

## **2016 Project Abstract**

For the Period Ending June 30, 2018

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

**PROJECT MANAGER:** Emily Deaver

**AFFILIATION:** Southwest Minnesota State University

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**WEBSITE:** <http://www.smsu.edu/academics/programs/environmentalscience/redwood-river-monitoring-project.html>

**FUNDING SOURCE:** Environment and Natural Resources Trust Fund

**LEGAL CITATION:** M.L. 2016, Chp. 186, Sec. 2, Subd. 05i

**APPROPRIATION AMOUNT:** \$39,000

**AMOUNT SPENT:** \$37,132.14

**AMOUNT REMAINING:** \$1,867.86

### **Overall Project Outcome and Results**

In southwest Minnesota, over 80% of a typical watershed is used for agriculture which impacts stream water quality. Area citizens must be engaged in water quality efforts if progress is to be made in protecting local waterways. An ENRTF grant facilitated a partnership between Southwest Minnesota State University (SMSU), area public schools, and state agencies. SMSU agricultural undergraduates served as mentors to high school and middle school students while promoting stewardship of clean waters through river monitoring. Agricultural education undergraduates took a semester long course that taught water quality content and mentoring techniques. Students then traveled to public schools where they mentored 10<sup>th</sup> grade and 7<sup>th</sup> grade students in hands-on experience with test kits and meters. All students then traveled to the Redwood River to monitor ten parameters at three sites. A total of 644 students were involved in the project. Pre-post content quizzes showed significantly improved water conservation knowledge at all grade levels. A water conservation attitude scale indicated that after participating in the program, 100% of students at all grade levels agreed that water conservation is important. A civic engagement scale administered at the end of the semester indicated that students felt a responsibility to help conserve and improve water quality in their communities. Civic engagement and stewardship scale scores were also significantly higher for students at all three grade levels compared to control groups not involved in the project. Our results indicate that through these hands-on experiences, agricultural education students gained both content knowledge and a sense of civic responsibility and were able to successfully pass this information on to younger students. Educating agriculture students and engaging them in conservation and monitoring efforts will bridge the perceived conflict between agriculture production and water conservation efforts, while collecting useful water quality data for the state.

### **Project Results Use and Dissemination**

The project is described in detail on the SMSU website (<https://www.smsu.edu/academics/programs/environmentalscience/redwood-river-monitoring-project.html>) and includes information about the sampling sites, the parameters measured and acknowledgement of the funding sources. It also displays graphs of all the data from the beginning of the project in 2004 to present for each of the

10 parameters. One useful result of this project is the development of Civic Engagement and Stewardship scales that were used for evaluation of water conservation attitudes in the experimental group versus the controls (students not involved in the project). These are available for use with any future projects aiming to assess these values. Fall 2017, this project was highlighted on the DNR Website and in packets of information provided to the media as part of the *Governor's Pheasant Opener* which was held in Marshall on Oct. 14, 2017. An article appeared in the local newspaper, the *Marshall Independent* at that time. Several professional presentations were produced - an extended abstract was published and a poster presentation was given at the 2017 *North Central Regional Conference of the American Association for Agricultural Education (AAAE)* on Sept. 21-23, 2017 in Ames, Iowa, and an hour-long interactive session was presented at the *Minnesota Science Teachers' Association Conference (MnCOSE)* in St. Cloud, MN on November 10, 2017. In December of 2017 the SMSU alumni magazine, *SMSU Focus*, had a cover story about this project titled "Taking Water Testing to a Whole New Level". Another extended abstract was published and another poster presentation was given at the 2018 *American Association for Agricultural Education (AAAE) National Conference* on May 14-18 in Charleston, South Carolina. A video was also created by Alex Peterson at Studio 1- Marshall Community Access TV from footage taken on Oct. 13, 2017 at the middle sampling site, near the 7<sup>th</sup> Street Bridge. The video is accessible through One Drive at <https://1drv.ms/v/s!AnulpG6ag3kyiUUopAdfu1VpHxqZ> .



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

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**Date of Report:** July 18, 2018

**Final Report**

**Date of Work Plan Approval:** June 7, 2016

**Project Completion Date:** June 30, 2018

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

**Project Manager:** Emily Deaver

**Organization:** Southwest Minnesota State University

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**Location:** Lyon

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**Total ENRTF Project Budget:**

**ENRTF Appropriation:** \$39,000.00

**Amount Spent:** \$37,132.14

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**Balance:** \$1,867.86

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**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 ENVS 115) and learn about water quality and river monitoring techniques. SMSU students will then travel to area schools and mentor high school (10<sup>th</sup> grade) students who in turn teach 7<sup>th</sup> 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 3<sup>rd</sup> 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 10<sup>th</sup> grade students and two 7<sup>th</sup> 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 10<sup>th</sup> grade students, who mentor three classes of 7<sup>th</sup> 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:** Twenty-four undergraduates at Southwest Minnesota State University enrolled in a course and learned water quality and river monitoring techniques. On Oct. 13, 2016 they travelled to local schools and mentored 10<sup>th</sup> grade students, who in turn taught 7<sup>th</sup> grade students how to use test kits and meters to analyze water quality. Oct. 14th, 143 students traveled to the Redwood River and monitored water quality at 3 sites. Ten different water quality parameters were measured (dissolved oxygen, temperature, pH, turbidity, flow, ammonia, nitrate, phosphate, alkalinity and coliform bacteria). Evaluation of a Pre-Post Content quiz showed improved scores on the post-content quiz at all grade levels, compared to the pre-test. However, the goal of 80% of all students scoring 75% or better on the post-content quiz was not met, with 7<sup>th</sup> grade students scoring lowest. Mentoring activities will be modified to focus on transfer of information with emphasis on age appropriate language and context. A Civic Engagement/ Stewardship Survey administered to determine student attitudes about water conservation, and the responsibilities of citizens to take an active role in community based conservation efforts showed 100% of students at all grades agreed that water conservation is important. More than 73% of students indicated that they would likely participate in water conservation activities in the future. The project goal of having at least 50% of the students indicate that they value water conservation efforts and express a willingness to take an active role in community based conservation efforts was successfully met.

**Project Status as of July 15, 2017:** Activity 1 continued with undergraduates at Southwest Minnesota State University enrolled in a course where they learned water quality and river monitoring techniques. On April 10, 2017 they travelled to local schools and mentored 10<sup>th</sup> grade students, who in turn taught 7<sup>th</sup> grade students how to use test kits and meters to analyze water quality. April 11th, 139 students traveled to the Redwood River and monitored water quality at 3 sites. Ten different water quality parameters were measured. Evaluation of a Pre-Post Content quiz showed improved content knowledge in all groups of students. A Civic Engagement/ Stewardship Survey administered to determine student attitudes about water conservation, and the responsibilities of citizens showed 100% of students at all grades agreed that water conservation is important. The project goal of having at least 50% of the students indicate that they value water conservation efforts and express a willingness to take an active role in community based conservation efforts was successfully met. Activity 2 *SMSU Ag Majors Mentor Future Farmers of America (FFA)* was completed. Undergraduate Ag Education majors attended a 3-day workshop on "Ag and Water Quality", discussed topics with partners from the MPCA and MN DNR, and learned about the MPCA Citizen Stream Monitoring Program (CSMP). They then attended the Marshall High School FFA club meeting and taught FFA club members about the CSMP. SMSU Ag Ed students also visited two high school classes and demonstrated the CSMP protocols at a nearby pond. The remaining work to be done on this activity includes final analyses and assessments.

**Project Status as of January 15, 2018:** Activity 1 continued with undergraduates at Southwest Minnesota State University enrolled in a course where they learned water quality and river monitoring techniques. On Oct 12, 2017 they travelled to local schools and mentored 10<sup>th</sup> grade students, who in turn taught 7<sup>th</sup> grade students how to use test kits and meters to analyze water quality. Oct. 13, 154 students traveled to the Redwood River and monitored water quality at 3 sites. Ten different water quality parameters were measured. The river monitoring date was chosen to coordinate with media day associated with the *Governor's Pheasant Opener* which was held here in Marshall Oct. 14, 2017. This project was highlighted on the DNR Website and in packets of information provided to the media. Evaluation of a Pre-Post Content quiz showed improved content

knowledge in all groups of students on the Post Content quiz. A Civic Engagement/ Stewardship Survey administered to determine student attitudes about water conservation, and the responsibilities of citizens showed 100% of students at all grades agreed that water conservation is important. The project goal of having at least 50% of the students indicate that they value water conservation efforts and express a willingness to take an active role in community based conservation efforts was successfully met. Most of Activity 2 *SMSU Ag Majors Mentor Future Farmers of America (FFA)* was completed earlier. Information about this activity was presented at the *North Central Regional Conference of the American Association for Agricultural Education (AAAAE)* in Sept. 2017 in Ames, Iowa. The remaining work to be done on this activity includes some final summaries and assessments.

#### **Overall Project Outcomes and Results:**

In southwest Minnesota, over 80% of a typical watershed is used for agriculture which impacts stream water quality. Area citizens must be engaged in water quality efforts if progress is to be made in protecting local waterways. An ENRTF grant facilitated a partnership between Southwest Minnesota State University (SMSU), area public schools, and state agencies. SMSU agricultural undergraduates served as mentors to high school and middle school students while promoting stewardship of clean waters through river monitoring. Agricultural education undergraduates took a semester long course that taught water quality content and mentoring techniques. Students then traveled to public schools where they mentored 10<sup>th</sup> grade and 7<sup>th</sup> grade students in hands-on experience with test kits and meters. All students then traveled to the Redwood River to monitor ten parameters at three sites. A total of 644 students were involved in the project. Pre-post content quizzes showed significantly improved water conservation knowledge at all grade levels. A water conservation attitude scale indicated that after participating in the program, 100% of students at all grade levels agreed that water conservation is important. A civic engagement scale administered at the end of the semester indicated that students felt a responsibility to help conserve and improve water quality in their communities. Civic engagement and stewardship scale scores were also significantly higher for students at all three grade levels compared to control groups not involved in the project. Our results indicate that through these hands-on experiences, agricultural education students gained both content knowledge and a sense of civic responsibility and were able to successfully pass this information on to younger students. Educating agriculture students and engaging them in conservation and monitoring efforts will bridge the perceived conflict between agriculture production and water conservation efforts, while collecting useful water quality data for the state.

#### **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 10<sup>th</sup> grade and 7<sup>th</sup> 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 (10<sup>th</sup> grade) students who in turn teach 7<sup>th</sup> 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 10<sup>th</sup> grade students and two 7<sup>th</sup> 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 3<sup>rd</sup> 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: \$ 34,560.00**  
**Amount Spent: \$ 32,973.80**  
**Balance: \$ 1,586.20**

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

Fall 2016 twenty-four undergraduates enrolled in the course *Freshman Year Seminar: Redwood River Mentoring and Monitoring* (LEP 100). A pre-assessment quiz was administered to all SMSU students the first day of class to determine initial content knowledge. Equipment and expendable chemicals were purchased (Vernier LabPros with probes, LaMotte Water Quality test kits, and Coliform bacteria field kits) and the mentoring and monitoring dates were set as Oct. 13 and Oct 14, 2016. Middle School and High School students took a pre-assessment content quiz to determine their initial level of understanding and knowledge prior to beginning any instruction related to the project. On Oct. 5, 2016, SMSU students were tested on their mastery of water quality equipment through a lab practical exam in which they demonstrated how to use meters and test kits to analyze provided samples. The class average on the lab practical was 75.7%. SMSU students traveled by bus to Marshall Middle School on Thursday Oct. 13, 2016 and mentored 2 classes of high school (10<sup>th</sup> grade) students who in turn taught 2 classes of 7<sup>th</sup> grade students how to use test kits and meters to analyze water quality. A third class of 7<sup>th</sup> grade students was mentored directly by SMSU students. Twenty-four university students, 42 10<sup>th</sup> grade students and 77 seventh grade students were involved, for a total of 143 students. Water quality meters and test kits were transported from SMSU to the public schools so that students got hands-on experience learning to use the equipment during the mentoring activities. The mentoring was done in small groups: one (or two) SMSU undergraduates, two 10<sup>th</sup> grade students and two 7<sup>th</sup> grade students per group. Each group learned details and methods for two to three water quality parameters and got experience with both test kits and meters (see Table 1 below). The next day, Friday, Oct 14, 2016 all students traveled by bus to the Redwood River to monitor three sites: one site as the river comes into the town of Marshall (Pre Site, Wayside Rest), one site in the middle of town (Mid Site, Justice Park), and a 3<sup>rd</sup> site as the river leaves town (Post Site, Skunk Hollow Road). Equipment and meters were transported from SMSU to each river site. Students spent approximately an hour at each site analyzing river water samples and recording observations. Partners from the MN DNR joined students at the river and demonstrated flow rate and channel measurement equipment used by the DNR. Ten different water quality parameters were measured (dissolved oxygen, temperature, pH, turbidity, flow, ammonia, nitrate, phosphate, alkalinity and coliform bacteria). A water sample was collected and taken to the MN Dept. of Health lab in Marshall for analysis of coliform bacteria and *E. coli*. All water quality data was compiled (Table 2) and provided to each teacher. Each class of students discussed the results, examined inputs to the river at each site and speculated 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 included the importance of water conservation, the challenges and responsibilities that the agricultural community faces relative to water conservation and protection of water resources. Kyle Jarcho, the partner from the MN DNR visited each high school and 7<sup>th</sup> grade class on Monday Oct. 17, 2016 to help guide the discussion of the data and discussed the DNR's role in statewide efforts to maintain healthy aquatic systems. A post-assessment quiz was given to all students to determine the change in content knowledge. Evaluation of the pre and post content quizzes showed improved scores on the post-content quiz at all grade levels, compared to the pre-test. However, only 70% of 7<sup>th</sup> grade students scored 50% or higher on the post-content quiz, and only 15.5% scored 75% or higher. In addition only 37.5% of 10<sup>th</sup> grade students and 75% of the college students scored 75% or higher on the post-content quiz, well below the target of 80%. This reflects a discrepancy between class test scores and verbal content assessments given, which indicated a better understanding of the water quality content by all students. The responses to each question were evaluated in detail. It was clear that some areas of content knowledge were not being successfully transferred to the younger students (i.e. what is the minimum level of dissolved oxygen that will support most fish?). We will modify the mentoring activities to focus on more transfer of information from one grade level to the next, particularly focusing on age appropriate language and context. It was also found that two of the survey questions were poorly worded. These two questions were reworded for clarity and will be used future surveys. An additional assessment instrument (Civic Engagement/Stewardship Survey) was administered after the final class discussions to determine student attitudes about water conservation, and about the responsibilities of citizens (if any) to take an active role in community based conservation efforts. Analysis of this survey indicated that students at all levels value water conservation efforts: 100% of students at all grades agreed that water conservation is important. Interestingly, more than 90% felt that they could make more of an effort to prevent water pollution. Most students indicated that they would likely participate in water conservation activities in the future (73.9% of all 7<sup>th</sup> graders; 65.7% of 10<sup>th</sup> graders and 80% of college students), and most students also indicated that they felt a responsibility to help conserve water and improve water quality in their communities (82.6% of 7<sup>th</sup> graders; 74.3% of 10<sup>th</sup> graders; 65% of college students). The project had set a goal that at least 50% of the students would 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 so far, this goal is being met.

<b>Table 1. Example of Mentoring and Monitoring Groups for Post Site (Skunk Hollow Road)</b>			
	<b>SMSU</b>	<b>7th Grade</b>	<b>High School</b>
<b>GROUPS</b>		<b>POST Site</b>	
<b>Group 1 = Flow probe, Orange Method for flow, Ammonia Kit</b>	Todd Erickson Kelli Wentz	Andrea Jones Franziska Lubenow David Huback	Spencer Ehlers
<b>Group 2 = Flow probe, Orange Method for flow, Ammonia Kit</b>	Ben Thompson Lucas Tetrick	Taylor Ariasola, Hailey Brandt	Katie Ewing Lexi Schnaser
<b>Group 3 = Turbidity Probe, Turbidity Kit</b>	Mackenzie Athman	Kadam Brinkman Isabelle Cordes	KC Boerboom
<b>Group 4 = Turbidity Probe, Turbidity Kit</b>	Deena Weber George Lomeli	Flor Rodriguez Shelby Hauser	Bryce Paulsen
<b>Group 5 = DO Probe and DO Kit</b>	Emily Buysee	Cassie Hoover Bryant Paulsen	Parker Winkelman
<b>Group 6 = DO Probe and DO Kit</b>	Stephanie Athman Derek Michaelis	Emma Runchey- Smalley Jacob Eben	Bridget Appel
<b>Group 7 = Temperature Probe, Alkalinity Kit, pH kit</b>	Marcus Miller Laxmi Magar	Bryce Gile Reese Jensen	Ashtan Vlaminck

<b>Group 8 = Temperature Probe, Alkalinity Kit, pH kit</b>	Brittany Johnson Cole Olson	Allison Kopitski Jared Reinsma	Braedy Slagel
<b>Group 9 = Temperature Probe, Nitrate Kit, Secchi Tube</b>	Austin Mertens Pratima Dahal	Coltyn Marcy Emma Myhre	William Moua
<b>Group 10 = Temperature Probe, Nitrate Kit, Secchi Tube</b>	Taylor Harden Ryan Riebel	Sebaztian Payne Gabbi Schlenner	Hunter Smidt
<b>Group 11 = Temperature Probe, Phosphate Kit, pH kit</b>	Donavan Phoenix Katie Robling	Emma Mernaugh Elizabeth Weiss	Brett Wartner
<b>Group 12 = Temperature probe, Phosphate Kit, pH kit</b>	Haley Skorczewski Johnathan Weets	Ethan Omwoyo Carter Versaevel	Hodan Khalif Kayla Imker
<b>Group 13 = pH Probe and pH Kit, Secchi Tube</b>	Yangi Sherpa Zach Kelly- DeLorme	Brenton Thomas R'Moni Warner	Adam Welu Joe Burner

<b>Table 2. Redwood River Monitoring Data Averages from Fall 2016</b>			
<b>Analysis &amp; Method</b>	<b>Oct 14, 2016</b>		
	<b>Post-Marshall (Skunk Hollow)</b>	<b>Mid-Site (Justice Park)</b>	<b>Pre-Marshall (Wayside Rest)</b>
<b>Time Sampled</b>	0830-0910	1220-1315	1405-1440
<b>Flow rate (m/sec) LabPro Meter</b>	0.2135	0.4795 (Range 0.337 to 0.514)	0.289
<b>Orange flow method (m/sec)</b>	0.82	0.74	0.89
<b>Turbidity probe (NTU) LabPro meter</b>	16.59 (Range 14.08 to 18.11)	20 (Range 15 to 30)	25.98 (Range 17 to 37)
<b>Turbidity kit (JTU) LaMotte Kit</b>	23.75 (Range 15-35)	27.5 (Range 16.8 to 39.6)	18.75 (Range 15 to 25)
<b>Dissolved oxygen probe (mg/L) LabPro</b>	9.84	9.53	9.74
<b>Dissolved oxygen (mg/L) LaMotte kit</b>	9.7	9	10.1
<b>Temperature probe (°C) LabPro meter</b>	8.8	11	12.4
<b>Nitrate (LaMotte kit) mg/L (nitrate-nitrogen)</b>	8	4.5	4.25
<b>Phosphate kit (mg/L) (Orthophosphate)LaMotte</b>	0.4	0.4	0
<b>Ammonia-nitrogen (mg/L) LaMotte Kit</b>	0.1	Less than 0.1	0.1
<b>Alkalinity (LaMotte kit) (mg/L as CaCO<sub>3</sub>)</b>	285	248	232
<b>pH kit (LaMotte kit)</b>	7.4	7.45	7.4
<b>pH probe (LabPro meter)</b>	8.01	8.1	8.02
<b>Secchi Tube (cm)</b>	29 (range 23 to 33.5)	25 (Range 17.5 to 30)	32 (Range 25 to 38)
<b>Coliform Bacteria (<i>E. coli</i>)</b>	≥200	≥200	≥200

(MPN/ 100 ml)*			
*Coliform bacteria counts done by Mn Dept. of Health, Marshall, MN and given in most probable number (MPN) per 100 ml.			

**Activity Status as of July 15, 2017:** The Outcomes listed above for this time period have all been completed. Activity 1 continued with 24 undergraduates at Southwest Minnesota State University enrolled in a course where they learned water quality and river monitoring techniques. On April 10, 2017 they travelled to local schools and mentored 10<sup>th</sup> grade students, who in turn taught 7<sup>th</sup> grade students how to use test kits and meters to analyze water quality. April 11th, 139 students traveled to the Redwood River and monitored water quality at 3 sites. Ten different water quality parameters were measured. Evaluation of a Pre-Post Content quiz showed improved content knowledge in all groups of students, with statistically significant improvement in 7<sup>th</sup> grade and College age students. A Civic Engagement/ Stewardship Survey administered to determine student attitudes about water conservation, and the responsibilities of citizens showed 100% of students at all grades agreed that water conservation is important. The project goal of having at least 50% of the students indicate that they value water conservation efforts and express a willingness to take an active role in community based conservation efforts was successfully met. Interestingly, all groups of students in the project scored significantly higher on Civic Engagement and Stewardship attitudes than a control group of 10<sup>th</sup> grade students not involved in the project.

**Activity Status as of January 15, 2018:** The Outcomes listed above for this time period have all been completed. Activity 1 continued with 23 undergraduates at Southwest Minnesota State University enrolled in a course where they learned water quality and river monitoring techniques. On Oct 12, 2017 they travelled to local schools and mentored 10<sup>th</sup> grade students, who in turn taught 7<sup>th</sup> grade students how to use test kits and meters to analyze water quality. Oct. 13<sup>th</sup>, 154 students traveled to the Redwood River and monitored water quality at 3 sites. Ten different water quality parameters were measured. Evaluation of a Pre-Post Content quiz showed improved content knowledge in all groups of students, with a statistically significant improvement in content knowledge for all 3 grade levels. A Civic Engagement/ Stewardship Survey administered to determine student attitudes about water conservation, and the responsibilities of citizens, showed 100% of students at all grades agreed that water conservation is important. The project goal of having at least 50% of the students indicate that they value water conservation efforts and express a willingness to take an active role in community based conservation efforts was successfully met. All groups of students in the project scored higher on Civic Engagement attitudes than a control group of college students not involved in the project, indicating that the project is having a positive impact on student attitudes.

**Final Report Summary:** Activity 1 continued spring 2018 with 19 undergraduates at Southwest Minnesota State University enrolled in a course where they learned water quality and river monitoring techniques. All proposed work related to this activity was completed. The majority of the students enrolled were agricultural education majors. On April 15, 2018 they travelled to local schools and mentored 10<sup>th</sup> grade students, who in turn taught 7<sup>th</sup> grade students how to use test kits and meters to analyze water quality. On April 19th, 147 students traveled to the Redwood River and monitored water quality at 3 sites. Ten different water quality parameters were measured. A total of 583 students were involved in Activity 1 of this project. Evaluation of Pre-Post Content quizzes showed improved content knowledge in all groups of students, with a statistically significant improvement in content knowledge for all 3 grade levels. Overall content knowledge increased with increasing grade level- 10<sup>th</sup> grade students scored higher than 7<sup>th</sup> grade and college students scored highest on content knowledge. Civic Engagement/ Stewardship Surveys administered to determine student attitudes about water conservation and the responsibilities of citizens, showed 100% of students at all grades agreed that water conservation is important. The project goal of having at least 50% of the students indicate that they value water conservation efforts and express a willingness to take an active role in community based conservation efforts was successfully met each of the 4 semesters this project was administered. All groups of students in the project scored higher on Civic Engagement attitudes than control groups of college and 10<sup>th</sup> grade students not

involved in the project, indicating that the project is having a positive impact on student attitudes. One useful result of this project is the development of Civic Engagement and Stewardship scales/ surveys that were used for evaluation of water conservation attitudes in the experimental group versus the controls (students not involved in the project). These are available for use with any future projects aiming to assess these values. Our overall results indicate that through these hands-on experiences, agricultural education college students gained both content knowledge and a sense of civic responsibility and were able to successfully pass this information on to younger students. Educating agriculture students and engaging them in conservation and monitoring efforts will bridge the perceived conflict between agriculture production and water conservation efforts, while collecting useful water quality data for the state.

## **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 be 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: \$ 4158.34**  
**Balance: \$ 281.66**

<b>Outcome</b>	<b>Completion Date</b>
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:** This activity is still in the planning stages. Jason Kaare, the Marshall High School Agriculture Education teacher and FFA Advisor who was involved in initially planning Activity 2 for the grant, left Marshall Summer 2016. A new Agriculture Education teacher, Emma Hoversten, was hired at Marshall High School fall 2016. I met with her in Dec 2016 and she agreed to participate in the grant as we had previously discussed with Jason, so Activity 2 should continue on schedule as planned.

**Activity Status as of July 15, 2017:** All Outcomes listed above for this time period for Activity 2 *SMSU Ag Majors Mentor Future Farmers of America (FFA)* were completed. Six undergraduate Ag Education majors attended a 3-

day workshop on “Ag and Water Quality” (Feb. 25, March 17 and March 18, 2017), discussed topics with partners from the MPCA and MN DNR, and learned about the MPCA Citizen Stream Monitoring Program (CSMP). Six SMSU Ag Ed students then attended the Marshall High School FFA club meeting and taught approximately 25 FFA club members about the CSMP. Four SMSU Ag Ed students and their faculty advisor also visited two different high school Fish and Wildlife classes (April 12 and April 21, 2017) taught by the FFA club advisors, and demonstrated the CSMP protocols at a nearby pond. As a result of these activities, one student chose to volunteer for the CSMP program. Final assessments of this activity will be completed during the next few months.

**Activity Status as of January 15, 2018:** All Outcomes listed above for this time period for Activity 2 *SMSU Ag Majors Mentor Future Farmers of America (FFA)* were completed. One student who volunteered for the Citizen Stream Monitoring Program (CSMP) completed the monitoring and submitted the data to the MPCA. Information about this activity was presented at the 2017 *North Central Regional Conference of the American Association for Agricultural Education (AAAE)* on Sept. 21-23, 2017 in Ames, Iowa. A final summary assessment will be completed during the last few months of the grant.

**Final Report Summary:** All outcomes for Activity 2 were completed and an overall evaluation completed. A total of 61 students were involved in this activity, with one student volunteering for the CSMP program. Evaluation of comments from the college students indicated that they particularly valued the presentations done by the partners at the MPCA and DNR and learning about the role of those agencies in water quality during the “Ag and Water Quality” workshop. Pre-post content quizzes indicated improved content knowledge at the end of the 3-day workshop for all students. Having agricultural education college students work with high school Fish and Wildlife classes in hands-on field activities at a nearby pond was more successful than meeting with the FFA club students. Hands-on use of field equipment at a nearby pond provided more one-on-one engagement between high school students and their college mentors. As a result of this activity, one student chose to volunteer for the MPCA Citizen Stream Monitoring Program to monitor a river site near his home. He has continued with this volunteer activity since he began it spring 2017. Educating agriculture students and engaging them in conservation and monitoring discussions is an important step in bridging the perceived conflict between agriculture production and water conservation efforts.

## **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:** The Redwood River Mentoring and Monitoring pages on the SMSU website have been updated. Language acknowledging funding from the ENRTF was added to the website and all of the water quality data collected as part of Activity 1 was posted. The data was also uploaded to the World Water Monitoring Website (<http://www.monitorwater.org/>) and sent to the Minnesota Pollution Control Agency (MPCA).

**Status as of July 15, 2017:** The Redwood River Mentoring and Monitoring pages on the SMSU website have been updated with the most recent data collected spring 2017. In addition, abstracts were submitted to present information about this project at two different professional conferences. A presentation will be made in November 10, 2017 at the *Minnesota Science Teachers’ Association Conference (MnCOSE)* in St. Cloud, MN. A second application was submitted to present a poster at the 2017 North Central Regional Conference of the

American Association for Agricultural Education (AAAE) Sept. 21-23, 2017 in Ames, Iowa. We are waiting to hear if the abstract has been accepted.

**Status as of January 15, 2018:** The Redwood River Mentoring and Monitoring pages on the SMSU website have been updated with the most recent data collected fall 2017. The river monitoring date this fall was chosen to coordinate with media day associated with the *Governor's Pheasant Opener* which was held here in Marshall Oct. 14, 2017. This project was highlighted on the DNR Website and in packets of information provided to the media. An article appeared in the local newspaper, the Marshall Independent. In addition, a poster presentation was done at the 2017 *North Central Regional Conference of the American Association for Agricultural Education* (AAAE) on Sept. 21-23, 2017 in Ames, Iowa, and an hour-long interactive session was done in at the *Minnesota Science Teachers' Association Conference* (MnCOSE) in St. Cloud, MN on November 10, 2017. In December of 2017 the SMSU alumni magazine, *SMSU Focus*, had a cover story about this project titled "Taking Water Testing to a Whole New Level".

**Final Report Summary:** The project is described in detail on the SMSU website (<https://www.smsu.edu/academics/programs/environmentalscience/redwood-river-monitoring-project.html>) and includes information about the sampling sites, the parameters measured and acknowledgement of the funding sources. It also displays graphs of all the data from the beginning of the project in 2004 to present for each of the 10 parameters. One useful result of this project is the development of Civic Engagement and Stewardship scales that were used for evaluation of water conservation attitudes in the experimental group versus the controls (students not involved in the project). These are available for use with any future projects aiming to assess these values. Fall 2017, this project was highlighted on the DNR Website and in packets of information provided to the media as part of the *Governor's Pheasant Opener* which was held in Marshall on Oct. 14, 2017. An article appeared in the local newspaper, the *Marshall Independent* at that time. Several professional presentations were produced - an extended abstract was published and a poster presentation was given at the 2017 *North Central Regional Conference of the American Association for Agricultural Education* (AAAE) on Sept. 21-23, 2017 in Ames, Iowa, and an hour-long interactive session was presented at the *Minnesota Science Teachers' Association Conference* (MnCOSE) in St. Cloud, MN on November 10, 2017. In December of 2017 the SMSU alumni magazine, *SMSU Focus*, had a cover story about this project titled "Taking Water Testing to a Whole New Level". Another extended abstract was published and another poster presentation was given at the 2018 *American Association for Agricultural Education* (AAAE) *National Conference* on May 14-18 in Charleston, South Carolina. A video was also created by Alex Peterson at Studio 1- Marshall Community Access TV from footage taken on Oct. 13, 2017 at the middle sampling site, near the 7<sup>th</sup> Street Bridge. The video is accessible through One Drive at <https://1drv.ms/v/s!AnulpG6ag3kyiUUopAdu1VpHxqZ>.

## VI. PROJECT BUDGET SUMMARY:

### A. ENRTF Budget Overview:

Budget Category	\$ Amount	Overview Explanation
Personnel:	\$25,859.56	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:	\$6975.08	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:	\$4297.50	Busses to transport students and teachers for mentoring, and monitoring sites on Redwood River
<b>TOTAL ENRTF BUDGET:</b>	<b>\$37,132.14</b>	

**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
<b>State</b>			
Southwest Minnesota State University (cash)	\$52,566	\$53,749	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	\$1000	General office support
<b>TOTAL OTHER FUNDS:</b>	<b>\$53,566</b>	<b>\$54,749</b>	

**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 640 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 Education 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 Final 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:** July 18, 2018



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
<b>BUDGET ITEM</b>	<b>Mentoring and Monitoring Activities</b>			<b>Ag Workshop and Activities</b>				
<b>Personnel (Wages and Benefits)</b>	\$21,800	\$21,701.22	\$98.78	\$4,440	\$4,158.34	\$281.66	\$26,240	\$380.44
Emily Deaver, Project Manager; \$15,427 (84.3% salary, 15.7% benefits); 4.7% FTE each year for 2 years		\$11,912.27			\$3,321.63			
Scott Peterson, statistician, \$7906 (84.3% salary, 15.7% benefits); 2.6% FTE each year for 2 years		\$7,004.99			\$836.71			
Tony Greenfield, microbiologist, \$2907 (84.3% salary, 15.7% benefits); 2.1% FTE for 1 year		\$2,783.96						
<b>Professional/Technical/Service Contracts</b>								
<b>Equipment/Tools/Supplies</b>								
Vernier LabPro (12 ea) and probes (6 temperature, 2 dissolved oxygen, 2 pH, 4 turbidity, and 2 flow probes)	\$5,400	\$5,400.00	\$0.00				\$5,400	\$0.00
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	\$832.19	\$167.81				\$1,000	\$167.81
Coliform Test kits (88 tests)	\$250	\$142.89	\$107.11				\$250	\$107.11
Secchi Tubes (10 each)	\$600	\$600.00	\$0.00				\$600	\$0.00
<b>Capital Expenditures Over \$5,000</b>								
<b>Fee Title Acquisition</b>								
<b>Easement Acquisition</b>								
<b>Professional Services for Acquisition</b>								
<b>Printing</b>								
<b>Travel expenses in Minnesota</b>								
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	\$4,297.50	\$1,212.50				\$5,510	\$1,212.50
<b>Other</b>								
<b>COLUMN TOTAL</b>	<b>\$34,560</b>	<b>\$32,973.80</b>	<b>\$1,586.20</b>	<b>\$4,440</b>	<b>\$4,158.34</b>	<b>\$281.66</b>	<b>\$39,000</b>	<b>\$1,867.86</b>

## Promoting Water Quality Stewardship through Student Mentoring and River Monitoring

