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Urban Watersheds Project
Table of Contents

Table of Contents .............................................................................................................................................. 2
Introduction ....................................................................................................................................................... 3

Section 1: Science Standards Applied .................................................................................................................. 4
1.1 Texas Stream Team ..................................................................................................................................... 4
1.2 Texas Parks & Wildlife - Texas Nature Trackers ....................................................................................... 4
1.3 Texas Parks & Wildlife – Project WILD Aquatic ....................................................................................... 4

Section 2: Persons Involved ............................................................................................................................... 5

Section 3: Activities Performed .......................................................................................................................... 5
3.1 Teacher Workshops .................................................................................................................................... 5
3.2 Monitoring Field Investigations .................................................................................................................. 6
3.3 Interventions .............................................................................................................................................. 7

Section 4: Evaluations ......................................................................................................................................... 8
4.1 Measuring Environmental Literacy .............................................................................................................. 8
4.2 Findings & Successes .................................................................................................................................. 10
4.3 Teacher Progress Report ............................................................................................................................. 12

Section 5: Problems Encountered & How They Were Resolved ....................................................................... 13
5.1 Staffing Issues .......................................................................................................................................... 13
5.2 School Issues .......................................................................................................................................... 13
5.3 Training Issues ........................................................................................................................................... 14

Section 6: Successes & Recommendations for Future Project Iterations ........................................................... 15
6.1 Success Stories .......................................................................................................................................... 15
6.2 Future Recommendations ........................................................................................................................... 15

Section 7: EPA Priorities Addressed .................................................................................................................... 16
7.1 Linkage to EPA’s Strategic Plan ................................................................................................................... 16
7.2 Linkage to EPA’s environmental priorities .................................................................................................. 17

References ......................................................................................................................................................... 18

Appendix A – Service Learning Activities ........................................................................................................... 19

Appendix B - Pre & Post Test Questions ............................................................................................................. 20

Appendix C - Middle School Mobility Rating Report ......................................................................................... 22
Introduction

The Urban Watersheds (UW) grant project was funded through a U.S. Environmental Protection Agency (EPA) Environmental Education Grant awarded October 1, 2009. The EPA awarded $83,962 and the recipient contribution was $31,440 through local and state partnerships. The project combined three environmental education programs - Texas State University’s River Systems Institute - Texas Stream Team (TST); Texas Parks and Wildlife Department (TPWD) Texas Nature Trackers; and TPWD-Project WILD Aquatic. The three education programs have been working together since Texas Stream Team’s inception. The previous grant project, Learning Urban Watersheds, is an example of a prior coordinated project. Learning Urban Watersheds was the precursor model to Urban Watersheds Project and was funded through a U.S. EPA Environmental Education Grant that was awarded September 20, 2005.

The goal of the UW project was to increase environmental literacy and stewardship among middle school students in an impaired watershed, with the ultimate goal of preventing pollution and improving water quality.

Two middle schools in Corpus Christi were recruited to participate in the UW project. Claude Cunningham Middle School received the education program of the UW grant project and served as the Treatment school. Sterling Martin Middle School was the Control school of the UW project. The project study was structured based on the Solomon 4-Group design.

Findings for year one showed that sixth grade students receiving the project’s education program in the Treatment school scored better on the higher-level skills (Functional and Operational), such as knowledge about the local watershed, conservation ethic, and personal conservation action. No differences were indicated between the Treatment and Control schools on the Nominal subset of the test (e.g. definitions, life cycle of frog). See subsection 4.1 Measuring Environmental Literacy for more details.

Findings for year two showed that sixth grade students in the Treatment school scored significantly higher on the post-test than the Control school. Seventh grade students in the Treatment school showed no significant differences in post-test scores compared to the Control school.

This report details grant activities between June 1, 2010 and October 1, 2012.

The project deadline was changed to October 1, 2012 with a no cost extension change request on June 27, 2011.
Section 1: Science Standards Applied

The Urban Watersheds project applied pre-existing education training procedures and curriculum materials that have been developed by TST, TPWD – Texas Nature Trackers (Texas Amphibian Watch), and Project WILD Aquatic. Each program maintains scientific standards for the relevant procedures and curriculum. All three programs are endorsed by the Texas Education Agency through its Texas Environmental Education Advisory Committee (TEEAC).

1.1 Texas Stream Team

Texas Stream Team maintains a Quality Assurance Project Plan (QAPP) on file with the EPA and the Texas Commission on Environmental Quality (TCEQ). The purpose of the QAPP is to clearly delineate quality assurance policy, management structure, and policies that will be used to implement the quality assurance requirements necessary to document the reliability and validity of environmental data. This assures data reliability and therefore can be used for educational purposes, local decision-making, research, screening and problem identification and other uses deemed appropriate by resource managers and the TCEQ. All of the water quality monitoring training and education activities are aligned with the Texas Essential Knowledge and Skills (TEKS) and are approved by the State Board of Education for teacher continuing education credit in environmental science.

1.2 Texas Parks & Wildlife - Texas Nature Trackers

TPWD biologists review all data collected by Texas Nature Trackers volunteer monitors. Volunteers undergo science-based training to become a monitor. Volunteers receive backup materials that have been developed by TPWD biologists and science educators. All of the activities are aligned with the TEKS and are approved by the State Board of Education for teacher continuing education credit in environmental science <http://www.tpwd.state.tx.us/huntwild/wild/wildlife_diversity/texas_nature_trackers/>.

1.3 Texas Parks & Wildlife – Project WILD Aquatic

Project WILD is endorsed by the Texas Education Agency through the TEEAC, and the State Board for Educator Certification. Project WILD activities develop conceptual skills such as analysis, classification, description, estimation, evaluation, inference, hypothesis formation, and problem solving and are correlated with TEKS. Project WILD has earned the endorsement of organizations including the California Board of Education, the National Council for the Social Studies, and the International Association of Fish and Wildlife Agencies <http://www.tpwd.state.tx.us/learning/project_wild/>.
Section 2: Persons Involved

<table>
<thead>
<tr>
<th>NAME</th>
<th>ASSOCIATION</th>
<th>TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emily Warren</td>
<td>River Systems Institute-Texas Stream Team</td>
<td>Program Director</td>
</tr>
<tr>
<td>Jennifer Mandel Buratti</td>
<td>Texas Stream Team, UW Project Leader</td>
<td>Education &amp; Outreach Coordinator</td>
</tr>
<tr>
<td>Neal Denton</td>
<td>Texas Stream Team</td>
<td>QA Officer (former)</td>
</tr>
<tr>
<td>David Boylan</td>
<td>Texas Stream Team</td>
<td>Volunteer Trainer, Contractor</td>
</tr>
<tr>
<td>Cheryl Boyette</td>
<td>Boyette Consulting</td>
<td>Evaluation Contractor</td>
</tr>
<tr>
<td>Jennifer Welch</td>
<td>Claude Cunningham Middle School</td>
<td>STEM 6th Grade Science Teacher</td>
</tr>
<tr>
<td>Patricia Castillo</td>
<td>Claude Cunningham Middle School</td>
<td>School Principal (former)</td>
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<tr>
<td>Hillary (Kramer) Blair</td>
<td>Claude Cunningham Middle School</td>
<td>TSTEM Coordinator (former)</td>
</tr>
<tr>
<td>Marsha May</td>
<td>Texas Parks &amp; Wildlife Department</td>
<td>Texas Nature Trackers Program</td>
</tr>
<tr>
<td>Leeann Linam</td>
<td>Texas Parks &amp; Wildlife Department</td>
<td>Texas Nature Trackers Program</td>
</tr>
</tbody>
</table>

Section 3: Activities Performed

3.1 Teacher Workshops

Summer 2010 Workshop

Texas Stream Team project managers met with partners by phone and communicated via email with others to coordinate and plan the summer 2010 teacher workshop. Trainers:

- Day 1: Project WILD Aquatic – Texas State Aquarium – Auburn Carpenter
- Day 2: Texas Stream Team – Neal Denton & Jennifer Mandel Buratti
- Day 3: TPWD – Texas Nature Trackers – Marsha May

Training for 6th grade teachers was held on July 26-28, 2011 at Texas A & M University – Corpus Christi.
SUMMER 2011 WORKSHOP
Water quality monitoring training for new 6th grade teachers and 7th grade teachers participating in the grant was held on July 13, 2011 at Texas A & M University – Corpus Christi.

3.2 Monitoring Field Investigations
The trained teachers were charged with the implementation of the monitoring activities and associated curriculum. Pre-tests were taken prior to field investigations (August-September) and post-test were taken in May, after monitoring was completed.

FALL 2010 WATER QUALITY MONITORING
- Nov 30-Dec 2 – 6th grade field trip
- Dec 14-16 – 6th grade field trip

TST curriculum was used in 6th grade Language Arts course.

SPRING 2011 AMPHIBIAN, REPTILE & WATER QUALITY MONITORING
- March 21-23 – 6th grade field trip
- May 16-19 – 6th grade field trip

FALL 2011 WATER QUALITY MONITORING
- Nov 2-4 – 6th grade field trip
- Nov 9-11 – 7th grade field trip (E. coli monitoring)

SPRING 2012 AMPHIBIAN, REPTILE & WATER QUALITY MONITORING
- Feb 20–22 – 6th graders field trip
- February 27-29 – 7th graders field trip
- May 14-16 – 6th and 7th graders field trip
3.3 Interventions

**Midyear Intervention**

Jennifer Buratti, UW project team leader, spent three days with Cunningham students and teachers in fall 2010 in order to prepare them for their first field trip.

In January 2011, TST discussed with Treatment school’s TSTEM coordinator, Hillary Kramer, interventions for Amphibian Watch monitoring as well as fall 2011 intervention visits/field support. Additionally, a preliminary plan for the 2011 Summer Teacher Workshop was established.

Texas Nature Trackers program intervention required a supplemental teacher training on March 3, 2011 by Texas Parks and Wildlife. Biologist, Leeann Linam, also accompanied teachers on their first student field investigation in March 2011. The intervention allowed Ms. Linam to gain a better understanding of the monitoring location and its limitations.

Ms. Linam concluded that the students should incorporate reptile monitoring, specifically turtles. Furthermore, students were advised to monitor local ponds due to required daytime monitoring (the school could not sponsor after sunset monitoring events) and the lack of amphibians at the Oso Creek location.
Section 4: Evaluations

4.1 Measuring Environmental Literacy

The evaluation of the Urban Watersheds Project was designed to measure the effectiveness of the program in improving student’s environmental literacy and stewardship. The quantitative measure of the success of this project was a test instrument developed during a pilot project that used Roth’s definitions of environmental literacy. The definition categorizes levels of knowledge, understanding, attitudes, and action relating to an environmental concept or issue.

Levels of literacy are generally assumed to exist but are not often defined (Disinger and Roth, 1992). Roth proposed the identification of three levels used in this project:

- **Nominal** - ability to recognize many of the basic terms used in communicating about the environment and to provide rough, if unsophisticated, working definitions of their meanings;

- **Functional** - a broader knowledge and understanding of the nature and interactions between human social systems and other natural systems; and

- **Operational** - progress beyond functional literacy in both the breadth and depth of understandings and skills (Roth, 1992).

**METHODS**

Changes in environmental literacy were collected using a pre- and post-test control group experiment. A Solomon 4-Group design was planned but was only implemented at the Control school due to time and equipment constraints at the Treatment school. The test includes 35 items with a Cronbach’s alpha reliability score of .809(year 1) and .727(year 2).

Students were given an online (SurveyMonkey) pre-test at the beginning and an identical post-test at the end of the year (pre- and post-test questions in Appendix B). Data were gathered and saved by SurveyMonkey and downloaded for analysis by the project evaluator. The seventh grade students were tested in the second year of the project using a pre- and post-test design with a control group.

The questions of the pre- and post-test questions were developed by the project trainers and reviewed by teachers at the 2010 Teacher Workshop. Each question was categorized as nominal, functional or operational. These categories enabled the project evaluator to analyze students’ levels of environmental literacy and changes in those levels over time. Students were also assessed for their attitudes toward the issue of water quality.
The evaluator performed the following statistical tests in the data analysis:

- descriptive statistics,
- cross tabulations,
- analysis of variance,
- t-tests,
- correlations,
- and chi-square tests.

### TESTING SCHEDULE

<table>
<thead>
<tr>
<th></th>
<th>Cunningham Middle School (Treatment school)</th>
<th>Martin Middle School (Control school)</th>
</tr>
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<tr>
<td><strong>Fall 2010 Pre-Tests</strong></td>
<td>September 13-17&lt;sup&gt;th&lt;/sup&gt;</td>
<td>September 21&lt;sup&gt;st&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Spring 2011 Post-Tests</strong></td>
<td>Cunningham Middle School</td>
<td>May 15-21&lt;sup&gt;st&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Martin Middle School</td>
<td>May 15-21&lt;sup&gt;st&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Fall 2011 Pre-Tests</strong></td>
<td>Cunningham Middle School (Treatment school)</td>
<td>August 29, September 2</td>
</tr>
<tr>
<td></td>
<td>Martin Middle School (Control school)</td>
<td>August 29, September 2</td>
</tr>
<tr>
<td><strong>Spring 2012 Post-Tests</strong></td>
<td>Cunningham Middle School</td>
<td>May 8-11&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td></td>
<td>Martin Middle School</td>
<td>May 15-21&lt;sup&gt;st&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

### DEMOGRAPHICS

<table>
<thead>
<tr>
<th>School</th>
<th>Pre-test n</th>
<th>Post-test n</th>
<th>% Hispanic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>95</td>
<td>170</td>
<td>Both schools are over 90% Hispanic leaving numbers too small for other analysis or comparisons relating to ethnicity.</td>
</tr>
<tr>
<td>Control</td>
<td>83</td>
<td>165</td>
<td></td>
</tr>
</tbody>
</table>
4.2 Findings & Successes

YEAR 1 GRADE 6 RESULTS

No significant differences were observed between the Treatment school scores and the Control school scores on the pre-test. Both schools showed significant increases between their pre-test and post-test scores (Table 1). The Treatment schools scores were significantly higher than the Control school scores. Significance for this study was set at p=.05.

Table 1. Mean Pre-test and Post-test Scores for the Treatment and Control 6th Grade in Year 1.

<table>
<thead>
<tr>
<th>Group</th>
<th>Condition</th>
<th>N</th>
<th>Mean</th>
<th>Sig. 2-tailed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>Pretest</td>
<td>95</td>
<td>17.98</td>
<td>17.98</td>
</tr>
<tr>
<td>Control</td>
<td>Pretest</td>
<td>83</td>
<td>19.58</td>
<td>19.58</td>
</tr>
<tr>
<td>Treatment</td>
<td>Posttest</td>
<td>170</td>
<td>50.46</td>
<td>50.46</td>
</tr>
<tr>
<td>Control</td>
<td>Posttest</td>
<td>165</td>
<td>44.10</td>
<td>44.10</td>
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</table>

Of particular interest was the effect of the program on the Functional and Operational level subset scores, which include the higher level thinking skills, knowledge about local watershed, conservation ethic, and personal conservation action. These were the subsets of the test that showed significant differences between the Treatment and Control schools. No differences were indicated between the two schools on the Nominal subset of the test. This appears to indicate that the treatment has its greatest influence on the higher-level skills.

YEAR 2 GRADE 6 RESULTS

The second year of the study supports findings of the first year and adds to the reliability of the test instrument (Chronbach’s alpha year2 = .727). No significant differences were observed between the Treatment and Control school on the pre-test. Table 2 displays the observations of the pre- and post-test scores for the Treatment and Control schools. Independent samples t-test indicated statistical difference between the Treatment and Control school on the post-test (p=.000) at the 0.05 level. Treatment school scores were significantly higher on the post-test than the Control school post-test scores.

Table 2. Mean Pre-test and Post-test Scores for the Treatment and Control 6th Grade in Year 2.

<table>
<thead>
<tr>
<th>Group</th>
<th>Condition</th>
<th>N</th>
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<th>Sig. 2-tailed</th>
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<tbody>
<tr>
<td>Treatment</td>
<td>Pretest</td>
<td>86</td>
<td>37.74</td>
<td>.754</td>
</tr>
<tr>
<td>Control</td>
<td>Pretest</td>
<td>77</td>
<td>41.65</td>
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</tr>
<tr>
<td>Treatment</td>
<td>Posttest</td>
<td>79</td>
<td>60.70</td>
<td>.000</td>
</tr>
<tr>
<td>Control</td>
<td>Posttest</td>
<td>193</td>
<td>40.93</td>
<td>.000</td>
</tr>
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</table>
**Year 2 Grade 7 Results**

While no significant differences were observed in the post-test scores of the two schools, there was a significant difference in the pre-test scores (Table 3). The Control school had significantly higher scores on the pre-test; this indicates a leveling effect of the program bringing Treatment school students up-meeting higher scores of the Control school. One possible explanation for the pre-test score differences may be seen in the student response to the test question: “Do you attend a STEM (Science, Technology, Engineering, and Mathematics) Academy at your school?” Over 50% of the Control group students indicated that they do participate in such an academy within their school. These students may have an increased interest and/or knowledge in the area of science that skewed the results. The rate of student population turnover may have an influence on student scores. According to 2009-2012 data about Campus Mobility Rates, Cunningham Middle School has a 20% rate and Martin Middle School has a 24.8% rate (Mobility Rating Report, Appendix C). The UW project design was aimed at building and reinforcing on the previous year’s student experiences and knowledge gained. If a large influx of new students occurred at the treatment school, scores may have been influenced. The Texas Education Agency calculates mobility ratings a year behind. The data in Appendix C is the most recent data available.

<table>
<thead>
<tr>
<th>Group</th>
<th>Condition</th>
<th>N</th>
<th>Mean</th>
<th>Sig. (2-tailed)</th>
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<tbody>
<tr>
<td>Treatment</td>
<td>Pretest</td>
<td>53</td>
<td>1.5</td>
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<tr>
<td>Control</td>
<td>Pretest</td>
<td>168</td>
<td>17.5</td>
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<tr>
<td>Treatment</td>
<td>Posttest</td>
<td>161</td>
<td>16.61</td>
<td>.289</td>
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<tr>
<td>Control</td>
<td>Posttest</td>
<td>168</td>
<td>14.64</td>
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**Findings Analysis**

Analysis continues to support the influence of the program on the higher levels of Roth’s categories of environmental literacy. **Table 4** shows that the program affects the Functional, Operational, and Attitudes categories which include higher level thinking skills, knowledge about local watersheds, conservation ethic, and personal conservation actions.

**Table 4. Program affects the Functional, Operational, and Attitudes.**

<table>
<thead>
<tr>
<th>Level</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>Sig 2-tailed</th>
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<tbody>
<tr>
<td>Nominal</td>
<td>Treatment</td>
<td>79</td>
<td>3.34</td>
<td>1.08</td>
<td>.838</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>193</td>
<td>3.37</td>
<td>1.42</td>
<td></td>
</tr>
<tr>
<td>Functional</td>
<td>Treatment</td>
<td>79</td>
<td>3.77</td>
<td>1.34</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>193</td>
<td>2.56</td>
<td>1.47</td>
<td></td>
</tr>
<tr>
<td>Operational</td>
<td>Treatment</td>
<td>79</td>
<td>8.67</td>
<td>3.34</td>
<td>.000</td>
</tr>
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<td></td>
<td>Control</td>
<td>193</td>
<td>4.69</td>
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<tr>
<td>Attitudes</td>
<td>Treatment</td>
<td>79</td>
<td>9.06</td>
<td>1.67</td>
<td>.000</td>
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<td></td>
<td>Control</td>
<td>193</td>
<td>7.76</td>
<td>2.17</td>
<td></td>
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**Additional Observations**

There are two observations that deserve special note; first was the post-test score on the Nominal subset and second was the score of a group of students at the Treatment school that did not attend the field trips. The Nominal subset of questions (listed in Appendix B) was made-up of questions that contain the basic content knowledge about watersheds. No differences were observed between the Treatment and Control schools on either the pre-test or the post-test for Nominal questions. This observation appears to indicate that the treatment has no significant effect on gains in nominal level learning.

The UW project does have an effect on both functional and operational level, which includes higher level thinking skills, knowledge about local watershed, conservation ethic, and personal conservation actions.

Within the Treatment school there was a group of 50 students that indicated they did not attend the field trips. This deserves investigation because while there was no indication on the pre-test that there was a difference within the Treatment school these 50 students had significantly lower scores on the post-test.

**4.3 Teacher Progress Report**

Teachers participating in the program submitted progress reports periodically. These detailed reports were included in quarterly project reports (QPR).
Section 5: Problems Encountered & How They Were Resolved

5.1 Staffing Issues
Loss of TST grant personnel delayed the project initiation. Project activity began June 2010. In 2011 discussions with EPA led to a no cost time extension request from River Systems Institute-Texas Stream Team. The project received the change request for NE83447901-0 for a no cost time extension through October 1, 2012 from EPA.

The EPA project officer changed four times since the beginning of the original contract with the university. While the reporting was not affected, communication between grantee and grantor was not consistent. Staff associated with Texas State University ensured good documentation and made significant effort to follow-up with the EPA.

For year 1 at the Treatment School, the lead 6th grade STEM teacher, Jennifer Welch was moved to 8th grade due to a staffing shortfall. In her absence, Texas-STEM coordinator, Hillary (Kramer) Blair acted as main coordinator for the UW Project but Ms. Welch assisted as needed. During year 2, Ms. Welch, took over full coordination and Ms. Blair went to work at another school. This lack of staffing placed more responsibility on Ms. Welch to work with Texas Stream Team. Her duties in relation to the UW project included but were not limited to:

- organizing water quality testing;
- organizing all school science field trips;
- arranging field trip teacher schedules;
- offering guidance for teacher stipend paperwork;
- coordinating and guiding teacher progress reports;
- arranging student pre and post test technology and logistics;
- and general grant administration.

Ms. Welch voluntarily worked after hours with Texas Stream Team grant coordination staff.

5.2 School Issues
Student field investigations were reduced from three a semester to two a semester due to benchmarks preparation and testing needed during the middle month of each semester. A second field trip for the fall 2011 was canceled due to lack of bus funds and school district performance review of the school’s test scores.
The Treatment school underwent major administrative changes to operation due to poor benchmark test scores. The effects of this on our grant were:

- New Principal was assigned to the Treatment school. The new principal’s unfamiliarity with project reduced it’s ranking among other education activities at the school.

- Ms. Welch was asked to lead the school’s science division due to her expertise. The additional responsibilities reduced Ms. Welch’s time for UW project work

- All field trips were put on hold from late fall 2011 to early spring 2012. As a result, monitoring field trips unable to be conducted for a short period of time.

5.3 Training Issues

Seventh grade teachers at the Treatment school required special assistance with *E. coli* sampling and dissolved oxygen testing in fall 2011. In response Jennifer Mandel Buratti and David Boylan (Texas Stream Team contractor) traveled to Corpus Christi to support the teachers. Having experts on hand allowed the teachers to set up their own system of field teaching and post-test analysis at the school. No further support was needed thereafter.
Section 6: Successes & Recommendations for Future Project Iterations

6.1 Success Stories

Two seventh grade students have been recognized for their leadership and are now project mentors. The students enjoyed their field activities of water quality monitoring so much that they asked permission to be teacher assistants. Their affinity for the environmental monitoring activities led them to take on leadership roles. For one of the girls, the leadership role was credited with helping resolved her behavioral problems. The teachers and principal were very impressed and happy that these two Hispanic girls now express interest in the sciences and careers in water resource management.

A science-mentoring program has been created for the seventh grade students. The two students became the “lab instructors” for the Urban Watershed grant field trips. Ms. Welch and the two lab instructors coordinated to guarantee that the students on the field trip followed Texas Stream Team environmental monitoring procedures during their water quality monitoring. Based on teachers’ support of these students, it would also be interesting to track these students/types of students beyond middle school. A separate research project would be able to better understand why Hispanic female students choose or avoid science careers.

6.2 Future Recommendations

The Treatments school desires to continue the monitoring field trips. The challenge at this time is obtaining funding for transportation. The STEM teacher at the Treatment school stated that the Oso Creek monitoring location, though safe and accessible is not as desirable for her science activity planning at the Nueces River Delta. The delta is further away but has a formal park setting with more options to incorporate other science curriculum activities. For instance, STEM students began using new GPS units at the end of the monitoring field trips as an additional learning tool.

It would also be useful for future iterations to incorporate a student orientation presentation rather than having them conduct monitoring immediately. The orientation should use maps of their watersheds (including its sub-watersheds); amphibian and reptile demos; and the Enviroscape© watershed model to demonstrate watershed and nonpoint source pollution concepts. This orientation method is used by the Guadalupe-Blanco River Authority in the Plum Creek Watershed Protection Plan Outreach and reinforces water cycle concepts and is enhanced by associative learning patterns.
Post project interviews with the Treatment school STEM teacher, Ms. Welch, brought forth the fact that the school was paying twice the cost of bus rental fees due to policies on bus rental. Better transportation and testing planning with any school that may be part of future iterations of this grant is highly recommended.

In light of poor response for support and cooperation from the Oso Creek and Oso Bay Watershed TMDL steering committee and city staff related to Oso Creek- Oso Bay Greenbelt, Parks and Trail System plan, it would be best to coordinate closely with the local river authority during future grant planning in the Oso Creek and Oso Bay Watershed. TST received verbal support from Nueces River Authority as well as the Coastal Bend, Bays and Estuaries Program.

There also arose a conflict between the UW project and the Texas State Aquarium’s Gulf of Mexico Alliance project <http://www.gulfofmexicoalliance.org/state-by-state/texas.php>. Both entities were serving the same schools with similar education programs and neither knew until discussion at the 2011 Informal Science Educators Association (ISEA) conference. The Texas State Aquarium’s project did not get further funding and therefore, did not skew results but it is important to consider such conflicts in future planning. Networking with other informal education agencies/organizations will reduce project conflict.

Better coordination with local outreach programs such as Texas A & M Harte Research Institute, Nueces River Authority, Coastal Bend, Bays and Estuaries Program, and Texas State Aquarium is needed to avoid any bias in our analysis of treatment. Students often take part in other field trips hosted by these and other agencies. Coordination can be achieved at events such as the Informal Science Educators Association conference and Nueces River Authority Clean Rivers Program Steering Committee Meeting.

Section 7: EPA Priorities Addressed

7.1 Linkage to EPA’s Strategic Plan

The project supported EPA’s strategic goals by raising public awareness of personal actions that could be taken to prevent pollution and promote environmental stewardship. Students exhibited their awareness and stewardship in their cleanup of litter at the monitoring locations. Students and teachers learned more details about their watershed and shared this knowledge with others. Students and teachers promoted their project and environmental monitoring with local television news and were proud that their project data was useful to EPA.
The project supported EPA Headquarters grant scope by its broad integration of language arts and social studies into the field of environmental science. The project made the field of environmental science relevant by its use of local environmental issues and data of the Oso Creek Watershed.

7.2 Linkage to EPA’s environmental priorities

**Priority 3: Community Stewardship**

The design and implementation of the UW project educated students, teachers, and the public about environmental issues in the Oso Creek watershed. The students met and talked with local citizens at their monitoring location at Oso Creek. The Kiii news broadcast about the project was used to reach a broader audience in the watershed. Also, a student written news story was printed in the Texas Stream Team’s Winter/Spring 2011 *Headwaters* Newsletter and distributed to 2000 subscribed readers around the state.

Treatment school STEM teacher, Ms. Welch, discussed the UW project, along with other environmental stewardship projects with parents during parent-teacher events and will use its resource materials at the upcoming Conference for the Advancement of Science Teachers (November 8-10, 2012 Corpus Christi, TX) as the lead presenter of the event’s watershed field trip. Recently, Cunningham Middle School (Treatment school) received an Disney Planet Challenge 2011-2012 honoree award for their 6th grade Watershed Project <http://dpcproject.com/winners2011/Honorees.aspx?page=1&orderby=school>.

**Priority 6: Career Development**

Though the UW project was not identified as a strong application for this priority, the project did raise interest among several students toward environmental careers. Two of the students who demonstrated leadership initiative would benefit from continued support toward their leadership abilities and future interest in environmental science.
References


Appendix A – Service Learning Activities

Texas Stream Team worked with STEM Science Teacher, Jennifer Welch, on Environmental Fair in late November 2010, and in January 2011 - sending support materials to Cunningham Middle School for their Environmental Fair.

Students participating in the grant led a series of Oso Creek Clean-ups from fall 2010 – spring 2012. Their water quality monitoring and clean up story was publicized on December 2, 2010, News Broadcast. Though the video is no longer available, the broadcast dialog can be found at <http://www.kiiitv.com/story/13606834/middle-school-students-test-oso-creek-water?redirected=true>. Sixth grade student, Kassandra Granados, wrote an article about the Urban Watersheds Project. The article was published May 2011 in Texas Stream Team’s Headwaters newsletter.

Cunningham Middle School Students Test Water at Oso Creek
By: Kassandra M. Granados, 6th grade student, Claude Cunningham Middle School

Corpus Christi– Claude Cunningham Middle School sixth grade students took water samples this past November and December from Oso Creek. Students collected data environmental data and learned to read pH and how to record other important data about the creek. They used the water samples to test the water temperature, pH, dissolved oxygen, conductivity, and water clarity.

I talked to some of the students about Oso Creek and they summarized their work with the following statements. Several students said they smelled a bucket full of creek water after throwing it in the water and it smelled like watermelons. They also said they threw a Secchi disc into the water and measured the clarity and depth of the water. The students mixed chemicals into their water samples and performed many experiments.

The students took time to observe Oso Creek and discovered the remains of dead crabs and deer tracks that were left in the muddy banks along the creek. Some students decided to take pictures of the crab remains and the deer tracks and others actually followed the tracks to see where they led. Along with the discoveries of the crab and tracks, live animals were seen along the creek and in the water itself. The students reported they had seen fish jumping and flying out of the water as well as turtles just walking through the mud, minding their own business. All in all, the students seemed to have a great time performing experiments and experienced through a life-changing field trip.

## Appendix B - Pre & Post Test Questions

<table>
<thead>
<tr>
<th>Item</th>
<th>Environmental Literacy Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which describes the life cycle of most toads and frogs?</td>
<td>Nominal</td>
</tr>
<tr>
<td>What is Dissolved Oxygen?</td>
<td>Nominal</td>
</tr>
<tr>
<td>A group of Texas fourth graders successfully petitioned the Texas legislature to name what animal the official amphibian of Texas?</td>
<td>Nominal</td>
</tr>
<tr>
<td>Who is responsible for protecting water quality in Texas?</td>
<td>Nominal</td>
</tr>
<tr>
<td>Who do I contact if there is a water quality problem at my monitoring site?</td>
<td>Functional</td>
</tr>
<tr>
<td>Who do I contact if there is a fish kill at my monitoring site?</td>
<td>Functional</td>
</tr>
<tr>
<td>Why should you monitor the quality of your community water resources?</td>
<td>Functional</td>
</tr>
<tr>
<td>Why is DO (Dissolved oxygen) important?</td>
<td>Functional</td>
</tr>
<tr>
<td>Amphibians are thought to be declining because of?</td>
<td>Functional</td>
</tr>
<tr>
<td>Plastic is an important part of our society and has strong influences on wildlife. Plastic litter is an important environmental issue because?</td>
<td>Functional</td>
</tr>
<tr>
<td>Learning about aquatic science can expand my understanding of what is important to me.</td>
<td>Operational</td>
</tr>
<tr>
<td>Learning about aquatic science can teach me how I can contribute to water quality protection</td>
<td>Operational</td>
</tr>
<tr>
<td>Learning about aquatic science is not important to me.</td>
<td>Operational</td>
</tr>
<tr>
<td>Learning about aquatic science is important to my everyday life.</td>
<td>Operational</td>
</tr>
<tr>
<td>Learning about aquatic science means I can contribute to water quality protection</td>
<td>Operational</td>
</tr>
<tr>
<td>Learning about aquatic science is boring.</td>
<td>Operational</td>
</tr>
<tr>
<td>Petronila Creek, Oso Creek, and Oso Bay are water resources within your community; how would you rate their water quality?</td>
<td>Operational</td>
</tr>
<tr>
<td>What frog or toad is found in your part of the state?</td>
<td>Operational</td>
</tr>
<tr>
<td>Learning about aquatic science is a waste of my time.</td>
<td>Operational</td>
</tr>
<tr>
<td>Learning about aquatic science is too much work</td>
<td>Operational</td>
</tr>
<tr>
<td>Learning about aquatic science is fun.</td>
<td>Operational</td>
</tr>
<tr>
<td>Based on the principles of Leave No Trace what conclusions can you make about litter?</td>
<td>Operational</td>
</tr>
<tr>
<td>Which river is in your watershed?</td>
<td>Operational</td>
</tr>
<tr>
<td>Are you an environmental steward of water quality?</td>
<td>Operational</td>
</tr>
</tbody>
</table>
Please list up to 5 things you do as an environmental steward of water quality. If you are not an environmental steward of water quality please use the answer “None”.

1. 
2. 
3. 
4. 
5.

Learning about aquatic science can help me better understand my community. (True/False)

What have you done to raise public awareness about water quality in your community?

1. 
2. 
3. 
4. 
5.
Appendix C - Middle School Mobility Rating Report

July 31, 2012
Office of Legal Services
CORPUS CHRISTI INDEPENDENT SCHOOL DISTRICT
P.O. Box 110 Corpus Christi, Texas 78403-0110
Office: (361) 695-7427 Fax: (361) 844-0283
Website: www.ccisd.us

Texas State University- River Systems Institute
RE: Public information request

Dear Ms. Buratti:
This will acknowledge receipt of your public information request dated and received in this Office on July 3, 2012, and clarified on July 17, 2012. Pursuant to your request, please see the response below regarding your request for:
The student turnover for all the middle schools, by individual campus.
RESPONSE: Please see attached 2009-2010 Middle School Campuses Mobility Ratings.

<table>
<thead>
<tr>
<th>Campuses</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baker MS</td>
<td>16.3%</td>
</tr>
<tr>
<td>Browne MS</td>
<td>26.5%</td>
</tr>
<tr>
<td>Cullen MS</td>
<td>27.8%</td>
</tr>
<tr>
<td>Cunningham MS</td>
<td>20.9%</td>
</tr>
<tr>
<td>Driscoll MS</td>
<td>27.2%</td>
</tr>
<tr>
<td>Grant MS</td>
<td>16.9%</td>
</tr>
<tr>
<td>Haas MS</td>
<td>29.8%</td>
</tr>
<tr>
<td>Hamlin MS</td>
<td>28.4%</td>
</tr>
<tr>
<td>Kaffie MS</td>
<td>16.3%</td>
</tr>
<tr>
<td>Martin MS</td>
<td>24.8%</td>
</tr>
<tr>
<td>South Park MS</td>
<td>29.6%</td>
</tr>
</tbody>
</table>

*2009-2010 Middle School Campuses Mobility Ratings
*The Texas Education Agency calculates mobility ratings a year behind. This is the most recent data available. CCISD does not calculate mobility ratings.

If you have any questions or concerns, please contact me at (361) 695-7427.
Sincerely,
Andrew Johnson, J.D.
Assistant General Counsel

Office of Assessment and Accountability
James H. Gold, Executive Director
JHG/mdf 07/31/2012