NPS PROJECT SUMMARY SHEET

AWARD FISCAL YEAR: FY 2010

PROJECT TITLE: Development and Application of a GIS-Based Planning and Tracking Tool for Best Management Practices

NAME: James River Water Development District
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PROJECT TYPES: Watersheds

LATITUDE – DEGREE: 43
LATITUDE – MINUTES: 38
LONGITUDE – DEGREE: -97
LONGITUDE – MINUTES: 32

WATERSHED NAME: Wolf Creek
HYDROLOGIC UNIT CODE (HUC): 10160011

HIGH PRIORITY WATERSHED? (Y/N): Yes

POLLUTANT TYPE: TSS
UWA CATEGORY: Best Management Practices

TMDL DEVELOPMENT (Y/N): No
TMDL IMPLEMENTATION (Y/N): Yes

TMDL PRIORITY (High, Medium, Low): High

WATERBODY TYPES: Streams/Rivers

ECOREGION: Northern Glaciated Plains

PROJECT CATEGORY: Agricultural/Animal Feeding Operations

PROJECT FUNCTIONAL CATEGORY: BMP Implementation/Design

GROUNDWATER PROJECT? Y/N: No

FY-2010 319(H) FUNDS REQUESTED (Base): $72,000

MATCHING FUNDS: $48,000

BUDGET 319 TOTAL: $120,000

§319 Funded FTE's: 0.3

GOALS:

This project will continue build upon the goals of the Lower James River Watershed Implementation Project, Segment II, by continuing efforts to reduce nutrient, sediment and fecal coliform bacteria loadings to the James River and its watershed in an effort to attain the goal of restoring and protecting the water quality of the James River. Developing an easy-to-use GIS tool for the tracking of BMPs will allow the tracking of all best management practices (BMPs) that are implemented to reduce non-point source pollutants in the watershed. The tool will be compatible with typical water quality models and can be used to demonstrate the utility of a BMP tracking tool in a sediment-impaired watershed. The tool can then be transferred to the other impaired watersheds in the James River Watershed and in other impaired watersheds across the state.

PROJECT DESCRIPTION:

The project will develop a GIS-based tool for tracking agricultural sediment BMPs at the parcel and watershed scale. The tool will be developed within the ESRI ArcMap framework, and will be designed for compatibility with two existing planning tools: the RUSLE2 model (for farm field-level planning) and the AnnAGNPS model (for watershed-scale modeling).

1 PROJECT PROPOSAL SUMMARY SHEET

See attached cover page for project proposal Summary Sheet

2 STATEMENT OF NEED

2.1 Water Quality Priority

Wolf Creek has been impacted by extensive agricultural practices and habitat modification. The beneficial uses assigned to Wolf Creek are fish and wildlife propagation, irrigation waters, warm water marginal fish life propagation and limited contact recreation waters (Figure 1). According to the 2008 South Dakota Integrated Report for Surface Water Quality Assessment, Wolf Creek is on the State's 303(d) list of impaired waters and is currently impaired for the beneficial use of warmwater marginal fish life propagation due to excessive total suspended solids (TSS). A Total Maximum Daily Load (TMDL) has been developed jointly by the South Dakota Department of Environment and Natural Resources (DENR) and the James River Water Development District (JRWDD). The JRWDD has initiated implementation activities on Wolf Creek as well as seven other waterbodies for which TMDL's have been prepared by the JRWDD and the DENR, including: Beaver Lake, Lake Carthage, Dawson Creek, James River – Sand Creek to I-90, James River – I-90 to Yankton County Line, James River – Yankton County line to mouth, and Pierre Creek.

Wolf Creek is included in the overall Lower James River Implementation Project, which is a two year project designed to restore and protect the water quality of the James River and the lakes and streams in the Lower James River Watershed. Best management practice (BMP) implementation in the Lower James River Watershed study area is currently focusing on priorities identified during the watershed assessment and the priorities included in the project implementation plan (PIP) developed during segment I to address the TMDLs established for water bodies within the lower watershed. The BMPs installed will reduce nutrients, sediment, and fecal coli-form bacteria, thereby:

- Protect and support designated beneficial uses;
- Address water quality impairments identified in the PIP based on the Lower James River Watershed Assessment and input from local stakeholders; and
- Support implementing the TMDLs established using data collected during the Lower James River Watershed Assessment.

This proposed project will build upon the Lower James River Implementation Project by developing and providing a tracking tool for BMP implementation. To date and to our knowledge, no such tracking tool exists for BMP implementation in South Dakota. The project will create a BMP tracking tool for the Wolf Creek Watershed as a pilot project. This project will also create a GIS template that can be applied to the other ongoing implementation projects in the Lower James River Watershed; future implementation

projects that will occur when the JRWDD and DENR complete their assessment of impaired waterbodies in the Upper James River Watershed; and actions by other agencies implementing BMPs in South Dakota. The template will be easily transferrable to any other watershed across the State.

2.2 General Information on the Wolf Creek and the Lower James River Watersheds

Wolf Creek is a 400 square mile tributary to the James River. Wolf Creek and the rest of the Lower James River Watershed lie entirely within the Level III ecoregion of the Northern Glaciated Plains. Land use in the project area was gathered during the watershed assessment and will be included in the final report for the Lower James River Watershed Implementation. Landuse in the Wolf Creek Watershed consists primarily of row crow farming with some pasture and hay land. There are also a number of animal feeding areas in the watershed. Detailed information was gathered during the assessment project. The Wolf Creek Watershed lies in four counties. The soils range from level and poorly drained to steep and well drained. Erosion rates are currently being determined in the Lower James River Watershed Implementation project and will be included in its final report.

The Wolf Creek Watershed has a sub-humid, continental climate characterized by pronounced seasonal differences in temperature, precipitation, and other climactic variables. January is typically the coldest month and July the warmest. The average annual precipitation varies spatially and temporally across the Lower James river Watershed and ranges from 22 to 26 inches per year.

2.3 Water Quality Impairments

The Lower James River Watershed Assessment Project was initiated at the request of local organizations, and citizens concerned about water quality problems in the James River. Wolf Creek was placed on the 303(d) list for suspended solids. The sources for these listings were determined during the assessment project. Most likely the sources are agricultural. Point sources in the area were also assessed, and all results will be included in the final assessment report. The watershed assessment final report is scheduled for completion during 2009. The assessment will include results for the following activities:

- watershed modeling using the Annualized Agricultural Nonpoint Source model (AnnAGNPS);
- review of previous water quality data collected for the lakes and watershed;
- biological monitoring, including fish surveys, macro invertebrate surveys;
- periphyton surveys, and habitat assessments;
- Rapid Geomorphic Assessments;
- sediment survey; and
- quality assurance/quality control.

The sources of impairment for the water bodies, as determined by the assessment, will be fully identified in the final report scheduled for completion during 2009. Preliminary analysis of the data indicated that excessive TSS concentrations were present in Wolf Creek during periods of high flow. Sources of TSS in Wolf Creek are associated with 5 feeding areas located near the stream's confluence with the James River.

The priorities for Segment II of the Lower James River Watershed Assessment Project are the preliminary site assessments to address livestock feeding areas (9), installation of animal nutrient management systems for feeding areas (6), installation cropland and grassland BMPs on 15,000 acres, and information and education activities. This project will serve to provide a common, spatially accurate database to track the implementation of BMPs in the Wolf Creek Watershed. Completion of this project will support attainment of the beneficial uses of water bodies in the watershed, and allow for continued use of the watershed for agricultural production, swimming, boating, recreation, wildlife, and residential living.

3.0 Project Description

Excessive erosion, transport, and deposition of sediment is one of the most serious water quality problems in the nation. Excessive sediment is a common cause of impairment of aquatic life uses, especially by siltation of in-stream habitat and impacts of turbidity on flora and fauna. Sediment can also impair recreational, drinking water, and navigational uses. The large number of sediment-related 303(d)-listings presents a great challenge to states and nonpoint source stakeholders, particularly with regard to the development of TMDLs and associated implementation plans.

Sediment TMDLs are developed at the watershed scale, but implementation must ultimately be planned and executed at the parcel or farm field scale in agricultural areas. Currently available planning tools are intended for use either at the farm field scale (*e.g.*, RUSLE2, NRCS Toolkit) or the watershed scale (*e.g.*, models such as AnnAGNPS, HSPF). Interestingly, there are no standard, commonly-available tools for tracking farm-field level BMPs at the watershed scale. Such a tool would be desirable for measuring progress toward TMDL goals, pre-processing model inputs, administering nonpoint source programs, and supporting field studies of actual water quality improvements.

The Revised Universal Soil Loss Equation 2.0 (RUSLE2), developed by the Natural Resources Conservation Service, is a proven and widely-used tool for the parcel-level planning of soil erosion BMPs. The Annualized Agricultural Non-Point Source (AnnAGNPS) model, in contrast, is a commonly-used watershed-scale for evaluating non-point source pollution from agricultural watersheds and develop sediment TMDLs. The GIS-based sediment BMP tracking tool developed for this project will not replace either of these tools, but rather will enhance their common utility.

3.1 Project Goal

The goal of this project is to restore and protect the water quality of Wolf Creek and its watershed.

3.2 Objective and Tasks

To attain the goal, the following actions will be taken during this project:

- Develop an easy-to-use GIS tool for the tracking of BMPs to reduce land surface erosion. The tool will be compatible with RUSLE2 inputs and capable of pre-processing data needed for AnnAGNPS inputs. The tool's effectiveness will be demonstrated within the Wolf Creek Watershed, a sediment impaired watershed. The tool will be fully transferable to other watersheds.

Task 1—Kickoff Meeting: The multi-agency project team will hold a kick-off meeting to discuss the project details and schedule. Of particular importance will be the determination of the required functionality and form of the BMP tracking tool, in light of current conservation planning efforts and TMDL development.

Task 2—Database Development: The project team will develop the structure of the sediment BMP tracking tool database, and create the prototype geodatabase. The schema will rely heavily on pre-existing databases, including BMP definitions/cover management practices of the RUSLE2 database, and the attribute structure of the Farm Service Agency's Common Land Unit (CLU) database. ArcGIS programming will be performed to create forms for the population of the BMPs database on a farm field basis. To the extent practical, the database format will also be made consistent with the NRCS Toolkit data analysis tool expected in early 2007.

Task 3—Pre-Processor Programming: After creation of the BMP tracking database utility, additional ArcGIS programming will be performed to create a pre-processing tool for the AnnAGNPS model. The pre-processor will take information on crop types and cover management practices (consistent with RUSLE2 definitions) in a pre-delineated area and create data that can be used for inputs in the AnnAGNPS model. This will provide an explicit linkage between farm-field and watershed-scale conservation planning.

Task 4—Demonstration Project: The sediment BMP tracking tool will be applied to the Wolf Creek Watershed, a subbasin of the James River watershed, as a demonstration of its utility and to support the development of a user's guide (see Task 5). The project team will perform a review of publicly-available conservation plans and populate the BMP database with on-the-ground BMP information. The AnnAGNPS pre-processing tool will be employed to develop watershed model input for both the existing level of BMP implementation and a theoretical level that is expected to be similar to that of the TMDL implementation plan.

Task 5—User's Guide: The structure and capabilities of the sediment BMP tracking tool will be fully documented in a technical report that is written to facilitate transferability of the tool to other watersheds. Application of the tool to the Wolf Creek Watershed will be used to develop examples in a tutorial fashion. The report will describe how to populate the database with BMP information, alter this information to reflect different planning scenarios, produce watershed-scale summaries of BMPs information, and execute the AnnAGNPS pre-processing tool.

Task 6—Training Workshop: A workshop will be conducted to provide a hands-on training on how the sediment BMP tracking tool can be applied. The workshop will be oriented toward the state and local agencies currently involved in the James River sediment TMDL. However, the training materials (to include handouts and visuals) will be generic enough to be used in any watershed.

3.2.1 Results of Activities (Outputs)

The primary results/deliverables from this project will be:

1. A structure for the BMP tracking database, including the actual geodatabases for Wolf Creek, the demonstration watershed;
2. An ArcMap utility that serves as an interface for
    a. Entering, displaying, and summarizing information on farm-field level BMPs, compatible with RUSLE2 definitions of cover management practices.
    b. Pre-processing BMP information to develop AnnAGNPS input files to reflect on-the-ground conservation practices.
3. A technical report that describes the structure and use of the sediment BMP tracking tool, including demonstration in Wolf Creek, a subbasin of the James River watershed in South Dakota.

Progress towards achieving these outputs will be tracked as percentages of completeness for each item. A schedule for this one-year projected is present in section 3.2.

3.2.2 Projected Environmental Improvement (Outcome)

The sediment BMP tracking tool will improve the ability of watershed managers to simultaneously plan at the parcel (*i.e.*, farm field) and watershed scale, and to track BMPs implemented in a watershed. This will result in more effectual and cost-effective sediment TMDL implementation plans and greater coordination between agencies implanting BMPs under other government programs. The primary outcome will therefore be better land use practices and lower sediment loads to surface waters.

Because this project is intended to be transferable to other watersheds after completion, progress toward the primary outcome during the project will be evaluated qualitatively in terms of the utility and transferability of the final deliverables. Progress will also be evaluated by the number of sediment BMPs that are successfully targeted in the demonstration watershed. Future outcomes will be tracked in terms of the actual transfer and successful application of the tool to target and track sediment BMPs in other watersheds.

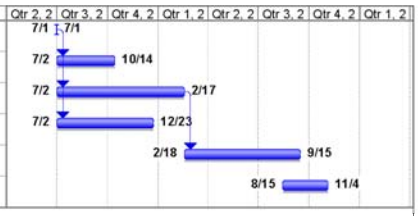
3.2.3 Baseline for Measurement

The baseline for measurement for this project is the current practice of tracking BMPs through individual conservation plans or watershed-specific geodatabases. Under the baseline situation, there is no standard method for accounting for BMPs, and no streamlined method for converting farm-field level conservation plans into (AnnAGNPS) watershed model input. Improvement from this baseline will be determined as the increased ability to track BMP information and exchange information between conservation plans and watershed models.

3.3 Milestones

Wolf Creek Watershed BMP Tracking Tool Demonstration Project Milestones
7/1/2010 to 11/4/2011

ID	Task Name	Duration	Start	Finish	Predecessors
1	Task 1: Kick-off meeting	1 day	Thu 7/1/10	Thu 7/1/10	
2	Task 2: BMP Database Development	75 days	Fri 7/2/10	Thu 10/14/10	1
3	Task 3: Pre-Processor Programming	165 days	Fri 7/2/10	Thu 2/17/11	1
4	Task 4: Demonstration Project	125 days	Fri 7/2/10	Thu 12/23/10	1
5	Task 5: User's Guide	150 days	Fri 2/18/11	Thu 9/15/11	3
6	Task 6: Training Workshops and Materials	60 days	Mon 8/15/11	Fri 11/4/11	



Project: 319 Grant Milestones
Date: Wed 9/30/09

Task | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Milestone | Rolled Up Progress | Split | External Tasks | Project Summary | Group By Summary | Deadline

Page 1

3.4 Permits

No permits will be necessary for this project.

3.5 Lead Project Sponsor

The James River Water Development District is the lead project sponsor. The Wolf Creek Watershed lies in Hanson, Hutchinson, McCook, and Miner Counties. The county conservation districts have a working relationship with both landowners and community organizations and citizens. The sponsors during project, Segment I of the Lower James River Watershed Assessment, have completed a memorandum of understanding (MOU) or joint power agreement (JPA) with each district. The agreements outline how it will cooperatively implement the work plan for Segment II and future projects, thereby including this project.

3.6 Operation and Maintenance Responsibilities

Responsibilities for operation and maintenance of 319 funded tools will be provided for through James River Water Development District.

4.0 COORDINATION PLAN

4.1 The lead project sponsor for this project is James River Water Development District.

The James River Water Development District will document cash and in-kind match to this project and is responsible for completion of this project's goal, objectives, and tasks. A steering committee comprised of representatives from the resource agencies and organizations listed below will advise the project sponsor, and develop priorities, practice manuals, work plans and strategies for this and future project segments.

- **Project Area Conservation Districts:** (See Section 3.5), Project partners by
- MOU will provide technical assistance, local support, and funding.
- **James River Water Development District:** Will continue to provide local support and technical and financial assistance.
- **Lower James RC&D:** Will continue to provide technical assistance for project planning and project management and serve on the project steering committee.
- **US Fish & Wildlife:** Through the Partners for Fish and Wildlife Program, the US F&WS will contribute technical services toward the implementation of this project.
- **USDA Farm Service Agency –** Coordination services to ensure tracking tool compatibility with agency implementation projects.

- **Natural Resources Conservation Service** - Coordination services to ensure tracking tool compatibility with agency implementation projects.
- **South Dakota Department of Environment and Natural Resources –** Technical assistance for database structure and project management.
- **South Dakota Game, Fish, and Parks (GFP) –** Coordination services to ensure tracking tool compatibility with agency implementation projects.
- **South Dakota Association of Conservation Districts (SDACD) –** Technical advice.

4.2 Local Support

The James River and its watershed are important economic and social assets to the communities in the project area, as well as rural residents and landowners. The James River Water Development District and the Conservation Districts have provided leadership for this project. Through community support, the Lower James River Watershed Assessment project was initiated during 2006, and its completion scheduled for 2009. During the assessment, the James River Water Development District staff visited with key land owners in the watershed to inform them of the project and discuss implementation of potential BMPs. An EPA 319 project proposal (Segment I) is being implemented through 2009 to develop a watershed PIP based on the watershed assessment and local input.

4.3 Coordination with Other Programs

The Lower James River Watershed Implementation Project will be coordinated by a steering committee made up of available local, state, and federal partners (see section 4.1) to maximize technical assistance and funding for successful project implementation. Due to the geographic cross over and the explicit connection of this project to the Lower James Watershed Implementation Project, this project will utilize the existing steering committee to ensure successful project implementation. In addition, this project will utilize training and other technical assistance available such as:

- Rapid Watershed Assessment Program (USDA NRCS)
- Conservation Reserve Program (USDA FSA)
- Conservation Reserve Enhancement Program (CREP) Application pending (USDA/GF&P).
- Partners for Fish and Wildlife (USF&WS)
- Project Coordinator training workshops (SD DENR)
- Technical training (USDA NRCS)
- South Dakota Non-point Source Information and Education Project
- Technical assistance for grassland management through the
- Grassland Management Team and 303(d) Watershed Planning and Assistance Projects.
- Technical and administrative training provided by the SD Association of Conservation Districts (SDACD), SD DENR, and NRCS.

Similar Activities in the Watershed

The Lower James River Watershed Implementation, Firesteel Creek Implementation and Lake Hanson Implementation projects are 319 projects in the lower James River watershed that are currently in progress.

5.0 EVALUATION AND MONITORING

5.2 Monitoring Strategy

This tool will be used to enhance monitoring and evaluation efforts for the Lower James River Watershed Implementation.

5.3 Data

The James River Water Development District will be responsible for collecting, storing, and managing data collected during implementation of this project. South Dakota DENR will provide technical assistance and guidance to assist in the appropriate record systems and computer software for project data collected. Data collected will be forwarded to South Dakota DENR for entry into the STORET database.

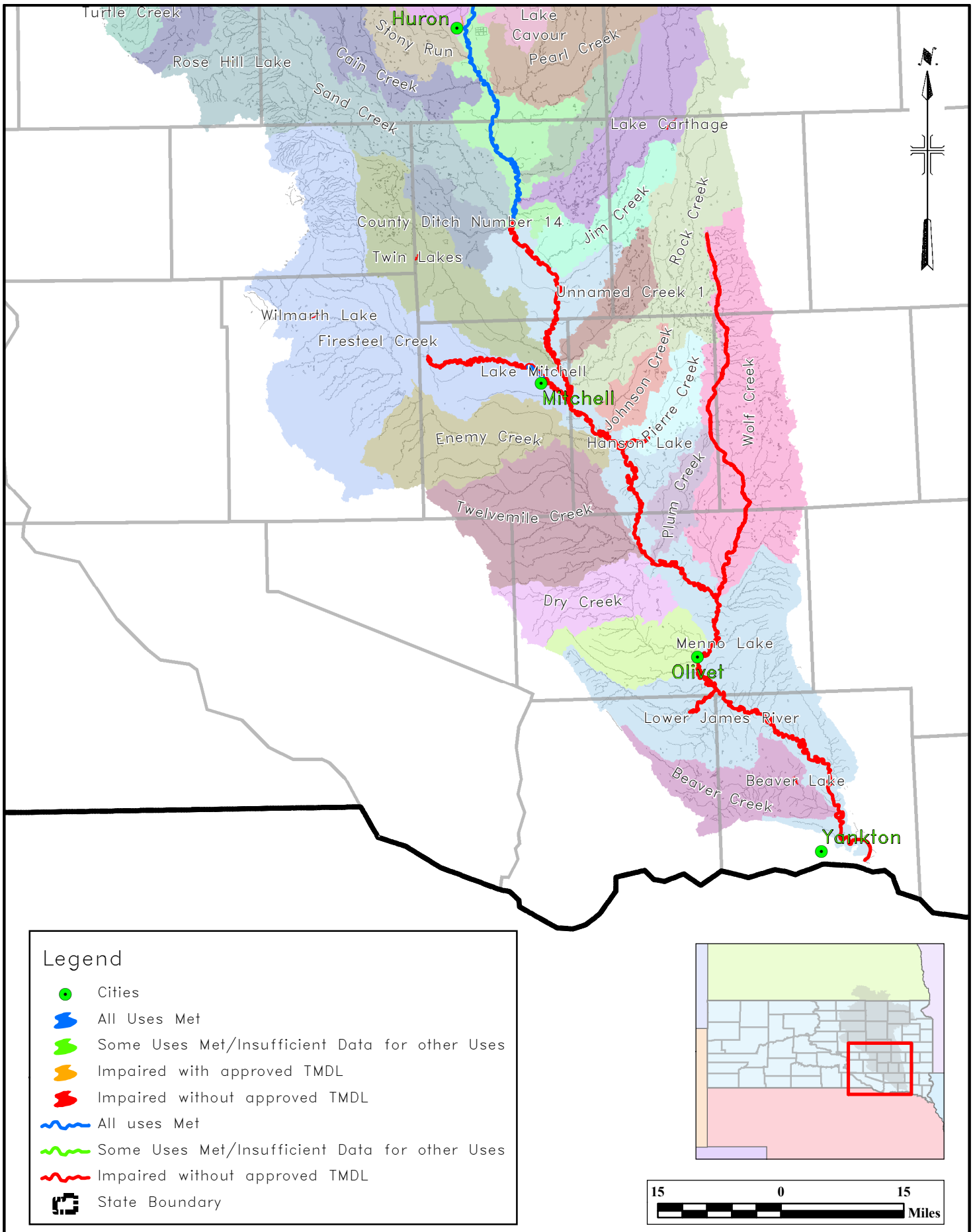
6.0 BUDGET

The proposed budget for this project is $120,000, of which $72,000 is requested from the Section 319 Program Grant monies. The detailed budget breakdown is presented on the following page.

DETAILED ITEMIZED BUDGET

Task	Budget Category	Federal Funds	Non-Federal (cash)	Non-Federal (in-kind services)	Total	Notes
1—Kickoff Meeting	Personnel*			$430	$430	Includes approximately 8 hours of JRWDD staff labor to prepare for and lead kick-off meeting.
	Supplies			$110	$110	JRWDD will provide supplies for kick-off meeting.
	Contractural		$3,000		$3,000	JRWDD contractor will attend meeting, provide technical overview, and collect information on deliverable needs.
2—Database Develop.	Personnel*			$430	$430	Includes approximately 8 hours of JRWDD staff labor to oversee database development task.
	Contractural	$12,600	$8,400		$21,000	JRWDD contractor will develop database and associated geodatabases.
3—GIS Programming	Personnel*			$430	$430	Includes approximately 8 hours o f JRWDD staff labor to oversee GIS programming task.
	Contractural	$30,500	$16,500		$47,000	JRWDD contractor will program GIS interface to BMP tracking tool and AnnAGNPS preprocessor.
4—Demo Project	Personnel*			$5,480	$5,480	Includes approximately 100 hours of JRWDD staff labor to perform demonstration project.
	Travel			$800	$800	Travel expenses associated with demonstration project.
	Equipment		$3,600		$3,600	Laptop, GIS software, and GPS equipment to perform farm field survey.
	Contractural	$6,400	$3,000		$9,400	JRWDD contractor will provide technical assistance on demonstration project.
5—User's Guide	Personnel*			$860	$860	Includes approximately 16 hours for JRWDD staff to assist with development of User's Guide.
	Supplies			$300	$300	Cost of printing supplies for User's Guide.
	Contractural	$15,000	$2,000		$17,000	JRWDD contractor will prepare User's Guide.
6—Workshop	Personnel*			$860	$860	Includes approximately 16 hours of JRWDD staff labor to assist with training materials and host workshop.
	Supplies			$300	$300	Training materials supplies.
	Contractural	$7,500	$1,500		$9,000	JRWDD contractor will develop visuals, handouts, and lead training workshop.
TOTAL		**$72,000**	**$38,000**	**$10,000**	**$120,000**	

*Personnel costs include salary, fringe benefits, and indirect costs. The costs are based on an average salary of $20 per hour and a total multiplier of 2.70.



MALCOLM PIRNIE

JAMES RIVER WATER DEVELOPMENT DISTRICT

319 GRANT APPLICATION

JAMES RIVER BASIN SURFACE WATER QUALITY

SCALE: 1" = 15 MILES

MALCOLM PIRNIE, INC.

SEPTEMBER 2009

FIGURE 1