRRI projects in the St. Louis River Estuary

- Habitat assessment and bird population survey, 1976-79, estuary-wide
- Fisheries survey, 1977, Wisconsin Grassy Point
- Organic residue effects on gull and tern movement, 1978-79, estuary-wide
- Flora and fauna survey, 1979-80, Western waterfront trail
- Ring-billed gull survey, 1980-81, Arrowhead Bridge
- Walleye "Young of the Year" survey, 1982, estuary-wide
- Macroinvertebrate survey, 1993, U.S. Steel, Interlake Tar sites
- Sediment toxicity and macroinvertebrate survey, 1995-96, Stratified random points
- Invasive niche competition, 1995-97, Perch Lake
- Survey of aquatic vegetation, water quality, contaminants, diatoms, fish and macroinvertebrates, 2001-03 and 2011, Great Lakes coastal wetlands and nearshore habitats
- Survey of aquatic vegetation, water quality, fish and macroinvertebrates, 2011, Great Lakes coastal wetlands
- Fish and macroinvertebrate survey, 2009, Radio Tower Bay
- Macroinvertebrate, aquatic vegetation, bird survey and ecological modeling, 2010, 40th Avenue West (Duluth)
- Macroinvertebrate, aquatic vegetation, bird survey and ecological modeling, 2011, 21st Avenue West (Duluth)
- Bird, macroinvertebrates, vegetation survey at prioritized restoration sites and reference condition, present, estuary-wide
- Submerged aquatic vegetation study, present, 21st Avenue West
- Wastewater discharge model, present, 21st Avenue West

Nine problems targeted for remediation and restoration in the St. Louis River Estuary:

1. Fish consumption advisories
2. Degraded fish and wildlife
3. Fish tumors and other deformities
4. Degradation of aquatic bugs and insects
5. Restrictions on dredging
6. Excessive loading of sediment and nutrients
7. Beach closings and body contact restrictions
8. Degradation of aesthetics
9. Loss of fish and wildlife habitat

St. Louis River Area of Concern Coordinators:

- Minnesota Pollution Control Agency
- Wisconsin Department of Natural Resources
- Minnesota Department of Natural Resources
- Fond du Lac Band of Lake Superior Chippewa



(Above) Slip C at the former Superwood site in the St. Louis River estuary in 1968. This was before the Clean Water Act required treatment of industrial waste discharge. (Photos courtesy of MPCA)





Are moose crying wolf?

NRRI, Minnesota Zoo study the impact of wolves on Minnesota moose

Wolves, once nearly extirpated in the contiguous United States, have rebounded. The Minnesota Department of Natural Resources estimates that over 400 wolf packs roam the northern woods, approximately 2,200 individual wolves. But are the wolves impacting Minnesota's declining moose population?

"We just don't know yet," said Brian Kot, a Minnesota Zoo biologist working in collaboration

with NRRI. "That's what our work, along with other researchers in the state, aims to clarify. Will we even be able to collect enough data to determine the impact in the state? We hope so."

Multiple organizations are deploying expertise to study the problem, and that research has already revealed some information. Studies show that the diet of Minnesota wolves is primarily deer, moose and beaver. But to understand the synergy of this

predator-prey relationship more thoroughly, Kot, working with NRRI Principal Investigator Ron Moen, is starting a three-year study this winter.

"We intend to deploy GPS radiocollars on wolves to track their movements and look at broad scale behaviors, prey preferences and habitat use," Kot explained.

Improved technologies in radiocollars are going to provide more data than was possible in the past. Two-way communication capability on an Iridium-based satellite system means the radiocollars can be programmed and re-programmed remotely from the scientists' laptops. And the new collars can collect more and different types of information than the older radiocollar technologies.

"At 24 or more locations a day, we might be able to tease out information about wolf feeding behavior that involves not only adult moose and deer but also calves and fawns," said Kot.

Predators are an important part of the Minnesota northern woodland ecosystem. "A deer population without wolf predation would have negative impacts on Minnesota forest regeneration," Kot added.

Other ongoing research is showing that moose are facing multiple stressors that may also be impacting their populations: heat stress from warming temperatures, proliferation of diseases and ticks and loss of natural habitat could all be playing a role.

Tara Harris, Director of Conservation at the Minnesota Zoo, explained that the zoo has long participated in animal conservation research around the world, but they were interested in finding ways to become involved closer to home.

"Moose and wolves are two of the most iconic wildlife species in our northern forests, and the Minnesota Zoo does a lot to educate the public about them," said Harris. "We're excited to take that one step further and to be involved in scientific research in Minnesota to better understand interactions between these two animals. Partnering with NRRI's expertise is a great fit for this research."

In December, Moen and Glenn DelGiudice of the Minnesota DNR organized a two-day moose symposium for regional management

and research agency personnel to share insight and current research findings. He explained that Minnesota is at the front of deploying research and management in response to the moose decline.

"Interestingly, it is becoming increasingly clear that populations of moose in other parts of North America are also having problems," said Moen. "Causes vary, but we are seeing declining moose populations across the southern edge of moose range."

The Minnesota Zoo and NRRI wolf and moose research is funded by the Minnesota's Clean Water, Land and Legacy Amendment; the Environment and Natural Resources Trust Fund and the Minnesota Department of Natural Resources.



Biologist Brian Kot searches for wolf clues.



STATISTICAL KNOWLEDGE: THE POWER (AND FRUSTRATION) OF NUMBERS

It's often been said that there are three kinds of lies: lies, damned lies, and statistics. Yes, when numbers are bandied about without scientific rigor, people lose faith and tune out. But accurate statistics, properly employed to help us understand the complexities of our world, are a powerful tool.

This article is about good statistics. Important statistics. The kind that scientists at NRRI use to help us understand environmental quality, or product quality – hard numbers can tell us about levels of certainty for a given hypothesis.

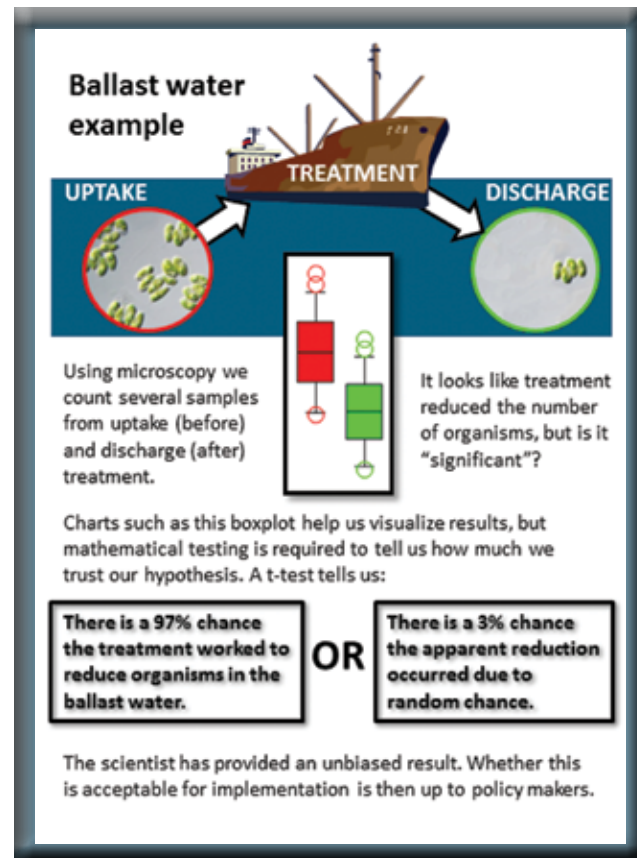
Here, two NRRI scientists talk about why statistics are important to what they do, and how it informs the decisions they make. Euan Reavie is an aquatics scientist testing a variety of technologies for their efficacy in eliminating invasive micro-critters in ballast water. Matt Aro is a wood scientist who is testing a variety of engineered wood products – plywood and oriented strandboard – with varying thermal treatments to upgrade the wood quality.

Why should people trust scientists? One reason is that they go beyond simple observation, testing and retesting to be sure of their answers. Science – and the statistics behind it – provides the most verifiable information we've got on a given subject.

Reavie: For a given ballast water treatment, we can calculate that there is a 97 percent chance the reduction in organisms was due to treatment, or rather, that there's a three percent chance that it was due to chance alone.

Aro: And if we're analyzing the bending strength of a new plywood product, we can easily determine the average bending strength. We just run the same bending test on many samples of the same product. The more samples we bend, the better.

Reavie: Similarly, we run a given ballast technology many times, and we'll see that yes, it looks like this technology is killing the organisms. The more tests we run, the greater our confidence that the apparent success of the treatment is significant.



Erik Skare digitally measures the strength of wood samples. Data collected from these tests were then statistically compared to determine the best wood treatment.

Aro: Right. So if we want to compare the bending strength of plywood subjected to two different temperature treatments, we can run a "t-test" which tells us if the difference in the bending strength between the two groups is truly, statistically significant. Luckily, software programs can do the complicated math.

Reavie: Building trust in science is mired in the fact that we rarely say there's 100 percent certainty of anything we measure. We base decisions on probabilities. We often choose to set our probability more stringently, like saying: There's a greater than 99.9 percent chance this treatment is working.

Tricks of the trade

Camp teaches teens lessons of successful entrepreneurship

By Lance Boedigheimer, UMD Writing Intern

As the owner and sole proprietor of Life's Little Joys Photography, Laura Lucy has a busy year ahead of her: she's looking into office space for the business, taking on some employees and – wait for it – finishing her sophomore year of high school.

Lucy attended the 2013 UMD Teen Enterprise camp in Virginia, Minn., an event for students age 14-18 aimed at teaching them how to be a successful entrepreneur. The program is run through the UMD Center for Economic Development.

For some participants, the lessons from the camp are for future career plans, but for others, like Lucy, these lessons are put to use right away.

"With my photography business, I had been struggling a bit with the 'business' aspect: time, money, expansion, things like that. Just managing all of this was pretty new to me," she said. "The camp showed me that I definitely needed to change how I managed my time. Before, I was a bit lazy when it came to setting up the shoots, editing the photos and upkeep with the website."

Camp participants conducted market research, found information on big companies like Coca-Cola, and then shared their findings with the group.

According to Sandi Larson, creator and program director of UMD Teen Enterprise, the presentation aspect is repeated throughout the week.

"Employers are looking for soft skills – being able to communicate, team work, being able to present well," she said. "This program is about entrepreneurship, but it's also about developing those soft skills."

Larson came up with the idea for UMD Teen Enterprise after a discussion with the U.S. Small Business Administration and Minnesota Small Business Development Center's network about focusing on programs for veterans and youth entrepreneurship.

"When we talked about that being a priority for the SBA/SBDC," she said, "the youth entrepreneurship idea really resonated with me."

At the time, Larson's entrepreneurial-minded son was in junior high and creating a program for youth like him appealed to her. While developing the camp, she used her son as a resource to figure out what the camp should look like.

"I bounced a lot of ideas off him and he really liked the idea of learning how to think through the business process, how to take your own idea and put it into action," she said.

According to Larson, the participants build on a business plan every day throughout the camp, getting "big picture" lessons and relating it back to their idea. Then,



Entrepreneur Laura Lucy

at the end of the week, everything is put together in a business presentation for participants, staff, parents, and whomever the students want to invite.

And while those communication skills are important to hone, Lucy found another unique experience offered by UMD Teen Enterprise to be both her favorite, and the most helpful.

"We visited numerous small businesses and got to question them about their start up struggles, and how they got the leg-up on the competition," she said. "It gave us a chance to be really engaged, and to learn from the personal experience of the owners about the challenges we can expect to face in the future."

Nicole Wrazidlo, a UMD freshman who attended the first Teen Enterprise camp in 2012, agrees that visiting businesses around town was both enjoyable and helpful. But, for Wrazidlo the most beneficial time was that spent in the classroom.

The camp welcomed a variety of business owners from around Duluth who shared their story. One example was the owner of Frost River, a business specialized in making and selling a variety of outdoor packs.

"The owner came in and shared his products, his marketing strategy, how he got started," she said. "It was fun to hear from people who made it."

Success stories like these gave the participants in UMD Teen Enterprise hope about the future, while understanding that the path to success is far from smooth.

Conveying the reality of entrepreneurship is an important part of the camp, but it's all part of the overall mission—teaching young people how to be successful in the world of business.

Both Lucy and Wrazidlo agree that young people who want to become entrepreneurs should attend the CED Teen Enterprise camp. However, according to Larson, this field casts its net much wider than one might think.

"We've heard that people coming into the workforce now are going to have at least seven different careers in their lifetime and one of those will be entrepreneurship," she said. "We're showing young people what it takes because there's a good chance that they will be an entrepreneur at some point in their lives."



NRRI Scientist Ed Zlonis in the field

Tweet this: Minnesota forest bird populations are increasing

Minnesota may be capable of sustainably harvesting up to five million cords of wood per year (according to the Generic Environmental Impact Statement), but is currently only harvesting about two thirds of that amount. While that may not be good news for loggers, there is a silver lining. Less wood harvesting in Minnesota means that more forested land is maturing and providing habitat to forest song birds.

And here's just one reason why we should all care: Birds are highly effective, non-chemical insecticides. One pair of Evening Grosbeaks eats an estimated \$4,000 a square mile per year in equivalent cost of chemical insecticide applications.* And each bird species has carved

out their preferred food niche – some species, for instance, depend upon spruce budworm. Take out one species and it could unbalance the system.

NRRI has been monitoring forest bird populations in three national forests – the Chippewa, Superior and Chequamegon – for almost 20 years (monitoring in the Chequamegon ended in 2010) and the trend is steady or upward for 90 percent of the species being watched over these two decades. The NRRI database is one of the longest and most detailed for forest birds in the Midwest, with over 1,000 point counts gathered each year and almost a half million individual birds counted.

The upward trend is encouraging given that

when the monitoring started there was some concern about forest song bird populations.

“At the time we started the monitoring program in 1991, forest harvesting in Minnesota was increasing,” explained Gerald Niemi, NRRI ornithologist and principal investigator for NRRI’s bird research. “We lacked information on the population status for many species of forest birds and how they might be affected.”

By simply overlaying a graph of the downward trend in forest harvest with a graph of the upswing in forest birds, scientists suspect that the availability of more mature forests is one reason for the healthy trend. A 2013 report from the Department of Natural Resources shows a five percent increase

in forest coverage in Northeast Minnesota.

“We know that many bird species are associated with intermediate and older forests,” said Ed Zlonis, NRRI ornithologist and assistant scientist. “When an area is logged it promotes a period of even-age and often single-species forests that overall support fewer bird species. It takes 60 – 80 years for more diverse layers and tree species composition to develop.”

Other bird-friendly practices include more selective logging practices over the decades and an increase in backyard bird feeding could be contributing to the upswing. Warmer winters may also be beneficial to some species.

On the other hand, some species are declining dramatically.

“The Connecticut Warbler and Evening Grosbeak have declined 75 – 80 percent over the last 20 year. It’s a big problem,” said Zlonis. “The Swainson’s Thrush and the Yellow-bellied Flycatcher are also in decline, and these are all species found in lowland conifer habitat.”

In the case of colder, wetter lowland bogs, climate change has a more pronounced impact which the scientists think may be impacting those species. But to further confound the researchers, some woody wetland bird species are increasing.

“We don’t have concrete causative factors yet, so that’s something we’ve started researching,” said Zlonis. “Does climate change have a direct physiological effect on some species? Or is it an indirect effect through changing the birds’ preferred habitat?”

Zlonis is lead author on the summary report of breeding bird trends from 1995 – 2013 submitted to the Chippewa and Superior National Forests last October. Not only does the data inform land managers and industry for better forest stewardship, the long-term dataset provides a lot of opportunities for young scientists.

“It’s something like a playground to learn different statistical techniques and ways to manage data, to learn what you can do with research,” said Zlonis. “As a young person interested in science, it’s fantastic.”

*Takekawa and Garton, Journal of Forestry, 1984



Bird photography by Ed Zlonis

DID YOU KNOW?

- Migrating songbirds eat 3,000 – 10,500 tons of insects per day.
- 6.8 million birds are killed each year by communication towers.
- 360 – 900 million birds are killed each year by windows and buildings.
- 3-5 billion birds migrate each fall from Canada, many of which over-winter or pass through Minnesota on their way south.

NRRI generates possibilities in sustainability



NRRI Sustainability Coordinator Ryan Hueffmeier

It's time to do more than walk the talk. It's time to tango! NRRI is taking its overarching mission of sustainability and integrating it into every nook and cranny of the institute. The effort started in July 2013 with the development of a new part-time position – Sustainability Coordinator – and hiring the enthusiastic Ryan Hueffmeier to staff it.

“We’re coordinating NRRI’s sustainability operations lock-step with what UMD is doing on campus,” said Hueffmeier, who spends the bulk of his time as NRRI Junior Scientist for Great Lakes Worm Watch. “And because we’re a research organization, we’re looking at how we can incorporate savings and reduce our waste into every research project, from beginning to end.”

A recent example revealed itself when 700 pounds of corn stover was left over after a research project. A little extra effort went into making sure it was composted. Those pounds were added to the tally of compost that NRRI is now generating internally – almost 20 pounds a week from two lunchrooms. And this is just the start as NRRI staff learn new habits, like planning for composting and recycling efficiencies at every lunch meeting and waste-generating event.

“We’re still finding corrugated cardboard in paper recycling, and things like that,” said Hueffmeier. “People want to do the right thing and are trying, but don’t always know what to do. That’s why I’m trying to develop good signage and teach people.”

Getting some data at the start will also allow Hueffmeier to monitor progress. UMD undergraduate student Matt Detjen will

be pulling together current electricity and water usages as well as help Hueffmeier conduct regular trash audits.

Topping Hueffmeier’s long list of sustainability possibilities at NRRI is the development of a shared catalog of research equipment that can be recycled into other research projects.

“New equipment purchases are regularly written into grants and then discarded or set aside when the project is done,” he said. “My goal is to get information to researchers about NRRI equipment that can be repurposed and save grant funds.”

He’s also very excited about a project that will help prove-out some NRRI research efforts and taste good, too. A vegetable garden is being planned that will utilize durable thermally modified wood, reduce parking lot run-off into the headwaters of Miller Creek, put NRRI’s new compost pile to use and provide fresh veggies to staff.

“We’ll start small, but I believe the garden will kick-start even more ideas and generate more collaborations,” said Hueffmeier. In January, he started building community networks with monthly brown bag lunch meetings that are open to the public, as well as NRRI staff.

UMD has a long reputation for operating with a sustainability focus – especially in energy efficiency and stormwater management. But in 2008, the Office of Sustainability was formed and Campus Sustainability Coordinator, Mindy Granley, was hired to link campus operations with education, outreach and research opportunities.

“We don’t just think about ‘greening’ the campus,” said Granley, “we also think about who can get involved, what can be learned, and how can students help lead these efforts? There are so many learning opportunities along the way.”

Highlights over the past five years include, creating a UMD Energy Action Plan and campus goals for reducing greenhouse gas emission, LEED certification on five new buildings, student-led composting across campus, integrating locally (and university!) grown food into the dining hall, and so much more.

Learn more about UMD’s efforts at www.d.umn.edu/sustain.

A welcome demonstration

NRRI tests thermally modified aspen siding at the Sax-Zim Bog

Northern Minnesota’s Sax-Zim Bog – a rare, old growth Black Spruce/Tamarack bog – is one of the most famous birding spots in North America. Especially in the winter, it attracts birders from all over the United States in search of Great Gray Owls, Northern Hawk Owls, Redpolls, Pine Grosbeaks, Black-backed Woodpeckers.... and many more.

The goal for the Bog’s managing non-profit organization, Friends of Sax-Zim Bog, is to protect this officially designated Important Bird Area and promote public understanding of the bog and the critters that inhabit it. To do that, the group wants to make people feel welcome and comfortable with a new Welcome Center. NRRI thermally modified 1,200 board feet of aspen siding for the project underway this winter.

“We wanted to build with local materials and local labor. That’s very important to us,” said Mark “Sparky” Stensaas, executive director of Friends of Sax-Zim Bog. “When we heard about the wood treatment that makes aspen – which we have plenty of – work for siding, it fits right with our goal.”

NRRI has been testing a variety of wood species in a pilot-scale thermal modification kiln that makes Minnesota wood – like birch, basswood and aspen – more durable, water resistant and dimensionally stable. NRRI hopes to open up new markets for local wood with the thermal modification treatment. The Welcome Center is an excellent demonstration project for the process.

“We don’t want to promote the logging of cedar because cedar bogs are an ecologically important ecosystem,” Stensaas added. “Plus, I like the warm, brown color of the treated wood better than the aged gray color of cedar.”

When completed, the Welcome Center will be solar-powered and heated with a propane stove. The roof will be planted with a variety of native grasses and plants and the interior walls will be made of Tamarack. Wagner Zaun Architecture of Duluth designed the structure and the timber was milled by Lester River Sawmill. More information can be found at www.saxzim.org.



Visit us online: www.nrrri.umn.edu



The Natural Resources Research Institute was established by the Minnesota Legislature in 1983 to foster economic development of Minnesota's natural resources in an environmentally sound manner to promote private sector employment.

Lucinda Johnson, interim director

Center for Water & the Environment

Lucinda Johnson, director

Center for Applied Research & Technology Development

Donald Fosnacht, director

Center for Economic Development

Elaine Hansen, director

NRRRI Now

June Kallestad, editor/writer


Trish Sodahl, graphic design

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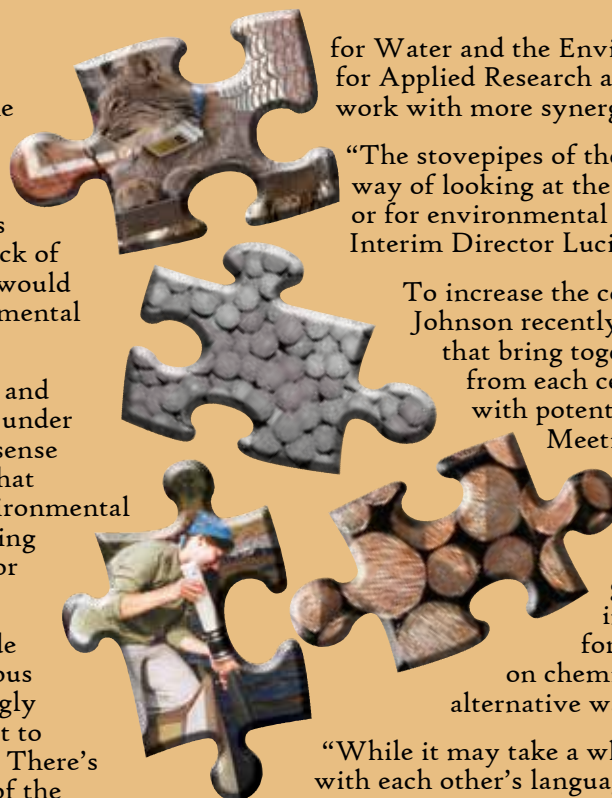


NRRRI collaborations fit the research pieces together

It took vision and political will to establish the Natural Resources Research Institute back in 1983 in the midst of a recession. And it took guts to give the new organization such a dichotomous mission. Forward-thinking legislative leaders realized that building jobs on the back of a natural resources-based economy would require serious attention to environmental issues.

Bringing the two forces – engineers and environmental scientists – together under one roof was bold enough. It made sense then to develop two centers under that roof: one to focus on water and environmental issues, and another to focus on helping industries and growing private sector employment.

Today, however, the walls that made those research goals seem incongruous are crumbling. The public increasingly demands accountability with respect to industry's environmental footprint. There's also a much greater understanding of the contributions of both jobs and the environment to a region's quality of life. Researchers in NRRRI's Center



for Water and the Environment and in the Center for Applied Research and Technology Development work with more synergy than ever before.

“The stovepipes of the past are no longer a viable way of looking at the future, either for businesses or for environmental organizations,” said NRRRI Interim Director Lucinda Johnson.

To increase the connections within NRRRI, Johnson recently instigated monthly meetings that bring together two researchers – one from each center – to talk about programs with potential overlap. The Muffin

Meetings (and yes, muffins are served) bring together

NRRRI's disparate expertise. Past meetings paired water quality expertise with geologists, wood products industry know-how with a forest bird expert and a topic on chemically-engineered peat with alternative wastewater treatment systems.

“While it may take a while to become comfortable with each other's language and approaches, the conversations in the halls suggest we are heading in the right direction,” Johnson added.