

## NRRI Mission:

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

[www.nrri.umn.edu](http://www.nrri.umn.edu)



### From the Editor:

When NRRI innovates, waste taconite rock becomes valuable aggregate, regional wood species make higher value products and biomass becomes a clean energy source.

NRRI's research is at the intersection of the economy and environment -- a tricky juncture that needs informed decision-making. And no one knows that better than our state legislative leaders.

On August 18, a dozen Minnesota leaders came through NRRI to learn how we're developing new ideas for the state's resilient future.

Others are noticing, too. NRRI was recently cited as an example of innovative economic development for rural areas in a report by the Brookings Institution "Localizing the economic impact of research and development." NRRI is mentioned in number 13 of 50 policy proposals for consideration by the Trump Administration.

*June Breneman*



Senator Kari Dziedzic takes pictures of biomass samples while NRRI's Tim Hagen explains how he's developing a clean burning solid bio-fuel to replace fossil coal.

### NRRI Leadership

Rolf Weberg, Executive Director

### Initiative Directors:

Don Fosnacht, Renewable Energy  
Elaine Hansen, Business & Entrepreneurial Support

George Host, Forest & Land  
George Hudak, Mining, Minerals & Metallurgy

Lucinda Johnson, Water  
Eric Singaas, Wood & Bioeconomy

Duluth Labs & Administration  
5013 Miller Trunk Highway  
Duluth, Minn., 55811  
218-788-2694

Iron Range Labs  
One Gayley Avenue  
Coleraine, Minn., 55722  
218-667-4201

The University of Minnesota is an equal opportunity educator and employer.

## Minnesota Value: Seeing the forest for the bats

For millions of years, bats' impeccable timing worked well for them. They emerge from their caves each spring just as the insects hatch. Then, bats zoom through the forests all summer long, eating insects and storing the energy as fat that sustains them through the long, cold winter ahead.

But then white nose syndrome appeared, arriving in Minnesota from the east two years ago. This non-native fungus spreads quickly through the population when bats congregate in caves to hibernate. Once established, the disease depletes the bats' energy stores causing them to leave the caves too early in the spring, before the insects hatch. Without food, the bats weaken and die.

Ron Moen, a biologist who specializes in wildlife research, was ahead of the problem. In a preemptive move, he and Rich Baker at the Minnesota Department of Natural Resources proposed a study before the fungal problem hit Minnesota bats. They wanted to know where in the forest the northern long-eared bats live, when they bear young and how long they stayed in the forest.

"A lot of the bats people see -- in their buildings and attics -- are little brown bats. The northern long-eared bats that we're studying almost always roost in trees, in a woodpecker hole or other openings or under loose bark," said Moen. "With the knowledge we're gaining, we'll know which trees we have to be more careful with to protect those maternity roosts."

The recent appearance of white nose syndrome hit Minnesota's northern long-eared bats as devastatingly as in other locations, with about 90 percent



NRRI researchers Morgan Swingen holds a bat during field work.

mortality. It's a real problem for humans to lose that many natural mosquito controllers, especially as the insects carry diseases like West Nile virus.

The northern long-eared also hibernate and roost communally in large numbers so the syndrome spreads quickly. Further hampering the propagation, the females birth only one "pup" per season.

Minnesota is home to eight bat species, four of which are vulnerable to white-nose syndrome.

Moen has an advantageous dual appointment with UMD. His wildlife research through the Natural Resources Research Institute ranges from moose to martens to turtles, answering questions specific to challenges and changes in the environment. In the case

of bats, understanding how this threatened species uses the forest helps inform forest management decisions, which is important to Minnesota's vibrant wood products industries.

As a biology professor in the Swenson College of Science and Engineering, Moen has ready access to a pool of talented biology students at the graduate, undergraduate and recently graduated levels.

"This is a big project that received just over a million dollars because it takes a lot of people to do this," said Moen. "But it is really great experience, looks good on their resume, and when they do a good job I'm always happy to serve as a reference."

## Manager, scientist, future grad student: Adelle Schumann



Adelle Schumann, UMD '10, is proof that a winding road to college graduation can lead to work life satisfaction.

When she started her bachelor's degree, all she knew for sure is that she liked science. So Schumann tried a few majors -- chemistry, biology, biochemistry -- before landing on cellular and molecular biology.

### Career at NRRI keeps her going & growing

"I switched majors a lot and by my third year all my classes just shimmied into this degree," she said with a laugh.

But now, as a NRRI laboratory manager and scientist, Schumann credits those experiences and a variety of post-graduation lab jobs with the intuition gained to be successful and the confidence to pursue a master's degree in the fall of 2018.

Adding another "ball" to her juggling act doesn't worry her. Managing NRRI's busy Microbiology and Biotechnology lab for principal investigator and Professor Chanlan Chun includes managing six projects and seven student technicians. She's good at juggling.

For each project Chun brings to the lab, Schumann takes care of critical details -- trains students on lab, experiment and safety protocols, orders supplies and equipment, coordinates logistics. She also helps with sample collection, data processing and interpretation.

"And ordering supplies can be a hassle," she said. "Because this is a new lab we need everything. It takes time and energy to shop for the right product at the right price."

On top of lab management, Schumann is coordinating and conducting her own research to assess

sewer systems for antibiotic resistance. The summer sampling season has meant many days out of the lab to collect samples. But this research will deliver a double whammy; she can build her master's degree project around the data.

"That will give me a clear plan and preliminary data for my master's, which is really great," Schumann said.

Her assistance has also been requested by another NRRI principal investigator leading a wolf study, as well as training people to use NRRI's scanning electron microscope. Schumann started working in the lab as it was being established at NRRI in 2015 which allowed her to develop the organizational logistics and lab protocols.

As she considers her long-range goals, Schumann thinks she'd enjoy teaching 100 and 200 level college courses.

"I like those entry level courses, where students weed themselves out and find their way, much like I did," she added. "It's a time when you can watch the students really grow."