**Project Manager Qualifications and Organization Description**

**Miki Hondzo (PI),** James L. Record Professor

Department of Civil, Environmental, and Geo- Engineering, University of Minnesota

M.Sc., Surface Water Hydrology, 1988, Free University of Brussels, Belgium

Ph.D., Civil Engineering, 1992, University of Minnesota, Twin Cities, MN, United States

Dr. Hondzo will be responsible for the development and guidance of the detection of cyanotoxins under field and laboratory conditions using the proposed drone and spectral camera technologies. He will guide the development of Excel spreadsheet-type models for the early detection and prediction of cyanotoxins in Minnesota waters. Dr. Hondzo has 20 years of experience in physical limnology and water quality monitoring and modeling in lakes. Furthermore, he will be responsible for exploring and documenting the proposed mitigation strategies of harmful algal blooms and cyanotoxins. A physical/chemical mitigation strategy will be investigated in the field and outdoor bioreactors at SAFL by adding clay particles for the aggregation and dispersal of cyanobacteria and associated toxins. A mechanical mitigation strategy will be investigated at SAFL and in the field by injecting air bubbles for the dispersal of cyanobacteria and cyanotoxins. Dr. Hondzo will be responsible for the submission of yearly progress reports. Dr. Hondzo is an Associate Editor of the Environmental Fluid Mechanics journal.

**Ardeshir Ebtehaj (Co-PI),** Assistant Professor

Department of Civil, Environmental, and Geo- Engineering, University of Minnesota

M.Sc., Mathematics, 2012, University of Minnesota, Twin Cities, MN, United States.

Ph.D., Hydrology, 2013, University of Minnesota, Twin Cities, MN, United States.

Dr. Ebtehaj will be responsible for the development of the analytical models that relate the cyanotoxin concentrations and the measurements of the spectroradiometer. He will guide the detection of cyanobacteria and cyanotoxins by remote sensing using the drone and hyperspectral camera technologies. He has been studying remote sensing of environment and water systems for ten years. Dr. Ebtehaj is an associate editor of the Journal of Hydrometeorology. He was a NASA’s Earth and Space Science Fellow in 2014 and won a NASA’s new investigator (Early Career) award in 2018 for his contribution in remote sensing sciences.

**Shahram Missaghi (Co-PI),** Extension Professor

Minnesota Extension, University of Minnesota

M.Sc., Biology, 1988, Bemidji State University, Bemidji, MN.

Post B.S. Certificate, Stream Restoration, 2009, University of Minnesota, Twin Cities, MN, United States.

Ph.D., Limnology, 2014, University of Minnesota, Twin Cities, MN, United States.

Dr. Missaghi will be responsible for research outreach and lake water quality modeling. He will lead the

setup, configuration, and coupling of the 3D hydrodynamic and ecological modeling with the collected

remote sensing field data. Project outreach and extension will include creating a project website with

available online instructions and training for the Early Detection and Prediction of Cyanotoxins Model for

both natural resources managers and the general public. A series of locally tailored workshops will be

conducted throughout the State to demonstrate and train natural resources practitioners on the developed

Cyanotoxins mitigation strategies. Dr. Missaghi is experienced in conducting lake water quality modeling and

has 20 years of experience in lake management, outreach, and extension.

**Organization Description**

The proposed research will be conducted by the St. Anthony Falls Laboratory (SAFL), University of Minnesota. SAFL a unique laboratory located on an island just downstream of the only major waterfall on the Mississippi River – St. Anthony Falls. SAFL also houses several smaller labs, including wet chemistry, sediment analysis, and a biological laboratory with phytoplankton-growth chambers, incubators, and outdoor bioreactors. The EcoFluids Laboratory, developed by PI Hondzo, allows SAFL researchers to study the interactions among fundamental fluid mechanics, microbiological processes, and chemical reactions that are mediated by biological organisms. Several bioreactors with computer controlled operation and data collection have been developed and will be used in the evaluation of proposed mitigation strategies. The laboratories and offices of the PI and Co-PIs contain the necessary fixed and moveable equipment and facilities needed for the proposed studies.