



# UPSTREAM

News from Itasca Biological Station and Laboratories

## Sink or source?

**Two lakes in Itasca State Park become part of a larger experiment to better understand the flow of greenhouse gases into and out of freshwater.**

Scientists know that freshwater is a key component of greenhouse gas cycling. What's harder to understand is how much and how frequently those gases tend to cycle in and out of the water. Researchers Jim Cotner and Lesley Knoll are launching an experiment at Lake Itasca and Elk Lake in Itasca State Park, along with other lakes in Minnesota, designed to measure these fluctuations in real time. Their research will contribute to a global effort to study and monitor lakes.

"Freshwaters are the sources of two important greenhouse gases, carbon dioxide and methane," says Knoll, station biologist at Itasca Biological Station and Laboratories. "We plan to use new tools to better understand and model the flow of these gases both into and out of freshwater."

Cotner is leading an effort to get the project off the ground at Itasca and Cedar Creek Ecosystem Science Reserve, a field station in East Bethel, Minnesota, famous for long-term ecological research. Cotner studies how the number and type of microbes in water impact carbon and phosphorus cycling.

In Lake Itasca and Elk Lake, as well as Cedar Bog Lake at Cedar Creek, Cotner and Knoll will set up towers, buoys, floating chambers and portable air analyzers to better observe the exchange of gases between water and air.



Photo: Jonathan Pavlica

**Lake Itasca beckons at Itasca Biological Station and Laboratories.**

Each lake has unique characteristics that, taken together, provide a broad look at gas fluxes in varying aquatic environments and, in particular, what factors affect whether a lake stores or releases gases.

Through the use of these varied data collection methods, the team hopes to both measure flow as well as identify trends in the tracking for better modeling.

"These tools will help us quantify the fluxes of two of the most important greenhouse gases," says Knoll. "But they'll also help us understand the mechanisms behind how those gases are released back into the atmosphere."

In addition to offering insights into the role of three varied freshwater sources in greenhouse gas exchange, the team sees broader potential to impact the community and fellow researchers through the implementation of these tools.

"Both these sites not only have a history of long-term field research, but each has thousands of visitors each year," says Knoll. "These tools have great potential to generate new knowledge relevant to greenhouse gas research, but also creates an opportunity to interface with the public on these pressing issues." —*Lance Janssen*



## DIRECTOR'S MESSAGE

# Greetings from Itasca!

It is such an honor to be writing this note to you all as the new director. The goal of this newsletter is to relate the simple joys of being at Itasca, as well as the work being done to keep it relevant, productive and useful to the state, the university, and our community.

I started this job after midnight on January 1, with an air temperature of -22 F, four sets of skis leaning against Cabin 4 in the moonlight and family excitement bubbling in the cabin kitchen. This year saw Field Biology courses successfully come and go, the Nature of Life first-year orientation program crank to full tilt and various graduate programs bond as they embark on their collective journey.

For many, Itasca was their first experience at the University of Minnesota. We did not take that moment for granted. What a cool way to shape your first perspectives of the university, among old-growth pines, next to the “headwaters” lake, and alongside highly regarded scientists in a jovial come-as-you-are dining hall. As they say in Maine, where my wife and I pursued our Ph.D.s, this is the way life should be.

The doors are open at Itasca. All are welcome, and we have a purpose to share, together — to match good, basic science with efforts to integrate it in hands-on learning and with public engagement as a community-planning tool. We have more than 110 years of experience at the Station to ballast things as we ply the waters ahead, and I am so excited to share the journey with you.

Jonathan Schilling, Director  
*Itasca Biological Station and Laboratories*



An aerial view of the new land north of the park.

## More room for research

**Newly purchased land just outside Itasca State Park will allow scientists to do long-term studies.**

For more than 100 years, Itasca Biological Station and Laboratories has occupied around 50 acres of land in iconic Itasca State Park at the headwaters of the Mississippi River. But last fall, the University of Minnesota purchased an additional 63 acres just outside Itasca State Park to expand long-term research efforts.

“This offers researchers the unique opportunity to do benchmark science — to compare ‘sanctuary science’ inside state park boundaries to manipulative trials being done on adjacent land,” says Jonathan Schilling, station director. The sanctuary created by the park boundaries provides a system to observe nature with minimal human disruption, while the new land enables scientists to alter the system or take samples to enable more control over the science. “This will help us tease out and predict how nature responds to change at this spot, a bellwether location at the edge of the forest-prairie transition.”

## A year-long look at lakes

Lesley Knoll and fellow lake enthusiasts around the world return to the same spot each day for a simple photo. The reason? Knoll launched #Lake365 last winter as part of an effort to document how lakes change over the course of a year. There are at least 15 lakes in nine states and five countries participating. You can follow along online by searching for #lake365 on Twitter.





# Methane and microbes

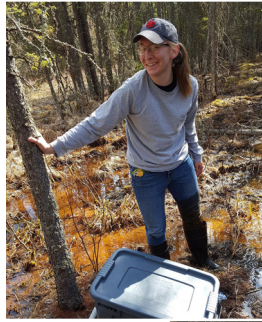
**Research at Iron Springs Bog focuses on how microorganisms affect production of the gas.**

Anna Bennett, graduate student in the College of Biological Sciences and recipient of the Itasca Director's Fellowship, spent this summer digging into how microbes in Iron Springs Bog just outside Itasca State Park impact methane production and consumption.

"This research is important because there are aquatic systems across the world that sequester methane and we must understand these values in order to grasp how they contribute to the amount of carbon released into the atmosphere," says Bennett.

Bennett, who is a graduate student in Trinity Hamilton's lab, focuses her broader research on microbes in extreme environments. From this last summer's work, she sees potential for future research not only in finding levels of methane, but also the impact on iron cycling, critical in understanding ecosystem productivity.

"There hasn't been much work on iron oxidizing bacteria in neutral, iron-rich systems, so I hope to contribute to that field with this research," she says. —*Lance Janssen*



**Iron Spring Bog near Itasca State Park.**

Photo: courtesy of Anna Bennett

# Life at the edge the prairie

**Itasca's Elk Lake sits at the cusp of the prairie making it the perfect place to study changing conditions.**

Minnesotans are proud of our natural surroundings which include multitudes of lakes, plentiful forests of various types, amazingly productive wetlands, and the prairies, the latter of which now feed us, and often, the world. But the prairies were not always where they are today and research done at the University of Minnesota's Itasca Biological Station and Laboratories (IBSL) has been instrumental in understanding how the position of the prairies on the North American landscape has moved due to a changing climate.

Elk Lake, which sits in Itasca State Park has been one of the most studied lakes in the world, due in part to its proximity to IBSL but also due to the fact that it sits literally at the edge of the prairie. Low oxygen conditions that predominate in the

sediments of this lake preserve a beautiful record of what has been happening on the landscape for the last 10,000 years. It is somewhat ironic that scientists have to look in the water to understand what's been happening on land.

While a great deal of past research at IBSL used lakes to help understand how the landscape responded to a changing climate, current work being done there by Jim Cotner and Lesley Knoll along with Tim Griffis and Forest Isbell is focused on trying to understand how aquatic systems might actually be changing our climate today. Lakes, wetlands and rivers all produce significant quantities of the greenhouse gases carbon dioxide and methane and the release of these gases into the atmosphere could make the Earth a bit warmer than it used to be. Their team is being funded by the National Science Foundation to deploy instruments in lakes Itasca, Elk and Cedar Bog at Cedar Creek to measure how much of these gases that are produced in the lakes is 'poofed' out into the atmosphere and the conditions which lead to these releases. —*Jim Cotner*



## About the station

The Itasca Biological Station and Laboratories is among a global network of field stations that enable "place-based" teaching, research and public engagement. Itasca, however, is like no other place. It is a sentinel on the edge of forest and prairie biomes, a source for waters of the Mississippi River, and a common ground for people in nature since 1909.

*Upstream* Fall 2018

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#### STATION NOTES

## A season at the station

Head nets are packed up, lake sampling equipment stowed, bikes returned and all-day access to popcorn in the dining hall is sadly over. It's also that time of year where I reflect back on our busy season at the station.

This year we saw growth in our research community with my lake ecology program expanding, our new director and his lab becoming familiar with all Itasca has to offer, and with new and returning scientists studying anything from birds to bogs, lakes to lichens, and microbes to migrations. We welcomed scientists from the University of Minnesota as well as from many other institutions within and outside Minnesota (Minnesota Department of Natural Resources, University of Connecticut and St. Olaf College, to name a few).

Our scientists included undergraduates getting their first field experiences and seasoned biologists who are continually drawn to the landscape and natural features of Itasca.

With this growth, we committed a space as our new research lab hub (the upper north lab in building 48, known to many as the former library). I cannot wait to see what 2019 brings us as we continue to support and grow our community.

Lesley Knoll, Station Biologist  
*Itasca Biological Station and Laboratories*



## Did you know?

It takes a raindrop approximately 90 days to travel from Lake Itasca to the Gulf of Mexico.

## Meet Eric Sather

**The station's new carpenter shares a little bit about himself and his work.**

Eric started working at the station midsummer, as consistent buzzing of the lawn mower gave way to the sound of drills and the smell of paint. Eric is the boots-on-the-ground person getting in every nook and cranny of all of those buildings on campus. He came schooled in carpentry and experienced in the fencing business, a role that took him to Alaska for many years before returning to Minnesota. He schooled himself in the tools and techniques of self-reliance, making him a wealth of knowledge on foraging, low-temperature gardening and food storage.

### What do you do at Itasca?

I help to keep the facilities and grounds in working order here at Itasca Biological Station and Laboratories. Working at a facility that has been in operation for over 100 years in such a beautiful location is rewarding and a lot of work.

### How did you get into this line of work?

As a kid I fixed things around the house and, after high school, went into construction. I got to observe and learn from tradespeople, plus I just enjoy the challenge of doing things myself. I'm building a log home on our property located near Bagley. I have always enjoyed building and fixing things as well as being outdoors, so working at Itasca Biological Station and Laboratories is the perfect fit for me.

### What brought you to northern Minnesota?

I grew up in the Cities and visited the area many times as a kid. I decided way back then that I wanted to live up here. Part of the reason is that I have always been drawn to the outdoor lifestyle available around Itasca State Park. I enjoy any activity I can do with my wife and two daughters including, but not limited to, fishing, hunting, gardening, beekeeping and woodworking.



Eric pauses from work in one of the station's cabins.

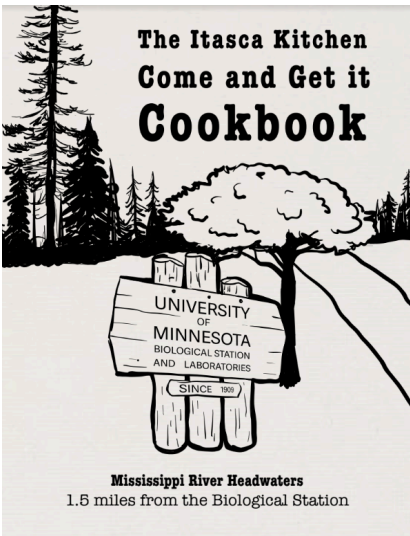




Director Schilling on one of several naturalist-led hikes for Itasca State Park this year. His talks, often titled “The Afterlife of Trees,” focused on how wood is decomposed once trees die and hit the ground. The relationship between the station and the DNR/state park is growing. This not only brings programming to state park visitors, it enables visiting researchers and teachers a way to plug in with engagement on site. There are over 500,000 annual visitors to Itasca State Park, making it the most visited park in the Minnesota state park system.

## Eat like an Itascan!

Visitors to the station often leave with fond memories of the food. Now you can make it at home!



meals for each of these guests. No matter what brings them to the park, when they hear the ring of our dinner bell, we want them to know they are getting a meal that has been lovingly made with fresh, locally sourced ingredients.” Find more information at [z.umn.edu/itascacookbook](http://z.umn.edu/itascacookbook).

Due to popular demand, the cooks at Itasca Biological Station and Laboratories have compiled their top 100 recipes and turned them into a cookbook. Now you can recreate everything from their Minnesota Wild Rice Soup to their Grilled Brie Sandwiches with Greens and Garlic in your own kitchen (minus the dinner bell and the loon calls).

“I meet visitors who are at the station for many reasons: to conduct research, teach courses, attend Nature of Life or simply trade the hustle and bustle of the city for the peace, quiet and pine trees,” says head cook Dawn Wannebo. “My team and I take great pride in providing delicious

## Itasca Wild Rice

Makes 4 servings

From the *Come and Get It* cookbook by the cooks of Itasca Biological Station and Laboratories.

- 1 cup sliced mushrooms
- 4 Tbsp butter, melted
- 2 cups cooked wild rice (from about ¾ cup dried)
- Salt and pepper to taste
- ¼ cup dried cranberries
- ¼ cup toasted slivered almonds
- ¼ cup sliced green onions

Sauté mushrooms in butter until hot. Add cooked rice and sauté until hot. Add salt and pepper to taste, cranberries, almonds and green onions. Stir well and serve.





Photo: Stephanie Xenos

John S. Anderson with 2018 Nature of Life peer mentors in the Biome Center at Itasca Biological Station and Laboratories.

## A tradition of traditions

**John S. Anderson provides incoming students with a sense of history and their place in it.**

Professor Emeritus John S. Anderson has made the hours-long drive to Itasca State Park every summer for 16 years to participate in Nature of Life (NOL), the College’s signature program at Itasca Biological Station and Laboratories. Over the course of three weeks, hundreds of soon-to-be freshmen make their way through biology modules and cohort-building activities.

**On the lasting impression NOL leaves on students and alumni:** “The transition from the high school environment to the university environment is challenging in many ways: making one’s way among a massive crowd of people totally unknown to one an-

other, the stress of more demanding course standards, living away from home and family. NOL addresses these challenges head on by building a sense of community among CBS students.

When they arrive on campus for their first semester, they have already become acquainted with a substantial number of their classmates. They have been briefly submerged in the details of two modules and learned interesting aspects of the University of Minnesota. Having had the four-day NOL experience, they are better prepared to begin their four-year on-campus journey. Many have made lifelong friendships.”

## Itasca time capsule

In 1902, Dr. Thomas Sadler Roberts had lunch with his family in Preachers Grove, taking a photo to document the moment. The red pines show the same fire scars that remain visible today. That moment in time was when the state park was managed from St. Paul before University of Minnesota forestry students began classes in 1908. With park management so far away, the Roberts family may have run into a lumberman or two on their trip north. The moment was also 13 years before Dr. Roberts, 44 years young in the photo, would leave his medical practice to devote himself to ornithology and the establishment of the Bell Museum of Natural History. He would later write one of the quintessential Midwest birding guides in *The Birds of Minnesota*, and his life was chronicled in the 2013 biography by Sue Leaf titled *A Love Affair with Birds*. With fire scars on the red pines there to bridge time, what an interesting moment to capture — a medical doctor and his family at Itasca, stoking their passion for nature and planting the seeds for a life ahead in conservation.

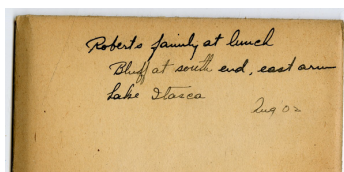






Photo: Tannon Tople



Photo: Rachel Berg



Photo: Sara Henry



Photo: Dustin Nguyen



Photo: Ralaene Burke

## Picture perfect

Each summer, hundreds of incoming College of Biological Sciences students make their way to Itasca Biological Station and Laboratories for four days before the start of their first semester. During Nature of Life (NOL), they connect with NOL peers and get acquainted with college-level coursework in a living laboratory. We asked the peer mentors — students who have already been through the program and lead small groups of students through the activities — to send us their best photos from the week spent here at the station. Congratulations to first-place winner Rachel Berg!



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 Follow us on Twitter @ItascaBio



## An Itasca love story

**Geri and Darby Nelson bonded over a shared love of biology at Itasca more than 50 years ago.**

Darby and Geri Nelson met at Itasca Biological Station and Laboratories in 1966. He was a graduate student and she was working on her undergraduate degree as a member of the College of Biological Sciences' first graduating class. Their connection to Itasca has also endured through the years. The Nelson's support scholarships and contributed to the Biome Center.

"We love how the station steeps students in biology, research and the natural world," says Geri Nelson. "Living and learning there was life changing for us and for so many others. Thank you, Itasca!"

**Support education and research at Itasca Biological Station and Laboratories. Go to [z.umn.edu/ibsl](http://z.umn.edu/ibsl).**