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# Collaborative Research: Linking ion transport, energetics and species distributions in freshwater ecosystems

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## **Data Management Plan**

### **Overview:**

Two institutions will be generating data as part of this research program – North Carolina State University and Utah State University. All data generated will be freely shared among the Co-PIs and archived accordingly (see below). A project wide DropBox™ account will be established to enhance the exchange of data among Co-PIs.

### **Types of Data:**

North Carolina State University will collect respirometry data, real time RT-PCR data, ion flux data, and insect digest elemental analysis data. These data will be stored in Excel files which are backed up systematically in addition to a back-up hard drive on the PIs office computer. Whole animal experiments will consist of scoring survival in mayfly larvae on hard copy data sheets, which will be taped into students' notebooks and also digitally transferred to Excel files. All respirometry experiments will be conducted on a dedicated computer used only for respirometry experiments. Photos of stained gill tissues will be taken across development and maintained on a dedicated PC that is associated with the microscope. These images will be backed up on the PIs computer and dedicated external hard drive.

Utah State University (USU) will compile and analyze previously collected survey data consisting of occurrence and count data of freshwater invertebrates and associated environmental data including measures of salinity (conductivity) and concentrations of individual ions). Raw data files, along with relevant metadata, are currently available for public use and can be downloaded in standard digital formats (\*.csv, \*.txt, \*.xls) from several web sites: <https://www.epa.gov/national-aquatic-resource-surveys>, <https://water.usgs.gov/nawqa/about.html>, [www.usu.edu/buglab](http://www.usu.edu/buglab), [www.qcnr.usu.edu/wmc](http://www.qcnr.usu.edu/wmc). USU will also generate derived datasets resulting from the niche analyses based on invertebrate counts and salinity measurements. All data used and produced by USU will be initially housed on USU's Box file server. Working copies of data will be stored and processed locally on desktop workstations and backed up to the Box server daily.

USU will also produce laboratory-derived data on the effects of salinity on freshwater invertebrate oxygen consumption, growth, and mortality. All respirometry experiments will be conducted on a dedicated computer used only for respirometry experiments. These data will be backed up on a daily basis to the PI's USU Box account. Data will consist of raw measures of oxygen consumption under different salinity treatments, initial and final individual body masses, and the number of animals surviving to the end of each experiment in addition to data prepared for analyses.

### **Data and Metadata Standards:**

USU – The survey data we will use for analyses are all of known and well-documented quality (e.g., <https://www.epa.gov/national-aquatic-resource-surveys>, <https://water.usgs.gov/nawqa/about.html>, [www.usu.edu/buglab](http://www.usu.edu/buglab), [www.qcnr.usu.edu/wmc](http://www.qcnr.usu.edu/wmc)). Data quality (measurement error) will be assessed and reported for all experimentally-derived observations.

### **Archiving Data:**

NCSU – All NSCU-generated data will be backed up on a weekly basis via an external hard drive that is dedicated to this project. RT-PCR data will be housed on a computer in the PI's lab, and archived via both a project DropBox™ site and external hard drive. Any new confirmed gene sequence information will be uploaded to GenBank.

USU – The results of the salinity niche analyses we conduct will be documented and archived on Utah State University’s Digital Commons web site (<http://digitalcommons.usu.edu/>), which Utah State University established to meet federal data sharing requirements.

**Policies for Data Sharing and Access:**

All data generated by this project will be freely shared among the Co-PIs with the intent of producing high-quality peer-reviewed publications. The sharing of data with outside parties will primarily be in the form of these publications. Requests for access to pre-publication data by outside parties will be considered and approved if there is unanimity among the Co-PIs that sharing such data will not compromise the publication impact of the research products.