



# The National Great Rivers Research & Education Center

## 2017 River Mesocosm Studies Program

### REQUEST FOR PROPOSALS

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#### RESEARCH OPPORTUNITIES

The research mission of the National Great Rivers Research and Education Center (NGRREC<sup>SM</sup>) is to pursue studies that make significant contributions to our understanding of large rivers, the watersheds associated with these rivers, and society's interconnections to large rivers. The Mesocosm Studies Program requests proposals for research projects aligned within this mission. Any investigator from NGRREC<sup>SM</sup> partner institutions, federal agencies, or other universities are eligible to apply. Accepted proposals will be offered full access to mesocosm facilities (raceways, tanks, or both), technical training and assistance from a NGRREC<sup>SM</sup> staff member, and laboratory space for sample processing. No direct funding will be provided through this program.

The Jerry F. Costello National Great Rivers Research and Education Center's Confluence Field Station (field station) is situated along the banks of the Mississippi River and near the confluence of the Mississippi, Missouri and Illinois rivers in East Alton, Illinois. There are three concrete mesocosms, each 50 feet long by 12 feet wide, that are supplied with Mississippi River water at a rate of up to 4 million gallons per day. The river water is unfiltered so that it contains intact planktonic communities, suspended sediments, and nutrient concentrations representative of the Mississippi River near the field station. Each of the three mesocosms can be set up in multiple ways, including standing ponds, independent raceway channels (50 feet long by 6 feet wide), meandering channels, or other configurations a researcher might desire. The mesocosm facilities allow researchers to conduct controlled studies with fishes and other aquatic organisms, sediment flow studies, and other river-floodplain research areas, which would not be possible in smaller outdoor tanks or laboratory settings. See section below for a selection of specifications.

Additionally, an indoor wet lab with a connection to Mississippi River water is available for use during 2017. This wet lab is equipped with an array of 15 individual spigots in the ceiling, and two above perimeter work areas. The lab utilizes floor drainage and currently is equipped with two sets of fiberglass tanks- 12 each of 280 gallon tanks and 40 gallon tanks.

For photos and more information about the mesocosms, please visit the [NGRREC<sup>SM</sup> mesocosm website](#) or contact Miles Corcoran ([mcorcoran@lc.edu](mailto:mcorcoran@lc.edu)).

#### **Availability**

The mesocosms are available from April through October. A static tank system that it is internal to the building is also available.

#### **Fee Structure**

NGRREC<sup>SM</sup> is offering this facility with no cost during its initial years of operation.

#### **Risk**

For projects during 2017 researchers must understand that NGRREC is in the early stages of use, and though we do not anticipate mechanical problems, the possibility exists that the pumps or other mechanics may malfunction for reasons of which we are yet unaware. The mesocosms were utilized successfully in 2015 and 2016.



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## Restrictions

If fish or other living organisms are to be utilized, it is required that studies involve only species found in the Mississippi River or its direct tributaries in the vicinity of the field station. If the study involves vertebrates, the researcher is required to provide a copy of the approved IACUC from their home institution. Introduction of any chemicals or contaminants into the water is prohibited due to water discharge directly back into the Mississippi River. Similarly the use of invasive species is limited to only those species that are known to be currently established in the Mississippi River near the field station.

## Scheduling

Duration of the projects will be an important factor in scheduling multiple partner usage. Due to the uncertainties, researchers should adopt a flexible approach and be cautioned that unexpected issues may arise that might cause a scheduling delay. Every effort will be made to accommodate project schedules. The mesocosm schedule will be made available on the [NGRREC<sup>SM</sup> website](#) or by contacting Ted Kratschmer, field station manager at [ekratsch@lc.edu](mailto:ekratsch@lc.edu).

## Selected Specifications:

*Recirculation:* Water in the mesocosms is able to be recirculated in each raceway, with the flow rate set by researchers. Two recirculation pumps are situated in each mesocosm (i.e. one per raceway), each capable of producing flow rates between 150 to 350 gallons per minute (gpm).

*Flow through:* Mississippi River water is pumped into each raceway. Target flow rates are set by the investigator, and can range from 0 to 500 gpm when filling all raceways simultaneously.

*Air pumps:* There are 5 air pump pipes on each side of the mesocosms that are able to be used for water aeration. A hose can run from the spigot of each pipe into the water, with an air stone at the end.

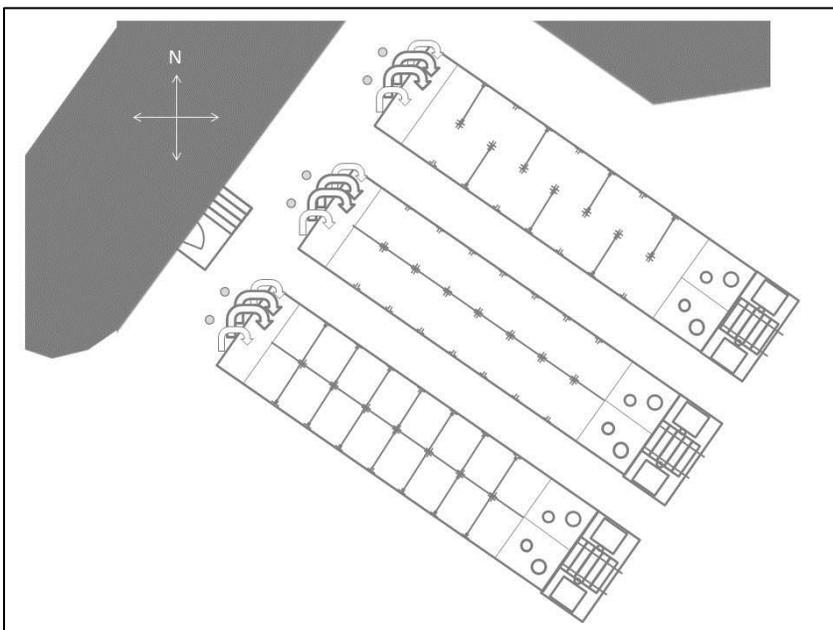
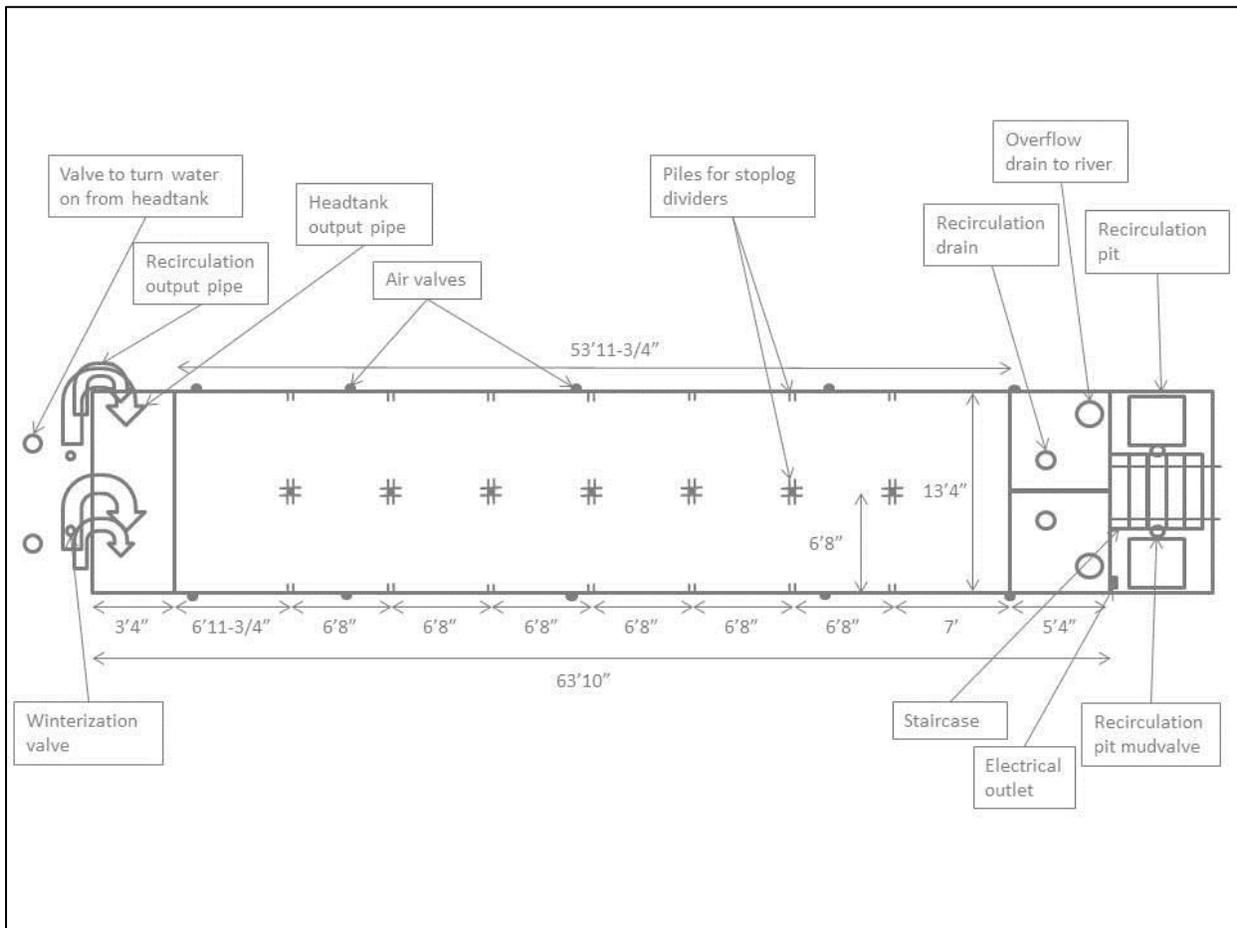
*Dividers:* Each of the three mesocosms has piles to hold either stoplog dividers or screen dividers. When the mesocosms are divided into two independent raceways with stoplog dividers, there is a small amount of connectedness between the two sides since water is able to seep through the dividers at a slow rate. This permeability equalizes the water levels between the two sides.

*Flow rates:* The following flow rates represent the average values for one mesocosm raceway with a range of water inputs (gpm) to the system. Please note that water in the mesocosms does not flow uniformly. Eddies that create backwards flow form often, leading to a relatively low overall flow rate. Flow rates can be increased by either lowering the water height or increasing flow from the pumps. Flows through rates above 500 gpm can only be employed on a single mesocosm, not on all raceways running simultaneously.

GPM	Water level (m)	Flow Rate (ft/sec)
500	0.75	0.059
300	0.75	0.036
100	0.75	0.012
500	1.5	0.030
300	1.5	0.018
100	1.5	0.006



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**Top: Schematic of an individual mesocosm, highlighting system components. All measurements were taken from the outside of raceway walls.**

**Left: Schematic of mesocosms with 3 possible configurations of stoplog dividers.**



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## OVERVIEW

**Areas of Interest:** Proposals should consider the relevance of the project in relation to the NGRREC<sup>SM</sup> research mission (see [www.ngrrrec.org](http://www.ngrrrec.org)). Topics with clear relevance to environmental or ecological concerns are particularly welcomed.

## Types of Projects

Preference will be given to projects that utilize the unique features of this facility; to studies that are collaborative in nature; to the significance of the problem being addressed; and to the overall feasibility and relevance of the research. Examples might include:

- 1) Macroinvertebrates
- 2) Dissolved oxygen / temperature
- 3) Hydrology
- 4) Sediment and / or nutrient transport
- 5) Aquatic organisms – Growth, behavior

## Technical Assistance/Training

NGRREC<sup>SM</sup> employs a staff member to assist with training users and for routine maintenance needs encountered pre, during and after use.

**Eligible Applicants:** Four- and two-year university and college faculty and staff members, federal and state agencies, and other partners.

**Reporting and Related Requirements:** A written final report will be submitted to NGRREC<sup>SM</sup>. PIs are required to present findings at the annual NGRREC<sup>SM</sup> Science Day to be scheduled in the fall of 2017. Publications and presentations resulting from this work should acknowledge the National Great Rivers Research and Education Center. The text *“This research was conducted in part through resources provided by the National Great Rivers Research and Education Center, which is supported by Lewis and Clark Community College and the University of Illinois at Urbana-Champaign”* or wording similar to be included in publications of all kinds.

**Deadlines and Proposal Review & Selection Process:** Mesocosm proposals will be considered on a rolling basis, with preference given to those proposals received first, and those proposals with direct relevance to NGRREC’s mission. NGRREC administration and/or a scientific advisory committee appointed by NGRREC will evaluate proposals and notify researchers of acceptance as soon as possible after submission.

Proposal Content (not to exceed 5 pages, excluding “Mesocosms Request Form”)

## The project proposal should contain the following:

1. Name(s) of PI and Co-PIs and if applicable, name(s) of collaborators
2. Researcher’s institution
3. Project title
4. Project abstract – including purpose, objectives and proposed methods
5. Usage plans
6. Start date
7. End date
8. Alternative start date
9. References



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### PROPOSAL FORM

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1. Principal Investigator (PI) Name
2. Co-PI Name(s)
3. PI and Co- PI Affiliation(s)
4. Project title
5. Project abstract (include purpose, objectives and proposed methods)
  
6. Usage plans
  
7. Describe advantages of conducting your research in the NGRREC mesocosms
  
8. Could this research be conducted in alternative facilities?
  
7. Start date of research
8. End date of research
9. Alternative start date
10. References