Call for Proposals (CFP):

Creating a Plan for Development of a Wisconsin-based Nitrogen-Loss Tool

for Use in Agricultural Systems

Funding available through June 30, 2021: $50,000

Background: Nitrate is Wisconsin's most widespread groundwater contaminant. The sources of nitrate contamination are well understood with agriculture being a primary driver. Several nitrate-nitrogen leaching models or relative risk indices have been developed over the past few decades and have been validated to varying degrees. Our overarching end-goal is to enter into a collaborative partnership to develop a nitrate-nitrogen leaching planning tool that can be used by Wisconsin farmers, agronomists and other technical service providers to assess nitrate leaching rates resulting from current cropping practices and evaluate the reductions that can be achieved by implementing crop, nutrient and conservation practices to minimize nitrate contamination of groundwater. **The primary deliverable from this CFP is a plan, or roadmap, that can be used to develop a field scale nitrate-nitrogen planning tool for use in Wisconsin agricultural landscapes.** The plan should be based on the evaluation of existing models, and/or indices and supported by data. Our first imperative is to identify useful frameworks, gaps in existing model structures, gaps in data to validate models and then prioritize the research needed to fill gaps accordingly. We realize that this CFP will likely be insufficient to support the development of the nitrogen management tool itself, but will instead identify the steps and resources necessary to create the tool.

The Wisconsin Department of Natural Resources (DNR) and Department of Agriculture, Trade & Consumer Protection (DATCP) seek a contractual partnership with University of Wisconsin (UW) researcher(s) to address this high priority research need shared by UW, DNR and DATCP. Agricultural producers, agronomists, and providers of technical assistance seek reliable tools to estimate nitrate leaching associated with production and conservation practices. Therefore, our challenge is to develop a planning and educational tool for farmers to estimate how various management practices affect nitrate-nitrogen leaching. Such a tool will likely need to incorporate a variety of factors including nitrogen sources, application methods, crop types & rotations, tillage methods, living cover/cover crops, soil properties, recharge rates, and conservation practices, for example.

A nitrate leaching tool should have the capability of interfacing with and supporting SnapPlus platform and outputs and use shared input data to express nitrate leaching potential under a variety of land management, nutrient application, and geophysical conditions. Various nitrogen budget calculators and nitrogen leaching indices and models exist or are under development, including an NRCS Nitrogen Index tool tailored to Wisconsin, NLEAP and Agro-IBIS (Dr. Chris Kucharik, UW-Agronomy). A cursory review of these tools and models suggests each has potential to inform and/or connect with a field-level agronomic tool such as SnapPlus, though each will likely need further refinement to calibrate and validate its applicability to a wide range of scenarios for Wisconsin. Other tools and models could be optimized to maximize their support of SnapPlus. Regardless, applied research across diverse agricultural settings quantifying the soil leaching portion of nitrogen budgets within and outside the growing season will be needed to address the calibration gaps for a Wisconsin tool. We strive for better nitrogen research alignment across research institutions to leverage funding from a variety of sources and collaborations.

We also recognize present demand for outreach and planning tools that agricultural professionals and farmers can use immediately while the nitrogen index described herein is being developed and validated. While not

required, we encourage PIs to evaluate the strengths and weaknesses of currently available tools, outreach materials and programs to address this need.

Expected Deliverables: Components of the plan, to be delivered in a final document by 6/30/2021 include:

1) A detailed literature review of existing nitrate leaching models/indices and the data supporting these with identification of gaps in knowledge and capability needed to calibrate and validate a nitrate leaching tool for use by farmers and farm advisors in Wisconsin.
2) A detailed plan to prioritize the sources of error/uncertainty in estimating nitrate leaching in agricultural production settings and identify research needs to address these including, but not limited to, the following:
    a. Soil, agricultural production systems and conservation practices and hydrogeologic settings on which applied research is most needed
    b. Field Infrastructure needed for applied research to quantify nitrate losses in these settings and practices
    c. A projection of funding amount, potential sources and other resources needed to implement this applied research
    d. How this applied research could most strategically be phased in over time
3) Identification and description of future steps *and a timeline* necessary to incorporate a reliable, accepted nitrogen leaching index quantifying estimated N leached as a component of and/or sharing input data with SnapPlus.
4) A summary of related research and outreach needs directly related to implementation of this plan.
5) Identification of financial and human resources currently or potentially available to complete the future steps identified.

Proposal Process: Funds are available to any University of Wisconsin principal investigator(s) with the expertise and capacity to conduct and complete these deliverables on time, particularly those with evidence of current or future partner and funding leverage. **Proposals shall consist of no more than 2-4 pages and shall be submitted by 9:00am, Monday, November 2, 2020 to Brian Weigel, brian.weigel@wisconsin.gov and Sara Walling, sara.walling@wisconsin.gov. Proposals shall include the following:**

- A narrative description of the approach, steps and expertise that will be engaged to complete the deliverables.
- A budget up to $50,000 consisting of funds allocated within the categories of salary & fringe, supplies, travel and services.
- A plan for engaging a technical advisory committee consisting of members from UW, DNR, DATCP and NRCS and that meets regularly to ensure deliverables are consistent with the above goals, adapt to knowledge learned and honor mutual inter-organizational objectives.

Review and selection of a PI or co-PIs will be conducted by an inter-organizational team representing UW, Wisconsin DNR, DATCP and NRCS.

Following selection of a PI or PIs, DNR, DATCP and UW will commence formalizing this partnership through a contract. In recognition of the short timeframe available to complete work, efforts will be made by all parties to expedite finalization of this agreement.

Questions regarding this CFP can be directed to Brian Weigel, Wisconsin DNR, brian.weigel@wisconsin.gov, 608-225-4964, Sara Walling, sara.walling@wisconsin.gov, 608-224-4567 and John Exo, UW-Madison at john.exo@wisc.edu, 608-393-0496.