



Seeking postdoctoral and post-master's applicants for the Wisconsin Water Resources Science-Policy Fellowship (surface water quality focus)

The University of Wisconsin Water Resources Institute (WRI) in partnership with the Wisconsin Department of Natural Resources (WDNR) seeks postdoctoral and post-master's candidates interested in tackling science and policy challenges related to water resources management in Wisconsin. Together, these programs will fund a Wisconsin Water Resources Science-Policy Fellow position. This Fellow position will provide a unique educational and career opportunity for a recent graduate who is interested both in aquatic resources and in the policy decisions affecting those resources in Wisconsin. This program places a recent master's or doctoral graduate within a state program full-time for one year, with the Fellow bringing technical skills to benefit water issues and challenges and receiving valuable real-world science-policy experience from the resource professionals who will serve as mentors. This mutually beneficial partnership will result in advancing science to support policy decisions as well as valuable training opportunities for new professionals entering the work force.

This Fellow will be placed at the Wisconsin Department of Natural Resources, Bureau of Water Quality office in downtown Madison and will be working with researchers from across the state and region in addition to stakeholders and policy-makers in Wisconsin. WDNR has identified three priority areas in which we are seeking assistance. The qualified fellow would be asked to take on one of the following three projects:

1) *Determining significant reductions in average seasonal water levels for lakes in the Central Sands region of Wisconsin.*

2017 Wisconsin Act 10 ("Act 10") directs the department to determine whether existing and potential groundwater withdrawals are causing, or are likely to cause significant reduction of average seasonal water levels of Pleasant Lake, Plainfield Lake and Long Lake (s. 281.34(7m)(2)(b)). "Significant reduction" is not defined in Act 10. Therefore, the department must define it.

The overall study will include data collection and analysis, hydrologic modeling, a field study, and a significant impact determination for each of the three lakes. If significant impacts from groundwater withdrawals are identified, the department will evaluate special measures to address predicted impacts, complete an economic impact analysis, compile a decision document for public hearing and comment, and create final reports and recommendations for submission to the Wisconsin Legislature.

The fellow will contribute to data analysis to determine significant thresholds for fish and aquatic life, water quality, and recreation and navigation in the three lakes. These thresholds will then be compared to the groundwater flow model results to determine whether groundwater withdrawals are causing, or are likely to cause a significant reduction in lake levels. The fellow may also help with drafting the final report and recommendations to the legislature.

2) *Review and synthesize existing scientific knowledge on aquatic herbicide toxicity and develop a decision-making framework to improve science-based management of aquatic plant communities*

DNR staff are required to determine whether herbicide treatments proposed for aquatic plant management will significantly affect fish or wildlife, other non-target organisms, or have other adverse effects on aquatic ecosystems. They must weigh this against the likelihood that the proposed treatments will be effective in removing a nuisance caused by aquatic plants.

The toxicological and non-target effects of herbicides used for aquatic plant management in Wisconsin are not well understood. Recent studies have demonstrated that even without reapplication, a prolonged presence of aquatic herbicides can persist in the water column, exposing aquatic and semi-aquatic organisms to a chronic low concentration of herbicide. WDNR has observed a large degree of variation in concentration and exposure time

across field applications of herbicide, and lake biologists need tools to help them assess the likely target and non-target effects of a given management approach across lake types.

The fellow would conduct literature reviews of the most commonly used aquatic herbicides in Wisconsin (e.g. 2,4-dichlorophenoxyacetic acid, fluridone). The information would be synthesized to increase our understanding of herbicide efficacy and non-target impacts in various aquatic ecosystems and under varying environmental conditions. The fellow will survey the literature and identify gaps in knowledge regarding the effects of herbicide applications in field contexts. This gap analysis will be used to design lab or field research to fill current knowledge gaps.

The fellow would work with the DNR staff to create a decision making tool that would help staff make use of newly synthesized knowledge on toxicity, efficacy, and the likely risk of adverse effects. The objective at hand would be to align decision points with supporting scientific information and either recommend decisions or outline a decision-making process at each decision point. The intent is to simplify the review of proposed herbicide treatments and increase consistency across reviews conducted statewide. There may be a possibility for the fellow to be involved in additional toxicity research, but the creation of a decision making framework will be the primary goal.

3) Accounting for short, extreme precipitation events in water quality models to improve assessments

Water quality impairments in Wisconsin are largely driven by nonpoint source pollution. These nonpoint source pollutants are delivered to surface waters in precipitation-driven runoff, where extreme precipitation events are particularly impactful. Therefore, it is particularly important to account for variability in precipitation – especially extreme precipitation events – to understand other drivers of water quality dynamics, assess trends in water quality monitoring data, and analyze for effects of restoration efforts or agricultural best management practices.

Recent work by Wisconsin DNR water quality modelers and a postdoctoral fellow has laid the groundwork for a more sophisticated approach to accounting for variability in precipitation in water quality models and assessments. This work involved developing models that predict daily TP and TSS concentrations from watershed attributes like land use and soil characteristics, and from daily temperature and precipitation data. However, because these models run at the daily timestep, they do not capture short, extreme precipitation events that last hours, instead of days.

The goal of this new project is to first develop models of hourly TP and TSS to ensure that we are capturing the effects of short storms, and use these models to control for underlying weather variability in assessments of water quality trends and document success of management interventions.

The fellow would be involved in the following tasks:

- 1) Download and geoprocess hourly precipitation and temperature datasets for each watershed in Wisconsin's WHDPlus geospatial hydrography layer.
- 2) Develop and assess statistical models of hourly TP and TSS using precipitation and temperature data, along with other data available in WHDPlus.
- 3) Incorporate model results into site/watershed-level reports and online applications for use by other DNR staff
- 4) Prepare guidance documents for refinements to monitoring and assessments of water quality. Prepare scientific article based on model findings.

More detail on the fellowship is below. If you have any questions, please contact: Jennifer Hauxwell at jennifer.hauxwell@aqu.wisc.edu or (608) 263-4756.

Application Deadline: April 15, 2018

Eligibility

Any student or postgraduate who will have graduated between spring 2017 and spring 2018 with a degree in toxicology, limnology, aquatic ecology, statistics, , hydrology, or a related field is eligible to apply. Fellows must have completed all degree requirements before starting the fellowship.

Stipend and Expenses

Annual stipends are dependent on the Fellow's academic background, with post master's Fellows earning \$40,000 and postdoctoral Fellows earning \$47,476, both with additional benefits (see - <http://www.ohr.wisc.edu/benefits/new-emp/grad.aspx>). Fellows will be allotted up to \$2,000 to cover fellowship-related travel and can include conferences. Additional travel associated with the fellowship may be covered by the host agency at the agency's discretion.

Application Requirements

Application packages should be sent to jennifer.hauxwell@aqua.wisc.edu at the University of Wisconsin Water Resources Institute and should include:

1. A cover letter that describes your background and abilities, your expectations from the fellowship experience and how this experience fits with your career goals. (2 pages or fewer)
2. Curriculum vitae with relevant educational, professional and volunteer experience. (no length limit)
3. Copies of undergraduate and graduate student transcripts. Scanned copies are acceptable.
4. Two letters of recommendation, including one from the applicant's major professor; if no major professor exists, another faculty member at the same institution, familiar with your academic record, may be substituted. References should email letters directly to jennifer.hauxwell@aqua.wisc.edu.
5. Up to 4 writing samples, both formal and informal (e.g., journal articles or other technical documents, popular articles, web resources, etc.)

Selection Process

WRI and WDNR staff will identify a short list of candidates for interviews. Interviews will be conducted by a panel of WRI and WDNR staff members to determine the best fit for the position. It is expected that applicants will possess a strong toxicology, aquatic sciences, and/or modeling background, strong analytical skills, an ability to manage projects and work independently, and excellent written and verbal communication skills.

Length of Assignment

The length of assignment is one year with an anticipated start of fall 2018. This timeline may be adjusted to accommodate academic semester needs or the needs of the candidates or funding institutions.

Reporting and Other Requirements

Quarterly reports will be required during the fellowship as well as a final write-up of the fellowship experience. The Fellow will participate in the WRI's outreach and social media and student engagement programming.

Timeline:

April 15, 2018 – Deadline for submission of applications

Late April/early May – Interviews

August 2018 (approx.) or later – Fellowship begins