PROJECT SUMMARY SHEET

PROJECT TITLE: Eastern South Dakota Lakes Assessment Project

NAME AND ADDRESS OF LEAD PROJECT SPONSOR:
East Dakota Water Development District
132B Airport Ave
Brookings SD 57006

LOCAL CONTACT:
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STATE: South Dakota

WATERSHEDS: James River, Vermillion River, and Big Sioux River

HUC # 101600, 101701, and 101701

PROJECT TYPES: [ ] BASE [x] WATERSHED [ ] GROUNDWATER [ ] I&E

WATERBODY TYPES
[ ] Groundwater
[x] Lakes/Reservoirs
[ ] Rivers
[x] Streams
[ ] Wetlands
[ ] Other

NPS CATEGORY
[x] Agriculture
[ ] Urban Runoff
[ ] Silviculture
[ ] Construction
[ ] Resource Extraction
[ ] Stowage and Land Disposal
[ ] Hydrologic Modification
[ ] Other

SUMMARIZATION OF MAJOR GOALS:
The goal of the Eastern South Dakota Lakes Assessment Project is to collect water quality data from 4 lakes and their tributaries, where applicable, for the purpose of TMDL development. These 4 lakes are included on the South Dakota 303(d) list of impaired waters and are scheduled on the South Dakota TMDL Vision Schedule for TMDL submittal in FY2021 and FY2022. In order to meet the timeline of the TMDL Vision Schedule, data collection must be completed at least two years prior to TMDL submittal in order for South Dakota Department of the Environment and Natural Resources (DENR) staff to have sufficient time for data analysis and TMDL development.

PROJECT DESCRIPTION:
Data collection activities are to be carried out by East Dakota Water Development District (EDWDD) staff and will occur over the span of two field sampling seasons. The project is comprised of 3 objectives, which are lake sampling, tributary sampling, and quality assurance/quality control (QA/QC). Lake samples are collected to assess the current status of the lake, while tributary samples are collected to assess how the watershed influences water chemistry within the lake. Data collection activities will adhere to the procedures outlined in the SD DENR Standard Operating Procedures for Field Samplers Volume I Tributary and In-lake Sampling Techniques document. Data will be collected for the purpose of setting up, calibrating, and running the BATHTUB model, a hydraulic mass-balance model that simulates how inputs from tributaries impact pollutant concentrations within a reservoir. Data needs include sample data from within the reservoir, tributary sample data from upstream of the lake (input), and tributary sample data and flow data downstream of the lake (output). Water quantity data will be

obtained from the Elevation Derivatives for National Applications model (EDNA) or from existing flow data. Once the BATHTUB model is set up, various scenarios may be simulated to determine the magnitude of pollutant reduction(s) required in the tributary to meet water quality standards in the lake.

Funded Full Time Personnel: 0.31 **Total project costs: $ 91,800**
EDWDD: $11,800
Federal 604b: $80,000

2.0 STATEMENT OF NEED

2.1 The purpose of the Eastern South Dakota Lakes Assessment Project is to collect data for calculating Total Maximum Daily Load development. In collaboration with United States Environmental Protection Agency (EPA), DENR developed a schedule for future TMDL development referred to as the TMDL Vision Schedule that projects TMDL submittals through the year 2022. A series of lakes are scheduled for TMDL submittal in the years 2021 and 2022. Four of these lakes are located in eastern South Dakota within reasonable proximity to East Dakota Water Development District. These four lakes are Lake Carthage in Miner Country, Twin Lakes in Sanborn County, Lake Thompson in Kingsbury County, and Bullhead Lake in Deuel County. Existing data from these lakes is not sufficient for TMDL development and it is unlikely other sampling programs will collect sufficient data prior to scheduled TMDL development.

2.2 The area to be assessed during this study is approximately 16,600 acres and includes 1 municipality and 4 counties.

Federally listed threatened and endangered species that occur in the project area are: the Topeka shiner (*Notropis topeka*), interior least tern (*Sterna antillarum* athalassos) and the piping plover (*Charadrius melodius*) (SDGFP, 2003). These species will not be impacted by the assessment work of this project.

2.3 The location of the Eastern South Dakota Lakes Assessment Project may be found in Figure 1.

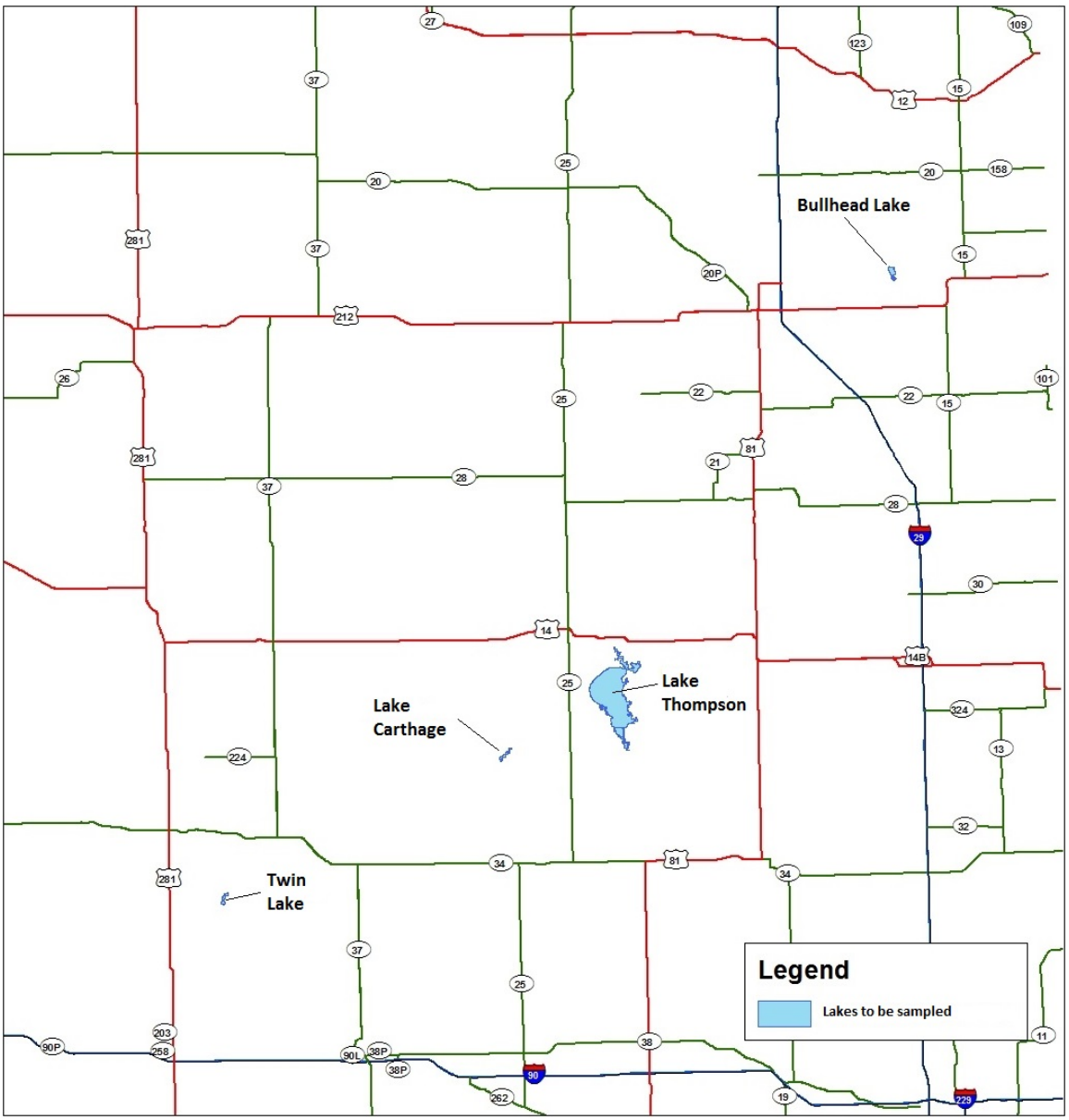

Figure 1. Eastern South Dakota Lakes Assessment Project study area including the lakes where sampling will occur.

3.0 PROJECT DESCRIPTION

3.1 GOALS

The goal of this project is to collect water quality data through a coordinated effort between SDDENR and EDWDD which will provide data for TMDL development for the 4 lakes included in the project. All parameters will be collected at each sampling site, except for chlorophyll-α which will only be measured at lake sampling sites. Tributary sites will not be sampled for chlorophyll-α.

Table 1. Chemical parameters to be measured for each site.

Parameter Analyzed by Health Lab		Field Measurements
Alkalinity	Total Dissolved Phosphorus	Dissolved Oxygen
Nitrate/Nitrite	Total Kjehldahl Nitrogen	pH
Total Phosphorus	Total Dissolved Solids	Temperature
Total Ammonia as N	Total Suspended Solids	Conductivity

3.2 OBJECTIVES AND TASKS

Objective 1: Lake Sampling

TASK 1 Collect water chemistry samples.

In each lake a water sample will be collected at three locations within the lake and composited into a single sample. The composite samples will be analyzed for the same parameters collected during the South Dakota Statewide Lakes Assessment Program to maintain uniformity in data collection procedures. These parameters are presented in Table 1. Each of the four lakes will be sampled 20 times over the course of the 2 year project, roughly ten samples per year, for a total of 80 lake samples. Lakes are to be sampled twice per month during the growing season (roughly June-Aug) with an additional 4 samples collected each year outside the growing season for a total of 10 samples per year. An alternative schedule would be to sample each lake twice per month from May-Sept for a total of 10 samples per year. Chlorophyll-α samples will be shipped on ice to DENR for processing in the DENR lab.

TASK 2 Measure vertical profile in lakes.

Vertical lake profile measurements for temperature, specific conductance, pH, and dissolved oxygen using a YSI multi-meter probe will be taken at three designated sampling locations in the lake upon each sampling visit.

PRODUCTS:

The primary product from this objective is water chemistry data. This data will be used to set up, run, and calibrate the BATHTUB model for the purpose of calculating nutrient load reductions and developing TMDLs for each lake. Sampling equipment including a boat and motor, water quality multi-probes, and laptop computers is included as part of the cost of this objective.

COST: $56,560 FEDERAL 604b COST: $56,560

RESPONSIBLE AGENCIES:

East Dakota Water Development District
South Dakota Department of Environment and Natural Resources

Objective 2: Collection of water quality and quantity data from lake tributaries

TASK 3 Collect water quality data from lake tributaries

Water samples from tributaries will be collected with an isokinetic sampler to ensure a depth-integrated sample along the stream cross-section. When a depth-integrated sample cannot be collected (i.e. water depth < 1ft.), then grab sampling methods will be used.

All samples will be collected using approved methods described in the State of South Dakota Water Resource Assistance Program Standard Operating Procedures for Field Samplers (WRAP SOP). After collection, bottles will be put on ice for transport. Samples will be shipped on ice to the SD State Health Laboratory for analysis.

Field measurements (Table 1) will be taken during each trip. A water quality sonde will be used to measure tributary dissolved oxygen, pH, specific conductivity, and water temperature whenever tributary water samples are collected. The Sonde will be calibrated on a daily basis prior to its use for measuring environmental water.

Three of the lakes have tributaries that will be sampled. These include Redstone Creek both above and below Lake Carthage, the tributary that flows into Twin Lake from the south, and the connections between Lake Thompson and Lakes Henry and Whitewood and the outlet of Lake Thompson on the south end of the lake. Bullhead Lake lacks a significant tributary so no tributary sampling is necessary. A total of 15 water quality samples are to be collected at each tributary sampling location over the course of the two year project for a total of 90 samples. Tributary samples will be collected only when flow is apparent; samples will not be collected when flow is absent. Dry conditions may limit sampling due to the tributaries not containing flowing water. Sampling times will be dictated by available flow in each tributary.

PRODUCTS:

The primary product from this objective is water chemistry data. This data will be used to set up, run, and calibrate the BATHTUB model for the purpose of calculating nutrient load reductions and developing TMDLs for each lake.

COST: $10,440 FEDERAL 604b COST: $10,440

RESPONSIBLE AGENCIES:

East Dakota Water Development District
South Dakota Department of Environment and Natural Resources

Table 2. Sampling site location table for the Eastern South Dakota Lakes Assessment Project.

Station_ID	Station Description	Latitude	Longitude	County	Beneficial Uses	Basin	HUC12Digit
VERMILRVREF25	River near Winfred,SD on 225th St 1 mile West of Mine	44.124330	-97.386518	Kingsbury	9,10	VERMILLION	101701020103
KINGSBULTO	Lake Thompson outlet.	44.182390	-97.415909	Miner	9,10	VERMILLION	101701020101
KINGSBULWO	Whitewood Lake outlet	44.324395	-97.390806	Kingsbury	9,10	VERMILLION	101701030208
LOWJIMCLD27	Lake Carthage outlet. Redstone Creek.	44.174517	-97.712737	Miner	9,10	JAMES	101600061204
LOWJIMCLU28	Lake Carthage inlet, Redstone Creek.	44.209305	-97.701269	Kingsbury	9,10	JAMES	101600061204
SWLAZZZ2303A	Bullhead Lake	44.953000	-96.807700	DEUEL	5,7,8,9	Big Sioux	101702010701
SWLAZZZ2303B	Bullhead Lake	44.949400	-96.804800	DEUEL	5,7,8,9	Big Sioux	101702010701
SWLAZZZ2303C	Bullhead Lake	44.945700	-96.802400	DEUEL	5,7,8,9	Big Sioux	101702010701
SWLAZZZ4222A	Lake Thompson	44.299400	-97.458800	KINGSBURY	4,7,8,9	Vermillion	101701030209
SWLAZZZ4222B	Lake Thompson	44.266500	-97.457900	KINGSBURY	4,7,8,9	Vermillion	101701030209
SWLAZZZ4222C	Lake Thompson	44.242800	-97.442800	KINGSBURY	4,7,8,9	Vermillion	101701030210
SWLAZZZ5103A	Lake Carthage	44.175300	-97.709100	MINER	4,7,8,9	James	101600061204
SWLAZZZ5103B	Lake Carthage	44.180800	-97.703700	MINER	4,7,8,9	James	101600061204
SWLAZZZ5103C	Lake Carthage	44.185600	-97.695800	MINER	4,7,8,9	James	101600061204
SWLAZZZ5606A	Twin Lake	43.951000	-98.334400	JERAULD	5,7,8,9	James	101600100402
SWLAZZZ5606B	Twin Lake	43.958600	-98.331700	SANBORN	5,7,8,9	James	101600100402
SWLAZZZ5606C	Twin Lake	43.964200	-98.325700	SANBORN	5,7,8,9	James	101600100402
TWINWILTLT01	Twin Lake tributary	43.939403	-98.331458	Sanborn	9,10	JAMES	101600100402

Table 3. Mileage and staff cost estimates.

	# Visits	Miles/trip	Total Mileage	Travel @ $.42/mi	Hours Travel	Hours sampling	Staff Cost (2 staff @ 15/hr)	Per Diem	Staff Total
Twin	25	212	5300	$2,226.00	0.75	0	$562.50	$550.00	$1,112.50
Thompson	25	78	1950	$819.00	1.5	3	$3,375.00	$550.00	$3,925.00
Carthage	25	124	3100	$1,302.00	2.5	2	$3,375.00	$550.00	$3,925.00
Bullhead	20	108	2160	$907.20	2	2	$2,400.00	$440.00	$2,840.00
Twin (out of district)	25				3.25	3	$4,687.50		$4,687.50
Total				$5,254			$14,400	$2,100	$16,500

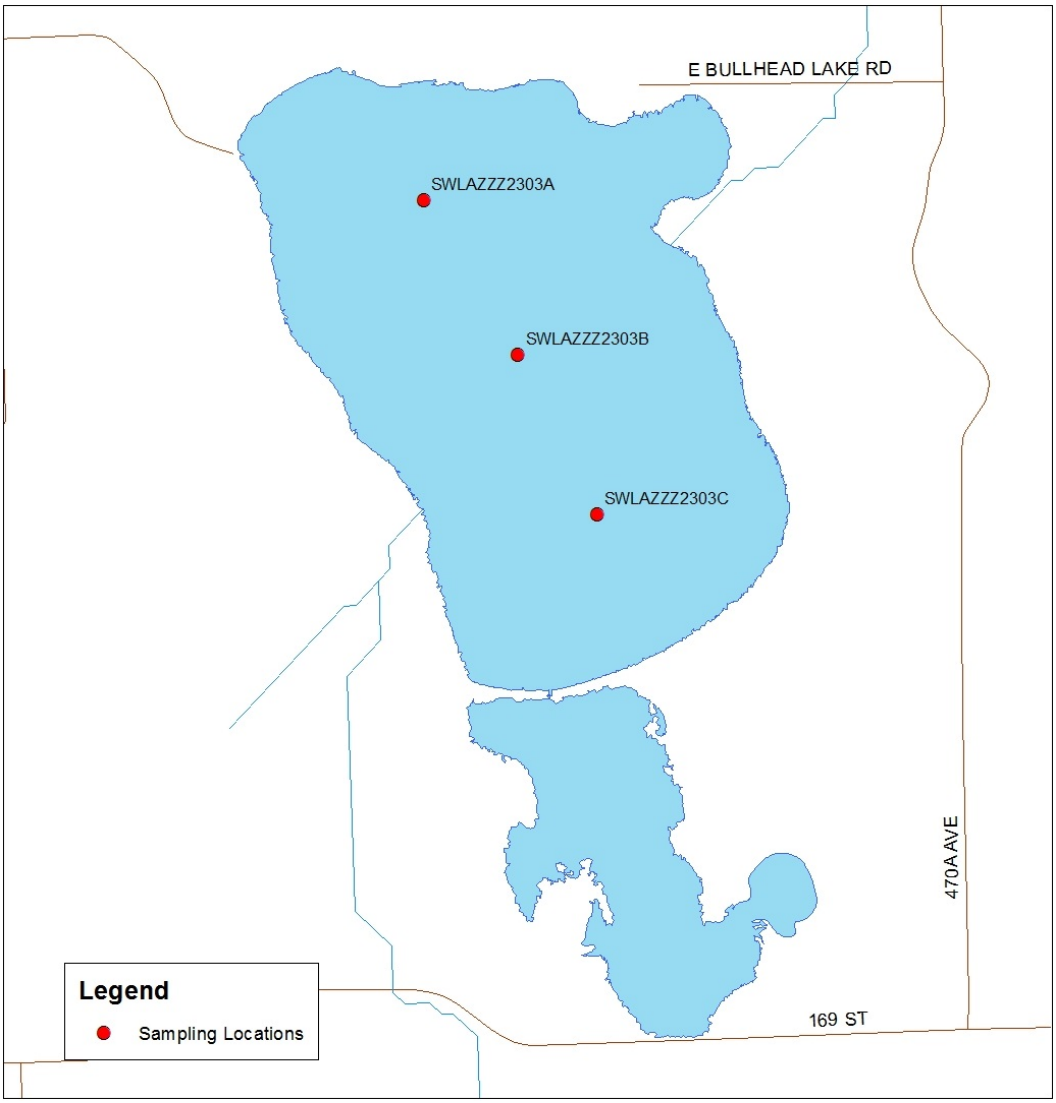

Figure 2. Bullhead Lake map and sampling locations.

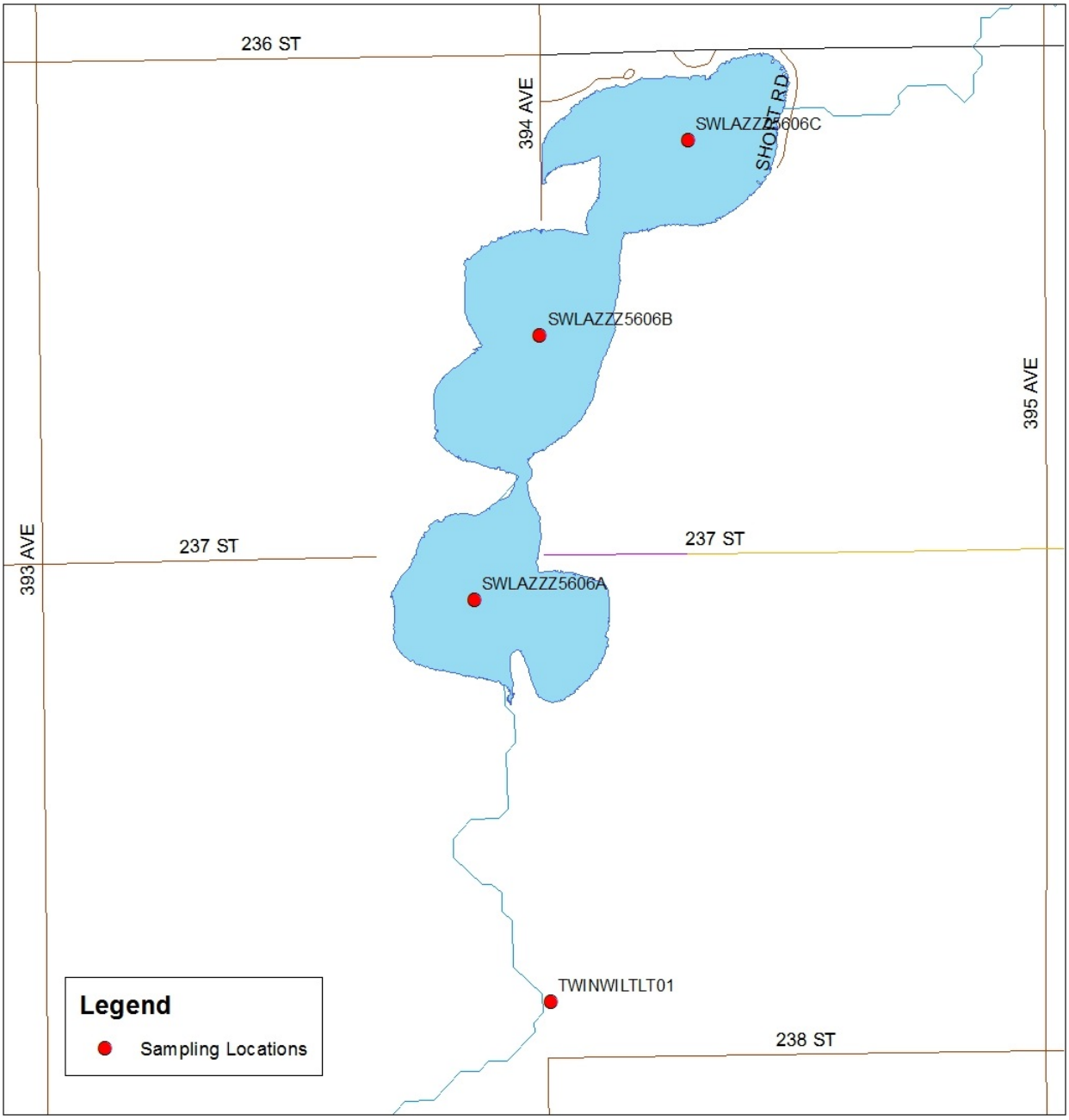

Figure 3. Twin Lake map and sampling locations.

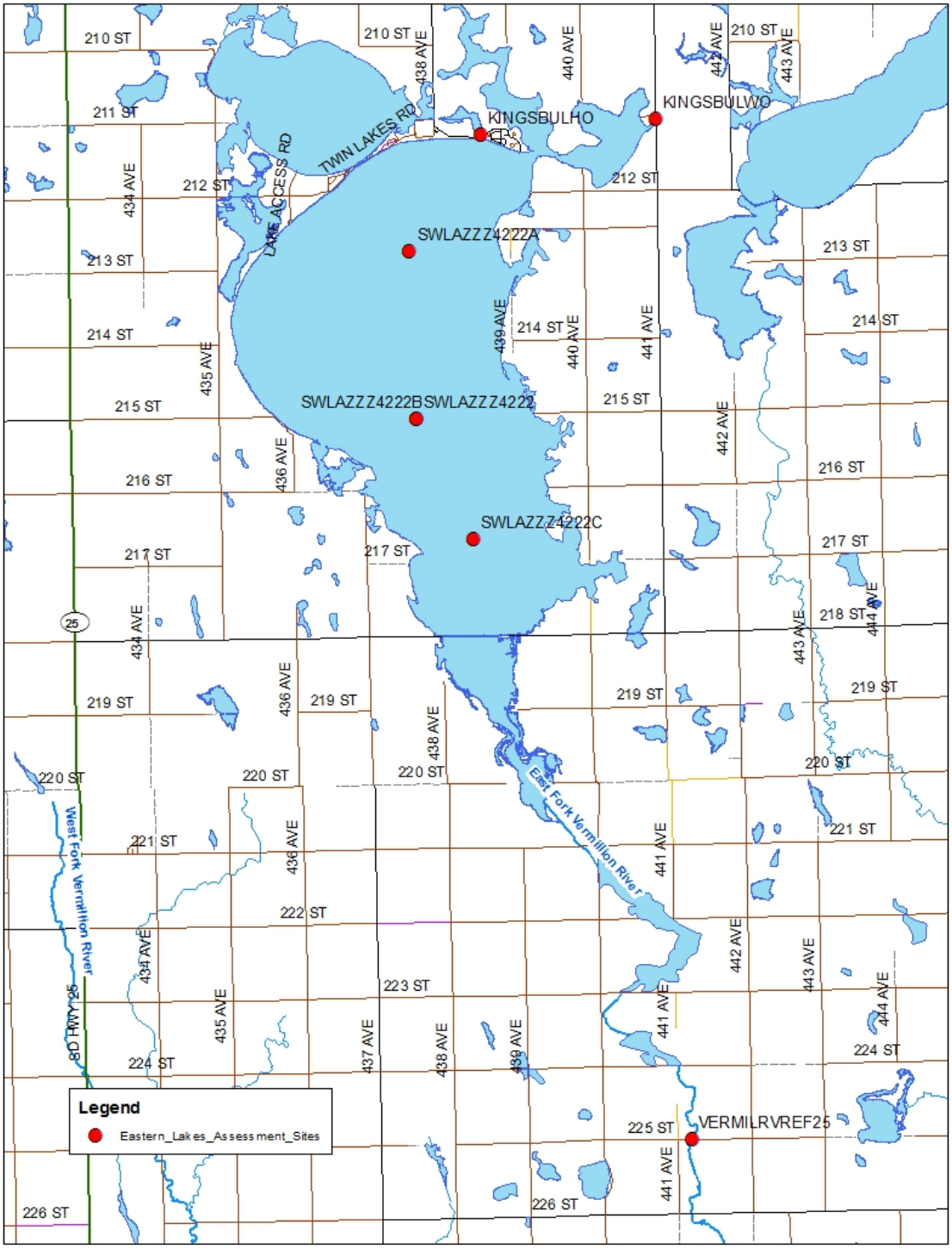

Figure 4. Lake Thompson map and sampling locations.

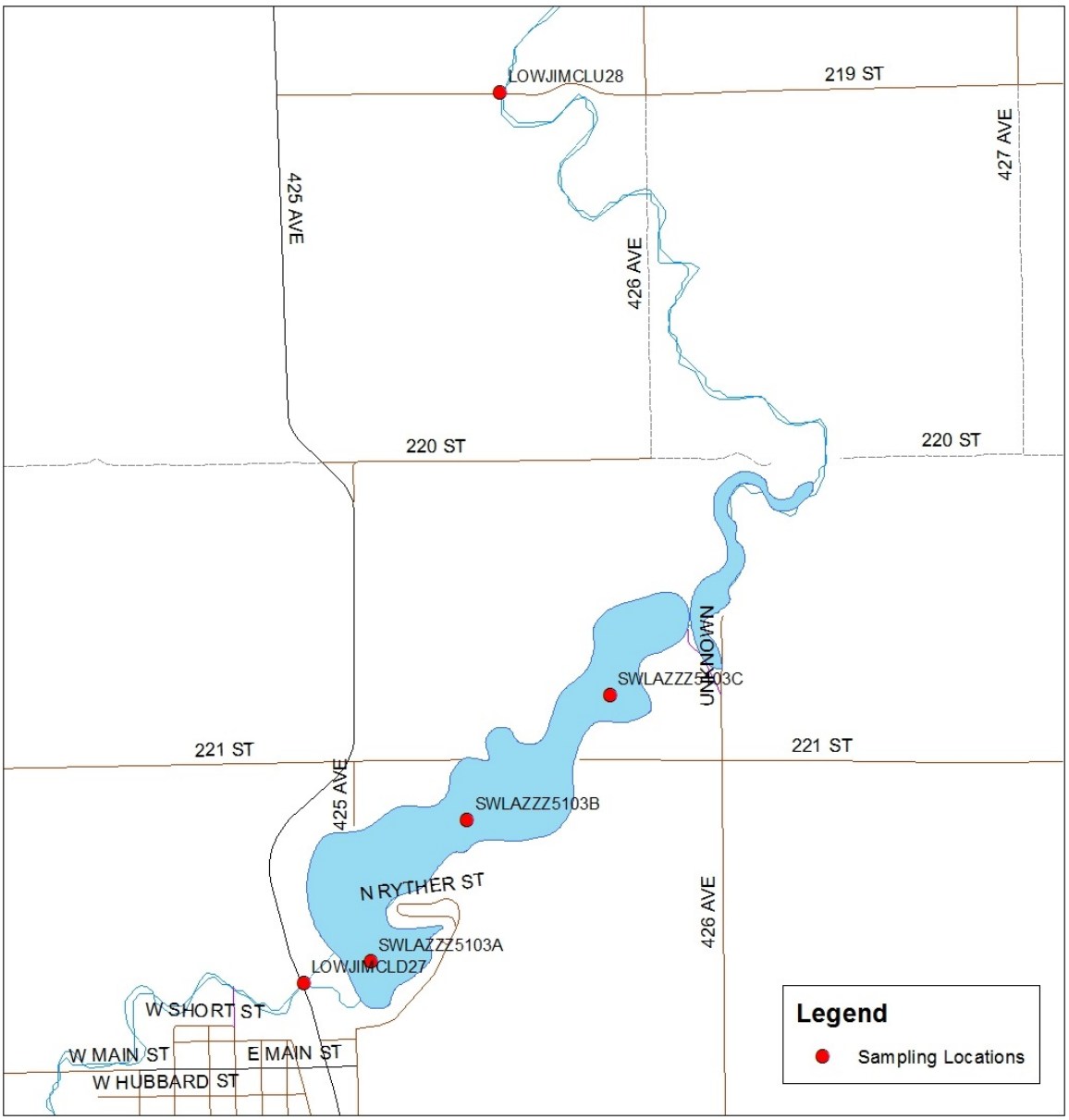

Figure 5. Lake Carthage map and sampling locations.

Objective 3: Quality Assurance/Quality Control

Approved Quality Assurance/Quality Control (QA/QC) procedures will be used to ensure that all samples are accurate and defendable.

TASK 12 A minimum of 20 percent of the water quality samples processed at the South Dakota State Health Laboratory will be collected for QA/QC purposes. QA/QC sample sets will consist of half field blanks and half field replicate samples. An estimated 9 water quality QA/QC sample sets (consisting of a blank

and a replicate) will be collected during the project. The collection of all field data will be accomplished in accordance with the WRAP SOP.

All QA/QC activities will be conducted in accordance with the Nonpoint Source Program Quality Assurance Project Plan.

The activities involved with QA/QC procedures and the results of QA/QC monitoring will be compiled and reported to the states QA/QC coordinator at the end of the project.

PRODUCTS:

A written QA/QC report will be provided to the States QA/QC coordinator for the annual report.

COST: included as a percentage of Objective 1 and 2 costs.

RESPONSIBLE AGENCIES:
East Dakota Water Development District
South Dakota Department of Environment and Natural Resources

Objective 5: Public Participation and Involvement

TASK 13 Disseminate project information to the public.

Project information will be disseminated through reports to the East Dakota Water Development District board at their quarterly meetings. These meetings will provide an avenue for input from the residents in the area. Notification of meetings will be made according to SD Open Meeting Law requirements.

MILESTONES:

2 public meetings (midyear and end of year meetings)
Involvement and/or input from the public will be documented

PRODUCTS:

Two progress reports to the EDWDD board.

COSTS: $0 FEDERAL 604b: FUNDS: $0

RESPONSIBLE AGENCIES:
East Dakota Water Development District
South Dakota Department of Environment and Natural Resources

Objective 6: **Reporting**

TASK 14 This project is designed to collect data for multiple goals which are portions of larger, longer term efforts. SDDENR will complete all midyear and final grant reports. The project sponsor will ensure that field and stage data are reported to SDDENR not less than monthly.

PRODUCTS:

Monthly Data submissions by EDWDD.
Semiannual and year end grant reports

COSTS: $0 Federal Funds: $0

RESPONSIBLE AGENCIES:

Grant Reports
South Dakota Department of Environment and Natural Resources
Data Reports:
East Dakota Water Development District

3.3 MILESTONE TABLE -.

Table 4. Milestone table for the Eastern South Dakota Lakes Assessment Project

	2016				2017												2018							
	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
Lake Sampling	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tributary Sampling	X	X					X	X	X	X	X	X	X	X					X	X	X	X	X	X

3.4 No work on this project will harm threatened and endangered species. The project will be in compliance with threatened and endangered species and cultural resource regulations.

3.5 The East Dakota Water Development District is a local governmental entity whose boundaries include a majority of the study area making it an appropriate lead sponsor for this project.

4.0 COORDINATION PLAN

4.1 The following groups/agencies have agreed, through an informal agreement, to cooperate in the Eastern South Dakota Lakes Assessment Project. These agencies are members of the assessment steering committee formed to advance the project and make project-related decisions.

SD Department of Environment and Natural Resources
Financial and Technical Assistance
Project oversight including training of field personnel

East Dakota Water Development District
Project Sponsor
Local Support
Field Data Collection

4.2 Project activities will be coordinated with state, federal, and local government agencies through frequent personal communication and monthly meetings.

5.0 EVALUATION AND MONITORING PLAN

6.0 BUDGET

Table 5. Project budget table.

		State	EDWDD	Total
Mileage @ $0.42/mile	12,510 miles	$5,300.00		$5,300.00
Equipment		$47,280.00		$47,280.00
Supplies/Shipping		$3,000.00		$3,000.00
Samples @ $116	170 samples	$19,720.00		$19,720.00
EDWDD Staff @ $15/hr + per diem	960 hours	$4,700.00	$11,800.00	$16,500.00
	Total	$80,000.00	$11,800.00	$91,800.00

7.0 PUBLIC INVOLVEMENT

8.0 REFERENCES CITED

SD Department of Environment and Natural Resources. 2003. Standard Operating Procedures for Field Samplers Volume II – Biological and Habitat Sampling. (Draft Version).

SD Department of Game, Fish, and Parks. 2003. South Dakota Natural Heritage Program.

SOUTH DAKOTA NONPOINT SOURCE PROGRAM
QUALITY ASSURANCE PROJECT PLAN

SUBMITTED BY

SOUTH DAKOTA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF FINANCIAL AND TECHNICAL ASSISTANCE
WATER RESOURCES ASSISTANCE PROGRAM

Project Title: Eastern South Dakota Lakes Assessment Project
APPROVED BY:

_____ _____
South Dakota Watershed Protection Program Date
Environmental Senior Scientist, Assessment Section

_____ _____
South Dakota Watershed Protection Program Date
Project Officer

_____ _____
South Dakota Watershed Protection Program Date

_____ _____
South Dakota Watershed Protection Program Date
DENR Quality Assurance Coordinator