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Dr. Marissa Jablonski
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Dear Dr. Jablonski,

We have appreciated the chance to meet with you and UW-Milwaukee School of Freshwater Sciences faculty to discuss ongoing water research and the Freshwater Collaborative of Wisconsin (FCW). The goal of developing a collaborative, UW system-wide research network is an exciting and important effort that would fit well with the Governor's priorities on clean drinking water, rural prosperity and science-informed policy. In 2019, at the direction of the Governor, DNR began rule making on PFAS and nitrates, and this month we launched a new funding program to help municipalities make headway on removing lead service lines. In addition, last spring the Speaker's Task Force on Water Quality held hearings across the state and received significant public feedback focusing in five key areas: nitrates, nonpoint source pollution, PFAS, lead in drinking water and pathogens in drinking water.

Below is a list of the Department's water research priorities that could benefit from working with a collaborative UW system effort.

- Nutrient pollution: After nearly 50 years of focus on non-point sources, progress achieving surface and ground water quality goals has been elusive. Historic changes in land use policy and practices in Wisconsin (and the upper Midwest) have contributed to significant nutrient pollution of our waters and to historic numbers of family farm bankruptcies. Today's water pollution problems clearly cannot be solved with technical solutions alone. How might FWC organize a transdisciplinary research effort (physical science, socioeconomics and policy) that engages a diverse set of stakeholders to explore the non-point source program, review policies that maximize production over profitability and prevent sufficient conservation participation and chart a new path forward for meaningful change?
    - Systems Change: What is the estimate of land use change and/or conservation intensity required to achieve a quantifiable change in water quality? What system changes would result in achieving these land use changes? What changes to federal and state policies are needed to achieve water quality solutions? On what timeframes can we expect to see quantifiable change in water quality for different land use/systems/policy changes, and what implementation rate and costs are associated with systems changes?

- Cyanobacteria/Harmful Algal Blooms: What are key drivers that stimulate both cyanobacteria biomass and production of cyanotoxins in Wisconsin waters including the Great Lakes, Mississippi River, and inland lakes? What systems change and/or management actions could we take to prevent or reduce cyanobacteria and harmful algal blooms?
- Modeling: What is the performance, effectiveness and scale of conservation and/or best management practices (BMP) that is needed to achieve changes in water quality? What underlying processes and policies cause a lag between BMP implementation and positive changes in water quality in streams? How can lag responses be incorporated into region and basin scale models? How can research better refine the transport of nutrients from edge of field to streams and impacts to water quality? What easy to use field scale conservation tools can be developed that incorporate estimates of nutrient reduction benefits?
- Wetlands: How does anthropogenic disturbance and eutrophication affect biota and water quality of wetlands, do wetlands truly possess an "assimilative capacity" for excess nutrients, and what is the risk of wetland eutrophication and degradation from non-point sources?

- Emerging contaminants: How do we assess and evaluate emerging contaminants in the environment? What field and lab methodologies should be used to evaluate contaminants? How do we prioritize assessment and evaluation of emerging contaminants? What contaminants should we be interested in? What are “safe” limits of emerging contaminants in the environment? What treatment technologies can be used to remove these contaminants from our water? How do we determine whether to act and what action to take? Specific contaminants of interest include (but not limited to): per-fluorinated chemicals, microplastics, pharmaceuticals, and endocrine disruptors.
- Invasive Species Risk and Response: What is the risk of invasive species to Wisconsin waters, including the Great Lakes and Mississippi River? What are the impacts of upcoming or new invasives on our native communities and habitats? What rapid response and assessment protocols should be implemented? How can threatened invasions be prevented or delayed?
- Fisheries: How have increased temperature and altered hydrologic patterns affected trout streams and lake fish communities and what options are best to pursue for promoting resilience to these changes? Where and how does in-lake or in-stream habitat availability limit fishery potential, and how should habitat restoration projects be carried out to best promote desired fisheries? How do current harvest levels in inland lakes and the Great Lakes affect the sustainability of popular harvest-oriented fisheries, and how does the prominence of catch-and-release behaviors affect the others?
- Climate change: Climate change is having an effect on water resource issues and therefore, should be a critical consideration in all of the research areas raised in this letter. Climate assessments developed by WICCI project historical climate changes – especially seasonal warming, precipitation changes, and increases in extreme climate events. Wisconsin is already experiencing significant flooding across the state and along our Great Lakes coasts. What will these climate changes mean for aquatic habitats, fish and wildlife, fate of chemicals in the environment, movement of water, nutrients and sediment transport? How can we improve forecasting and assessment of how waterbodies, including the Great Lakes and Mississippi River, will respond to future changes, and what management actions can we take to minimize negative impacts of climate changes? How can we determine whether higher safety and design standards are

warranted for dams, especially for high and significant hazard dams that pose the greatest risk to life and property? And, in terms of protecting property and habitats along the Great Lakes coastline, what is the optimal design for erosion control structures while minimizing adverse impacts? How can our Great Lakes coastline remain resilient to projected increased variability in high and low water levels in the future?

In addition, we encourage FCW to review the State of Wisconsin Joint Solicitation of Groundwater Research and Monitoring process. This 30-year research effort has answered key scientific questions and advanced our understanding and management of groundwater in Wisconsin and is a good framework for a new, system-wide research network.

Finally, in addition to the above research priorities, this spring, DNR will be launching a new fellowship program for people of color. The goal of the program is to create greater professional opportunities for people of color, to increase diversity, equity and inclusion in the agency's workforce and to expand the department's outreach in the recruitment of a diverse workforce. We would welcome your support, including co-marketing of the program to students and young scientists associated with FCW.

Sincerely,

Todd L. Ambs

Todd Ambs
Assistant Deputy Secretary
Wisconsin Department of Natural Resources