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Natural Resources Research Institute

NRRI Now

A monthly newsletter from the Natural Resources Research Institute

Minnesota Value • Innovative Research • Global Relevance

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NRRI Executive Director Rolf Weberg shares New Year greetings from his office.

2021 is now in the books with all its challenges, ideas and accomplishments. None of our success could have been possible without the dedication and commitment of the NRRI team to take care of one another and do excellent research. I also extend thanks to our many supporters -- from our advisory board and the University System, the Minnesota Legislature, and our stakeholder groups – your support and engagement is crucial.

Our Strategic Focus

Looking forward, 2022 promises to be an exciting year at NRRI. We have been steadily building our capacity in personnel, instrumentation and facilities to place ourselves in a position to drive our three strategic initiatives across our state and region:

1. Ecosystem Resilience
2. Iron & Minerals of the Future
3. Future Forest Industries

I look forward to sharing the impacts of our work and collaborations.

On behalf of the team at NRRI, best wishes for a prosperous New Year.

Rolf Weberg, *NRRI Executive Director*

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Dad was wrong. Money can grow on trees.

NRRI report on Ecosystem Services applies a monetary value to School Trust Lands ability to store carbon and improve environmental health.

June Breneman

Dec 29, 2021

Did you know that Minnesota's public schools are partially funded by revenue from state lands? Get out your No. 2 pencils for a mini history lesson.

In 1858, the federal government granted land to Minnesota "for the use of schools" which is managed by the Department of Natural Resources. It was written into the state Constitution.

The revenue from School Trust Lands – 2.5 million acres – is generated from mineral leases, timber sales and other real estate transactions. But what if the lands could make money by managing the forests for timber and carbon storage simultaneously?

The rise of carbon markets is making that a possibility. It's a way to compensate landowners for their stewardship, which benefits everyone. NRRI Landscape Ecologist Christopher Wright is working to understand the possibilities and opportunities for carbon sequestration on Minnesota's School Trust Lands.

Carbon markets 101

Carbon markets aim to reduce carbon emissions with a “cap-and-trade” mechanism. Governments cap how much carbon an industry or business can emit. If it emits beyond its cap, it must trade for carbon credits earned elsewhere for carbon emission reductions. It’s similar to the Wetland Bank Credits system set up in Minnesota in 1994 to keep wetlands on the landscape.

California is the U.S. leader in raising money through carbon markets. But Minnesota is catching up.

“Forests everywhere capture and store carbon and also release oxygen, so they’re very beneficial to humans,” said John DuPlissis, NRRI Forestry Program manager. “Active management of School Trust lands can improve carbon sequestration potential as well as carbon stored in long-lived forest products.”

Minnesota’s forests store the equivalent of 50 years of all carbon dioxide emissions produced in the state, and about 75 tons of carbon per acre, according to the Forest Resources Association’s Minnesota Carbon Fact sheet.

And while carbon storage is vitally important, active management can improve other ‘ecosystem services’ that forests provide to society, including water-quality protection and wildlife habitat.

The Office of School Trust Lands has a fiduciary responsibility to manage forests for long-term returns, which goes hand-in-hand with an environmental responsibility.

“This gives them the flexibility to pursue economic returns from multiple ecosystem services markets – including timber, carbon sequestration, water-quality enhancement, and wildlife habitat,” explained Wright. “This is a new and exciting direction for School Trust Lands in Minnesota and nationwide. Carbon-centric forest management has likely benefits for water quality and wildlife.”

Moving Forward

Wright just published a white paper outlining the markets, opportunities and challenges. It’s titled Improved Forest Management: An Opportunity to Stack Multiple Ecosystem on School Trust Lands

The paper will be distributed by Dovetail Partners, a non-profit that provides information about the impacts and trade-offs of environmental management, including consumption choices, land use decisions and policy alternatives.

Wright hopes the white paper helps move the conversation forward and sets policy in motion to make Minnesota a leader in not only carbon sequestration, but in marketing multiple ecosystem services. Among Wright's recommendations for the School Trust Lands, he cites:

- Conducting a comprehensive inventory of School Trust lands to identify the best and most marketable opportunities for ecosystem services.
- Adopting a consistent set of criteria for wetland mitigation, endangered species mitigation, and carbon market transactions to guide identification of lands for ecosystem services projects.
- Using ecosystem service criteria to conduct a strategic assessment of State Trust lands.

"Mining and timber are an important way to monetize our natural resources," Wright said. "But especially now, as we experience the impacts of climate change, we have an opportunity to obtain value from other services we get from our forest landscapes."

This project was made possible through the support of the Doris Duke Charitable Foundation and The Nature Conservancy's Natural Climate Solutions Accelerator program. Project partners include Dovetail Partners, the Minnesota Department of Natural Resources Resource Assessment Program, NRRI, the Minnesota Office of School Trust Lands and The Nature Conservancy.

Associated Staff

Chris Wright Ph.D.

Meet the Researcher: Ron Moen

Ron Moen's long wildlife career has taken him on a 26-year walk on the wild side.

2012 Archive: Ron Moen takes a break from testing GPS collars for moose projects at the Moose Research Center in Soldotna, Alaska..

He's held Canada lynx kittens in his hands. Looked for moose calves from a helicopter. Located bats in their tree roosts. Found a wood turtle that was almost 60 years old. Watched wolf pups waiting for the pack to return.

Wildlife biologist and mammalogist Ron Moen has dedicated the past 26 years of his career -- starting as a post-doc researcher at NRRI in 1995 -- to forest mammals (and the occasional woodland amphibian), especially those in decline.

"Over the years I have worked on many different wildlife species. Animals can co-exist with humans, and some of the research I have done showed how," said Moen. "For example, radiocollars on Canada lynx showed how forest management creates habitat that made it possible for Canada lynx to live in Minnesota. We also identified habitats moose can use to escape the heat."

Tracking a deer problem

A new research direction for Moen is a deer project funded by the Minnesota Department of Transportation. Moen is turning his conservation efforts to saving money – and hopefully animals at the same time.

His latest project is understanding how to reduce deer-vehicle collisions in Minnesota. About 1,200 of these collisions are reported each year.

"There probably have been five to 10 times as many deer-vehicle collisions, in most of which there is property damage to the car and the deer dies," Moen explained. "The base economic cost is $20 million per year for reported accidents, much more when considering unreported collisions. Decreasing deer-vehicle collisions by just one percent would save a lot of money, as well as saving the emotional cost to people involved."

The project has pulled in expertise from Raphael Stern, a professor in the University of Minnesota's Department of Civil, Environmental and Geo-Engineering, who is principal investigator on the project. Moen has also received many reports of dead deer on the side of the road from his NRRI Duluth colleagues. When one is reported, Moen goes to the site and collects data on road conditions, nearby habitats, and visual obstructions. The data will be analyzed by Stern using machine-learning techniques.

Central Support

One of the NRRI employees who worked behind the scenes to make the deer-vehicle collision possible is Grants Professional Megan Gorder. She helped Moen develop a budget for the project and then shepherded it through the UMD budget systems after the grant was awarded. Estimating budget categories is critical to the success of a project. Also critical is meeting the grant requirements for the University accounting system.

For Fun

Even though his wildlife work gets Moen outdoors observing nature on a regular basis, he still enjoys getting out to paddle on a kayak.

“I like sitting close to the water and watching fish, turtles and aquatic plants,” he said. “The Duluth area offers lakes and rivers that make this possible.”

Associated Staff

Ron Moen Ph.D.

Tiff's Tips for Eco Living #5: Be smart and 'Salt Smart'!

NRRI Sustainability Coordinator, Tiffany Sprague, shares tips for using sidewalk salt to be safe and keep excess salt out of the environment.

Tiffany Sprague

Dec 16, 2021

With the chilly weather upon us, I look forward to a cozy evening on the couch, curled up with the cat, getting lost in a good book or off-beat indie movie, while shoving my face with a giant bowl of *salty* popcorn. I should note the cat equally enjoys said bowl of popcorn, and usually gets first dibs. While Turtle (the cat) and I share many favorite snacks, as well as hobbies -- bird watching being #1 -- we also share an equal list of dislikes. Topping our list of dislikes is watching folks oversalt their sidewalks and driveways! “Salt the snacks, not the streams!” we say. (Apologies to my cardiologist and Turtle’s vet.)

Sad pet paws, upset (read: dead) fish, rusty cars, white-stained boots and jackets -- how much salt do we really need to spread each year?! The answer is not as much as you think. And yes, we can maintain public safety while protecting our environment. Before you start tossing out piles of sand or chicken grit instead (trust me, that comes with a different suite of issues), let’s learn a few ways we can all Salt Smart this winter.

Step 1: Befriend the Shovel

The more you can shovel, the better. Utilize those warm(er) and sunny days to scrape off layers of snow from sidewalks and driveways. Love shoveling? Look for opportunities in your community to sign up and shovel for older individuals or folks with a disability. Fitness + do-gooding = big biceps and a big heart.

Step 2: Scatter thy Salt

Before dropping handfuls of salt on the ground, first consider -- do I need to salt here? In some instances, shoveling may be enough. In other locations (like when folks love to dump their sump pump drain directly onto the sidewalk…ehm…but we’ll save that for another rant, I mean blog), you may experience consistent ice build-up. For these icy situations, scatter your salt, aiming for 3 inches between salt grains. To achieve this, I find the best method is to get into a crawling position, and using tweezers, delicately place down one salt grain; then using a ruler, protractor and compass, I find the ideal location 3 inches away for the next salt grain; continue until entire area is covered.

For those who may find this method cumbersome, a salt spreader makes a suitable alternative. You can DIY a salt spreader by rinsing out a laundry detergent container, letting it dry completely, poking holes in the lid, filling with salt, and you are ready to Salt Smart this season!

And remember, more salt doesn't mean more melting. Salt has a melting capacity, and a pile of salt in one area doesn't mean it melts more ice. There's a lot of science and math behind that, which you can Google at your leisure. As a general rule, one coffee cup covers a driveway or about 70 feet of sidewalk or the equivalent of two parking spaces

Step 3: Switch Deicer when Very Chilly

Salty-salt (sodium chloride, NaCl) doesn't work below 15 degrees Fahrenheit. Bummer, I know. Some melting agents, such as magnesium chloride (MgCl2) and calcium chloride (CaCl2) work to -10 deg F and -20 deg F, respectively. They can be purchased at any hardware store. Check the outdoor temperature and the components of your deicer to make Salt Smart decisions this winter.

If traction is the name of your game, chicken grit and sand could make a good alternative at lower temperatures. Just remember, these will still get washed away to local streams through ditches or storm drains. High levels of sand in our water ecosystems fills in critical fish and bug habitat, can cause fishy suffocation, and may make the water too murky for fish to find necessary prey and food. Sad fish, sad ecosystem, sad anglers – a lose-lose-lose situation.

Step 4: Sweep & Save Left-Overs

Sweep up and reuse extra salt, sand or grit left on sidewalks and driveways. Money savings for you, less stress on our environment -- a win-win situation!

BONUS Step 5: DIY Salt Brine

Like to overachieve? A pretreatment salt brine is a great way to minimize salt use, be prepared before a storm hits, and show off to your neighbors just how on top of life you are.

DIY De-Icer Salt Brine Recipe

You'll Need:

- Pot or kettle to boil water
- 5 gallon bucket
- Stirring spoon
- Watering can
- 3 cups (24 oz) rock salt
- 1 gallon water

All you have to do:

- Pour 24-32 oz. of rock salt into your bucket.
- Bring 4 cups of water to boil.
- Add the hot water to bucket
- Add 12 cups of water to brine, stir to combine.
- Pour salt brine into a watering can.
- Apply salt brine to cleared walkways using a steady back & forth motion.

Other ways we can reduce salt use during the winter is through a little kindness, patience, and appropriate footwear. Toss the cute shoes in your bag, strap on the heavy-duty boots, and embrace the winter wonderland with grippy shoes ready for snow and ice.

If you are able, identify opportunities to work remotely during large snow storms. This removes cars from the roads, reducing pressure on road crews and freeing up space for public transportation, increasing safety and access for all.

Researchers at NRRI are working hard to identify alternatives to our salty problems, striking a balance between protecting our environment and maintaining public safety. You can play your part by continuing to educate yourself on the challenges chloride presents in our environment and telling all your family and friends how to reduce their salt use (in snazzy PSA style).

Until next month,

Tiff

Associated Staff

Tiffany Sprague M.S.

About NRRI

The Natural Resources Research Institute was established by the Minnesota legislature in 1983 as an applied science and engineering research organization to inform state citizens and decision-makers while leveraging the power of the University of Minnesota. **The forward-looking charter provided by the Legislature is to *foster the economic development of Minnesota's natural resources in an environmentally sound manner to promote private sector employment.*** We are a mission-driven, project-focused team working to create opportunities for natural resource stewardship.

As part of the University of Minnesota system research enterprise, the Natural Resources Research Institute (NRRI) employs over 140 scientists, engineers, technicians, staff and students in two industrial research facilities.

Through collaborative partnerships, we deliver the innovative tools and solutions needed to utilize and sustain Minnesota's valuable natural resources.

With our partners and stakeholders, NRRI is helping Minnesota lead with globally relevant innovations to achieve the carbon-neutral economy of the future.

NRRI Mission

Deliver integrated research solutions that value our resources, environment and economy for a sustainable and resilient future.

NRRI Vision

Discover the economy of the future.

Two Industrial Research Facilities

NRRI has extensive laboratory capabilities to discover and deliver at the bench-to-pilot scales, reducing risk inherent in commercializing innovations. NRRI in Duluth has 19 labs to meeting the needs of land, wildlife, water and minerals research. There's also an additive manufacturing lab and several technology development labs. NRRI's facility in Coleraine is a 27-acre site focused on minerals and bio-based energy research.

Find out more: NRRI website / Facebook / Twitter / Instagram / YouTube / LinkedIn