



Environment and Natural Resources Trust Fund (ENRTF) M.L. 2016 Work Plan

Date of Report: May 29, 2016

Date of Next Status Update Report: January 15, 2017

Date of Work Plan Approval: June 7, 2016

Project Completion Date: June 30, 2018

Does this submission include an amendment request? No

PROJECT TITLE: Promoting Water Quality Stewardship through Student Mentoring and River Monitoring

Project Manager: Emily Deaver

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Location: Lyon

Total ENRTF Project Budget:

ENRTF Appropriation: \$39,000

Amount Spent: \$0

Balance: \$39,000

Legal Citation: M.L. 2016, Chp. 186, Sec. 2, Subd. 05i

Appropriation Language:

\$39,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with Southwest Minnesota State University to partner with area schools to deliver inquiry-based, hands-on learning and mentoring on water quality stewardship between university agriculture students and high school and middle school students.

I. PROJECT TITLE: Promoting Water Quality Stewardship through Student Mentoring and River Monitoring

II. PROJECT STATEMENT:

In the temperate prairie region in southwest Minnesota, over 80% of a typical watershed is used for some type of agriculture. Stream channelization and alterations to overland flow using tile drainage systems have negatively impacted stream water quality. Area citizens must be engaged in water quality efforts and discussions if progress is to be made in protecting local waterways. Providing students the knowledge and skills to improve and maintain water quality, coupled with hands-on outdoor experiences will promote a long-lasting conservation ethic. In particular, educating agriculture students and engaging them in conservation and monitoring efforts will bridge the perceived conflict between agriculture production and water conservation efforts.

The **goals** of the program are for college, high school and middle school students in Southwest Minnesota to:

- gain knowledge and understanding of local and state water quality issues;
- develop skills needed to measure local water quality;
- develop an awareness and sensitivity to challenges connecting agriculture and water quality.

The project builds on a program started in fall 2004 which established a long-term working relationship between Southwest Minnesota State University (SMSU) and area public schools. This project will expand the focus of the educational component, include new partnerships with state agencies, and demonstrate the value of individual involvement in community conservation to ensure resources for the future.

Undergraduates at Southwest Minnesota State University (SMSU) will enroll in an existing course (LEP 100 or ENV 115) and learn about water quality and river monitoring techniques. SMSU students will then travel to area schools and mentor high school (10th grade) students who in turn teach 7th grade students how to use test kits and meters to analyze water quality. A few days later, all students will travel to the Redwood River together to monitor three sites: one site as the river comes into the town of Marshall, one site in the middle of town, and a 3rd site as the river leaves town. Ten different parameters will be measured (dissolved oxygen, temperature, pH, turbidity, flow, ammonia, nitrate, phosphate, alkalinity and coliform bacteria) using both test kits and meters. The mentoring will be done in small groups: one (or two) SMSU undergraduates, two 10th grade students and two 7th grade students per group. Each group will learn details and methods for two to three water quality parameters and get experience with both test kits and meters. Partners from the MN DNR will join students at the river when they are monitoring and demonstrate equipment used by the DNR.

A second part of the project would include developing a relationship between SMSU Ag Education and Agronomy majors and local Future Farmers of America (FFA) high school students. Ag Education is a new major, with the first group of students enrolled at SMSU fall 2015. SMSU undergraduates would attend a 3-day interactive Workshop on “Ag and Water Quality” to learn scientific principles related to river water quality and to discuss issues such as tile drainage systems, the proposed 50-ft buffer strips and the connections between agriculture and water quality. Partners from the MPCA and MN DNR will be involved in teaching the workshops. The SMSU undergraduates will then attend FFA meeting at Marshall High School doing hands-on activities with the students. They will also recruit students to take on an AgriScience Project which includes adopting sites along local rivers to monitor as part of the MPCA Citizen Stream Monitoring Program (CSMP).

These activities will involve students at a variety of education levels. Each semester 24 SMSU undergraduates will be involved in mentoring three classes of 10th grade students, who mentor three classes of 7th grade students, plus mentoring of 35-40 FFA students for a total of about 690 students impacted by the project. This grant provides funding to broaden the content covered from the initial project to include a specific focus on the connection between agriculture and water quality, and to expand monitoring to include measurement of coliform bacteria. The addition of partners from the MN DNR and MPCA provides important links to existing state water quality programs. An additional part of the project includes expanding our assessment activities

from just evaluating how well students are learning content, to now include an evaluation in changes in attitude and development of stewardship ethic. Through these activities students take an active role in community based conservation in which the data generated is directly applicable to local water issues, and trains students at many levels to be 'citizen scientists'.

III. OVERALL PROJECT STATUS UPDATES:

Project Status as of January 15, 2017:

Project Status as of July 15, 2017:

Project Status as of January 15, 2018:

Overall Project Outcomes and Results:

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Mentoring of Public School Students & Monitoring of Redwood River

Description: Fall 2016 undergraduates at Southwest Minnesota State University (SMSU) will enroll in an existing course (LEP 100 or ENV 115). A pre-assessment quiz will be administered to all students the first day of class to determine initial content knowledge. Additional equipment and expendable chemicals will be purchased (Vernier LabPros with probes, LaMotte Water Quality test kits, and Coliform bacteria field kits) and dates for mentoring and monitoring with the high school and middle school students will be determined in coordination with Marshall teachers Holly Knudson and Carrie Sueker. SMSU students will be tested on their content knowledge and mastery of water quality equipment through a lab practical exam in which they must demonstrate how to use meters and test kits, and analyze provided samples to obtain accurate values. A pre-assessment quiz will be administered to all 10th grade and 7th students to determine their initial level of understanding and knowledge.

SMSU students will then travel by bus to area schools and mentor 3 classes of high school (10th grade) students who in turn teach 7th grade students how to use test kits and meters to analyze water quality. Water quality meters and test kits will be transported from SMSU to the public schools so that students get hands-on experience learning to use the equipment during the mentoring activities. The mentoring will be done in small groups: one (or two) SMSU undergraduates, two 10th grade students and two 7th grade students per group. Each group will learn details and methods for two to three water quality parameters and get experience with both test kits and meters. A few days later, all students will travel by bus to the Redwood River to monitor three sites: one site as the river comes into the town of Marshall, one site in the middle of town, and a 3rd site as the river leaves town. Equipment and meters will be transported from SMSU to each river site by SMSU undergraduates. Students will spend approximately an hour at each site analyzing river water samples and recording observations. Partners from the MN DNR will join students at the river when they are monitoring and demonstrate equipment used by the DNR. Ten different parameters will be measured (dissolved oxygen, temperature, pH, turbidity, flow, ammonia, nitrate, phosphate, alkalinity and coliform bacteria). Water quality data will be compiled and graphed. Each class of students will discuss the results, examine inputs to the river at each site and speculate on causes for variations between sites (i.e. the post-Marshall site is surrounded by agricultural fields compared to the mid-Marshall site which is adjacent to homes and a park). Discussions will include the importance of water conservation, and the challenges and responsibilities that the agricultural community faces relative to water conservation and protection of water resources. Partners from the MPCA and MN DNR will discuss their roles in statewide efforts to maintain healthy aquatic systems. Water quality values measured will also be examined relative to previous data collected since 2004. A post-assessment quiz will be administered to all students to determine the change in content knowledge. An additional assessment

instrument (survey) will be administered after the final class discussions to determine student attitudes about water conservation, about the connection between agricultural production and water quality and attitudes about the responsibilities of citizens (if any) to take an active role in community based conservation efforts. These activities will be repeated again spring 2017, fall 2017 and again spring 2018. Assessment data will be compiled at the end of each semester and evaluated. The goal is to achieve a post-assessment content quiz score of 75% or greater for 80% of the students involved in the project. A second goal is that at least 50% of the students will indicate that they value water conservation efforts and express a willingness to take an active role in community based conservation efforts. Based on the assessment data compiled each semester, modifications will be made to the teaching, mentoring process and class discussions, as needed, to try to achieve these goals.

Summary Budget Information for Activity 1:

ENRTF Budget: \$ 35,050
Amount Spent: \$ 0
Balance: \$ 35,050

Outcome	Completion Date
1. Equipment and expendable chemicals purchased	Aug 31, 2016
2. Twenty-four undergraduates enroll in LEP 100 or ENVS 115 (Fall semester 2016)	Aug 31, 2016
3. Twenty-four undergraduates demonstrate mastery of water quality equipment (Fall semester 2016)	Oct 25, 2016
4. Twenty-four undergraduates mentor 60 high school & 76 middle school students and complete assessment quiz (Fall semester 2016)	Nov 15, 2016
5. Three sites on Redwood River monitored for 10 parameters with 160 students (Fall semester 2016)	Nov 30, 2016
6. Data summarized and disseminated to SMSU website, world water monitoring database (Fall semester 2016)	Jan 15, 2017
7. Fall semester assessment data compiled and analyzed; results reported	Jan 15, 2017
8. Twenty-four undergraduates enroll in LEP 100 or ENVS 115 (spring semester 2017)	Jan 25, 2017
9. Twenty-four undergraduates demonstrate mastery of water quality equipment (spring semester 2017)	Mar 31, 2017
10. Twenty-four undergraduates mentor 60 high school & 76 middle school students and complete assessment quiz (spring semester 2017)	May 5, 2017
11. Three sites on Redwood River monitored for 10 parameters with 160 students (spring semester 2017)	May 15, 2017
12. Data summarized and disseminated to SMSU website, world water monitoring database (spring semester 2017)	June 15, 2017
13. Spring semester assessment data compiled and analyzed; results reported	July 15, 2017
14. Twenty-four undergraduates enroll in LEP 100 or ENVS 115 (Fall semester 2017)	Aug 31, 2017
15. Twenty-four undergraduates demonstrate mastery of water quality equipment (Fall semester 2017)	Oct 25, 2017
16. Twenty-four undergraduates mentor 60 high school & 76 middle school students and complete assessment quiz (Fall semester 2017)	Nov 15, 2017
17. Three sites on Redwood River monitored for 10 parameters with 160 students (Fall semester 2017)	Nov 30, 2017
18. Data summarized and disseminated to SMSU website, world water monitoring database (Fall semester 2017)	Jan 15, 2018
19. Fall semester assessment data compiled and analyzed; results reported	Jan 15, 2018
20. Twenty-four undergraduates enroll in LEP 100 or ENVS 115 (spring semester 2018)	Jan 15, 2018
21. Twenty-four undergraduates demonstrate mastery of water quality equipment (spring semester 2018)	Mar 31, 2017

22. Twenty-four undergraduates mentor 60 high school & 76 middle school students and complete assessment quiz (spring semester 2018)	May 5, 2018
23. Three sites on Redwood River monitored for 10 parameters with 160 students (spring semester 2018)	May 15, 2018
24. Data summarized and disseminated to SMSU website, world water monitoring database and MPCA (spring semester 2018)	June 15, 2018
25. Spring semester assessment data compiled and analyzed; Final results reported	July 15, 2018

Activity Status as of January 15, 2017:

Activity Status as of July 15, 2017:

Activity Status as of January 15, 2018:

Final Report Summary:

ACTIVITY 2: SMSU Ag Majors Mentor Future Farmers of America (FFA)

Description: Content and activities for a workshop on “Ag and Water Quality” would be developed by SMSU faculty working with partners from the DNR and MPCA. Information would include scientific principles related to river water quality and topics such as tile drainage systems, 50-ft buffer strips, *E. coli* and connections between agriculture and water quality. Working with SMSU agriculture faculty, SMSU Ag Education and Agronomy majors would be recruited to attend the 3-day interactive workshop, with a goal of 5-10 SMSU students attending. Partners from the MPCA and MN DNR will be involved in teaching the workshops. SMSU students will complete pre- and post-assessment quizzes to determine water conservation content knowledge and attitudes. The goal is to achieve a post-assessment content score of 75% or greater for 80% of the students involved in the project. The SMSU undergraduates will then attend three FFA meeting at Marshall High School doing hands-on activities with the 35-40 Marshall FFA students. SMSU students will teach the high school students about the MPCA Citizen Stream Monitoring Program (CSMP), and work with high school students doing hands-on monitoring of water using the methods of the CSMP program. SMSU students will encourage FFA students to develop an AgriScience Project (with mentoring by SMSU students) which will include adopting sites along local rivers to monitor as part of the MPCA Citizen Stream Monitoring Program (CSMP). As part of the CSMP, citizens adopt and monitor a local stream site weekly from April through September measuring stream transparency with a Secchi Tube and recording stream stage. Data is then entered into the state of Minnesota’s water quality database (EQuIS). The activity will considered a success if two or more students choose to adopt and monitor river sites as part of the MPCA Citizen Stream Monitoring Program.

Summary Budget Information for Activity 2:

ENRTF Budget: \$4,440
Amount Spent: \$ 0
Balance: \$ 4,440

Outcome	Completion Date
1.Content and activities created for “Ag and Water Quality” workshop	Mar 1, 2017
2.Five -ten SMSU undergrads attend “Ag and Water Quality’ workshop	Mar 25, 2017
3. Five-Ten SMSU students mentor 35-40 Marshall high school FFA students	April 30, 2017
4. Assessment data compiled and analyzed;	July 15, 2017
5. FFA students adopt 2 sites and monitor April –Sept; submit data to MPCA	Oct 15, 2017
6. Final results compiled and reported	Jan 15, 2018

Activity Status as of January 15, 2017:

Activity Status as of July 15, 2017:

Activity Status as of January 15, 2018:

Final Report Summary:

V. DISSEMINATION:

Description:

The water quality data collected each semester from the three sites in the Redwood River as part of Activity 1 will be posted on the SMSU website (<http://www.smsu.edu/rrmp/>) by the end of each semester. The local newspaper, The Marshall Independent, will be contacted and asked to write an article about the project in order to inform the local community about water quality issues. Data will also be posted on the World Water Monitoring Website (<http://www.monitorwater.org/>) each fall and shared with the Minnesota Pollution Control Agency (MPCA). Water quality data collected from sites adopted for monitoring as part of Activity 2 will be submitted by Oct 31, 2017 as part of the MPCA CSMP reporting protocols.

Status as of January 15, 2017:

Status as of July 15, 2017:

Status as of January 15, 2018:

Final Report Summary:

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget Overview:

Budget Category	\$ Amount	Overview Explanation
Personnel:	\$ 26,240	1 project manager at 4.7% FTE each year for 2 years (\$15, 427); 1 statistician at 2.6% FTE each year for 2 years (\$7,906); 1 microbiologist at 2.1% FTE for 1 year (\$2907)
Equipment/Tools/Supplies:	\$7,250	Vernier LabPro (12 ea) and probes (6 temperature, 2 dissolved oxygen, 2 pH, 4 turbidity, and 2 flow probes)(\$5400); LaMotte Water Quality Test Kits (2 pH, 2 nitrate-nitrogen, 2 phosphate , 2 dissolved oxygen, 2 alkalinity, 2 turbidity, 2 thermometers, 2 ammonia-nitrogen) (\$1000); Coliform Test kits (\$250) ; Secchi Tubes (\$600)
Travel Expenses in MN:	\$5,510	Busses to transport students and teachers for mentoring, and monitoring sites on Redwood River
TOTAL ENRTF BUDGET:	\$39,000	

Explanation of Use of Classified Staff: N/A

Explanation of Capital Expenditures Greater Than \$5,000: N/A

Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation: 0.167 FTE

Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation: N/A

B. Other Funds:

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
State			
Southwest Minnesota State University (cash)	\$52,566	\$	Teaching salary for Emily Deaver, project manager, to teach ENVS 115 or LEP 100 each semester, 25% FTE per year for 2 years
Southwest Minnesota State University (cash)	\$1000		General office support
TOTAL OTHER FUNDS:	\$53,566	\$	

VII. PROJECT STRATEGY:

A. Project Partners:

Project Partners Not Receiving Funding:

- SMSU Agronomy Faculty (Lee French and Kristin Kovar), recruiting Agriculture majors to participate in Activity 2
- Holly Knudson, Marshall High School Biology teacher
- Dr. Carrie Sueker, Marshall Middle School Science teacher
- Jason Kaare, Marshall High School Agriculture Education teacher and FFA Advisor
- Kyle Jarcho, hydrologist at MN Department of Natural Resources (DNR); assist with both activities
- Diana Macziewski, environmental specialist, MN Pollution Control Agency (MPCA);assist with both activities

B. Project Impact and Long-term Strategy:

As a result of these activities students will have a better understanding of water issues and, as they grow into adults, should take better care of local water resources. By educating over 690 students over the project period we hope to see an improvement in local water resources over time (i.e. improved water quality and reduced litter). The students are trained at many levels to be ‘citizen scientists’ collecting data that will be available to the public, posted on the SMSU website, shared with the MPCA and submitted as part of the CSMP. Ag majors will be encouraged to continue working with FFA students by earning internship credits through the Ag Education major. Once implemented, the project will continue as part of a long-term commitment between SMSU, MN DNR, MPCA and local public schools, impacting an additional 250-300 students per year. Future costs of the project include primarily expendable chemicals and bussing costs and will be funded through university lab fees at Southwest Minnesota State University.

C. Funding History: N/A

Funding Source and Use of Funds	Funding Timeframe	\$ Amount
N/A		\$

VIII. FEE TITLE ACQUISITION/CONSERVATION EASEMENT/RESTORATION REQUIREMENTS:

A. Parcel List: N/A

B. Acquisition/Restoration Information: N/A

IX. VISUAL COMPONENT or MAP(S): See attached graphic

X. RESEARCH ADDENDUM: N/A

XI. REPORTING REQUIREMENTS:

Periodic work plan status update reports will be submitted no later than January 15, 2017, July 15, 2017, and January 15, 2018. A final report and associated products will be submitted between June 30 and August 15, 2018.

**Environment and Natural Resources Trust Fund
M.L. 2016 Project Budget**

Project Title: Promoting Water Quality Stewardship through Student Mentoring and River Monitoring

Legal Citation: M.L. 2016, Chp. 186, Sec. 2, Subd. 05i

Project Manager: Emily Deaver

Organization: Southwest Minnesota State University

M.L. 2016 ENRTF Appropriation: \$39,000

Project Length and Completion Date: 2 years, June 30, 2018

Date of Report: May 29, 2016



ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Activity 1 Balance	Activity 2 Budget	Amount Spent	Activity 2 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	Mentoring and Monitoring Activities			Ag Workshop and Activities				
Personnel (Wages and Benefits)	\$21,800	\$0	\$21,800	\$4,440	\$0	\$4,440	\$26,240	\$26,240
Emily Deaver, Project Manager; \$15,427 (84.3% salary, 15.7% benefits); 4.7% FTE each year for 2 years								
Scott Peterson, statistician, \$7906 (84.3% salary, 15.7% benefits); 2.6% FTE each year for 2 years								
Tony Greenfield, microbiologist, \$2907 (84.3% salary, 15.7% benefits); 2.1% FTE for 1 year								
Professional/Technical/Service Contracts								
Equipment/Tools/Supplies								
Vernier LabPro (12 ea) and probes (6 temperature, 2 dissolved oxygen, 2 pH, 4 turbidity, and 2 flow probes)	\$5,400	\$0	\$5,400				\$5,400	\$5,400
LaMotte Water Quality Test Kits (2 pH, 2 nitrate-nitrogen, 2 phosphate, 2 dissolved oxygen, 2 alkalinity, 2 turbidity, 2 thermometers, 2 ammonia-nitrogen)	\$1,000	\$0	\$1,000				\$1,000	\$1,000
Coliform Test kits (88 tests)	\$250	\$0	\$250				\$250	\$250
Secchi Tubes (10 each)	\$600	\$0	\$600				\$600	\$600
Capital Expenditures Over \$5,000								
Fee Title Acquisition								
Easement Acquisition								
Professional Services for Acquisition								
Printing								
Travel expenses in Minnesota								
Busses to transport students for mentoring, and students and teachers to go to 3 sites on the Redwood River for monitoring for Fall 2016, Spring 2017, Fall 2017 and Spring 2018.	\$5,510		\$5,510				\$5,510	\$5,510
Other								
COLUMN TOTAL	\$34,560	\$0	\$34,560	\$4,440	\$0	\$4,440	\$39,000	\$39,000

Promoting Water Quality Stewardship through Student Mentoring and River Monitoring

