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January 30, 2020

## AB 801

Thank you Chairman Murphy and members of the committee on Colleges and Universities for holding a hearing on Assembly Bill 801 which creates a Freshwater Collaborative within the University of Wisconsin system.

This bill is part of a package of bills introduced by the Speaker's Task Force on Water Quality.

The Freshwater Collaborative will work to leverage existing programs and resources at six UW-System campuses to develop undergraduate degree tracks to prepare our workforce for the growing water economy. In addition, the Collaborative will expand freshwater research opportunities, build capacity, and make UW a destination for talent wishing to pursue a career in the freshwater economy.

Water is the fastest growing sector of the world's economy, expected to reach \$800 billion annually by 2035. This growth is fueling a demand for hydrologists, ecologists, aquatic toxicologists, policy analysts, and business leaders who can understand and anticipate water issues and implement solutions. UW-Milwaukee analysis of workforce data suggests a Wisconsin water workforce of more than 60,000 or about 2% of the state's total employment. These occupations pay well, and consistently exceed the average national average for all occupations.

In order to focus the development of the Freshwater Collaborative, the bill requires that funds be used to address two grand water quality challenges the task force has identified to be of highest importance: Agricultural Water Management and Water Quality Safety and Emerging Contaminants. Agriculture contributes \$88.3 billion annually and 413,000 jobs to our state's economy. It also uses 582.7 million gallons of water per day and this water must be of high quality. Manufacturing contributes \$57.93 billion each year and employed 63,181 people in 2016. Both industries are vital to Wisconsin's economy but when contamination is found, we need the best minds working to develop solutions.

UW has identified a variety of metrics to be realized as part of the state's investment in the Freshwater Collaborative. These include curricular development for new freshwater undergraduate training, development of cross-campus collaborations and research clusters focused on the grand water challenges identified above. Capacity building is also an emphasis to be realized through the hiring of additional faculty and the development of both graduate and undergraduate research fellowships.

Before receiving state funds for this program, UW must present established and specific metrics to the Joint Committee on Finance for passive review. The Board of Regents is also required to submit a biennial report to JFC that shows how funding has been distributed and expended at each institution. In order to encourage equal allocation of funding across six UW campuses, the bill creates a panel of industry representatives and objective water quality experts to advise the Board of Regents.

In conclusion, I would like to emphasize the importance of this opportunity to take advantage of Wisconsin's growing water economy. The Freshwater Collaborative of Wisconsin will lay the foundation for private sector partnership and propel Wisconsin to lead in water sector innovation.

Thank you for your time and I am happy to take any questions.

Todd Novak



**Testimony in Support of Assembly Bill 801**  
**Assembly Committee on Colleges & Universities**  
*January 30, 2020*

Chairman Murphy, Vice-Chair Tranel, and members of the committee, I appreciate the opportunity to testify today in support of Assembly Bill 801, legislation to fund the Freshwater Collaborative of Wisconsin.

Over the past year, as we traveled the state with the Water Quality Task force, we heard repeatedly about the need for forward-looking solutions that grow our workforce and invest in water-related research. The UW System recognized and responded to that need by designing this innovative approach to our state's water quality, public health, and workforce needs. The Freshwater Collaborative of Wisconsin will conduct research, develop new technologies, develop and train our water workforce, and influence responsible resource management, water policy, and innovation. In the longer term, as it develops, the Collaborative intends to establish a water research network, hire new faculty, provide graduate assistantships, undergraduate scholarships and post-doc fellowships, offer inter-institutional research programs, new curricula and degree programs, internships, and facilitate stakeholder engagement, marketing, and administrative support.

With this bill, we are supporting the Collaborative with an initial continuing appropriation of \$2 million, which, in addition to startup funds from WEDC and the UW System, will allow them to begin building their programming to address two initial water challenges chosen for their urgency and relevance to the state's most pressing needs: Agricultural Water Management and Water Quality Safety and Emerging Contaminants. These two initial focus areas were chosen due to the imminent threats posed by well safety issues, groundwater contamination, and emerging contaminants like PFAS, and they include issues we heard about constantly during our hearings across the state. The initial appropriation, beginning in 2021, will support six UW System campuses in different regions of the state as they work to further the goals of the Collaborative.

The price of inaction is simply too high. We must act now to address our state's water quality issues, and we must plan for the future too. While the state commitment we are proposing is significant, the return on investment will be extraordinary, and will make our state a leader and destination for students who wish to enroll in freshwater-related educational programs. Furthermore, Wisconsin's hydrological makeup is varied and diverse, and the Collaborative is designed to serve as a centralized platform for collaboration among campuses, government, businesses, and non-academic stakeholders across the state to include, build upon, and maximize the impact of each campus' assets in the hopes of solving both long-term water quality challenges and more immediate or local issues.

This bill enjoys broad bipartisan support from members of the Water Quality Task Force and our other legislative colleagues, and I encourage the members of this committee to support and prioritize it to ensure that the bill continues to move forward through the legislature this session.

Thank you for your consideration, and I welcome any questions you may have.



**Alberta Darling**  
**Wisconsin State Senator**  
Co-Chair, Joint Committee on Finance

Testimony Before the Assembly Committee on Colleges and Universities  
Assembly Bill 801  
Thursday, January 30, 2020

Thank you Chair Murphy and committee members for holding a public hearing on this important legislation. The legislation before you today will create an innovative statewide water curriculum, making Wisconsin a global destination for water research. This legislation is also part of a package of recommendations from the Speaker's Task Force on Water Quality.

Assembly Bill 801 is the culmination of years of work and planning by UW campuses to help tap into the specific water disciplines at each campus to solve today's biggest water challenges. Water is the fastest growing sector of the world's economy – expected to reach \$800 billion annually by 2035. Throughout the task force's hearings, the task force heard about the need to grow our workforce and invest in research related to water.

The Freshwater Collaborative of Wisconsin (FCW) was designed as an innovative and forward-thinking approach to solve Wisconsin's water-related public health, environmental and workforce needs. The FCW will conduct fundamental research, develop innovative new technologies, prepare our water workforce, inform water policy and responsible resource management.

This bill creates an initial continuing appropriation of \$2 million for the program, starting in FY 2021. Building upon startup funds awarded by the WEDC and the UW System, this investment will allow the FCW to begin building its programming in two water challenges: Agricultural Water Management and Water Quality Safety and Emerging Contaminants. These topics were chosen as the first two challenges for investment because of the immediate need across the state to address dangerous water quality challenges including well safety, groundwater contamination and emerging contaminants like Per- and polyfluoroalkyl substances (PFAS).

Thank you again committee members for considering this legislation. I'd like to thank Senator Cowles, Representative Novak, and Representative Shankland for their leadership on the issue.




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January 30, 2020

TO: Honorable Members of the Assembly Committee on Colleges and Universities

FROM: Ray Cross, UW System President 

RE: Assembly Bill 801 Testimony - In Favor

Thank you, Chairman Murphy and committee members, for holding this public hearing on AB 801. Thank you to Senators Darling and Cowles and Representatives Novak and Shankland as well as the members of the Speaker's Task Force on Water Quality for supporting this proposal to invest in the UW System's Freshwater Collaborative.

Wisconsin can become the 'Silicon Valley of Water,' and the UW System is uniquely positioned to make this happen. From our universities on the great lakes, to our universities on the great rivers running through our state, from our universities that focus on water use for farmers, to our universities that directly assist Wisconsin's water technology companies, from our R1 research institutions, to our four-year comprehensive institutions that train the next generation, every university in the UW System in every part of the state can contribute to issues of water quality. No other state in the nation has the existing infrastructure, location advantages, and concentration of water-related businesses like Wisconsin.

Currently, 2% of Wisconsin's workforce is engaged in water-related jobs. The number of those employed in water-related jobs in the state and across the country is expected to grow significantly in the next decade. Each UW university has developed expertise on specific topics and already works with their community and the state on water-related issues. To build on this foundation and further address this growing industry, the UW System developed the Freshwater Collaborative proposal. This initiative focuses on collaboration between our universities, and it leverages the strength of the entire UW System to focus on research on water issues and training a skilled workforce. This bill invests \$2 million as a continuing appropriation starting in Fiscal Year 2020-2021 to support the UW System's Freshwater Collaborative proposal. This investment will allow Wisconsin to position itself as a leader in training the workforce needed both in our state and the country.

Specifically, the proposed funding will allow the UW System to begin planning the four-year undergraduate degree in Freshwater Studies, which will be the first of its kind in the country. In addition to educating the next generation of workers in Wisconsin's water industry, the new program will attract faculty and students from around the world because of its unique nature. The investment will also expand the capacity for UW System universities to conduct research on local water problems facing Wisconsin residents.

The Freshwater Collaborative calls for close collaboration between the UW System and Wisconsin businesses to ensure that our universities are providing direct assistance to the businesses that depend upon clean water resources. The value of the Freshwater Collaborative has already been recognized by the UW System and the Wisconsin Economic Development Corporation, which have both invested funds in the program already. The funding in this bill will build on these investments and allow it to continue to grow, attract more students, and better meet the talent needs in water-related industries in the coming years.

Thank you again for your consideration of this bill and the opportunity to submit testimony on AB 801.



**WISCONSIN**  
UNIVERSITY OF WISCONSIN-MADISON

**Assembly Committee on Colleges and Universities**  
*2019 Assembly Bill 801*  
*Creating a UW System Freshwater Collaborative*  
*January 30, 2020*

Good Morning, Chairman Murphy and members of the Assembly Committee on Colleges and Universities. My name is Matt Ginder-Vogel. I am a professor of Civil and Environmental Engineering at the University of Wisconsin-Madison. I am also the chair of Water @ UW Madison. Water @ UW Madison is dedicated to enhancing water research at UW Madison and supporting the state's need for water information. We do that by supporting the quality of water-related research at UW-Madison, increasing the quantity of water research being done at the university, making that research more visible to more people throughout the state, and making water research applicable to our state's needs. We're building connections among scientists throughout the UW System, state agencies, businesses, and other stakeholders.

Steve Ackerman, UW-Madison Interim Vice Chancellor for Research and Graduate Education, my boss, had a conflict with today's hearing and could not attend, but thank you for allowing me the opportunity to testify before you today on Assembly Bill 801 (AB 801), which creates a freshwater collaborative at UW System.

I would like to share a bit about water scholarship at UW-Madison, and how it will fit into Freshwater Collaborative of Wisconsin. As a large research-focused university, UW-Madison brings unique strengths to the Collaborative.

UW-Madison has numerous major research facilities and hubs of freshwater research, teaching, and outreach. Among them are the Aquatic Sciences Center as I mentioned earlier, that supports the entire UW System. The UW Center for Limnology, birthplace of the field, dates back to 1875. The Water Science and Engineering Laboratory is an interdisciplinary hub of water research. There are 5 graduate degree programs that are water focused, and about 30 others that include water.

The UW-Madison has vast experience in obtaining and managing multi-million-dollar interdisciplinary grants in water. The University also houses UW-Extension, the Wisconsin State

Laboratory of Hygiene, and has extensive links to State government.

Scholarly activity relating to water is diverse, dispersed across the many schools and colleges at UW and with differing foci at the other UW-System universities. Why is water scholarship so dispersed at UW-Madison and across the System? Because the role of water is essential to so many aspects of life and prosperity and is integral to so many distinct academic disciplines. Water supports our cities. Water is needed to grow our crops. Floods damage our infrastructure and threaten lives. Water quality affects our health. Water supports our ecosystems and grows our economy through tourism, agriculture and industry. Water is at the heart of some of our cultural and spiritual belief systems. Our umbrella group called Water@UW-Madison brings together the water research community, and represents the diverse interests and voices, and builds bridges outward. Similarly, the Freshwater Collaborative would bring together diverse perspectives in training future generations by leveraging the distinct strengths of the different universities across the UW System.

UW-Madison views the Freshwater Initiative as a model for how the UW-System can collaborate and work together to advance the lives of the people of the state of Wisconsin - clean water is fundamental to human well-being. We would like to thank you for your time and for allowing us to detail this important work.

## **Freshwater Collaborative of Wisconsin**

### **UW-Stout Support and Participation**

The University of Wisconsin-Stout supports the proposal for creation of the Freshwater Collaborative of Wisconsin. This initiative responds to the critical role that freshwater will play in the coming years in terms of environmental and human health, business and industry needs, including the tourism and recreational sectors, and builds on current institutional strengths. Below we highlight freshwater initiatives, programs and research on the UW-Stout campus, to provide an idea of what we are already doing and how the Collaborative could help advance our work.

Interdisciplinary work in the area of water research is a highlight of UW-Stout's research agenda, involving faculty, undergraduate and graduate students, and the local and regional communities. Specifically, we have focused on connections between the environmental and social sciences, bringing together scientists and policy analysts with community members to develop long-term sustainable solutions to issues of water quality. Because the university is situated at the bottom of a large agricultural watershed, UW-Stout's location provides ample opportunities to study excess nutrients in surface water bodies. The challenges presented by cultural eutrophication in these water bodies require solutions both scientific and social, and UW-Stout has taken a leading role in this regard to develop solutions to surface water impairment.

On a local level, the university works closely with stakeholders in the community to study problems in the watershed. Each degree program at UW-Stout requires an advisory board to ensure that curriculum stays up-to-date with the desires of employers and policymakers. The Environmental Science and Applied Social Science programs at Stout contain, among other individuals, county conservation officers, lake quality planners, and the president of the lake association on their boards. Along these lines, faculty in each department work closely with the Tainter-Menomin Lake Improvement Association – the local watershed group – to attack water quality issues that are relevant to the community. The interdisciplinary and outreach approach of the campus are also highlighted by the Red Cedar Watershed conference hosted each year at Stout. The conference is a rare opportunity to interact stakeholders – both academic and local – in a setting that is designed to bring all voices to the table. UW-Stout also has a unique relationship with the Wisconsin DNR, Minnesota Pollution Control Agency, US Geological Survey, and Army Corps of Engineers, all of which have commissioned interdisciplinary work from the university. Finally, UW-Stout is recognized at the national level through the NSF-funded LAKES REU program. The REU is well-known for bringing together faculty and students from diverse disciplines; in fact, the program is one of the only social science REUs in the entire country. The program attracts some of the best students from throughout the country and produces publishable work, with students as co-authors. Continuing this successful program under the Freshwater Collaborative, with students and faculty from across the UW-System, would be beneficial for everyone throughout the state. We are confident that UW-Stout will continue to grow as a leader both in the UW System and throughout the state in the areas of water policy, limnological research, and working on developing solutions to the eutrophication of surface water bodies.

UW-Stout is also poised for success in the Freshwater Collaborative through the campus's day-to-day operations and curriculum. At UW-Stout, we have a strong environmental research program in the Center for Limnological Research and Rehabilitation, academic programs in Environmental

Science focusing on aquatic biology, and professional graduate programs in conservation biology. In addition, the Applied Social Science program's proposed concentration in Water Policy and Management would prepare students for a wide variety of careers in business, non-profits/NGOs, human services, government, and policy by examining the human side of water issues. This program would be unique in the UW System. In addition, faculty at UW-Stout are actively involved in freshwater research, and the interdisciplinary nature of the projects, reports, and publications from the university is unparalleled throughout the state and region. Through the Freshwater Collaborative, we will be able to open our doors to students from across the UW System who wish to study and work toward solutions for one of the largest and most pressing environmental issues facing Wisconsin.

Finally, the Freshwater Collaborative will allow UW-Stout faculty and students access to all the proposed collaborative research and study opportunities. Such a System-wide initiative will strengthen programs and research on all the campuses and position UW-System as a global leader in freshwater research.



# UNIVERSITY *of* WISCONSIN LA CROSSE™

## **UW-System's Freshwater Collaborative, UW-La Crosse and Wisconsin's Great River Community**

**LOCATION:** The only system campus situated adjacent to the **Mississippi River**, the University of Wisconsin – La Crosse (UWL) provides a unique location and an academic specialization focusing on the study of our Nation's great river. If Wisconsin's Freshwater Collaborative receives legislative support, **UWL will be able to expand upon and provide the following for Wisconsin:**

**EXPERTISE:** The UWL **River Studies Center (RSC)**, created in 1972, is a multidisciplinary unit focusing on research and scholarly programs pertinent to the Upper Mississippi River and related freshwater resources.

- **24 faculty members** providing multidisciplinary expertise for the study of large rivers
- Mission – to prepare aquatic scientists by creating experiential learning opportunities
- Supported over **300 undergraduate research projects** and **120 Master's theses**
- Areas of expertise – **water quality** and **nutrients**, effects of **mercury contamination**, **invasive species**, geospatial analysis of large rivers, and mathematical modeling of complex environmental systems
- Awarded more than **\$14.5 million in external funding** since 2000
- Produced over **100 peer-reviewed publications** since 2000, the majority of which had student co-authors
- Provides Wisconsin's only **wetland delineation workshop series** to train professionals required to make the wetland boundary determinations.

**GOVERNMENTAL PARTNERSHIPS:** A 25-year old **Cooperative Educational Agreement (CEA)** between UWL and the Upper Midwest Environmental Sciences Center (U.S. Geological Survey or USGS) annually supports many experiential learning opportunities for undergraduate and graduate students. The objectives of the CEA include:

- Increase UWL **undergraduate/graduate assistantships** and research opportunities with the USGS
- Increase the number of students in aquatic and environmental sciences from **historically under-represented groups**
- Increase professional interactions among researchers from the RSC, other interested UW-La Crosse faculty and the USGS.

**PRIVATE & COMMUNITY PARTNERSHIPS:** UWL's River Studies Center has collaborated with many private partners over the years. These include **Brennan Marine**, **DairyLand Power Cooperative**, the National Geographic Society, The Nature Conservancy, the City of La Crosse. The partnerships have resulted in the following:

- Hosting 4 major international scientific meetings in Wisconsin since 2000
- Providing technical expertise for the barge industry operating on the Upper Mississippi River
- Providing employment opportunities for many UWL graduates
- Supporting La Crosse Mayor Tim Kabat and his participation with the Mississippi River Cities and Towns Initiative

**CURRICULUM IN AQUATIC SCIENCE:** The curricular centerpiece of what UWL has to offer students enrolled in Wisconsin's Freshwater Collaborative is the **Aquatic Science Concentration (ASC)** track at both the BS and MS degree level in Biology. The ASC models the mission of the American Society of Limnology and Oceanography. The ASC track creates, integrates and communicates knowledge across the full spectrum of aquatic sciences, advances public awareness and education about aquatic resources and research, and promotes scientific stewardship of aquatic resources for the public interest.

**FACILITIES:** The opening of the new \$82 million-dollar Prairie Spring Science Center (PSSC). This new laboratory science building contains several new instructional laboratories for the Aquatic Science Concentration.

29 January 2020

Dear Elected Officials,

I am grateful for the opportunity to provide testimony in support of the **Freshwater Collaborative of Wisconsin**.

UW-Parkside, like our sister campuses in the UW-System is situated among the abundant freshwater resources of the state, including rivers, lakes, and wetlands; our faculty and students are engaged in many practical and problem-solving areas of novel freshwater research; we provide state-of-the-art training for undergraduates and even graduate students in freshwater-related disciplines; and we are committed to community involvement and service learning.

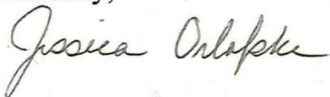
UW-Parkside is also unique among the campuses within the UW-System in that a disproportionate number of our students reside within the counties adjacent to our campus - a region of the state experiencing tremendous growth and change both economically and ecologically. Furthermore, a large proportion of these students want to stay right here in Wisconsin – and they are committed to improving the quality of life in the state for themselves, their families, and their communities. **The Freshwater Collaborative of Wisconsin is prepared to provide the rigorous, interdisciplinary programming necessary to help these students achieve their goals.**

The opportunities made available through the Freshwater Collaborative of Wisconsin are particularly important at our campus. UW-Parkside has one of the most diverse student populations within in the UW-System, and this initiative will bolster participation by underrepresented groups in a variety of careers related to water. These students are a source of new ideas, innovation, and creativity—all of which are needed to solve our current and future water challenges. **The Freshwater Collaborative of Wisconsin will be instrumental in identifying promising students, connecting them with experts and mentors, supporting these students throughout their training, and applying their contributions to real-world problems.**

UW-Parkside is also a respected conduit of information into the surrounding communities of Racine and Kenosha counties. Our students, faculty and staff are engaged in a variety of outreach and community-based learning programs. As a highlight: our Root River Environmental Education Community Center, informally known as “the Rec”, provides underserved children and families in our region with access to freshwater education and recreational opportunities such as fishing, kayaking and canoeing right in the heart of downtown Racine. **The Freshwater Collaborative of Wisconsin will enhance and expand these efforts by facilitating global impact with local significance – delivering valuable educational tools and resources to local residents while improving their health and wellbeing.**

Wisconsin is poised to become *the* leader in Freshwater research and training. Supporting the Freshwater Collaborative of Wisconsin will help create the talented workforce necessary to successfully address pressing water needs in Southeastern Wisconsin and across the state.

Sincerely,



Jessica M. Orlofske, Ph.D.  
Assistant Professor, Biological Sciences Department  
University of Wisconsin – Parkside  
orlofske@uwp.edu | 1-262-595-2547



January 30, 2020

Representative David Murphy  
Chair, Wisconsin Assembly Committee on Colleges and Universities

Representative Travis Tranel  
Vice Chair, Wisconsin Assembly Committee on Colleges and Universities

Dear Chair Murphy, Vice Chair Tranel and Committee members:

The Environmental Research and Innovation Center (ERIC), Department of Engineering Technology (ET), and colleagues at the University of Wisconsin Oshkosh are excited about the prospects of the UW Freshwater Collaborative interlocking with and enhancing water-related activities at UW Oshkosh. We support the Freshwater Collaborative Bill (Senate Bill 712/Assembly Bill 801).

I appreciate colleagues in the UWO Department of Engineering Technology and College of Letters and Science who contributed to this testimony. Many programs at UWO have a long and distinguished history of providing quality research and teaching experience in a number of freshwater areas, including, but not limited to, groundwater, surface water, beach engineering and public health. Additionally, UWO faculty and staff members operate field research sites throughout Wisconsin that could be useful to many researchers and students from other campuses. These facilities include lab facilities in Eagle River, Sturgeon Bay and Manitowoc.

A group of UW Oshkosh faculty and staff members has met to discuss the opportunities and is excited by the prospects. A number of university departments could contribute to the Freshwater Collaborative effort in a wide-array of ways. The exact methods of contribution and the extent to which we could be involved will be determined as funding becomes available and details are released. What follows are a number of capabilities that UW Oshkosh brings to the table to assist this effort:

- Participation in cross-institutional degrees, training and research.
- The ERIC ([www.uwosh.edu/eric](http://www.uwosh.edu/eric)) is a perfect site for collaboration and hosting guest researchers, projects, students and collaborators. The ERIC serves as a research and testing center for environmental health professionals, industries looking to evaluate materials for biogas potential, and conducting a variety of customized research projects.
- Lab analysis through the ERIC lab for all faculty and staff members who are awarded grants in the Freshwater Collaborative. This will allow funds to go further and fund more student and faculty members' work.

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- Modification of existing courses to meet the Freshwater Collaborative needs.
- New program development using existing courses from various departments with Environmental Engineering Technology and Environmental Health being novel majors and/or minors not available widely in the UW System.
- The offering of courses via distance education, field modalities, etc.
- Provision of site access for summer research experiences and support for graduate students at UWO and a variety of field research sites.
- Faculty and staff member pursuit of grants to support a number of the areas outlined in the Collaborative. This will fund basic research, industry-partner research and community-based research.
- UWO provision of the only permanent UW System access to Lake Winnebago and river system.
- Access to rural field research sites through county partnerships that are not near any other UW System institution but serve water-rich areas of Wisconsin.

UWO should be poised to become a significant partner in this effort. UWO faculty and staff members' experience, breadth of teaching and research in freshwater issues and unique field facilities and locations make us an ideal partner to compliment other UW System campuses.

Please let me know if you have any questions or would like my colleagues or me to elaborate on the many ways we see UWO's current and future initiatives supporting the Freshwater Collaborative vision.

Sincerely,

A handwritten signature in black ink, appearing to read "A. Leavitt", written in a cursive style.

Andrew J. Leavitt, Chancellor  
University of Wisconsin Oshkosh

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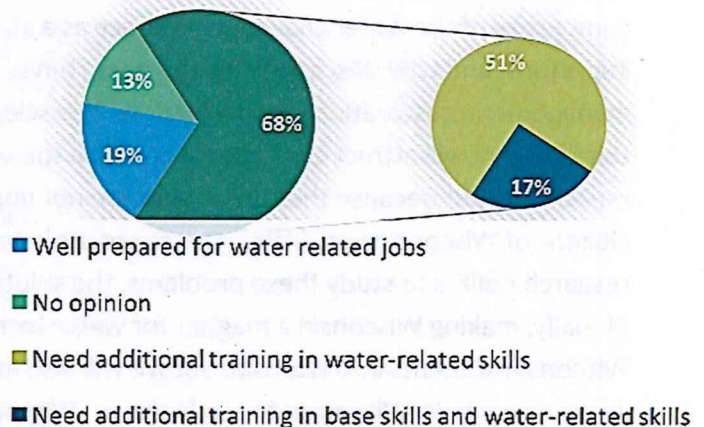
**School of Freshwater Sciences**

Remarks in Support of Assembly Bill 801 Freshwater Collaborative,  
 J. Val Klump, [vkump@uwm.edu](mailto:vkump@uwm.edu), School of Freshwater Sciences, UW-Milwaukee,

30 Jan. 2020

**The School of Freshwater Sciences @ UW-Milwaukee** was founded in 2009 upon 50-year record as a research institute and remains the only School dedicated to Freshwater Science in the country. 97% of our graduate students are placing in jobs in the water sector, which is the fastest growing sector of the world’s economy (about \$800 billion annually by 2035). This growth is fueling an increasing demand for hydrologists, ecologists, engineers, agronomists, modelers, data scientists, aquatic toxicologists, policy analysts, business leaders and others who can understand and anticipate water issues and problems, and who can devise, implement and manage solutions. U.S. water infrastructure alone employs 1 to 2 percent of the nation’s total workforce (~1.7 million workers). At the same time, however, Wisconsin industries are facing significant workforce shortages particularly in the water sector. A 2018 UW-Milwaukee survey of water industries revealed that, while almost half saw water-focused positions as growth areas, most could not find new employees with adequate training in water-related issues, technologies or processes. The Wisconsin water workforce is ~ 60,000, or about 2% of the State’s total employment. The projected growth by 2028 is 15%. Water occupations pay well with graduates in these fields currently earning annual salaries of \$55,600.

**Employer Survey: 68 percent of Wisconsin water sector employers struggle to find well prepared employees**



While our state faces some enormously difficult water quality problems, it also has some enormous competitive advantages represented by our expanding water economy, our unparalleled water wealth and geography, and the diversity of intellectual strengths within our system of public universities. The Freshwater Collaborative will lay the foundation for a new era of inter-campus, state agency, and private sector cooperation and partnership, trigger Wisconsin’s lead in water sector

innovation, and advance a unique platform for linking economic and workforce development with higher education.

The Freshwater Collaborative is a state-wide initiative designed to tackle Wisconsin's water problems and challenges by building upon UW System's expertise, world-class facilities, research firepower, and commitment to undergraduate/graduate education, training, research, and talent development across all 13 UW campuses.

**Assembly Bill 801 – a first step.** Two of the most pressing freshwater resource challenges for Wisconsin relate to the importance of water to agriculture – a key industry for our state - and the growing concern over emerging contaminants (pharmaceuticals, PFAS, nanomaterials, etc.) which impact every water supply upon which we rely for consumption, food production, manufacturing and recreation. The School of Freshwater Sciences houses the Great Lakes Genomics Center, the only center in the Midwest dedicated to applying state-of-the-art biotechnology, DNA sequencing and bioinformatics to freshwater environments, organisms and water quality issues. We are the largest academic Great Lakes research institute in the U.S. and the only one to operate a Research Vessel on the Great Lakes year-round. The School is also home to the Center for Water Policy, privately endowed in 2011 to link scientific understanding to water policy decisions, water resource management, and economics, for sustaining beneficial water uses and water quality for Wisconsin's citizens.

We recognize, however, that no one single institution has the capacity to fully address the complexity of the water challenges we face as a state. This is why the Freshwater Collaborative is so important, and why Wisconsin has the opportunity to be a global leader in freshwater science, policy, management, restoration and protection. The scientists, researchers, postdocs, and students that this initiative will attract can collectively solve these problems for the state and avoid their repetition. But because these problems are not unique to Wisconsin, this research will, also, cost the citizens of Wisconsin very little. Our scientists have an outstanding track record in attracting federal research dollars to study these problems, the solutions to which have immense market potential globally, making Wisconsin a magnet for water technology and training. We will not only retain more Wisconsin students in Wisconsin, but we will also attract students and professionals from around the world to come to Wisconsin to study water. Wisconsin is in a unique position to leap ahead of the competition if we move forward together and combine our two greatest assets – Wisconsin's freshwater and the ingenuity of its people.

Thank you.

**Dennis Busch**  
**Senior Scientist, Pioneer Farm, UW-Platteville**

Testimony in support of 2019 Assembly Bill 801

Date: 1/30/2020

Good morning. My name is Dennis Busch and I am a Senior Scientist at UW-Platteville Pioneer Farm, and I am here today to testify in support of the proposed Assembly Bill 801 providing funding for UW System Freshwater Collaborative.

The research program at Pioneer Farm was established in 2001 as part of the Wisconsin Agricultural Stewardship Initiative and its' primary focus has been quantifying the relationship between water quality and agricultural farming practices.

Federal and state taxpayers have invested significant resources to create a state-of-the-art agriculture water quality research program at Pioneer Farm. Examples include:

- 21 surface-water runoff monitoring gauges monitoring cropland and pasture runoff,
- 12 groundwater monitoring wells,
- 16 Undisturbed soil core lysimeters,
- Perennial stream gauge monitoring the headwaters of Galena River,
- Meteorological stations monitoring rainfall, temperature, soil moisture, etc.

**What makes our program unique?**

1. The infrastructure described above gives us the capability to monitor the complete water cycle.
2. Research/monitoring is conducted at the field-scale (not plot scale) of natural runoff events (not rainfall simulations) on a "working farm".
3. Water quality monitoring is conducted year-round.

**Results from the research program have had significant impact in the state of Wisconsin as well as nationally and internationally.**

Our data is used to develop tools and programs that farmers and stakeholders use to manage nutrients, target conservation activities, and establish water quality trading programs. Specific examples of these tools include:

1. WI-Phosphorus Index (UW-Madison) 2018 3.3M acres / 36% of WI Cropland
2. Wisconsin Runoff Risk Estimator (DATCP)
3. USDA/ARS Annual Phosphorus Loss Estimator (APLE)
4. USDA/ARS Barnyard Runoff Model

We also create additional value by sharing data with national and international research networks, such as the **USDA ARS Long Term Agroecosystems Research Network** and the **Global Farm Platform**.

In closing, I support the proposed Freshwater Collaborative as it can provide the funding needed to maintain agricultural water quality research at Pioneer Farm which is critical to the generation of science-based data which is required to inform farm management decisions and state policies related to land and water use.

Thank you!

School of Agriculture



**Rami Reddy**  
**Director, School of Agriculture**

Testimony in support of 2019 Assembly Bill 801  
Date: 1/30/2020

Good morning. My name is Rami Reddy and I am the director of the School of Agriculture at UW-Platteville. I am here today to testify in support of the proposed Assembly Bill 801 providing funding for UW System Freshwater Collaborative.

The UW System Freshwater Collaborative would benefit and be supported by multiple scientists and educators at UWP. The list is too long to recite, but a few specific examples include: Dr. Chris Wright and Rebecca Doyle-Morrine, Biology Professors conducting freshwater research; Drs. Andrew Cartmill and Chris Baxter, researching soil health, soil quality and plant nutrient requirements, and Drs. Austin Polebitski and Mike Penn research water quality and use in urban environments.

The Freshwater Collaborate can serve as the nexus to coordinate activities within the UW-Platteville campus and across campuses in the UW-System allowing us to better serve our students, industry partners and the citizens of Wisconsin. In the School of Agriculture, we are planning on launching an Applied Agriculture Hydrology minor that will train many undergraduate students in agricultural water quality studies.

In addition, given the stated purpose of the pending legislation “studying the challenge of agriculture water management”, Dr. Dennis Busch Senior Scientist at UW-Platteville Pioneer Farm can provide specific details on how we can support the agricultural related goals of the Freshwater Collaborative.

Thank you!

UW-Whitewater, Dr. Elisabeth Harrahy, 29 January 2020

I am here to speak in **support of the Freshwater Collaborative of Wisconsin**. UW-Whitewater has outstanding faculty, resources, and facilities to contribute to a successful Freshwater Collaborative. It is our students, our industry collaborators, our local community and the state of Wisconsin that will benefit from this program.

UW-Whitewater is **conveniently positioned to study a variety of impacts** to both surface waters and groundwater, from agricultural, urban and industrial sources. And to study the management and restoration of those resources as well.

UW-Whitewater has a modern, well-equipped **Instrumentation Laboratory**, where we can identify and quantify nutrients, pesticides, and emerging contaminants of concern. One of the great things about this lab is that these instruments are often run by undergraduate students themselves.

We have a **Geographical Information Systems Center**, where a wide variety of water-related work is performed using the latest software and equipment, including drones. One of our faculty members even outfitted kayaks with water monitoring equipment, which allows the mapping of water quality in real-time.

Our **Institute for Water Business** is the first of its kind in the U.S. Board Members represent academia, non-profit agencies, water law and policy firms, and water businesses. Several faculty have also collaborated with Milwaukee-area water businesses through the **Water Council**. And our campus has had a **Student Chapter of the Water Council** since 2010.

Our **Fiscal and Economic Research Center** supports faculty and students in water-related research as well. For example, faculty and students conducted an assessment of the *economic* impacts of repeated blue-green algal blooms on Tainter Lake. This ties nicely to the *scientific* research conducted by my students and me on the occurrence of the blue-green algal toxins in the water of this lake, and in the surrounding air.

Clearly, UW-Whitewater is in a unique position to **examine water quality issues from both the scientific and business/economic perspectives**. UW-Whitewater employs more than 20 faculty with expertise and research interests in water that coincide with the two **Grand Water Challenges** that are the focus of this bill: **agriculture water management**, and **water quality and safety**. Faculty and students at UW-Whitewater have recently conducted, or are currently conducting research on wastewater treatment, nutrient pollution in surface and groundwater, blue-green algae and their toxins, pharmaceuticals and personal care products, neonicotinoid and other pesticides, sensor development, and the economic impacts of water pollution. Our faculty have **collaborated with a number of partners**, including iButtonLink, DMR International, Stonehouse Water Technologies, the Wisconsin DNR, DATCP, Rock River Coalition, SEWRPC, Kettle Moraine Land Trust, and the Walworth and Rock County Departments of Health.

From an academic perspective, UW-Whitewater offers **two water-related majors that are unique** in the UW-System: **Marine Biology and Freshwater Ecology**, and **Integrated Science and Business, with an emphasis in Water Resources**.

**In summary**, UW-Whitewater is committed to working towards improving water quality in the State of Wisconsin, and to bringing skilled employees to water-related jobs. Funding the **Freshwater Collaborative of Wisconsin** program will increase our ability to accomplish this through curriculum development, education, collaborative research, economic assessments, service, and partnerships with key stakeholders. Thank you for your time.

UNIVERSITY of WISCONSIN  
**GREEN BAY**

Public Hearing – Committee on Colleges and Universities, January 30, 2020

Thank you Chairman Murphy and other members of the committee for this opportunity to speak with you. I am here on behalf of the University of Wisconsin-Green Bay in support of Assembly Bill 801 - relating to funding a University of Wisconsin System freshwater collaborative. I am a professor in the Department of Natural and Applied Sciences and a soil and water resources Extension Specialist. I have been a campus representative to the UW-System-wide effort to develop the Freshwater Collaborative Wisconsin and spoke in favor of investing in clean water initiatives and investment in water research, training and education at the August 28<sup>th</sup> meeting of the Speaker's Task Force on Water Quality held at our Green Bay campus.

The four-campus configuration of the University of Wisconsin-Green Bay stretches along 420 miles of Lake Michigan shoreline, from Sheboygan, to Manitowoc, through the Door County peninsula and around the bay of Green Bay to the city of Marinette. Like much of Wisconsin, the economy and quality of life along this freshwater coast and the connected rural and urban communities throughout the region are driven by water.

Since its founding in the late 1960s UW-Green Bay has had a strong record of applied water research, education and outreach in the Green Bay area and throughout Northeastern Wisconsin. Much of this work has and continues to be done in concert with partner organizations including citizen groups, NGOs, private businesses & industries, local governments, state agencies, academic institutions, federal agencies, farmers and many others. With these partners we have conducted scientific studies and trained students to help develop solutions and guide management of many water resource problems, including: wastewater treatment systems; PCB impacts on fish and wildlife; restoration of the Lower Fox River-Green Bay Area of Concern (AOC); research on groundwater and drinking water quality in the deep aquifer and in karst bedrock areas; studies of nutrient and sediment runoff sources and management; and the impacts of water quality on fish, wildlife and aquatic resources.

Through the application of science, engineering and significant private and public investments, tremendous progress has been made on reducing point source discharges and cleaning up PCB contaminated sediment in the Fox River (\$1B+). However, many water quality and quantity challenges that are critical to the well-being of our residents, businesses, and greater communities remain (e.g., runoff pollution, persistent contaminants, sustainable water use and treatment systems).

UW-Green Bay is a fully committed partner to the Freshwater Collaborative Wisconsin initiative. We recently added a Water Science degree program designed as a launching point for

UW-Green Bay student training in anticipation of the freshwater collaborative. Students are already enrolling in the program. In addition, we seek to strengthen watercentric training opportunities for students at all four UW-Green Bay campus locations. We are also working with the Governor's Office and NOAA to explore the development of a national research and education center focused on the Green Bay ecosystem.

This bill is an important first step that will help keep, attract, and grow an array of freshwater experts, managers, and innovators. These people will provide critical talent to the coalition of partners in NE Wisconsin and to communities throughout Wisconsin that are working to solve our water resource challenges and keep Wisconsin's water driven economy and quality of life strong!

Thank you.

Kevin Fermanich  
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