

# **Project Completion Report Rocky Mountains Cooperative Ecosystem Studies Unit (RM-CESU)**

**Project Title:** Developing and Enhancing National Water Quality Databases for Clean Water Act Integrated Reporting

**Project Code:** NPS: P12AC11163, CSU: 5345950

**Type of Project (Research, Technical Assistance or Education):** Technical Assistance

**Funding Agency:** National Park Service

**Partner University:** Colorado State University

**NPS Agreement Technical Representative (with complete contact information):**

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**Start Date of Project:** October 1, 2012

**End Date of Project:** September 30, 2015

**Funding Amount:** \$275,214.50

**Project Summary:**

CSU provided research associates and a graduate student to assist the National Park Service (NPS) Water Resources Division (WRD), the Environmental Protection Agency (EPA), and state water resource management agencies to improve the EPA STORET Data Warehouse by facilitating archiving NPS water quality data and documents in the STORET Data Warehouse for public use. These archived data have been used by states to assess water quality status and trends and to foster a variety of other academic and research applications for CSU and other universities. The project built upon previous joint cooperative efforts between CSU and NPS WRD to augment the volume of NPS water quality data in the STORET Data Warehouse by integrating new data systems into the process and continuing to digitize and upload historic/legacy datasets.

A number of products were generated, enhanced, or maintained by this effort including, but not limited to, a water quality electronic data deliverable format specification to help flow water quality to the NPS and thence to the EPA STORET Data Warehouse, development of the NPSTORET water quality database management system, integration of commercial-off-the-shelf databases (Aquarius and EQUIS) into the archival and transmission process, and archiving of a number of historic/legacy datasets.

As part of this project, CSU research associates and graduate students helped ameliorate the state of knowledge about electronic data deliverable specifications, the NPSTORET database, and water quality conditions throughout our nation's parks and elsewhere. NPSTORET was

made available to non-NPS and non-CSU users including non-profit watershed organizations, Indian tribes, and others. CSU project staff assisted in identifying, acquiring, quality assuring, digitizing, and making publicly accessible physical, chemical, and biological water quality datasets through the EPA's STORET Data Warehouse to assist the states with their assessments.

**Number of students participating in this project: undergraduates, graduate students, degrees conferred.**

Three research associates (including two who were former CSU graduate students) participated directly in this project. One graduate student was involved on this project while working on a related thesis.

**Lessons Learned from this project:**

This agreement provided a mutual benefit to the NPS and CSU. CSU students, staff, and researchers gained invaluable experience, training, and research opportunities while working in close cooperation with WRD staff on real-world issues and concerns related to water resource database management. The importance of adequate documentation (metadata) describing source database projects, monitoring locations, sample collection and handling, analytical methods, and other aspects of water quality monitoring was a recurrent theme. One dataset that CSU staff helped process was data from an ongoing project collecting emerging contaminant (pharmaceuticals, pesticides, and personal care products) data from national park units. The data showed that some of these substances exist in waters that most think are pristine. The data uploaded to the EPA STORET Data Warehouse from this project and other projects can be downloaded from <http://www.epa.gov/storet/dbtop.html>.

The NPSTORET water quality database management system was upgraded to v.1.86 with a number of new features and enhancements added by request from park and network staff. This software, which requires Microsoft Access to run, can be downloaded from [http://nrdata.nps.gov/programs/water/npstoret/NPSTORET\\_1\\_86\\_Setup.exe](http://nrdata.nps.gov/programs/water/npstoret/NPSTORET_1_86_Setup.exe). An electronic data deliverable specification for transferring data from stand-alone data systems into STORET via EQUIS was created. This work highlighted the discrepancies and associated difficulties inherent in migrating data between different schemas based on how they represent the monitoring process.