Keeping track of a deadly virus, especially in diverse fish populations, is a slippery proposition at best. But when the stakes are as high as they are with the viral hemorrhagic septicemia virus (VHSV), the task takes on an even more critical dimension. VHS, which causes fish to bleed to death internally, can affect some of the most economically important sport fish in the Great Lakes—pike, muskie and large and smallmouth bass.

Wisconsin Department of Natural Resources (DNR) fisheries biologists and fish health specialists currently track the spread of VHS using virus isolation, which is a slow and labor-intensive process that’s also lethal to the sampled fish. (That’s because viruses only grow in living cells. Once the growth has occurred, the host living organism must be killed to complete the diagnosis.)

But virus isolation only indicates the fish’s current infection state, not whether a fish has mounted an immune response to the virus and survived. In a case like that, the fish could still be a carrier of VHSV, putting other populations at risk.

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Wisconsin Fish Identification Tools Go Mobile
seagrant.wisc.edu/fishid

Exactly 174 Wisconsin fish can now fit into your pocket. And they’re not even wet, or smelly. That’s because they are contained in the free Wisconsin fish identification app for Android and Apple phones. There is a finger-friendly mobile website as well.

Anglers can search by fish name, family or physical features—shape, distinctive features, pattern, and type of fins, mouth, scales, spine, tail or coloring. Each entry depicts the fish, from several photographic angles, and offers a short write-up of its features.

The overall project is a partnership of the Wisconsin Department of Natural Resources, the University of Wisconsin Center for Limnology and Sea Grant.

“It’s rewarding to see such a positive response to the Wisconsin Fish ID app and mobile website. The app was downloaded in a dozen countries in the first few days,” said Rich Dellinger, Sea Grant’s Web developer. “We have some ideas for new features.”

Sampling in an irrigation well revealed high levels of metal. Researchers plan to develop guidelines for well drillers to avoid encountering toxic chromium VI.

How much is too much?
CHROMIUM VI IN THE WATER CYCLE

The Wisconsin State Journal headline certainly made it sound unsettling: “Tests Show Madison Water Has High Levels of Chromium-6, but Below Fed Limits.”

That newspaper story, based on a 2011 report by the Environmental Working Group, a non-governmental organization, had Wisconsin residents who failed to read the part after the comma convinced they had an Erin Brockovich-sized environmental catastrophe in their kitchen taps. That wasn’t the case—as the headline noted, even the highest measurements collected from Madison wells were well under the federal 100 µg/L safety limits for the carcinogenic metal—but it did raise concerns. And for Patrick Gorski, the head of inorganic chemistry at the Wisconsin State Laboratory of Hygiene, it served as the impetus for a fascinating research project.

Using funding administered through the University of Wisconsin Water Resources Institute (WRI), Gorski, along with a team of researchers that includes metals expert Martin Shafer and WRI Director Jim Hurley, has spent the past year trying to determine the factors that determine the natural concentration of hexavalent chromium, or chromium VI, in Wisconsin groundwater.

“We knew it most likely wasn’t due to industrial contamination,” said Gorski of the Madison well readings. “And that made us think that it was probably occurring naturally. But if it’s natural, the question becomes, how does it occur? In what types of groundwater does it occur and what influences it?”

The research team began by identifying several key geological formations in Wisconsin where a confluence of geology and environment could create an ideal situation for the formation of chromium VI. Working with the Wisconsin Department of Natural Resources and the Wisconsin Geological and Natural History Survey, Gorski’s team collected rock and water
New Two-Year Cycle of Sea Grant Research Projects

Sea Grant will fund 15 new and four ongoing research projects in 2014-16. It’s the culmination of a long process that all starts with a spark for scientific discovery. It results in nearly $2 million to explore complex Great Lakes coastal or open-water topics.

Each of the Sea Grant focus areas—healthy coastal ecosystems, aquaculture and fisheries, resilient communities and economies, and environmental literacy and workforce development—is represented in this new research portfolio.

Some of the issues to be explored are harvesting light energy in Great Lakes bacterioplankton, estimating the economic value of Wisconsin’s Great Lakes’ fisheries, improving urban beach ecosystem health and assessing the role of quagga mussels in Lake Michigan’s carbon dynamics.

Researchers from around the state will undertake the work. The University of Wisconsin System is well represented by scientists on the campuses of Green Bay, Madison, Milwaukee, Oshkosh and Superior. A Northland College investigator will study wetlands in the St. Louis River estuary to better inform future management decisions. The Wisconsin Historical Society will conduct underwater archaeological investigations of Wisconsin’s stone industry. A research team from Marquette University will look into the accumulation of personal care products in the water. A researcher from St. Norbert’s College is continuing research into the fish pathogen flavobacterium.

If you wish to view more books on this topic, visit our recommended reading list at go.wisc.edu/71uqi2.

Wisconsin’s Water Library has seafood cookbooks available for checkout. If you have a favorite cookbook you wish to share, please let us know—we are looking to “beef” up our collection.

The Freshwater Fish Cookbook

By A.D. Livingston. Guilford, Conn.: Lyons Press, 2009. With easy-to-follow instructions and a humorous style, the author presents more than 200 mouthwatering recipes for a wide variety of fish, including trout, salmon, black bass, perch, pike, walleyes, stripers and many others. Included are instructions for anglers that like to cook and clean their catches.

The New Cleaning and Cooking Fish

By Sylvia Bashline. Minneapolis, Minn.: Creative Pub., International, 1999. If you want to learn how to prepare fish like an expert, this book is for you. Whether you purchase trout from the grocery store or catch a basket of bluegills from your favorite lake, this book teaches you the best methods for successfully cleaning and cooking your fish.

One Fish, Two Fish, Crawfish, Bluefish: The Smithsonian Sustainable Seafood Cookbook


Wild Caught and Close to Home: Selecting Freshwater Fish—It’s Not Just for Breakfast

Hauxwell, who holds a Ph.D. in aquatic ecology from the Boston University’s Marine Program at the Woods Hole Marine Biological Laboratory, knows the Sea Grant model well. She worked with Florida Sea Grant in the early 2000s, co-authoring outreach materials on the effects of nutrient loading on Florida’s coastal waters. But it’s her unyielding love of and dedication to science that both drives her and makes her a valuable advisor.

“It’s not just about learning new facts, but communicating them,” said Hauxwell of her approach to science. “We’re far more productive as a society if people have access to relevant information and if people are debating what to do with the facts, rather than debating the facts. It starts with quality science and outreach, and the support Sea Grant gives is key to that.”

Hauxwell enjoyed sitting in on UW Sea Grant’s most recent technical review panel in July, advising the group that selected the research projects that the organization will fund in the 2014-16 biennium. It was a thrill, she said, because it was two days focused on hands-on science, an opportunity to appreciate the widespread talent of Wisconsin’s academic community engaged in Great Lakes research and outreach, and an opportunity to look for partnerships where priorities and talents aligned.

Wisconsin Sea Grant welcomes Jennifer Hauxwell to the Advisory Council

Jennifer Hauxwell

Wisconsin Sea Grant welcomes Jennifer Hauxwell to its advisory council.

Hauxwell said she admires the Sea Grant business model, with its focus on peer review ensuring solid science. In her role on the advisory council, she hopes to build more bridges between the DNR and UW Sea Grant, sharing scientific needs as both agencies increase their research focus on the Great Lakes.

The timing is good. Like a lot of ecologists, Hauxwell is concerned about a lack of public engagement in preserving aquatic resources. She noted the growing concern nationally and in Wisconsin about recruiting youth into outdoor sports and recreation, which makes it even more important that organizations like the DNR and UW Sea Grant engage the next generation. In a modern world where instantaneous access to not-necessarily-accurate information has become increasingly common, the stakes have heightened.

“We’re in an era where ecological questions have become quite complex and bridging the gap between researchers and citizens is an ever-increasing need for innovating solutions,” says Hauxwell. “We want what we do to matter. Key ingredients for success include high-quality science coupled with an educated and engaged citizenry. And that’s exactly what Sea Grant is about.” —ARC
THE WINNING RECIPE

Seared White Fish With Creamy Grits, Sweet Corn Chow Chow and Poached Herring Butter

Chef Seth VanderLaan, Potawatomi Bingo Casino, Milwaukee

Serves 4

For the sweet corn chow chow:

- 1 ear fresh sweet corn, cut off the cob
- 1 tablespoon red pepper, small dice
- 1 tablespoon onion, small dice
- 1 tablespoon white onion, small dice
- 3/4 cup champagne vinegar

Combine all ingredients in a large bowl and let sit at room temperature for 45 minutes. Adjust seasoning with salt and pepper to taste.

For the creamed grits:

- 1/2 cup chicken stock
- 1/2 cup heavy cream

Bring stock and cream to a boil. Bring stock and cream to a boil. Stir occasionally.

Divide creamy grits and sweet corn chow chow between four plates.

For the poached herring butter:

- 1 cup court bouillon or vegetable stock
- 1 tablespoon heavy cream
- 1 tablespoon white onion, small dice
- 1 tablespoon red pepper, small dice
- 1 teaspoon chopped fresh herbs

Lightly shred the cooked herring and add to butter sauce. Season to taste with salt and white pepper.

The event was held in October by the Minnesota and Wisconsin Sea Grant Programs to raise the visibility of Lake Superior’s sustainably managed fisheries. It was sponsored by Bodin Fisheries in Bayfield, Wis.; Dockside Fish Market in Grand Marais, Minn.; the Duluth Seaway Port Authority; Lake Superior Magazine; and Minnesota Power. In 2011 and 2012, the competition and tasting event was held in Minneapolis. —H.N.
A New Gold Standard

RESEARCHERS DEVELOP TWIN TESTS TO TRACK VHSV MORE EFFECTIVELY

continued from page 1

Thanks to Tony Goldberg, Kathy Toohey-Kurth, Anna Wilson and Susan Marquenski, there are two new ways to get VHSV infection information.

Wilson was a graduate student at the University of Wisconsin-Madison’s School of Veterinary Medicine’s Comparative Biomedical Sciences Program, where Goldberg served as her advisor. Backed by funding from Wisconsin Sea Grant, she has developed a pair of serological assays that provide a much more complete picture of how VHSV may be affecting fish populations. The first is a virus neutralization (VN) assay; the second is a blocking enzyme-linked immunoabsorbent assay, also known as ELISA. The laboratory work happened under the supervision of Toohey-Kurth, director of virology at the Wisconsin Veterinary Diagnostic Laboratory (WVDL).

Wilson, now a microbiologist at WVDL, hooked into the project through fish inspection work she was doing with the DNR’s fisheries management bureau supervised by Marquenski, the DNR’s fish health specialist. Wilson took tissue samples from the drum population in south-central Wisconsin’s Lake Winnebago, conducted assays and interpreted the results.

“How much is too much?” asked Wilson. “Our goal is to get them up and running as routine tests at the WVDL, which would make it the go-to place for VHSV testing nationwide. Toohey-Kurth expects that eventually the WVDL will begin applying the assays to key sport fish species, and also begin meshing their findings with the DNR’s existing fish database to begin charting the true impact of the virus on fish populations.” —ARC

How Much Is Too Much?

CHROMIUM VI IN THE WATER CYCLE

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samples from replacement wells and brought them back to the lab, where reactor experiments were conducted to mimic what was happening in the environment. Factors like the concentration of oxygen—a force that turns the beneficial chromium III into the potentially dangerous chromium VI—were examined, as were levels of pH and the presence of other metals like iron and manganese in the surrounding water. In the latest round of experiments, Gorski’s team observed a slight increase in chromium VI in the presence of the reactors.

“We think we have a good link between geology and water,” said Gorski. “But just because chromium is in the rocks doesn’t mean it will be circulating, even if there aren’t any fish kills taking place.”

Over the next year, Zana Sijan, a graduate student pursuing a master’s degree in environmental chemistry, will continue to conduct reactor experiments on the samples, using a glovebox to maintain an anoxic environment.

In doing so, she may be breaking new ground. Currently, the Environmental Protection Agency (EPA) measurements include all types of chromium, even though not every type is toxic. Specific analytic techniques to measure chromium VI are still being developed and refined. In this sense, Gorski and Sijan could be writing the measurement guide other scientists will use to track the metal in their own states. It’s even possible that Gorski’s team will end up detailing the mechanics of how chromium VI enters the water cycle before the EPA has developed a clear set of guidelines specific to it.

“Our goal is to develop predictive capabilities,” he explained. “Where in the state could there be the potential for higher levels of hexavalent chromium?”

Eventually, Gorski hopes their findings could be used to help develop guidelines similar to what’s been done with arsenic, where well drillers in Wisconsin know where and how deep to drill to avoid encountering it, as well as which types of well casings to use.

“Having this type of research will benefit us now, and benefit us later,” said Gorski. —ARC
When extreme weather strikes, information—accurate information—becomes a matter of life and death.

However, in the heat of a crisis, sometimes warnings about weather can become misinterpreted or exaggerated. To combat the confusion, the National Weather Service (NWS) is rolling out a new, impact-based warning system, featuring specific messages that range from “major home destruction likely” to “tornadic winds could throw automobiles into the air” to “the entire neighborhood will be destroyed.”

“Providing impact-based warnings is important because they relay a consistent message about the impacts of severe weather that emergency managers and broadcast meteorologists can disseminate to the public,” said Jane Harrison, a social scientist with Wisconsin Sea Grant. “It takes out the guesswork when a big storm hits.”

Backed by a $50,000 grant from the National Oceanic and Atmospheric Administration’s (NOAA) Weather-Ready Nation project, Harrison is part of a team that’s testing the efficacy of the new system with three key user groups—broadcast meteorologists, emergency managers (EMs) and the weather forecasters charged with writing the impact statements.

Working with a network of social scientists within the Great Lakes Sea Grant Network, Harrison and graduate student Katie Williams spent the summer conducting focus groups in Fargo, N.D.; the Quad Cities, Iowa; Ill.; Chicago; and Louisville, Ky.

Harrison and Williams are aware that the project carries unique challenges—namely, trying to understand the complex terminology and jargon of three distinct groups. That’s essential to understanding whether the messages are working. Williams, meanwhile, has already discovered that different parts of the country view their emergency messages quite differently. (See sidebar.)

The project coincides with a growing effort at NOAA to fund projects related to preparing communities for extreme weather events. —ARC

Sea Grant and UWSP-NADF:
A Hookup

Beginning in February, Sea Grant takes on a formal relationship with the University of Wisconsin-Stevens Point: Northern Aquaculture Demonstration Facility (UWSP-NADF) to enhance technology transfer and the sharing of aquaculture knowledge with Wisconsin’s would-be and current fish farmers.

Sea Grant is providing funding for the facility based in Red Cliff at the northernmost tip of Wisconsin near Lake Superior. In return, Sea Grant is directly dialed in to the UWSP-NADF’s innovative work to optimize the health and growth potential for fish species such as lake trout, lake herring, Arctic char, yellow perch, Atlantic salmon and a hybrid of walleye and sauger, known as saugeye.

Hartleb said the new relationship with Sea Grant will help. Now, the UWSP-NADF will be able to more easily spread the word and strengthen the state’s diverse aquaculture industry.

The UWSP-NADF in Bayfield County is co-directed by Hartleb and his colleague Dr. Matt Rogge of the College of Letters and Science at UW-Stevens Point. Despite its far-flung location, the facility is a part of the school located in the central part of the state.

Greg Fischer is the facility’s manager. He chuckled as he recounted past phone conversations with campus colleagues. “I’ll be on the phone and the person will say, ‘Can we meet? Can you come to my office?’” not realizing that Fischer is more than 200 miles away.

But distance doesn’t hinder productivity or passion. “We take a lot of pride in what we are doing,” Fischer said. —MH

OUTREACH

NEW WARNING SYSTEM COULD SAVE LIVES

Local Weather

Katie Williams was ready for the focus groups. She wasn’t prepared for the vastness of the North Dakota sky.

“The clouds were amazing,” she said, “and huge.”

Earlier this summer, Williams, a graduate student in geography at the University of Wisconsin-Milwaukee, travelled to Fargo to interview the first group of broadcasters and EMs as part of NOAA’s Weather-Ready Nation project. Her participation is being funded by UW Sea Grant.

In Fargo, she discovered the broadcasters had heard of the impact-based warning tool but had yet to use it. As she spoke with them, Williams soon realized they viewed it differently than states with a less cool and dry climate—states like Oklahoma that live in constant fear of devastating tornados.

“They don’t take their summer severe weather nearly as seriously as their winter severe weather,” said Williams, noting that North Dakota experiences more blizzards than tornados. “Their reaction was like, ‘This is really helpful—not just helpful for us,’” said Williams. That reaction could complicate NWS plans to standardize the impact-based messages.

Williams said she’s been fascinated by the ways the focus groups interweave science and policy.

“It’s really interesting to see how this program is being received,” she said. “The broadcasters I spoke to clearly see their role as translating information from the National Weather Service, and they tend to rely on their own experiences. This is something of a departure from that.”

New Warning System Could Save Lives

When extreme weather strikes, information—accurate information—becomes a matter of life and death.

However, in the heat of a crisis, sometimes warnings about weather can become misinterpreted or exaggerated. To combat the confusion, the National Weather Service (NWS) is rolling out a new, impact-based warning system, featuring specific messages that range from “major home destruction likely” to “tornadic winds could throw automobiles into the air” to “the entire neighborhood will be destroyed.”

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OUTREACH
**CALENDAR OF EVENTS**

**JAN. 28, 2014**
The River Talks
Duluth, Minn.
bit.ly/18rZLjx

**FEB. 23-28, 2014**
Association for the Sciences of Limnology and Oceanography
Honolulu
sgmeet.com/osm2014/default.asp

**FEB. 8, 2014**
Lake Sturgeon Bowl
Milwaukee
glwi.uwm.edu/sturgeonbowl

**MARCH 13 AND 14, 2014**
American Water Resources Association – Wisconsin Section Meeting
Wisconsin Dells, Wis.
awra.org/state/Wisconsin

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**Find a Fellowship**
**Encourage Your Student to Apply**

Wisconsin students have traditionally fared well in national and regional competitions for professional fellowships. The students of 2013-14 have further chances to display their mettle through these opportunities, with various January and February deadlines:

- **Dean John A. Knauss Marine Policy Fellowship**, based for a year in Washington, D.C.
- **NOAA Coastal Management Fellowship**, which offers experience with a state coastal zone management program.
- **Great Lakes Commission-Sea Grant Fellowship** in Ann Arbor, Mich., focused on the sweetwater seas.
- **Sea Grant-NOAA Fisheries Graduate Fellowship** in either population dynamics or marine resources economics for summer 2014.

Visit the “students” tab at seagrant.wisc.edu for more.