Title:

Getting to the Point of Nonpoint Source Pollution: Investigating an Integrated Approach into Defining, Treating and Measuring Nutrients in Watersheds

Applicant:
State of Utah, Utah Department of Environmental Quality (DEQ)
DUNS Number: 031319275
Partner: DEQ Clean Utah Program
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Total Project Cost:

Total Budget: $646,000
Requested from EPA: $280,000
Leveraged funds: $366,000

Project Period:

October 1, 2009 – September 30, 2012

Project Abstract:
Waters that are impaired in Utah often exhibit high levels of nutrients, a common water quality concern across the U.S. Traditional approaches to regulating and treating nutrients have been relatively unsuccessful. The Utah Division of Water Quality (DWQ) has started several new initiatives to devise more effective nutrient removal strategies such as: a study to evaluate costs of removal from wastewater, science-based numeric criteria, and a framework to evaluate nutrient trading from a watershed perspective. These initiatives are part of the necessary steps for a new, innovative, cost-effective framework to regulate these pollutants. However, despite these initiatives, describing sources and quantities of nutrients from nonpoint sources, remains unclear. The ability to understand these dynamics in a cost-effective manner opens more, innovative approaches to manage nutrients. Utah is close to having defensible numeric nutrient criteria, but believes that these numbers should not be adopted without an overarching nutrient management plan that establishes both regulatory and non-regulatory ways to reduce nutrients equitably among all polluters. DWQ proposes to improve the science of evaluating NPS nutrient sources and using these data to devise incentives, both positive and negative, for controlling NPS nutrient sources. This incentive program will be coupled with initiatives that are currently underway to develop a comprehensive program that will be implemented in conjunction with numeric nutrient criteria.

Statutory Authority and Flexibility: Section 104 (b) of the Clean Water Act (CWA) grants authority for the State of Utah to receive funds for and administer this project. No regulatory flexibility is necessary.

State Agency Support: Interim Executive Director, William J. Sinclair, is aware of this application and endorses the project. If selected, Mr. Sinclair will provide a letter of endorsement for the project confirming the State of Utah's commitment to providing the necessary resources to ensure project success.

A. Issue Statement: Nonpoint source (NPS) polluters, primarily agri-businesses, are typically waived from water quality (WQ) permit restrictions due to: 1) weak Clean Water Act (CWA) regulations, 2) difficulty in obtaining specific, science-based pollutant loads, and 3) organized resistance to accept WQ shortcomings; thus, the problem remains the single most important water quality problem in Utah and most of the rural United States. Despite the massive national effort for almost 30 years (RE: CWA 319, Farm Bill, etc.) directed towards treating these issues, there are major shortcomings: 1) weak treatment-prioritization efforts across agencies and at measurable spatial scales, 2) limited effectiveness measurements for treatments, 3) few business-driven market-incentives.

B. Background Facts:

Currently, 21% of Utah's assessed waters are not meeting the designated beneficial uses. The 2006 *Integrated Report* identified agricultural uses as responsible for much of the impairment. Recent observations indicate that development (e.g. urban runoff, construction, permitted point sources, etc) are also becoming more prevalent and troublesome. Extensive bacteriological monitoring is just beginning in Utah, but preliminary data suggest that many waters have excessive bacteria (*E. coli*), which is frequently contributed by agriculture and represents a threat to public health. Nutrients are also an increasing water quality problem because they cause an ecological cascading effect that starts with altering ecosystem processes and ends with aquatic community disruption. Together these observations suggest that the fishable and swimmable goals (Section 101) of the CWA are threatened. Moreover, once these resources are impacted, restoring them to prior conditions may be impossible or prohibitively expensive. DWQ is meeting these challenges by enhancing the regulatory framework via developing numeric nutrient standards and incorporating new methods for assessing bacteria. By adopting numeric nutrient criteria, DWQ is ultimately transitioning into a Watershed-Based Permitting (WBP) system.

The ability of regulatory agencies to cost-effectively determine where, when and how nonpoint source pollutants enter waterbodies is not yet well developed. Therefore, nutrients from nonpoint sources are often addressed through inconsistent, and often ineffective treatments. This dilemma has developed into an increasing burden on DWQ to regulate and rate payers to fund Municipal Waste Water Treatment Facilities (MWWTFs) and other point source dischargers to obtain desired environmental results. Furthermore, nonpoint source discharges often contribute the majority of loads for some pollutants (i.e., nutrients and bacteria), and yet lack enforcement, performance tracking, or prioritization of resource expenditures to rectify water quality concerns. Often, the result is an over-priced MWWTF discharging clean water into a non-attaining waterbody that is unlikely to be managed into supporting beneficial uses without more careful consideration to all sources of pollution in the watershed. As a result, DWQ partnered with Utah State University to develop a watershed model that delineates nutrient delivery both spatially and temporally in the Bear River watershed in 2007. Such a model is useful for Water Quality Trading (WQT), prioritizing treatment projects, and tracking effectiveness.

Because of greater agency demands at these smaller spatial scales, there is greater recognition in natural resources management to employ a balanced approach of regulatory enforcement and market-based incentives. Such an approach allows for

improved flexibility and cost-effectiveness implementing CWA regulations. Currently, land-use changes and regulatory demands are occurring more rapidly than DWQ program management capacity. Fortunately, there is promise and success in utilizing market forces to help regulate water quality pollution equitably. WBP and WQT have been found to be important regulatory tools for nutrient management. WBP deals with nutrients in a holistic way, whereas WQT allows remediation efforts to focus on the most cost-effective improvements. When these tools are coupled with programs that employ a business-driven, market-based incentives approach to reduce targeted pollutants, the balance between regulatory and free-market can be achieved.

Utah DEQ developed the 'Clean Utah' (CU) program in 1991. CU is a State Performance Track (PT) program that employs the Environmental Management System (EMS) approach for rewarding businesses to voluntarily reduce pollution from their business practices. Currently, there are several businesses from varying sectors including a large agri-business enrolled in the program. There is great promise integrating CU into WBP and WQT especially in regards to, but not limited to, agri-businesses. The goal is to create a market-based incentive that goes beyond permitted facilities in this sector. There are many pollution-prevention frameworks that may be applied. However, despite the strides DWQ has taken into moving in this direction, it has been difficult to understand which agri-businesses are effectively treating pollutants and which ones are failing; thus, it is critical to develop a practical framework that delineates sources of pollutants and targets poor land-use practices for treatment and best land-use practices for rewards. This framework should encompass market-based incentives, agri-business mentoring, WQT, and performance measurement that encourages the sector to become innovative in best available treatments and methodologies. Learning from this approach has national implications in regards to EPA's emphasis to cost-effectively reduce nutrient loading, protect human health, and improve water quality.

Because the intended goals of this project are to prevent, reduce, and eliminate water pollution, the project meets the justifications for allocating funds under CWA, Section 104 (b)(3). The proposed project follows the direction set-forth by EPA's Strategic Goal 5, under Objective 5.2, that seeks to improve environmental performance through pollution prevention and innovation by understanding sources of water pollution and promoting sector innovation. Furthermore, the proposed project supports EPA's Strategic Goal 2: Clean and Safe Water. It supports all three (3) national objectives of "Protect Human Health" (Objective 2.1), "Protect Water Quality" (Objective 2.2), and "Enhance Science and Research" (Objective 2.3) by developing an integrated strategy to efficiently delineate nonpoint sources and prioritize treatment to the sector (agri-business) most often responsible for contributing high levels of bacteria into public waters. Targeting and treating this sector has ramifications across many of EPA's goals, including improving air quality, healthy communities and ecosystems, and compliance and environmental stewardship. The DWQ requests EPA $280,000 across three (3) years under this announcement beginning on October 1, 2009. DWQ, the Division authorized to receive funds through the CWA, plans to leverage this effort with $366,000 from "in-house" capacity and other directives that share similar objectives outlined in this proposal.

C. Project Objectives:

DWQ will implement an efficient framework to accomplish these 4 outcomes: 1) delineate pollutant loads from *all* sources (i.e. empirically develop a universal water quality monitoring framework that feeds WQT model), 2) identify which agri-businesses are effectively treating pollutants and which businesses need assistance, 3) build a program that creates market-rewards for agri-businesses that voluntarily reduce and prevent pollutants, and 4) track the performance of each framework component.

These four objectives depend on the performance of each other in order to function properly. In other words, 1) helps understand the problems, 2) identifies "good" and "bad" components, 3) builds a mechanism (based on 1 & 2) that rewards "good" businesses, and 4) tracks and measures the effectiveness of each objective.

By prioritizing treatment of nutrients and bacteria pollution in waterways across the agricultural sector, these outcomes will target performance improvements under CWA and SDWA. The vision of this project is to refine the monitoring strategy necessary to calibrate the WQT model to other watersheds in Utah and beyond and measure the effectiveness of agricultural BMPs. There is a wealth of data within the Bear River basin that will be used as baseline: university research, TMDL assessments, and the WQT model was developed in the watershed. Additionally, the Utah Department of Agriculture maintains a database for site specific BMP implementation on agricultural lands throughout the State.

This project not only supports many EPA strategic goals, it also epitomizes DWQ's mission to "protect, maintain and enhance the quality of Utah's surface and underground waters for appropriate beneficial uses; and to protect the public health through eliminating and preventing water related health hazards which can occur as a result of improper disposal of human, animal or industrial wastes while giving reasonable consideration to the economic impact".

D. Approach:

Our approach is best categorized in the grant guidance as the "Strategic Approach: Integrated Strategy for Environmental Permitting and Management". It includes developing an efficient, intensive synoptic monitoring framework to improve and calibrate a universal WQT model to be implemented statewide. This approach incorporates a strategy that targets water bodies at a 12-digit HUC scale and further provides an approach to quantify individual producers within these watersheds, so that pollution prevention programs such as those offered by CU can be focused and prioritized. This project will be building upon and integrating many other initiatives driven by DWQ: MWWTF Nutrient Study, a collaborative "Targeted Watershed" grant with USU that developed the WQT model, and numerous nutrient research studies through various TMDL assessments. All of these projects have been ongoing successes that not only reflect DWQ's capacity to implement federal agreements, but also the dedication and motivation to enhance water quality throughout the State. Listed below describes the two themes that DWQ hopes to accomplish through this project.

1. Improve regulatory environment: Like many States, Utah's DWQ is preparing Total Maximum Daily Loads (TMDLs) that could benefit from greater accuracy of the specific sources of nonpoint source pollutants. Determining these sources could pave the way for a more efficient, regulatory framework of WBP and WQT. Because DWQ is nearing implementation of numeric nutrient standards, incorporating a new approach based on

sound data collection and performance tracking is critical. These nutrient criteria cannot be presented nor adopted without the development of a holistic program that aims to solve documented eutrophication and associated problems with human pathogens in an equitable and cost-effective way. A regulatory approach that better balances the nexus between point and nonpoint source polluters will require development of a monitoring program that allows pollution inputs to be quantified at smaller spatial scales than is currently possible with DWQ's existing monitoring program.

2. Improve market-based incentives: Building strong partnerships is the cornerstone of effective multi-stakeholder programs. Under this program DWQ will continue to use past partnerships who have offered expertise to program development. All partners will be instrumental exploring and learning best approaches to integrate an incentive framework into WQT programs. Utah State University has past experience developing a WQT model developed for the Bear River watershed; a current goal is to calibrate it to other watersheds in Utah. Stakeholders such as municipalities, landowners, and agricultural groups will be engaged to ensure that final WQT standards fairly target actions to those responsible for the pollution. Specifically, the balance of economic incentives for proactive practices with focused programs to reduce pollution by specific producers with poor BMPs will encourage agricultural-based programs such as UDAF, Farm Bureau, and UACD to provide excellent outreach and implementation direction. Finally, incorporating pollution-prevention and market-based incentive programs such as UDA, Clean Utah, and UACD (via Farm Bill) will be critical to develop an incentive program policy framework. Certainly, MOAs will need to be modified where appropriate to formalize mission statements among partners to common goals of nutrient reductions. Together, these agencies, with the data and expertise gained through various initiatives, will develop and assess a framework and performance measures for implementing market-based incentives. Certainly, there are many tools/programs/data available to create an effective set of solutions; however, there is currently no organized framework developed to merge it into a focused, measured capacity. DWQ intends to build and implement this framework for universal application.

Methodology

	1. Improve regulatory environment	**2. Improve market-based incentives**
Year 1	Existing baseline data will be gathered and assessed for QA/QC with partners; data gaps will be identified; performance measures will be drafted; Year one monitoring framework will be developed; water quality monitoring equipment will be purchased and deployed; contract development; update database	Gather and assess existing baseline data from project partners, including literature review; incorporate PART framework into methodology; develop necessary MOAs; draft performance measures
Year 2	Assess field data; refine performance measures; adjust model calibration; identify data gaps, year 2 monitoring framework refinement; collect additional data	Public outreach and solicitation; explore policy implications; workshop; website development; performance measure refinement; pilot project-mentoring
Year 3	Final WQT model and calibration, final monitoring recommendations; final report	Final universal incentives report; present results; implement framework

Selection Criteria:

1. HQ Quantitative Evaluation Criteria:

a. Consistency with Theme: The theme of broad scale, integrated permits is widespread among EPA goals. The goal of this program is to empirically evaluate the level of monitoring, modeling, and data integration necessary to best capture nutrient inputs from both point- and non-point sources. This approach is the core of EPA's goal of improving waters on a watershed basis. Without the ability to carefully measure specific sources of nutrients, such coordination efforts will prove impossible because sources will point towards others as the primary polluter.

b. Consistency with Priority Focus Areas:

1. Environmental Results Programs. This project does not specify the use of ERP explicitly; instead, ERP will be evaluated as a possible tool, among others, to create incentives for nutrient reduction. Given the controversial nature and potential large economic impacts of nutrient criteria implementation, using ERP represents an excellent opportunity to provide positive incentives for nutrient reductions.
2. Permitting Integration: WBP, the overall end-goal in DWQ's permit approach is based on overall watershed goals, and requires integration among sectors and approaches.
3. Implementation of incentives: Again, the goal of this project is to understand the dynamics of NPS nutrient pollution from the agri-business sector so that market-based incentive programs can be produced. It will be critical to examine these dynamics at a small spatial-scale to ensure program success.

c. Measurable Environmental Outcomes:

This is the central driver and need for this research. Data are not collected with sufficient spatial and temporal resolution to measure results at the scale with which projects are typically conducted. WQT relies on measurable results so that pollutants are equitably traded. Undoubtedly, changes in knowledge and attitudes will occur through this project. There will be opportunities through workshops, webpage development, and other presentations. Performance measures will be developed to document these successes. Additionally, this project along with the MWWTF study will allow DWQ to measure potential nutrient reductions in lbs/$, which expresses goals on a scale that policy makers and businesses relate to best. While the project will initially be data intensive, it will provide sufficient detail to allow expansions to watershed in the most cost-effective way possible.

d. Transferring Innovation:

Nutrient criteria are a major focus nationally. Most research has been conducted on developing criteria that are scientifically defensible, yet critical gaps exist in understanding how the criteria can be implemented successfully. This program aims to evaluate how best to obtain reductions in an equitable and economically efficient way. Additionally, agri-businesses and related pollution problems are widespread nationally; and developing a comprehensive framework should work universally. This project will take a grass-roots approach by learning from businesses that "do it right" and make them a part of the solution.

e. Project Technical Feasibility:

In the past, DWQ has successfully tackled technical projects similar to this proposed project. DEQ will collaborate with technical project partners such as Utah State University, Clean Utah, and Utah Department of Agriculture

2. Regional Quantitative Evaluation Criteria:

a. Address EPA Regional-State Priorities: This project closely aligns with 3 of the regions priorities: 1) reduction of agricultural pollution, 2) direct implementation of environmental programs, and 3) supporting state capacity. Within the water program, this project is directly aligned with the emphasis of establishing numeric nutrient criteria.

b. Programmatic Capability and Reporting: DWQ has fulfilled the reporting requirements other deliverables of several recent agreements such as Targeted Watershed Grants, and CWA 319 Cooperative Agreements.

c. Regulatory and Statutory Environment for Project Implementation: DWQ takes a pragmatic approach for environmental regulatory development; numeric nutrient standards, WQT, and this project proposal are no exception. Success of this project will require close collaboration with agricultural stakeholders and these conversations are already underway.

d. Budget Reasonableness: The funds requested are reasonable given a three-year timeframe and partnership collaboration. All sub-contractive funds will be offered according to 40 CFR Parts 30, 31, or 35. These funds coupled with the ability to build on other projects (Bear River WQ trading framework, Utah MWWTP nutrient removal study, nutrient criteria development grant) make this admittedly ambitious project tractable.

e. Collaboration/Partnerships: There are numerous project partners identified through the proposal that encompass all aspects of the project as noted under D.2. “Improve market-based incentives”.

f. Leveraged Resources: DWQ is leveraging substantial funds to demonstrate the Division’s commitment and dedication to see this project succeed. DWQ is leveraging more funds than are being sought because it is in heading in the direction of the Division.

g. Public Involvement Process: There are numerous avenues (e.g. workshops, meetings, websites, etc.) provided to capture, assess, and measure public knowledge, attitudes, and participation.

3. NCEI Qualitative Selection Factors:

a. Strategic Value of project to national program: This project is attempting to enhance NPS pollution prevention, build an agri-business incentive program, and integrate all available initiatives into a performance-based, nutrient-management framework. This framework captures the essence of the grant and is processes established here would be valuable nationwide. Indeed, the 2008 national meeting of water quality managers identified the need to establish equitable nutrient controls as the single most important water quality concern. Programs that attempt to accomplish this task will undoubtedly receive much national attention.

E. Outcomes and Measures:

Activities and Milestones Schedule: Project initiation: October 1, 2009

Tasks/Activities	Outputs	Target Date
I. Manage data collection and quality control		
Review past data sets	QA/QC for data collection	March 2011
Literature review	Create specific WQ database	March 2011
II. WQ data collection implementation		
Collect field data	Initial WQ monitoring plan	March 2011
Weekly data download and backup into central database	WQ monitoring Performance Measures Development	March 2011
III. Build Partnerships		
Solicit Partnerships	Contract or MOA development	March 2011
IV. Collect WQ Baseline data		
Locate database collections Determine quality controlled data Identify data gaps	Universal WQT Model calibration	December 2011
V. Performance Track Investigation		
Literature review Gather data Identify PT options to Ag sector Policy implication research performance measures for implementing pollution-prevention and performance-track programs	Performance measures adoption for exploring incentives programs (policy implications)	March 2011
VI. Final Products		
Final document preparation to granting and partnering agencies providing improvements to WQT model, monitoring framework,	Final Monitoring Report	September 2012
Ag- marketing strategies report framework describing tiered-criteria for acceptance into marketing program	Final Universal Incentives Report	September 2012
Update webpages detailing shared mission, goals, and strategies-disseminate info.	Updated Partner websites	December 2011
Brochure to stakeholder and landowners	Brochures and public outreach	July 2010
Workshop for stakeholders and partners	Workshop	September 2011
Report-out at several conferences	Presentations	September 2012

F. Budget

a. **Personnel (includes fringe)**	**$60,000**	
Match:		*$60,000*
b. **Contractual**	**$120,000**	
Match:		*$300,000*
c. **Equipment**	**$80,000**	
Match:		*$5,000*
d. **Supplies**	**$2,000**	
Match:		*$1,000*
e. **Travel**	**$8,000**	
f. **Indirect @ 14.17%**	**$10,000**	
g. **Total EPA request charges**	**$280,000**	
h. **Match**		**$366,000**
i. **Total with match**	**$646,000**	

G. Programmatic Capability:
DWQ staffs dozens of scientists and engineers with broad expertise in disciplines related to this project that include nutrient removal from WWTPs, AFO/CAFO processes, CWA policy, biogeochemistry, geology, hydrology, and aquatic ecology. Our laboratory processes thousands of samples yearly and the analyses necessary to successfully complete this project is within their suite of routine samples. If funded, DWQ intends to collaborate with scientists from local universities, who are nationally recognized experts in water quality modeling, nutrient trading, and biogeochemistry. Given that the issues addressed in this proposal are regional and State priorities, this project, if funded, would be provided the necessary resources to ensure its success.

H. Past Performance Reporting Environmental Results:

Since 1990, DWQ has entered into CWA Section 319 Nonpoint Source Cooperative Agreements with EPA. Annually, DWQ receives and administers ~ $1.2 million to be used for water quality improvements. There is an annual reporting guidance that is dutifully fulfilled.

In 2005, DWQ was rewarded ~$700,000 for a Targeted Watershed Grant in the Bear River Valley. Main objectives were to develop a WQT model and establish a central water quality database. The grant was successfully concluded in 2008; all reporting requirements were fulfilled on time, including: Final report, research papers, and management guidance.

Finally, in 2005, DWQ was rewarded ~$600,000 for a Targeted Watershed Grant for the Upper Sevier River watershed. Projects primarily included into water quality and riparian improvement; additional projects are slated for 2009. All project reporting has been timely and in accordance to agreement guidelines

Attachment A: Logic Model

Inputs	Outputs	Strategies	End Outcome
$190,000 2 FTE 2 Temp			<u>Goal 1</u> <u>Improve science-based nutrient load allocations for nonpoint sources (NPS)</u>
	Output 1.1 -efficient, universal monitoring framework that determines temporal and spatial extent of nutrient and bacteria pollution Output 1.2 -refined, universal WBT model Output 1.3 -updated, agency-shared database	-obtain baseline data from Utah State University, DWQ, and Utah Dept. of Ag. -collect additional synoptic data in watershed -obtain baseline data from Utah State University, DWQ, and Utah Dept. of Ag.	-increase # of **identified** NPS nutrient and bacteria polluters -decrease the amount of $$ spent to calibrate WBT model for each watershed
Shared with Goal 1			<u>Goal 2:</u> <u>Improve treatment effectiveness monitoring</u>
	Output 2.1 -efficient, universal monitoring framework that determines temporal and spatial extent of nutrient and bacteria treatment effectiveness Output 2.2 -watershed-based ranking of pollution-reduction project locations	-obtain baseline data from Utah State University, DWQ, and Utah Dept. of Ag.	-decrease the # of prioritized project locations within the watershed spatially -increase the # of effective BMP projects

Inputs	Outputs	Strategies	End Outcome
$90,000 1 FTE 1 Temp			<u>Goal 3: Improve business-driven, market-based incentives for agricultural sector</u>
	Output 3.1 -brochure detailing program details and participation Output 3.2 -several landowner workshops Output 3.3 -updated partner websites detailing program mission, goals, and strategies Output 3.4 -report detailing cost-efficient marketing strategies for agricultural producers Output 3.5 -framework describing tiered-criteria for acceptance into marketing program Output 3.6 -develop performance measures for implementing pollution-prevention and performance-track programs	-develop partnerships with agricultural programs: Utah State University Extension, Utah Dept. of Agriculture, Utah Association of Conservation Districts, USDA NRCS, Utah Farm Bureau, Clean Utah, Utah's Own -obtain baseline data from Utah State University, DWQ, and Utah Dept. of Ag. -develop shared mission statements, strategies, and goals with partners -explore and identify market-based approaches that provide incentives for reducing water pollution from agricultural sector	-increase the # of pollution-prevention partners - increase the # of incentive-based options available to agricultural producers - decrease the amount of $$ expended per tons of phosphorus reduced - decrease the amount of $$ expended per *e. coli* colony forming units (CFUs) reduced -increase the # of WQ- informed agricultural producers - increase the # of participating agricultural producers in incentive-based programs - decrease the # of tons of phosphorus delivered to streams by NPS - decrease the # of *e. coli* CFU delivered to waterways by NPS

Benjamin M. Holcomb

South Dakota State University Brookings, SD Dec. 20, 2002
M.S. Wildlife and Fisheries Sciences- Fisheries Option
Allegheny College Meadville, PA May 16, 1999 Alden Scholar
B.S. Environmental Science Minor: Political Science

Research, **Manuscripts, Presentations**
"The effects of beaver impoundments on the benthic macroinvertebrate communities in high and low gradient streams"
"Created wetland habitat by beaver on the Erie National Wildlife Refuge, Guys Mills, PA"
"Zooplankton community assessment of Black Hills reservoirs"
"An assessment of iron availability, nutrient concentrations, and biological characteristics of Black Hills reservoirs"
"Periphyton biomass, invertebrate abundance, and fish biomass in Black Hills streams with varying iron concentration: Implications for stream productivity"

Related Experience & Employment
Utah Department of Environmental Protection- *Water Quality Division* (2008-Current)
Biological Assessment Program Coordinator: Program management, investigate new biological assessments, obtain funds to further new projects and programs

Nez Perce Tribe (2002-2008)
Department of Natural Resources- Water Resources Division
Nonpoint Source Coordinator: Assess, analyze, and mitigate nonpoint source pollutants affecting waters related to the reservation; coordinate projects with local agencies; obtain funds to further new projects and programs
Water Planner: Review, comment, and consult with various agencies regarding permits and procedures affecting tribal treaty rights; collect data pertaining to development of TMDL's; coordinate with local agencies in the collection and development of data for TMDL's

Department of Fisheries Resource Management- Watershed Division
Fisheries Biologist: Led four person electrofishing surveys on the distribution and abundance of fishes; duties included: weighing, measuring, and identifying fishes; collecting scale samples for aging and fin clips for DNA identification; stream cross-section and longitudinal surveys; mapping forest roads

South Dakota State University--USGS South Dakota Cooperative Fish & Wildlife Research Unit (2000-2002)
Graduate Research Assistant: Research included chemical, physical, and biological limnological assessments in Black Hills, SD; prepared and presented manuscripts, reports, posters, and presentations for professional meetings and agencies

Crawford County Conservation District (1999)
Determined impaired streams through macroinvertebrate assemblage, advised best management practices for remediation, tested soils for nitrogen content

Pennsylvania Dept. of Environmental Protection (1997-1998)
Completed lake and stream assessments via habitat evaluation, zooplankton sampling, fish and macro-invertebrate collection and identification, macro-invertebrate IBI scoring, river mussel surveys, fish tissue collection; various physical/chemical water sampling for compliance; zebra mussel monitoring; report writing; Presque Isle Bay brown bullhead tumor study; otilith extraction, bile extraction, PAH monitoring

Allegheny College– Environmental Educator– French Creek Environmental Education Project: Introduced local high school students to French Creek's diverse ecosystem through water quality monitoring, aquatic species identification and chemical/physical tests in the French Creek watershed.

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James Harris

Experience

August 2008-Present | Division of Water Quality | Salt Lake City, UT

Monitoring Section Manager

- Management of staff, grants and resources for statewide monitoring program
- Responsible for strategic monitoring plans to meet Division programmatic needs
- Coordinate with other staff on database management, laboratory issues, and special studies

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Dec. 2000- July 2008 | Division of Water Quality | Salt Lake City, UT

Environmental Scientist III

- TMDL coordinator for Sevier, Cedar and Beaver Rivers (2000-2006)
- TMDL coordinator for Jordan River (2006-2008)
- Responsible for developing water quality plans, modeling and implementation strategies

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June 2000- Dec. 2000 | Division of Water Quality | Salt Lake City, UT

Environmental Scientist I

- Field work to collect water quality samples
- Experience with lake, stream, groundwater and biological collection methods

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1998-2000 | University of Montana. | Missoula, MT

Research Assistant

- Nonpoint source water quality assessment in the Clark Fork River, MT
- Performed riparian assessments, water chemistry collection and loading analysis

Education

1997-2000 | University of Montana | Missoula, MT

MS Environmental Studies

1988-1993 | University of Illinois at Chicago | Chicago, IL

BA English and Writing