

# South Dakota Aquatic Invertebrate Collection Project

## First Annual Progress Report

November 15, 2008

Nels H. Troelstrup, Jr., Ph.D.

### **Project Overview**

Cataloguing and protecting biodiversity is a critical role of natural resource management. While many ecosystem services are provided by native biodiversity, little can be done to manage for those services without knowing what species are present and their distribution. Aquatic macroinvertebrates play critical roles in trophic dynamics, energy flow and biogeochemical cycling within aquatic ecosystems. Furthermore, these organisms are often excellent indicators of habitat and water quality, serving as a focus group for monitoring within the management plans of many state and federal agencies. Unfortunately, there is no central database in South Dakota from which invertebrate occurrences and distribution can be drawn. Furthermore, South Dakota lacks a centralized macroinvertebrate voucher collection to support water resource studies and species monitoring programs. Such a database should have the capacity to produce distribution maps, present digital images of vouchered specimens, facilitate identification of specimens from new sample locations and allow queries of specimen occurrence by macrohabitat features. The objective of this proposal is to establish and maintain a statewide voucher collection and digital database of aquatic macroinvertebrates to meet these needs.

### **Proposed Project Timeline**

Task	2008					2009			
	Jan	Mar	Jun	Sep	Dec	Mar	Jun	Sep	Dec
Hire undergraduate student	■								
Order equipment and database software	■								
Obtain agency voucher specimens		■							
Present outline of database structure		■	■	■	■				
Check ID's on specimens received			■	■	■	■	■		
Generate digital images			■	■	■	■	■	■	
Enter specimens onto database			■	■	■	■	■	■	■
Final report and presentation								■	■

### **Summary of Progress**

Progress on this project has followed the proposed timeline above. Efforts began in January 2008 and were focused on design, preparation, curation and creation of a new SPECIFY database.

## Defining the Design of the Collection and Database

The physical collection was designed to hold alcohol preserved specimens in vials within several cabinets. Cabinet layout is taxonomic by major group (usually Order) and with each vial assigned a physical address within the collection. Specimens are photographed (Dorsal, Ventral, Key) and measured (HCW and TL) prior to placement in the cabinet. The “Key” image for each specimen focuses on that character(s) which differentiate that taxon from the next closest taxon in the identification key.

We chose to use SPECIFY as the curation database for this collection. SPECIFY is an NSF sponsored curatorial database package which provides capability to track accessions, loans, digital images and metadata associated with each specimen. State of South Dakota site codes and geographic coordinates have been incorporated into the database to facilitate cross-comparison with existing state project data files.

## Hiring an Undergraduate Technician

An undergraduate student technician was hired in January 2008. This student was trained to use the new digital camera/microscope and proper curation techniques. This student will be graduating spring 2009 so we have posted an open position to start January 1, 2009.

## Acquiring Equipment and Supplies

A single cabinet, drawers, vials and other supplies were obtained during spring 2008. In addition, we ordered a new digital camera/microscope system to support acquisition of digital imagery, measurement and identifications of submitted specimens. SDSU provided matching funds to purchase this equipment.

## Acquiring Existing State Voucher Specimens

Voucher specimens were received from South Dakota DENR and South Dakota GF&P during spring and summer 2008. Submitted specimens were inventoried on an EXCEL file. We also received pdf copies of final project reports and EXCEL data files associated with each group of voucher specimens. These files will be available to view through links in the SPECIFY database.

## Curation of Existing Specimens

Specimen curation was initiated in March 2008. We currently have approximately 600 specimen vials curated and in the collection cabinet. Digital images and measurements were taken from each specimen. Specimens were transferred to cone-sealed, glass vials and filled with 70% ethanol. A few drops of glycerin were added to each vial as a precaution against dessication should the alcohol evaporate. New labels were created with the original label information and a specimen collection code. This code serves as

the relational item between the physical specimen, database metadata, digital images and report files.

### Establishing the SPECIFY Database

The initial database was created in EXCEL based upon a model database provided through the SPECIFY program. We included fields related to specimen attributes, site location, collector, identifier, project and associated report/data files. A subset of the working EXCEL file was submitted to the SPECIFY working group at the University of Kansas. Their technical support staff assembled a working SPECIFY database with the file we sent. They also created a SPECIFY WORKBENCH file to facilitate daily data entry and management of new accessions. The existing SPECIFY database has 110 records. We will use the WORKBENCH software to upload the remainder of our 600 entries into SPECIFY. Once this backlog of curated specimens is in SPECIFY, we will use WORKBENCH for the remainder of our daily curation activities and abandon the initial EXCEL file.

The digital database and all supporting files are maintained on the hard drive of a dedicated collection computer. Back-ups are written to an external jump drive and an external hard drive (two sets of back-ups) on a frequent basis.

### Communicating the Existence of the Collection

This state voucher collection will only be useful if potential users know that it exists. A poster presentation was delivered at the East Dakota Water Conference (Fall 2008) to provide an overview of the project and characteristics of the collection/database. Handouts were provided describing procedures for submission of specimens to the collection. In addition, we have created a web site dedicated to this project. This site will be updated periodically with pdf copies of presentations and information regarding the collection.

#### *Project Web Site*

<http://biomicro.sdstate.edu/Troelstn/Project%20WebPage/State%20Invertebrate%20Collections%20Project/State%20Invertebrate%20Collections%20Project.htm>

### Challenges Encountered

We have encountered several challenges during the initial stages of developing this collection/database:

- Many specimens arrive with incomplete label information
- Nearly all specimens arrive with inadequate location information (specimen labels and reports)

- Correction of site codes and geographic coordinates with the State master file occurred after many specimens had already been curated. These corrections slowed addition of new specimens to the collection.
- SPECIFY is a powerful database, designed to accommodate large natural history collections. The learning curve for this software is steep. However, the software is free and well supported.
- All state supported aquatic invertebrate studies should be required to submit specimens to the collection. Funding to support curation of these specimens should be incorporated into the operating budgets of these projects.
- The state (DENR and GF&P) should define proper protocols for the collection, maintenance and metadata in support of voucher specimens. These protocols should be incorporated into the SOP documents for each agency.

### Schedule

We do not anticipate any major changes to our project timeline at this time.

### Appended Material

A pdf reduction of our poster presentation at the East Dakota Water Conference has been attached with this report.