# the RESEARCHER IDAHO NSF EPSCOR | SUMMER 2017



PICTURED: College of Western Idaho Assistant Professor Rebecca Flock along with her students Jacob Tenorio and Blake Middleton at Lake Lowell. A newsletter publication of the Idaho EPSCoR Office

### the **RESEARCHER**

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### University of Idaho





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## Message from the Director

After 20 years in Idaho, I am leaving this fall to take a position in the University System of Maryland. I will miss the EPSCoR program and the many friends at the University of Idaho, Boise State University, Idaho State University, and our colleges. I would like to express a personal thank you to Dr. Janet Nelson, Vice President for Research and Economic Development at the University of Idaho, who generously agreed to take over as interim Project Director, despite her leadership role in several other major research initiatives and other national committees.



Peter Goodwin Former Idaho EPSCoR Project Director

The reputation and strength of Idaho EPSCoR comes from our community. The dedicated Idaho EPSCoR staff deals with the complex intricacies of these large NSF

awards and minimizes the administrative burden for participants. Institutional leads serve on the Executive Leadership Team and sacrifice their time and personal research agendas to ensure the EPSCoR award has the maximum impact on each campus. The Vice Presidents for Research and Economic Development ensure the alignment of priorities between the State and institutional levels and have met with faculty and students at all campuses to understand the challenges and successes of our complex, statewide initiatives. The Idaho EPSCoR Committee is less visible to faculty and students, but play a vital role in promoting partnerships and communicating the importance of research with our state legislature and with the US Congress. Idaho EPSCoR Committee leaders have given Idaho national recognition (for example through contributions to the influential EPSCoR2030 report). Together, faculty, postdoctoral fellows, staff, and students provide creativity and innovation to address issues of regional, national, and international significance that improve our education, environment, guality of life, and economy. Idaho is unique and fortunate to receive this level of commitment and support at so many levels.

Thank you to the Idaho research community for all you have done to advance the research enterprise of Idaho, enhance the experience of our students, and create pathways for students at all levels who might not have considered taking further steps in their educational journeys. Most importantly, Idaho's strength lies in the ONEIdaho philosophy of fostering a collaborative and supportive environment where our talented faculty, staff and students can thrive. Idaho may be a small state, but leveraging talent across our universities and colleges is helping to bring national and international recognition for Idaho research. Thank you for your support and friendship.

This material is based in part upon work supported by: The National Science Foundation under grant number OIA-1301792. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

### Idaho Research

## Transforming Research Through Human Environment Systems

#### By Max Bartlett

Understanding our ecosystem is not just about what we may consider the "hard sciences." It's about grasping the economics, sociology, public policy, and more that shape the decisions that affect Idaho's ecosystems. But coordinating academic professionals across different departments and disciplines can be a challenge.

That's where the Human-Environment Systems (HES) initiative at Boise State University comes in. They've hired faculty with expertise at the intersection of different disciplines, and are providing them with the resources to take a collaborative, people-focused, interdisciplinary approach to the study of Idaho's environment.

"This group starts at a different place," says Shawn Benner, Boise State campus lead for MILES. "They look out at the landscape and they say 'Hey, there's a societal problem I'm interested in solving."



Group photo of the Human-Environment Systems research team at Boise State University.

Benner points to Treasure Valley water as an example of what HES is uniquely positioned to study.

"In order to understand that problem, you have to understand the physics, but you also need to have a good sense of how the community is going to grow, and how they're going to manage that water," Benner says.

By combining biophysical and social sciences, HES seeks to find that understanding.

Right now, all HES faculty are at BSU. There's a core group researchers hired with initial funding from the NSF EPSCoR MILES award: Neil Carter, Jodi Brandt, and Vicken Hillis. HES is working to recruit a fourth. They work together with other faculty from across the university and the state.

HES is relatively new, but Benner sees it as a hub for interdisciplinary environmental research around the country. He hopes to see more scientists come from all over the world.

And its interdepartmental nature is helping break down traditional research barriers.

"I think this is pretty much one of the best examples of the power the EPSCoR investment can have in transforming research culture. The kind of research they're doing is really hard, and requires a high level of integration across a lot of disciplines," Benner says. "You can't do this kind of research with the traditional departmental categories. By housing the faculty outside of those boundaries, we're really providing a unique opportunity for success."

HES is just one of the ways Idaho EPSCoR is helping to change the way Idaho does research.

### MILES

## Social Network Analysis -Combining Art and Science

### By Max Bartlett

MILES, as anyone involved with it knows, is a big project. It encompasses hundreds of people across the entire state of Idaho. Understanding how they communicate with each other – and how we can improve communication – is essential to maximizing their effectiveness.

For several years now, Jocelyne Helbling has conducted a Social Network Analysis (SNA) survey. If you've participated in MILES, you've probably filled it out. It asks you about your interactions with other project participants.



This graph illustrates the complex interconnected social network that powers MILES, and the many ways participants interact with each other.

Helbling uses that data to put together the MILES Social Network Analysis. In addition to analyzing the data, Helbling maps those relationships out, making collaborative connections visible.

"I actually come from a design background," Helbling says. "I liked looking at maps and the way relational data was presented as a visual art. So I was looking into it more and more, and found this was a really powerful tool for seeing how people are working together."

She's found that idea sharing within MILES tends to happen at a local level, then filters up statewide. That's normal – after all, you talk to your colleagues first. Figuring out how best to manage a statewide research collaboration is tougher. There's fewer social network data for research projects (it's more common in the corporate world), so it's harder to say what's normal and what's not. MILES addresses one of its communication challenges, making information accessible to everyone without overwhelming individuals with data that's not relevant to them, through institutional project leads on each university campus. They're able to communicate between institutions and then provide important information to their colleagues in multiple ways.

There's more research to be done, so the SNA surveys will continue. As for what anyone can do right now to improve communication?

"If you are trying to establish yourself as a reliable go-to communicator within a group, one of the things you can do is respond to your emails quickly," Helbling says. "We generally trust people who respond faster."

# **Discovery Awaits at the Boundary**

### By Max Bartlett

Some of the most interesting interactions of our social and ecological landscapes happen at the border. Not the border between two countries, or two states, but the boundaries between communities. Idaho scientists are using EPSCoR funding through the multi-institutional Idaho Social-Ecological Exploratory Dynamics (ISEED) program to examine those boundaries.

"What we're doing with this ISEED funding is we're looking at land use, land use change, and development patterns. We have both researchers and graduate students working on this," Donna Lybecker says. Lybecker is one of the ISU investigators on the project.

Researchers at Idaho State University, the University of Idaho, and Boise State University are all involved.

"Although the three locations have different strengths in different areas, there's a lot of overlap," Lybecker says.

In the Treasure Valley, researchers are looking at land use changes in Ada and Canyon Counties, and how development has fragmented. UI is looking into the economics of land use: the cost of land and how it's changed over time, starting around Lake Coeur d'Alene.

And in Pocatello and Idaho Falls, they're looking at social factors and changing attitudes toward development in rural, urban, and suburban areas. Lybecker points to research by

graduate student Stephen Joy, comparing social perceptions along those boundaries.

"Stephen, his work is twofold, he has done the survey and he is analyzing the survey data," Lybecker says; "He also has been putting it on maps and attempting to find what we call hotspots: areas where you see a lot of land use change. Where people are moving, where the planning and zoning are shifting."

Chris Felt is another graduate student working on the project. He's modeling land use drivers in Ada and Canyon Counties. He's contrasting Ada County's "Blueprint for Good Growth," and its impacts in that county, to land use in Canyon County, which has no such plan.

Joy and Felt are using their research to develop their theses. They intend to publish their work in journals once it's complete.

ISU's Kathleen Lohse is the primary investigator on the project. Other faculty involved include Danelle Larson (ISU), Colden Baxter (ISU), Donna Lybecker (ISU), Michail Fragkias (BSU), Haifeng "Felix" Liao (UI), Susan Parsons (ISU), Mark McBeth (ISU), and Tanh Nguyen (ISU).

The Portneuf River is the subject of ISEED research, studying the ecology of boundary areas.



## Idaho Research

# New Lake Social Ecological Systems Lab Poised to Gain International Recognition

### By Max Bartlett

Idaho, especially north Idaho, is home to many communities that depend on lakes: for tourism, for housing, for business, and more. The relationship goes both ways. Those lakes also rely on humans to care for them. Understanding that relationship takes a lot of research.

That's why EPSCoR helped fund the University of Idaho's new Lake Social Ecological Systems (LaSES) lab. The lab, on Lake Coeur d'Alene, was completed last year. It has advanced instrumentation for studying the biophysical science of the lake, a custom built research vessel, and a new dock.

"We have not only our 22-foot boat for the larger lakes, but we also have smaller 16-footers as well as inflatables that will allow us to go into the shallows of smaller lakes as well," says Mark Solomon, the lab's director. "This is going to be a world-class facility that will attract researchers from across the world."

Right now, the lab is continuing MILES research into toxic algae on Fernan Lake, and mineral contamination at the bottom of Lake Coeur d'Alene. They hope to soon fly drones to study the lake ecosystems from above. And their new research vessel is equipped to create "mesocosms," using a specialized curtain to create an isolated column of water for controlled research. That's important when trying to find, for example, the conditions to control destructive algal blooms.

The social science portion of their research is important as well. The lab works with the Coeur d'Alene Tribe, local chambers of commerce, economic development groups, businesses, and other stakeholders to study the economics of the lakes. This can help researchers better understand the importance of Idaho's lakes.

"We all assume the lakes are valuable, but how?" Solomon says. "If Coeur d'Alene Lake, or Pend Oreille, or Fernan Lake was no longer able to support the kinds of amenities people are used to, how does that affect the local economy?"

They hope to keep expanding, and currently have a proposal to the National Science Foundation for another specialized piece of equipment.

"It will give us an instant profile of the full depth of the water column as to its mechanical and biological and hydrological characteristics," Solomon says.

The research will be valuable not just for Idaho, but for the world. Many lakes worldwide have struggled with toxic algae or mining contamination, just like Idaho. Understanding how Idaho can manage its lakes to provide benefits to humans will help the world understand theirs.

The new LaSES research vessel helps the team study the biology of Lake Coeur d'Alene.



## STEM Conference Highlights: Mentoring For Diverse Students

#### By Max Bartlett

Helping university students succeed in Science, Technology, Engineering, and Mathematics (STEM) takes a lot of things, but one of the most important is good mentoring. How can Idaho's science professionals give students from a wide range of backgrounds the support they need?

It's a tough question to answer. That's why Idaho EPSCoR participants organized the Idaho Diversity Network Mentoring Conference.

The 2017 two-day conference was held at Boise State University in February. It hosted 65 attendees and keynote speaker Dr. Valerie Purdie-Vaughns of Columbia University.

Participants came from institutions around the state: STEM faculty, mentors, and members of minority student support organizations. Students also attended from Idaho's colleges and universities.

Dr. Purdie-Vaughns, a professor of psychology, addressed stereotype threat. That's the psychological phenomenon in which minority students, aware of stereotypes and biases against them, underperform out of fear of fulfilling those stereotypes. Dr. Purdie-Vaughns addressed ways in which we can help these students overcome those biases and thrive. "Our stereotypes, discrimination and bias in our institutions undermine learning and development and achievement," said Sarah Penney, Education, Outreach, and Diversity Manager for Idaho EPSCoR. "I learned how much one person can affect the growth of another person. It was just a powerful presentation."

The organizers didn't want the conference to only focus on mentoring basics. Participants, Penney said, have plenty of resources on that.

"We didn't want to do any of that because this time was valuable with our participants," Penney said.

Instead, they dug deep into the topic of mentoring for diverse minority students underrepresented in STEM.

Workshops and discussions at the conference focused on stereotyping, implicit bias, peer mentorship, and inclusive mentoring.

The conference received strong positive feedback, with participants citing the activities and roleplaying, keynote speaker, and emphasis on data-focused strategies that could be implemented in and out of the classroom.

The conference was organized by members of the Idaho Diversity Network, including Donna Llewellyn and Catherine Bates from BSU, Melinda Davis at the UI, Sonia Martinez from ISU, and Karla Eitel from the McCall Outdoor Science School.

Keynote speaker Dr. Valerie Purdie-Vaughns addresses EPSCoR participants at the Idaho Diversity Network Mentoring Conference.



## Managing Data as a Key to Successful Research

### By Max Bartlett

Some researchers work with terabytes of information. This "big data" needs to be sorted, analyzed, stored, and shared, all securely: no researcher wants their work lost or stolen. Dealing with that amount of data is difficult.

"We have a researcher who needed 112 terabytes of storage," says Jean Barney, data manager for MILES at Boise State. It's just one example of the challenges researchers face in handling their data.

Barney led a project to establish a repository for Boise State researchers. It needed to be able to store massive amounts of information, put it into a useable form – you can't sort through 112 terabytes of data by hand – and keep researchers in compliance with federal funding requirements. Researchers don't just need support once they have their data.

"Data management at Boise State; we like to think of ourselves as a cradle-to-grave operation," Barney says. "It's a really important aspect because every researcher has to use computer resources, and they don't all have career experience in doing these things."

To put together a data system that fit the needs of Idaho scientists, Barney teamed up with the Northwest Knowledge Network at UI, other EPSCoR data professionals, and library scientists at Boise State. They partnered with a company called Scholarworks, which also works with research data.

With the new system, Boise State not only can store big data, they can make sure it gets sorted and tagged with all the metadata it needs to be useable. Barney gives the example of a researcher studying soil samples being able to sort through their data by their pH levels, moisture content, etc.

And the system allows researchers to easily embargo their data. They can publish metadata about their research without giving away everything they've learned.

Recently, the team also partnered with Globus to provide high-speed data transfers. Researchers will be able to send their data over the network at speeds of gigabytes per second.

Barney emphasized how important her team was in putting this together. Thanks in large part to EPSCoR, researchers throughout Idaho now have access to similar data management services.

Barney team: MILES data manager Jean Barney (center) teamed up with Amber Sherman (left) and Kyle Shannon (right) to create a new data management system for researchers at Boise State.



## Study Links Invasive Aquatic Plants to Changes in Property Values

#### By Max Bartlett

Nobody likes to see a lake full of weeds. Invasive species can be a real problem, both environmental and economic. For communities like Coeur d'Alene, which depend on the lake for their economic success, what are the economic consequences of invasive species?

A paper by MILES researchers, published in the journal Sustainability, explores the impact of watermilfoil – an invasive plant native to Eurasia – on property values on Lake Coeur d'Alene.

The paper, written by Felix Liao, Frank Wilhelm, and Mark Solomon, finds that property values dropped 13 percent with the presence of invasive watermilfoil.

"If you change the water quality it can have an impact on the recreational and even the cultural aesthetics of the lake," Liao says. That hurts property values, which rise with water quality and clarity. On average, that 13 percent drop is about \$64,000 for each property. In other words, controlling the weed means serious returns for the money spent on removal.

"If we don't do it, the milfoil will spread and affect lakefront property values, and the economic impact is much higher than the investment," Liao says.

It's not just a problem for Lake Coeur d'Alene. Watermilfoil, and other invasive plant species, are a problem at lakes all across the country. By quantifying the economic impact of invasive weeds, the paper encourages communities to invest in caring for the lakes.

"The whole region should contribute to that effort," Liao says. "Not just the [Coeur d'Alene] tribe. It's quite important to enhance the visibility of this issue at the regional level."

There are already entities working to control watermilfoil, Liao says, including the Idaho Department of Environmental Quality, and the Idaho Department of Agriculture. Utility company Avista has also contributed to efforts, as the region is used to generate hydropower.

Liao was recruited to be a new assistant professor at UI through the MILES award. He also recognized the efforts of the MILES team, his graduate students, and the Kootenai County government in providing support for the research.

University of Idaho researcher Felix Liao, studying milfoil in Coeur d'Alene.



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University of Idaho associate professor F. Marty Ytreberg is the lead investigator on a new \$6 million National Science Foundation EPSCoR Track-2 award. The research team, with members from Idaho, the University of Vermont and Brown University, is using computer simulation and modeling to determine how amino acid changes modify how proteins interact with other molecules. *Kudos!* 

